Swan News

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Newsletter of the Wetlands International / IUCN SSC Swan Specialist Group

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About the Swan Specialist Group

The Wetlands International / IUCN SSC Swan Specialist Group (SSG) is a global network of over 400 swan specialists from 38 countries who undertake monitoring, research, conservation and management of swan populations.

The SSG strives to facilitate effective communication between members and others with an interest in swan management and conservation world-wide, in order to improve national and international links for cooperative research, to identify gaps in knowledge and to provide a forum for addressing swan conservation issues.

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Cover photograph by Richard Sonnen, courtesy of The Trumpeter Swan Society .

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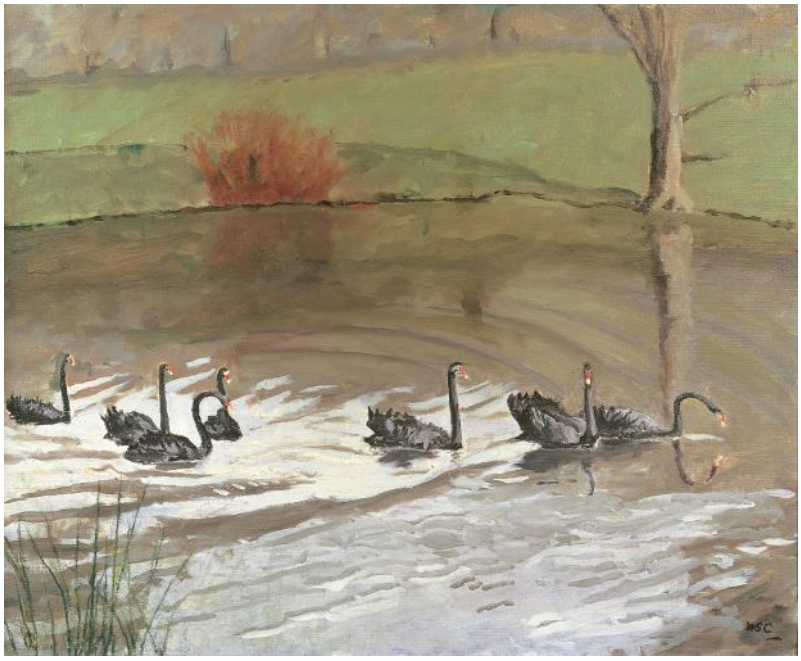
Editorial



C.384 Black Swans at Chartwell, by Sir Winston Churchill. (Reproduced with permission of Anthea Morton-Saner on behalf of the Churchill Heritage Ltd. © Churchill Heritage Ltd.).

Greetings to Swan Specialist Group members, and to all other readers. Welcome to this the 13th issue of Wetlands International / IUCN-SSC Swan Specialist Group (SSG) newsletter.

Until three years ago, newsletters of the SSG appeared only occasionally, albeit dating back to the 1st Newsletter for the IWRB Palearctic Swan Research Group, edited by Philip Bacon in 1987. The renewal of an annual issue says a great deal for the current status of swan research, and the benefits of global electronic communication. All previous SSG Newsletters have now been scanned and will be available on the new SSG website (which is now well advanced!) later on this year.

The current newsletter – *Swan News* 13 – would not exist but for the dedication, efforts and talents of WWT's Colette Hall and Eileen Rees, and the others involved in constructing and distributing the newsletter. Naturally there would also be no newsletter without all of the people who took the time to contribute. Thank you all!

As usual, there are a variety of reports, some positive, some negative, but all informative. We do not have an even coverage of the swan populations and geographic regions, but we have something on most species. We did not receive any articles on Black Swans or Coscoroba Swans in 2017, but look forward to updates on on-going studies of these species in 2018.

Sadly, in the last year we lost two good friends, both dedicated swan researchers and conservationists. The widely-respected Chilean scientist Roberto Schlatter, who died last year, and William J. L. (Bill) Sladen, a pioneer in global swan research, who died earlier this year. For those who did not have the pleasure of knowing Roberto, or Bill, brief obituaries are included. Their legacies continue in the inspiration that they provided to those working with swans, particularly in North and South America, and they will be sorely missed.

This newsletter's *rasion d'etre* is to let others know about important swan research and to disseminate information relevant to swan conservation and management. It's wonderful to see SSG members contribute to this effort. Please continue to send submissions and photos, so that others can benefit from your work. Also, don't hesitate to communicate new information as it comes through via the SSG listserve.

Meanwhile, please enjoy the following *Swan News* 13, and be sure to provide feedback. Constructive comments are always welcome!

Best wishes,

Carl D. Mitchell

"All the black swans are mating, not only the father and mother, but both brothers and both sisters have paired off. The Ptolemys always did this and Cleopatra was the result. At any rate I have not thought it my duty to interfere."

Winston Churchill to his wife Clementine, from Chartwell, 21 January 1935

Research projects and updates

Nest/egg temperatures in relation to Trumpeter Swan cygnet survivorship in the Yellowstone ecosystem

Jeff Snyder

Trumpeter Swans *Cygnus buccinator* were once widely distributed throughout North America. Population declines during the 19th and 20th Centuries occurred due to overhunting and habitat loss. The survival of Trumpeter Swan cygnets in some Greater Yellowstone Ecosystem flocks is currently very low. Possible reasons for this include food limitation, weather, diseases, genetic abnormalities resulting from inbreeding, emaciation, predation and parasites.

The objectives of our study were to: (1) determine fertility rates for eggs in swan nests at Grays Lake National Wildlife Refuge, Idaho; and (2) quantify their nest/egg incubation temperatures. Four artificial eggs with temperature data loggers were placed in four Trumpeter Swan nests during the 2015 breeding season. These indicated differences among nests in the average number of incubation recesses, average length of recesses, and average egg temperature fluctuations. We hypothesise that these differences may have a significant effect on the cygnets' subsequent survival probability during the three-month post-hatch rearing season.

Trumpeter Swan research in the Greater Yellowstone ecosytem

Jeff Snyder

In the Trumpeter Swan *Cygnus buccinator* research laboratory at Western Oregon University, research is continuing to investigate the factors that affect the long-term persistence and resilience of Trumpeter Swan flocks in the Greater Yellowstone Ecosystem. We currently have two research projects ongoing and are seeking funds for new projects.

Firstly, we will complete data collection for a five-year dataset on the abundance, distribution and species richness of the aquatic macrophyte community at the Harriman State Park Trumpeter Swan wintering site. These data will be compared with original data collected in winter 1988/89, to identify any significant changes in food supply between the two time periods.

Secondly, we will complete data analysis and prepare a manuscript on the initial findings of our nest incubation study, which used data-loggers implanted into artificial eggs. This cooperative project also involves the Wyoming Wetland Society, WOU, and the U.S. Fish & Wildlife Service.

In the future, following on from this work, we plan to include additional nesting sites in the ecosystem. Finally, we are in the early stages of a proposal to investigate the migratory pathways of Trumpeter Swans in Washington and Oregon, with a view towards understanding potential metapopulation dynamics in this area.

Trumpeter Swans courting (photo: Richard Sonnen, courtesy of The Trumpeter Swan Society).

The 2015 North American Trumpeter Swan Survey

Deborah J. Groves

The North American Trumpeter Swan Survey (NATSS) has been conducted approximately every five years since 1968 to monitor the status of Trumpeter Swans *Cygnus buccinator* in North America. The 2015 NATSS was conducted in January–September (primarily April–September) by numerous federal, state, provincial, and private cooperators throughout the northern United States and Canada. The primary survey objective in 2015 was to estimate the abundance of adult and subadult Trumpeter Swans ("white swans") in North America and within the three recognized Trumpeter Swan populations: Pacific Coast (PCP), Rocky Mountain (RMP), and Interior (IP).

For the first time since the survey's inception, the collection of cygnet abundance and other productivity data was optional. Methods varied among regions but were generally similar to 2010 surveys within regions. Notable exceptions included Minnesota, Wisconsin, and Michigan, where cooperators switched from censuses to sampling designs involving transects. Cooperators performed aerial surveys, ground counts, or a combination of the two.

The 2015 continental estimate of white swan abundance was of 63,016 adult/subadult Trumpeter Swans, which was a substantial increase since 2010 and the highest estimate recorded since the surveys began in 1968. The estimated average annual growth rate during 1968–2015 was +6.6% ($P < 0.01$). Each of the three populations reached record-high abundance levels in 2015. The 2015 white swan abundance estimates for the PCP, RMP, and IP were 24,240 (s.e. = 1,195), 11,721, and 27,055, respectively.

Abundance objectives established for the three populations by the Pacific, Central, and Mississippi Flyway Councils were met for the PCP and IP in 2015; although the RMP met the overall white swan abundance objectives for the Canadian and U.S. breeding flocks, several state- and region-specific objectives have not yet been achieved.

Editor's note

I am hopeful that the U.S. Fish and Wildlife Service Division of Migratory Bird Management will undertake or contract a thorough analysis of this long-term data set. There is much to be learned from it. I also hope to see a revision of the survey methodology to incorporate updated sampling designs.

Trumpeter Swan Survey: Rocky Mountain Population, U.S. Breeding Segment, fall 2016

Dave Olson

The fall Trumpeter Swan Survey is conducted annually in September and provides an index to abundance. The survey is conducted cooperatively by several administrative entities and is intended to provide an accurate count of the number of Rocky Mountain Population (RMP) Trumpeter Swans that summer in the U.S. Aerial surveys and ground surveys are used to count the number of swans in the Greater Yellowstone area, and are also sometimes used in Nevada, and at the Malheur NWR and the Summer Lake WMA in Oregon. Ground surveys are used to count the number of swans in areas where aerial surveys are not conducted, and in isolated pockets of habitat not covered by the aerial surveys. This fall survey is used as a data point for the official North American Trumpeter Swan Survey, which is conducted once every five years. While the RMP met the overall white swan abundance objectives for the Canadian and U.S. Breeding flocks of the North American Trumpeter Swan Survey, several state- and region-specific objectives have not yet been achieved for the RMP.

During fall 2016, observers counted 944 total swans in the RMP/U.S. Breeding Segment, which was a decrease from the previous year's survey by -2.5% (968 birds; Figure1). The total count of swans in the Greater Yellowstone area flocks in 2016 (721) was a slight decrease (< 1%) on the 2015 count (723 birds) and is the second highest count on record. Idaho's total swan count (155) was a 2.7% increase from last year (151) and the highest count since 2006 (171 birds). Montana (263) had a slight decrease (-3.3%) from last year's count of 272. The count of total swans in Wyoming (303) was the highest on record, and essentially the same as last year's count of 300. The number of white birds (*i.e.* second winter or older) in

the Greater Yellowstone core area (578) was an increase of 5.5% from last year's count of 548, while the number of cygnets (143) decreased by 18.3% from last year's count of 175.

Over the period 1993–2014, growth rates for total swans and for white birds in the RMP/U.S. Breeding Segment both increased by an average of 2.9% annually ($P < 0.01$; Figure 1). Cygnet growth rate of 3.6% per year was also statistically significant ($P < 0.01$). In future, a new trend line will be developed for 2015 onwards, following the inclusion of the birds from the successful restoration of the Confederated Salish and Kootenai Tribe swans in Northwest Montana. Similar results were evident for growth rates for swans in the Greater Yellowstone area flocks (1993–2015), but the rates for total swans (+2.7, $P < 0.01$) and white swans (+2.4, $P < 0.01$) were slightly lower than for the wider survey area. The number of cygnets in flocks in the Greater Yellowstone area also increased significantly (+4.1%, $P < 0.01$).

Although the total number of swans recorded in the RMP/U.S. Breeding Segment in 2016 declined slightly (by 2.5%) in comparison with observations made in 2015, the count of the Greater Yellowstone area flocks remained high over the long term and was similar to the previous year's count. Palmer Drought Indices suggest that moisture conditions within the range of the RMP/U.S. Breeding Segment in June 2016 were 40–60% drier than normal which, in combination with average temperatures, could have produced nesting and brood-rearing conditions that were below average for the swans. The number of white birds recorded during this fall's survey (731) has met, for the second year in a row, the objective of maintaining 718 white birds in the area, as listed in the management plan developed for the RMP Trumpeter Swans (Subcommittee on the Rocky Mountain Population of Trumpeter Swans 2008).

Trumpeter Swan pair (photo: Richard Sonnen, courtesy of The Trumpeter Swan Society).

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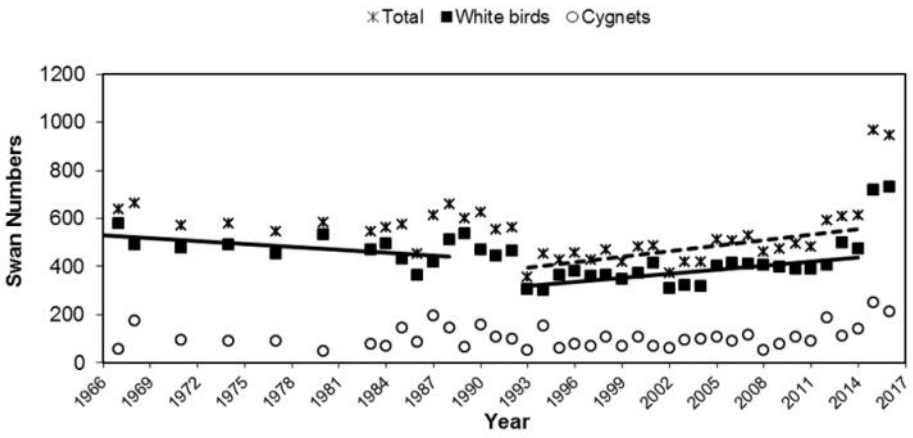

Figure 1. Counts of swans recorded in the RMP/U.S. Breeding Segment during the Fall Trumpeter Swan Surveys, 1967–2016. Dotted and solid lines depict trends in the numbers of total swans (including cygnets) and white swans, respectively, up until 2014. A new trend line will be calculated for 2015 onwards to account for the additional inclusion of birds from the Flathead Indian Reservation.

Refuge Notebook: where do our Trumpeter Swans go in the winter?

John Morton

Bob Richey, former assistant refuge manager at the Kenai National Wildlife Refuge, helped to place neck collars on many Trumpeter Swans during the 1970s and early 1980s (photo: courtesy Kenai National Wildlife Refuge).

Did you know that Trumpeter Swans *Cygnus buccinator* have been surveyed on the Kenai National Wildlife Refuge since 1957? Six decades ago, when only 20 pairs were known to nest on the Kenai Peninsula of Alaska, Trumpeter Swans were almost extinct in the Lower 48 states of the USA. Since then, swans have increased to about 50 nesting pairs on the Kenai, and breeding populations have been restored too much of their former range in the western and upper mid-western states.

As the biggest North American bird species, Trumpeter Swans are slow to mature. They need 140–154 ice-free days to complete a breeding cycle successfully: 49 days for nest-building, egg-laying and incubation, and 90–105 days for cygnets to fledge and become fully flight capable for migration. The earliest known hatch date on the Kenai Peninsula is June 4, with the earliest cygnets fledging in mid-September and some as late as mid-October. As such, it becomes a dire race to fly before ice locks them in.

Now, with winter descending on the Kenai, most Trumpeter Swans have flown the coop as the lakes freeze up. A few swans may linger in open water on the Kenai River below Skilak Lake, but the others are now headed south, scattered along the Inside Passage from the Copper River Delta to the Stikine River near Wrangell. But what's their ultimate destination?

Dairy farms. Yes, dairy farms that grow orchard grass and ryegrass as cover crops for silage during the winter. Agricultural landscapes like those that surround Duncan on Vancouver Island or the alluvial soils of the Fraser River delta or, in particular, the Skagit Valley in northwestern Washington. Swans, geese and dabbling ducks have learned to forage on these grasses to the dismay of local farmers.

Data from the Bird Banding Laboratory in Laurel, Maryland, show that nine records of eight different Trumpeter Swans originally neck-collared on the Kenai Refuge were re-sighted at or near Barney Lake in the Skagit Valley, Washington state, over several winters in the 1970s and early 1980s. These birds were among 160 swans (mostly cygnets) which were neck-collared and leg-banded by refuge staff between 1966–1984 to understand swan movements and survival. More recently, retired refuge biologist Ted Bailey and his staff tracked 45 Trumpeter Swans caught and harnessed with VHF radio transmitters during 1982–1985, to get a more detailed understanding of brood movements among the many lakes and wetlands in the Kenai lowlands. One adult female captured on Kenaitze Lake in the northern lowlands eventually travelled > 1,400 miles to the Barney Lake area, where she was recorded between 17 September and 2 December 1984.

In researching historical records of Trumpeter Swan management and research by the Kenai Refuge, I ran into an interesting account in a 1980 report, which stated: "*Swans banded on the Kenai National Wildlife Refuge continue to be observed at Barney Lake in Washington and on Vancouver Island in Canada. Barney Lake, a prime wintering area for Kenai Trumpeters is being subjected to intensive development along its shores and the future of this wintering area is in jeopardy. However, there is a movement to proclaim this area as a swan preserve*."

Last week I met Martha Jordan, now the Executive Director of the Northwest Swan Conservation Association, who was a field biologist actively involved in re-sighting neck-collared swans around Barney Lake during those early years. In a 1980 paper, she wrote that an effort was underway by the Audubon Society, Friends of the Swan, what-was-then the Washington Department of Game, and The Nature Conservancy to protect this wintering area. After a petition drive, these co-conspirators succeeded in getting the Barney Lake vicinity designated a "*steel shot ammunition only*" hunting area, 12 years before the steel shot prohibition

for waterfowl hunting became a nationwide mandate. By 1995, the Skagit Land Trust began conserving lands around Barney Lake for wintering waterfowl, including Trumpeter Swans.

Consider that in 1957, as aerial surveys for swans were being inaugurated on the Kenai Refuge, only six Trumpeters were recorded at Barney Lake. By 1980, 355 swans wintered there. There are now 7,000 Trumpeters and 2,000 Tundra swans wintering in Skagit County, and perhaps 15,000 swans in the greater Skagit-Whatcom area.

The Kenai Refuge has done its small part in helping Trumpeter Swans recover by providing good breeding and staging habitats with minimal aircraft disturbance of nests and broods during the summer and fall, and prohibited motorboat activity below Skilak Lake during the spring. Our small population of nesting swans on the Kenai Peninsula has cumulatively contributed > 3,500 cygnets over the past six decades to the Pacific Coast meta-population, which now numbers almost 6,000 pairs in Alaska.

What a great conservation success story!

(**http://peninsulaclarion.com/outdoors/2016-11-24/refuge-notebook-where-do-our-trumpeter-swans-go-in-the-winter**)

Lifetime reproductive success for Trumpeter Swan No. 9

Carrol Henderson

Trumpeter Swan No. 9 (USFWS BAND # 619-17822), a pen, was the offspring of two paired Trumpeter Swans that were originally hatched and raised by their parents at the Minnesota Zoo in Apple Valley, Minnesota. The pair was donated by the Zoo to the Minnesota Department of Natural Resources (DNR) for release in the spring of 1987 as part of the Trumpeter Swan restoration project at the Tamarac National Wildlife Refuge (NWR) near Detroit Lakes, Minnesota. The cob from this pair was the largest of all Trumpeter Swans released as part of this restoration programme, weighing 35.5 pounds.

In 1989, this pair nested at the Minnesota DNR's Hubbell Pond Wildlife Refuge a few miles south of the Tamarac NWR. Five cygnets hatched, but only one survived. That cygnet, a pen, was subsequently captured and banded with USFWS band # 619-17822 and marked with an orange patagial wing-tag displaying the number 9 in the left wing.

In the fall of 1989, this pair of swans, accompanied by No. 9, migrated to Monticello, Minnesota, where they wintered on open water of the Mississippi River adjacent to the shoreline home of Jim and Sheila Lawrence. Sheila Lawrence took on the daily task of providing corn for the wintering swans at this site for the next 24 years. She took meticulous records of all the marked swans in the wintering flock each year, including their leg-band numbers, neck-collar numbers and patagial-tag markers. She also recorded the number of cygnets accompanying all marked swans.

Trumpeter Swan Number 9. USFWS leg band #619-17822, on 21 December 2009 (photo: Carol Henderson).

Number 9 returned to Monticello in 1990, 1991, and 1992 with no young, but in her fourth year, 1993, she was accompanied by a mate and 5 young. This was the first of 21 years in which she wintered at Monticello, over which period she was accompanied by a total of 57 cygnets! The cygnets were approximately six months old at the time they were counted, so the initial number of cygnets hatched and fledged by No. 9 in would have undoubtedly been higher.

The number of cygnets recorded at Monticello for each year of No. 9's life was: 0 (in 1990), 0 (1991),0 (1992), 5 (1993), 5 (1994), 2 (1995), 7 (1996), 7 (1997), 0 (1998), 4 (1999), 4 (2000), 4 (2001), 0 (2002), 5 (2003), 5 (2004), 0 (2005), 2 (2006), 2 (2007), 2 (2008), 1 (2009), ? (2010), ? (2011), ? (2012), 2 (2013), 0 (2014).

Sheila Lawrence feeding swans at Monticello, on 21 December 2009 (photo: Carol Henderson).

Those 21 years of production included three years, 2010 to 2012, when the number of young was not recorded. Sheila became ill with cancer in 2010 and passed away in 2011. Her husband Jim took over the swan feeding duties but did not record band data nor productivity notes, and it is conceivable that No. 9 produced several additional cygnets during this period. Jim resumed recording the swan data in 2013 when No. 9 returned again and wintered with two young. She wintered at Monticello again in 2014 at the age of 25 but was not accompanied by any cygnets. That is the last time that Jim noted her presence.

Editors' note:

I am aware of at least two other examples of exceptional productivity by a single female Trumpeter Swan. Harry Lumsden documented the reproductive history of a Trumpeter Swan used in the Ontario, Canada restoration effort in an article entitled "A Single Swan Can Make a Difference", which was published in the North American Swans Bulletin 30(1): 4–5 in 2001. I can provide a pdf if anyone wishes one. I am also told of a female Trumpeter Swan in Wyoming, USA, with a remarkable history of productivity. It would be interesting to compare these data on longevity, number of mates, mean and total productivity, and environmental conditions. Adding similar records from other swan species would be advantageous.

Population trends of the Black-necked Swan of Carlos Andwater Sanctuary (Rio Cruces) Southern Chile

Yerko A. Vilina & Romina Flores

According to the most recent censuses carried out by the Corporación Nacional Forestal park rangers, the numbers of Black-necked Swans *Cygnus melancoryphus* at Río Cruces, southern Chile, are recovering. This wetland had the largest population and was also the most important breeding site for Black-necked Swans to the west of the Andean mountain range at the end of the 20th century. On Chile acceding to the Ramsar Convention on Wetlands in July 1981, it was one of the sites to be designated by the Chilean Government as a wetland of international importance (*i.e.* as a Ramsar Site) in the country. In 2004, however, there was a steep decline in numbers associated with the start of operations at the "Celulosa Arauco" pulp mill and a dramatic drop in the abundance of Brazilian Aquatic Grass *Egeria densa* (the primary food for the swans) in the area. The swans left the wetland, mortality rates increased, and annual breeding by Black-necked Swans at the site was also lost.

Following public campaigns, a Ramsar Advisory Mission (requested by Chilean authorities in 2005), and better management of liquid waste, the population has been recovering since 2012 (Figure 1). It has even grown exponentially in recent years with the resumption of Black-necked Swans breeding in this wetland. In December 2016 a total of 6,632 adults was recorded. Good news, with important lessons learnt!

In memoriam

This article is dedicated to the memory to Dr. Roberto Schlatter, a pioneer in the conservation of the swans in South America and the Rìo Cruces wetland.

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The mouth of Cartagena stream, a new breeding site for the Black-necked Swan in the Mediterranean Region of Chile, 10 May 2017 (photo: Romina Flores).

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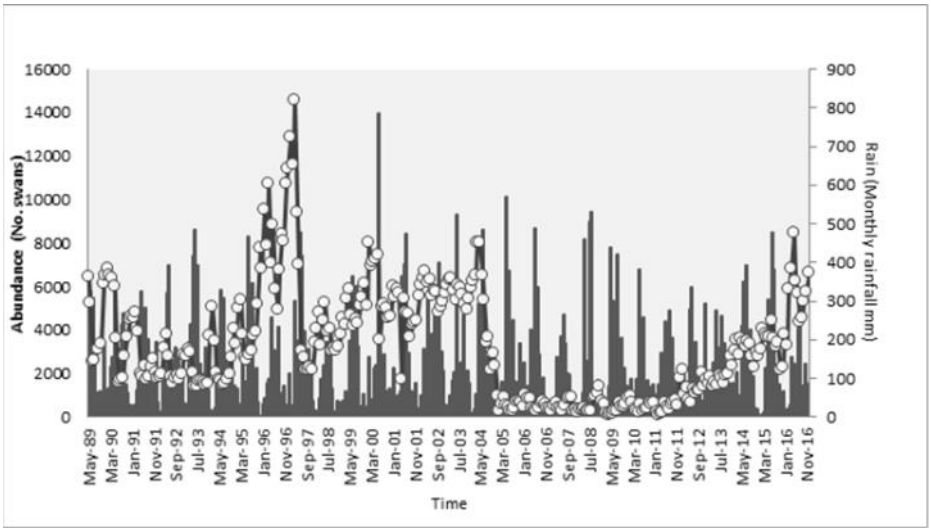

Figure 1. Monthly rainfall (columns) and monthly abundance of Black-necked Swans (white dots) .

Effects of water level on habitat selection by foraging Whooper Swans

Tetsuo Shimada

Lake Izunuma-Uchinuma (38°43' N, 141°06' E) is located in the Miyagi Prefecture, northern Japan, and covers an area of 491 ha. It is one of the main wintering sites for waterfowl in Japan, is internationally renowned for its high biodiversity, and was designated a Ramsar Site by the Japanese Government in 1985. Greater White-fronted Geese *Anser albifrons* and Whooper Swans *Cygnus cygnus* are representative of the migratory birds present, with *c*. 100,000 geese (90% of the geese wintering in Japan) and a few thousands of swans wintering at and around the lake each year.

The lake is surrounded by rice fields (Figure 1) and is quite shallow (1.6 m at the deepest point, with an average depth of 76–78 cm). The shallow depth has contributed to a spread in the Lotus *Nelumbo nucifera* beds, and now 85% of the surface area of the lake is covered with Lotus (Figure 2). The underground rhizomes of the Lotus provide an important food for the Whooper Swans in winter (Figures 3 & 4), with the birds generally up-ending to feed on the underground roots (Figure 5).

The Whooper Swans' use of foraging habitat was observed during winter 2008/09, to determine habitat selection in relation to water levels in Lake Izunuma-Uchinuma. The swans were counted at a variety of suitable feeding areas for the birds in the vicinity of the lake. During 21 counts, the mean abundance was of 645 swans (range = 186–1,239 swans). GLMM analysis indicated that, as the water level in the lake increased, the percentage of swans foraging in the areas of Lotus and wild rice decreased significantly, as the swans increasingly moved to cultivated rice fields to feed (Figures 6 & 7). As the aquatic plants became unavailable due to deeper water in the lake, the swans shifted their feeding habitats to those sites that remained shallow or exposed.

This article was based on the following paper: Shimada, T., Ueda, T., Hoshi, M. & Mori, A. 2017. Effects of water level on habitat selection by foraging Whooper Swans. *Bird Research* 13: S5–S9. [In Japanese with English summary.]

Figure 1. Lake Izunuma-Uchinuma, surrounded by cultivated rice fields (photo: Miyagi Prefecture).

Figure 2. Summer at Lake Izunuma-Uchinuma, covered with Lotus, with the Izunuma-Uchiuma sanctuary center (white building) in the background (photo: Y. Fujimoto).

Figure 3. Lotus rhizome (photo: J. Ashizawa).

Figure 4. Whooper Swans foraging on Lotus beds in winter (photo: R. Ito).

Figure 5. Whooper Swans up-ending (photo: R. Ito).

Figure 6. Whooper Swans foraging in rice fields (photo: R. Ito).

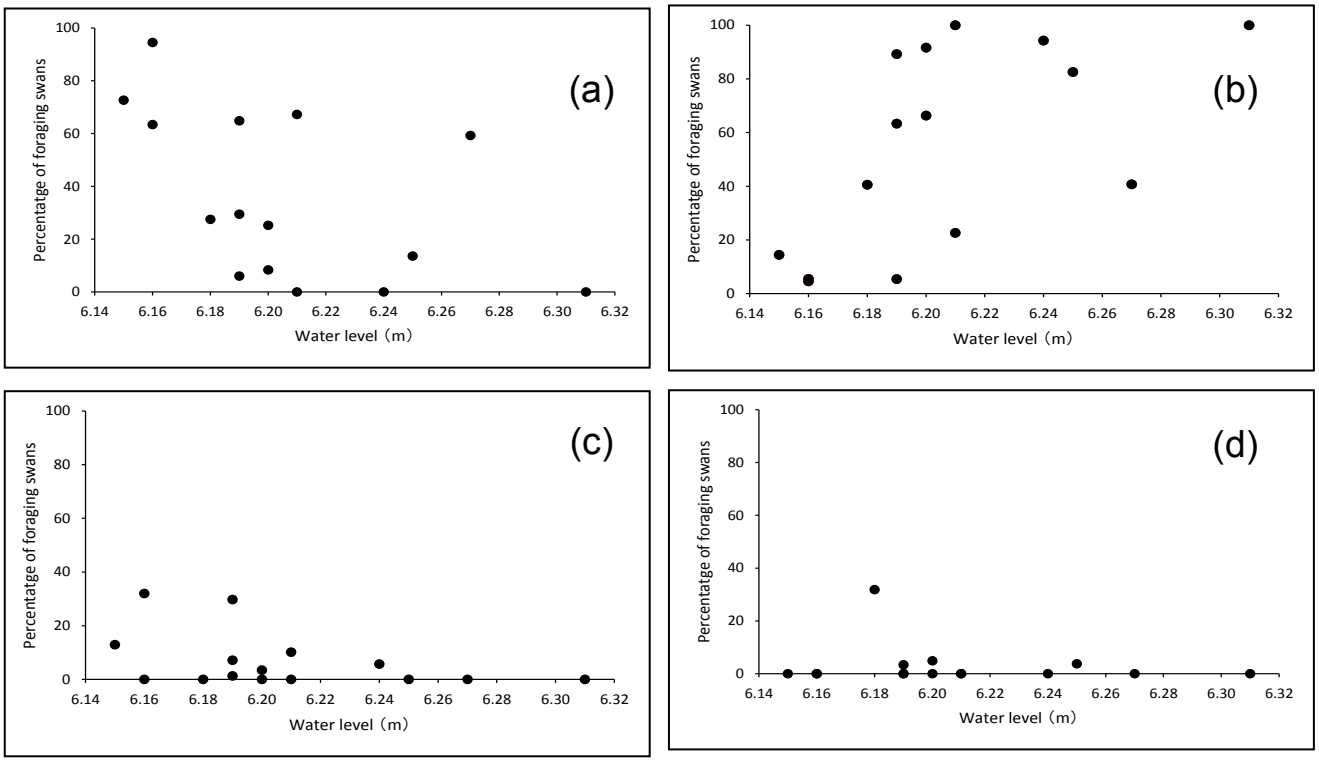

Figure 7. Relationship between water levels and the percentage of Whooper Swans foraging in: (a) Lotus beds, (b) rice fields, (c) wild rice patches, and (d) an artificial feeding area.

Impacts of lead on the body condition of wild Whooper Swans

Julia L. Newth, Eileen C. Rees, Ruth L. Cromie, Robbie A. McDonald, Stuart Bearhop, Deborah J. Pain, G.J. Norton[3], Claire M. Deacon & Geoff M. Hilton

Lead poisoning from ammunition sources is a long-standing problem for waterbirds and scavengers; it causes illness and death and contributes to population declines (Green & Pain 2016). Risks to birds from lead shot have resulted in restrictions on its use through national and international legislation, combined with calls for its replacement with non-toxic alternatives (Stroud 2015; IUCN 2016).

Waterbirds may become poisoned when they ingest discarded lead shot while foraging. Rapid death from acute lead poisoning occurs when relatively large amounts of lead are ingested and absorbed. However, the absorption of smaller amounts of lead, including through chronic, low level exposure, may also cause a range of sub-lethal impacts on physiology, biochemical composition and behaviour. One such impact is the muscular paralysis of the digestive system, which causes weight loss and leads to reduced body condition and increased risk of starvation. Consequences may be severe; in avian species, fat storage can greatly influence migration strategies, over -winter survival and clutch size.

In order to determine the impacts of lead on individuals and populations, it is important to identify thresholds for lead concentrations in body tissues at which measurable physiological effects occur. These effects may not be obvious to the naked eye but may carry serious implications for an individual's survival and breeding success. This study aimed, for the first time, to quantify the blood lead levels that have a significant influence on the body condition of wild Icelandic-breeding Whooper Swans *Cygnus cygnus* wintering in Britain. Migratory swans feeding in areas shot-over with lead shot are particularly susceptible to lead exposure. Lead poisoning accounted for the deaths of 27.3% of the Whooper Swans recovered in Britain between 1971 and 2010, while 43% of live Whooper Swans caught in winter 2010/11 had elevated blood lead levels (Newth *et al*. 2012).

Whooper Swans caught at Martin Mere, NW England, and at Caerlaverock, SW Scotland, between winters 2010/11 and 2013/14 were included in the study. A blood sample was taken from each bird for lead level analysis, which was undertaken at the University of Aberdeen using inductively-coupled plasma mass spectrometry. Blood lead concentrations usually reflect recent exposure to lead (*i.e*. within the preceding 34–40 days; O'Halloran *et al*. 1988). Each bird was weighed and their skull and tarsus lengths were measured. A scaled mass index of body condition was then calculated for each swan (Peig & Green 2009). In addition, birds were aged (as either adults or cygnets), sexed and ringed.

We used a General Linear Model with Gaussian error distribution and identity link function to fit a piecewise linear regression, to identify: (i) any significant negative effect of blood lead level on the swan's body condition, and (ii) the threshold at which blood lead levels began to affect body condition.

A total of 300 blood samples were collected from 260 Whooper Swans and lead was detected in all samples, with levels ranging from 5.6–132.9 µg dL. We found

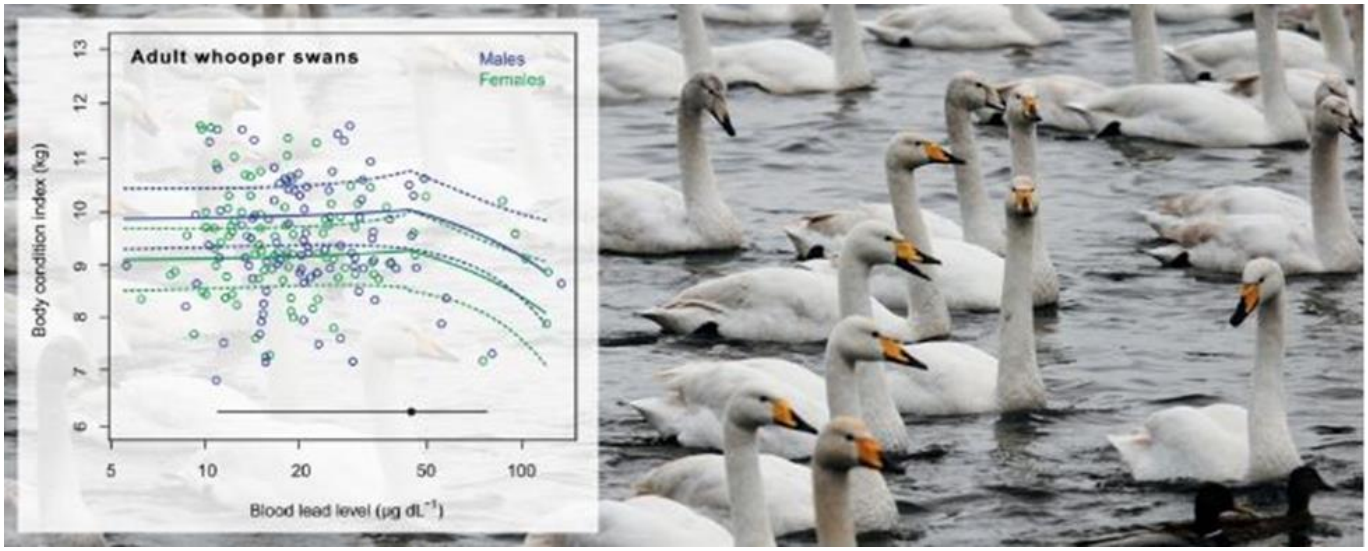

Figure 1. Whooper Swan body condition in relation to blood lead levels, from Newth *et al*. (2016) (photo: Colin Butters).

that 41.7% of swans had elevated levels of lead in their blood (*i.e.* > 20 µg dL).

Reduced body condition was associated with birds with lead levels of ≥ 44 µg dL (Figure 1). This was a lower threshold than expected – the range of blood lead levels within which *Anseriformes* are predicted to exhibit clinical signs of poisoning (including weight loss) had previously been estimated at 50–100 µg dL (Franson & Pain 2011). Wild birds may be subject to more natural stressors such as cold weather and poor diets than birds in experimental studies, which may make them more susceptible to the effects of lead poisoning. We therefore recommend that previously suggested thresholds for adverse clinical effects should be revised downwards, at least in wild waterfowl.

So what does this mean for the swans? Reduced body condition may have important impacts on fitness. Fat reserves developed by Whooper Swans at wintering sites in Britain serve to fuel a 1,000 km journey to summer breeding grounds in Iceland, and birds with reduced body condition and fitness may also be more susceptible to other mortality factors such as diseases, flying accidents and predation. If the Whooper Swans' survival probabilities are related to winter body mass (as has been found for other species; Haramis *et al*. 1986), then the survival rates for birds exposed to relatively high levels of lead may be reduced relative to those exposed to lower levels. Sufficient fat reserves may also influence the ability of a pair to defend a breeding territory and then to breed successfully.

Our findings, which indicate that ingesting lead can have sub-lethal effects on Whooper Swan body condition at levels below previously-established clinical thresholds, and that a relatively high proportion of individuals in the population may be affected, reaffirms the importance of reducing contamination of the environment with lead shot. The substitution of lead shot with non-toxic alternatives, which would reduce the availability and exposure of lead to swans, is widely regarded as the solution for protecting waterbirds from lead poisoning and reducing environmental pollution (Newton 2015; UNEP-CMS 2014 a, b).

This article was based on the following paper: Newth, J.L., Rees, E.C., Cromie, R.L., McDonald, R.A., Bearhop, S., Pain, D.J., Norton, G.J., Deacon C. & Hilton G.M. 2016. Widespread exposure to lead affects the body condition of free-living whooper swans *Cygnus cygnus* wintering in Britain. *Environmental Pollution* 209: 60–67.

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Are swans more aggressive than other waterbirds?

Kevin A. Wood, Jessica Ponting, Nathan D'Costa, Julia L. Newth, Paul E. Rose, Peter Glazov & Eileen C. Rees

Waterbirds show aggression towards other individuals with threat displays and a range of physical attacks consisting of pecks with their bill, trampling and crushing with their feet and body, and strikes with their wings (Johnsgard 1965; Figure 1). Such behaviour has long fascinated biologists and consequently has been a major focus of research. For decades waterbird researchers have compiled time-activity budgets, which describe the amount of time spent on each type of behaviour. More recently, concerns over aggression by swans towards other waterbirds has given new impetus to research on waterbird behaviour. For example, conservationists in Russia have expressed concerns that illegal hunting of Bewick's Swans *Cygnus columbianus bewickii* may be due to the perception that aggression by swans might reduce the productivity of key hunting quarry species of ducks and geese (Glotov 2017). There have also been concerns regarding the potential impacts of aggression by the invasive Mute Swan *Cygnus olor* on native waterbirds in North America (Conover & Kania 1994). Swans have a reputation as "aggressive" animals, but no research had examined whether swans showed consistently higher levels of aggressive behaviour than other waterbirds.

In a recent paper we carried out a meta-analysis of all of the published time-activity budgets on any waterbird species that we could find in the literature (Wood *et al*. 2017). Using a dataset comprised of 555 values from 88 studies, we examined the variation in the time that waterbirds engaged in aggressive interactions, in particular comparing the levels of aggression of swans and other waterbird groups. We made four predictions regarding avian aggression, based on the findings of earlier site-based studies, that the time spent on aggression would be influenced by four factors: (i) age class, (ii) sex, (iii) seasonal timing, and (iv) functional feeding group. We also accounted for a range of other variables that previous localised studies have suggested might influence the amount of time spent on aggressive interactions: latitude, mean body mass, migratory strategy ("sedentary" or "migratory"), breeding strategy ("group" or "lone"), and whether the focal species was sexually dimorphic ("yes" or "no"). In each model we also included family- and species-level random effects to account for phylogenetic non-independence.

Across all species, the mean (± s.d.) percentage of time devoted to aggressive behavioural interactions was 2.0% (± 3.6%). The highest single observed value of aggression was a value of 35% for male Barnacle Geese *Branta leucopsis* with fledged offspring feeding in coastal pasture grass fields during winter (Black *et al*. 1992). In contrast, no aggressive interactions (*i.e*. 0%) were observed in 72 out of the 555 study assemblages. A comparison of linear mixed effects models using an information theoretic approach indicated that the proportion of time waterbirds spent engaged in aggressive interactions was best explained by the age class and sex of the focal waterbird species (Wood *et al*. 2017). More time was spent on aggression by males compared with females, and by adults relative to juveniles. For example, males typically spent 2.4 times longer than females engaged in aggressive interactions. These findings likely reflect that amongst waterbird species adult males typically have the primary role in defence of the young, as well as the acquisition and defence of resources, including feeding areas and nesting sites. However, age and sex together explained only 7% of the variance in aggression, indicating that additional unmeasured variables clearly influenced the amount of aggression observed across the studies in our meta-analysis.

Figure 1: Two Mute Swans engaged in aggressive behaviour. Such displays have earned the species a reputation as a particularly "aggressive" animal (photo: WWT).

We found no evidence that the time spent on aggressive behaviours varied across latitudes or body mass, with seasonal timing, sexual dimorphism, migration or breeding strategies, or amongst different functional feeding groups. Moreover, we detected no differences in the time devoted to aggression amongst the six functional feeding groups of waterbirds for which data were available (Figure 2). Particular groups of waterbirds were not consistently more or less aggressive than others. This result may seem surprising given the reputation of some waterbirds, such as swans, for being "aggressive". Whilst there is undoubtedly observational evidence that swans do exhibit aggression towards both other swans and smaller waterbirds, our results suggest that swans do not spend more time than other waterbirds engaged in such aggressive interactions. Compared with smaller waterbirds, swans are generally considered more likely to show aggression towards humans, particularly species such as the Mute Swan which can occur in urban and recreational areas throughout the year, and this may contribute to their reputation for aggressiveness. Additionally, perhaps the large body size and conspicuous white plumage of many swan species may make aggressive behaviours more noticeable by human observers, leading to the perception that swans are more aggressive than other smaller, more cryptic waterbirds? Future research could test these ideas by comparing human perceptions of aggressiveness among waterbirds with actual levels of aggression shown by the birds.

Our findings suggest that labelling certain taxa or species as "aggressive" is too simplistic. All species appear capable of aggression, and the challenge for researchers is to identify the conditions under which elevated levels of aggression will be displayed. These may include variables such as bird density that influence the availability of shared limiting resources (*i.e*. food or nest sites), or genetic or other innate factors that predispose individuals to higher levels of aggressive behaviours. The debates about aggression will no doubt continue amongst researchers and wildlife managers. Whilst our findings suggest that swans are not more aggressive than other waterbirds, there is much that we still do not know. For example, does swan aggression result in higher incidences of injury and mortality as a result of their greater body size than other waterbirds, or can smaller species use their greater agility to evade attacks? Crucially, there has been little study to date of the potential impacts of aggression by swans on other species. Future research that quantified the effects that aggression by swans might have on the behaviour, habitat use, energy expenditure, productivity, and survival of smaller waterbirds would help to inform the debate.

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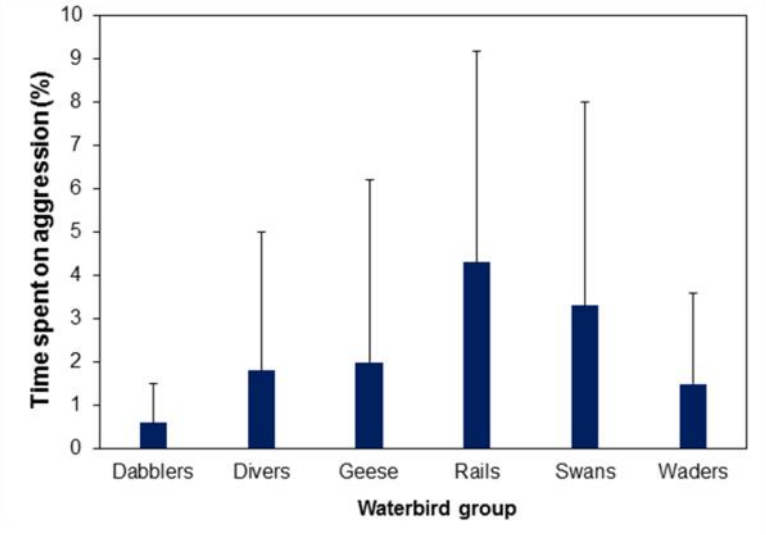

Figure 2: The mean (± s.d.) percentage of time spent in aggressive interactions by each of the six functional feeding groups of waterbirds for which data were available.

Bewick's Swan Expert Group updates

Bewick's Swans migration in relation to wind farm location: results of the tracking study

Eileen Rees, Larry Griffin & Baz Hughes

From winter 2013/14 onwards, Bewick's Swans caught in Britain have been tracked during their migrations to and from the Russian arctic. The main aim of the study was to describe the swans' flight-lines in relation to wind farm development along their migration route, with both offshore and onshore sites across Europe included in the analysis, to illustrate the potential cumulative effects of the swans encountering several wind farms along the flyway. The study was undertaken as part of the UK Government's Strategic Environmental Assessment (SEA programme) for offshore renewable energy, but it also falls within the actions required under the AEWA Bewick's Swan Action Plan. Although the Action Plan considered that collisions with turbines was likely not a major cause of the decline in the NW European Bewick's Swan population recorded since the mid-1990s, reducing the risk of the swans colliding with infrastructure including wind turbines was included as a priority action within the Plan (Nagy *et al*. 2012).

Twenty-two swans caught on the Ouse Washes, SE England (18 birds) and at Slimbridge, SW England (4 birds) therefore were fitted with solar-powered UHF-GSM-GPS data loggers, programmed to provide GPS fixes at hourly (sometimes 30 min) intervals, transmitted remotely via the GSM phone network every 4 h. Only one of eight loggers fitted in winter 2013/14 provided the frequency of data required for the study (although three more recorded the swans' locations 2–3 times a day) but all 14 loggers deployed in 2014/15 performed well. Shapefiles were obtained for areas with proposed and operational offshore wind farm sites in the North Sea; maps of terrestrial turbines were kindly provided by colleagues in countries with a national database of turbine locations (*e.g*. Denmark, Netherlands, Latvia and Estonia), or by using BING imagery to digitize turbine locations *c.* 2.5 km either side of the swans' tracks for countries where these data were not totally accurate or unavailable (UK, Germany). Swan location data recorded up to March 2016, wind farm locations and weather data were incorporated into a GIS for analysis. Tracks were inferred as being straight lines between consecutive GPS data points within a GIS; only track segments where GPS fixes were ≤ 70 minutes apart were included in the analyses of wind farm areas likely to be encountered by the birds.

The swans migrated on a broad front between England and continental Europe, and encountered a total of 52 offshore wind farm footprints, including 11 operational sites. Of these, 33 (63%) were in German waters, 12 (23%) Dutch, four (8%) British, two (4%) Belgian and one (2%) in Sweden. These included several wind farms in the area of the North Sea between the Netherlands and Schleswig Holstein (beyond the Heligoland Bight) not previously thought to be a major route for Bewick's Swan migration (Figure 1). Movement across the East Anglia ONE footprint was particularly evident, with all tagged swans and 83% of swan tracks crossing the site between spring 2014 and spring 2016. None of the tagged Bewick's Swans were found to cross UK offshore wind farms further north, but one individual flew across three more southerly consented or operational UK wind farms on moving to/from the Dungeness-Pett Level site in autumn 2015, which is a site of national importance for Bewick's Swans in SE England (Figure 1).

In addition to the offshore wind farm sites, 15 swans with detailed (*c*. hourly) location data were found to encounter 322 onshore wind turbines, most of which were in Denmark (43%), Germany (35%) and the Netherlands (20%), but also in the UK, Latvia and Estonia. Further assessment of hourly track segments where flight height, speed or distance data indicated

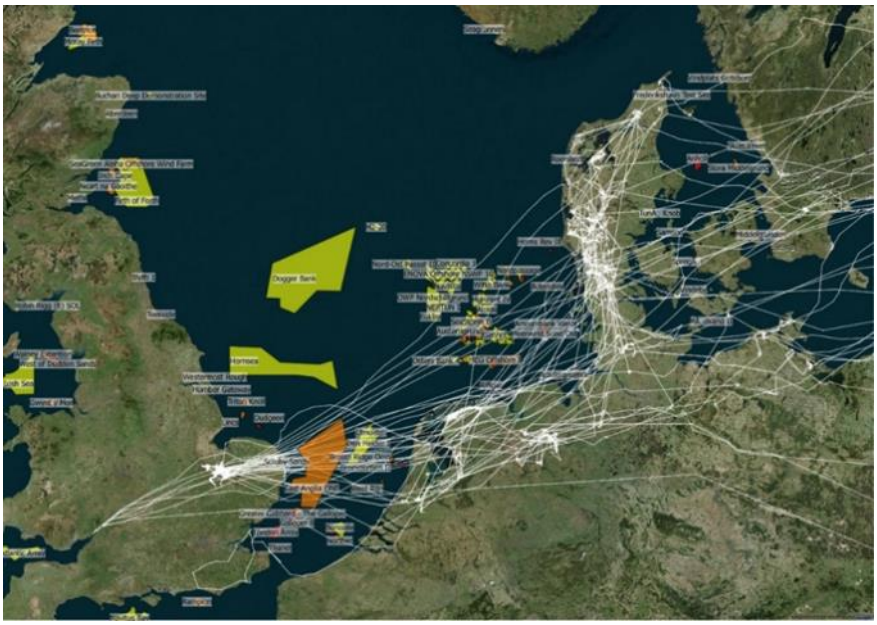

Figure 1. Overview of the main wind farm sites crossed by the tracks (white lines) of GPS-tagged Bewick's Swans. Yellow = wind farm at the application stage in March 2016, orange = consented, red = operational. From Griffin *et al.* 2016.

Figure 2. Bewick's Swan migration route (both spring and autumn migrations included) for Bewick's Swans tracked between January 2014 and March 2016. From Griffin *et al.* 2016.

that the swans were flying ("flight segments"), gave an overall encounter rate of 0.066 turbines per flight segment, suggesting one turbine encountered for every ~15 flights made by the swans. Encounter rates varied considerably between countries, from <0.001 (*i.e*. less than 1 in 1,000) encounters per flight segment for birds in the UK, compared with 0.14 in Denmark, 0.17 in the Netherlands and 0.23 in Germany, indicative of variation between these countries in onshore wind farm density. Encounter rates also varied across years for particular individuals, depending on their choice of staging or wintering site. Thus the network of onshore wind farms in Germany, Denmark and elsewhere should be considered in future cumulative collision risk assessments (also displacement assessments) undertaken for Bewick's Swans across NW Europe.

Flight height data were recorded for five Bewick's Swans whose tags were programmed to record altitudinal data. Although flight height estimates provided by the GPS-GSM loggers are currently prone to error, results indicated that 89.2% of flight height records over land (*n* = 323 locations) and 93% (*n* = 201) over water were at <150m, suggesting that the

swans mostly fly at or below the height of the turbine rotors. Departure from the UK wintering sites were mainly during the evening (18:00 h – midnight; 37%) or early morning (06:00 – 09:00 h; 63%), with the majority (63%) of swans also leaving the UK coast during early morning and therefore thought to be passing over the North Sea in improving light conditions.

In addition to informing the SEA programme, there have been several additional benefits from the Bewick's Swan tracking project. Onward tracking of migration to Russian arctic served to describe the wide range of sites used by UK-wintering swans during the summer months, which included Novaya Zemlya but particularly Vaygach Island and the Nenetskiy Nature Reserve (Figure 2). Some staging areas not previously known to be important for Bewick's Swans are now found to be so (*e.g*. Lake Ladoga, Sheksna Reservoir and Veliky Novgorod in Russia). Moreover, national-level data are serving to confirm links between feeding areas and roost sites in Estonia and the network of sites used by swans staging in the country, which will help towards monitoring and protection of the species within the National Bewick's Swan Action Plan for Estonia (Luigujõe 2014).

Overall, the study has demonstrated that the cumulative effect of all wind farms (both offshore and onshore) encountered during the annual cycle should be taken into account on assessing collision risk and displacement, that EIAs for offshore wind farms should include data for all Special Protection Areas (not just coastal sites), and that international communication and sound data on wind farm development across all range states are crucial for determining cumulative effects more precisely. Recommendations in the report (Griffin *et al*. 2016) included undertaking more detailed field and radar studies of swan movement in the vicinity of onshore sites to determine how the birds behave in relation to different turbine spacing, thus indicating whether the creation of east-west corridors a few hundreds of meters wide might be useful to migrating swans and other birds, including potential collision with other infrastructure (particularly powerlines) in the vicinity of wind farms in collision risk assessments (*cf*. Klop & Brenninkmeijer 2014, Brenninkmeijer & Klop 2015). Development of a single standardised database of all European offshore and onshore wind farms would be highly beneficial for facilitating cumulative impact assessments. Additionally, further modelling of Bewick's Swan tracking data is required to determine the collision risk of the swans encountering a series of both offshore and onshore windfarms during their movements through Europe each year.

The tracking of Bewick's Swan migration in relation to onshore and offshore wind farm sites was funded by the Department of Energy and Climate Change (now Department for Business, Energy and Industrial Strategy) as part of its offshore energy Strategic Environmental Assessment programme. We are grateful to John Hartley of Hartley Anderson Ltd. for facilitating the study, to Ib Petersen, Leho Luigujõe, Steven Velthuijsen, Abel Gyimesi, Roland Lebuss, Michaël Pierrot, Hans-Joachim Augst, Seb Rae and RenewableUK for provision of wind farm data, and to the many people who kindly helped in catching and resighting the swans.

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Flight of the Swans

Eileen Rees, Julia Newth, Chris Rostron & Kevin Wood

Photo: Ben Sadd / WWT

In autumn 2016, WWT's Sacha Dench undertook a remarkable flight by paramotor, from the Bewick's Swans breeding grounds in the Russian arctic to their long-established wintering site at Slimbridge, SW England. The initiative – named *Flight of the Swans* – aimed to provide a focus for a range of initiatives across the flyway to address the decline the NW European Bewick's Swan population, which had dropped in numbers from 29,000 in 1995 to 18,100 in 2010. Project Partners for *Flight of the Swans* in each country (several of whom are national contact points for the AEWA Bewick's Swan Expert Group) rose admirably to the challenge and put in place a varied range of events to engage a broad spectrum of people, scheduled to occur as closely as possible to Sacha's arrival for participation in these events.

Even before Sacha had commenced her flight, the *Flight of the Swans* got off to an excellent start when the Zoological Museum, Moscow State University, kindly hosted a launch event on 6 September 2016. The event was attended by > 20 eminent Russian ornithologists, A.P. Mejnev for the Ministry for Natural Resources of Russian Federation, Jonathan Brenton for the British Embassy, paramotorist Alexander Bogdanov (who would be flying with Sacha during her time in Russia), and with Sarah Rainsford (BBC Moscow correspondent) making the first interview of the expedition. Following this inaugural meeting, Sacha then transferred to Nar'Yan Mar in the Nenetskiy National Okrug where she met with Russian and British team members for the first and potentially most challenging leg of the flight – crossing the remote arctic tundra between Nar'Yan Mar and Arkhangelsk (see photo above) where Bewick's Swans spend the summer and breed each year.

The 11 weeks that it took Sacha and the team to travel from Nar'Yan Mar to Slimbridge, where she arrived safely on 16 December, were full of incidents and meetings with wonderful people, enthusiastic about the swans and their welfare. During this time she flew *c.* 5,000 km along the swans' migration route (Figure 1), despite having dislocated her knee when travelling across taiga habitat between Arkhangelsk and her next destination of Olonets near Lake Ladoga. Use of a trike attachment with wheels facilitated take-off and landing. In summary, however, a total of seven conservation workshops were convened by Project Partners during the *Flight of the Swans*:

1) Hunting Stakeholder Workshop, Nar'Yan Mar, Russia (9 September).
2) Workshop on the conservation and hunting of Anseriformes in the Arkhangelsk Oblast, Arkhangelsk, Russia (29 September).
3) Conservation Planning Meeting at Rakovie Lakes, near St Petersburg, Russia (7 October).
4) Conference on Bewick's Swan Conservation, the Estonian University of Life Sciences, Tartu, Estonia (10 October).
5) Demonstration of non-toxic gunshot, National Park Thy, Denmark (28 October).
6) Scientific meeting ("mini-symposium") at Lake Lauwersmeer, Netherlands (16 November).
7) Development of a charter for paramotor pilots in the west Flemish wetlands, Belgium (28 November).

Moreover, 51 schools across 10 countries (from north to south: Russia, Estonia, Latvia, Lithuania,

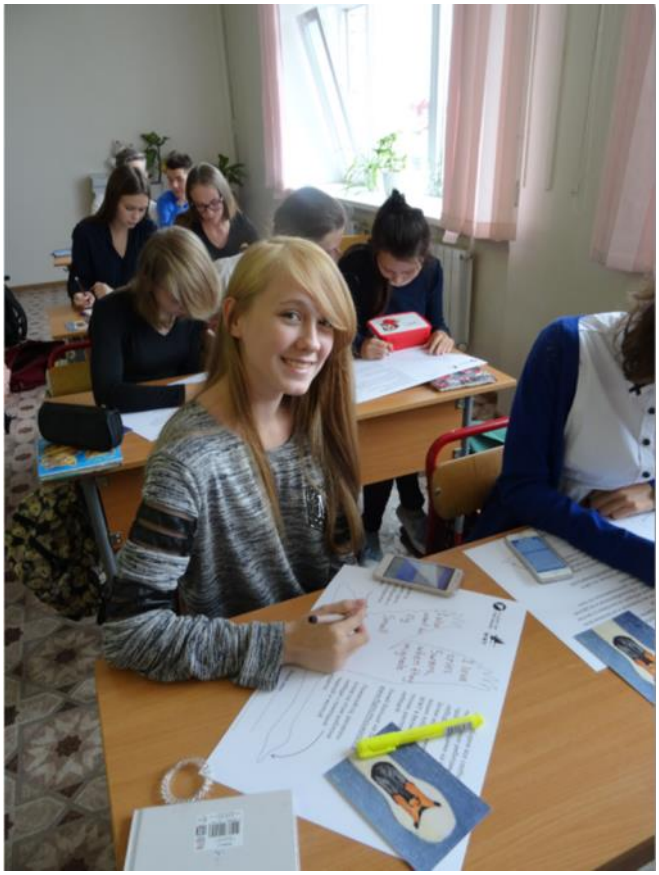
Poland, Demark, Germany, Netherlands, Belgium, UK) were engaged in the project, with activities including: letter writing, messages on swan silhouettes, lessons devoted to the swans and their wetland habitats, art competitions, kite making and singing. Fifteen community events were held, with schools involved in most of these events. *Flight of the Swans* also produced sustained media coverage across all the countries on the swans' migration, with > 700 articles published, and *c.*1,000 mentions on TV and radio. Highlights (of which there were many!) included extensive coverage on Russian TV, > 60 news items on Estonian TV/radio/press/websites, and Sacha appearing on RLT Late Night TV which has one million viewers in the Netherlands! Wetland conservation was in the spotlight and garnered the support of Members of the European Parliament, the Estonian Minister of Environment and the Ambassador of the Russian Federation in the UK, among others.

Five wetland centres have joined Wetlands Link International (WLI, **http://wli.wwt.org.uk/**) as a result of the initiative: the Nenetskiy *zapovednik* (Russia), Tartu Environmental Education Centre (Estonia), Lake Lubans Information Centre (Latvia) and Natureum Niederelbe (Germany) and Wallnau (Germany), and we hope that more will do so as conservation opportunities developed by the project are taken forward. The 28 national partners and five international partners (AEWA, FACE, Ramsar, Wetland Link International and Wetlands International) were tireless in ensuring that the initiative provided connections with diverse groups all important for swan conservation – politicians, schools, hunters, farmers, windfarm companies, conservationists, government official, local communities, scientists – and these individuals will continue their efforts into the future.

The immense scope of the work was recognized in the *Flight of the Swans* team being honoured as "Campaign of the Year" at the 2017 ENDS Environmental Impact Awards, with the judging panel indicating that the project was chosen for the scale of its ambition, huge profile and international reach. This award reflects the immense achievements of all those involved with Bewick's Swans and with wetland conservation across Europe!

Work resulting from or facilitated by *Flight of the Swans*, including collaborative fieldwork, new research initiatives and stakeholder engagement, is now continuing into 2017 and is highly likely to continue thereafter. In the immediate future, a film of the expedition is being prepared for release later on this year and a Community Toolkit is being developed from the experiences of Project Partners during *Flight of the Swans* in raising awareness about wetland conservation issues among different audiences. This toolkit will provide good practice advice on how to involve audiences for future engagement activities. Recommendations from the various workshops will also be taken forward in 2017. We will keep you updated of progress in *Swan News* 14 in 2018.

Figure 1. Route flown by Sacha during the *Flight of the Swans*. Note that the swans generally fly in a straighter line between the White Sea region (Arkhangelsk) and Estonia.



Visiting a school in Nar'Yan Mar (photo: Eileen Rees / WWT).

Community event in Estonia (photos: Leho Luiguijoe).

Conservation workshop at Rokovie Lakes, Russia (photo: Ben Cherry / WWT).

Conservation workshop at Tartu, Estonia (photo: Leho Luiguijoe).

Survival rates of the Northwest European population of Bewick's Swans

Kevin A. Wood, Rascha J.M. Nuijten, Julia L. Newth, Trinus Haitjema, Didier Vangeluwe, Panagiotis Ioannidis, Anne L. Harrison, Conor MacKenzie, Geoff M. Hilton, Bart A. Nolet & Eileen C. Rees

Over recent decades the northwest European population of Bewick's Swans *Cygnus columbianus bewickii* has shown marked fluctuations in numbers counted on the wintering grounds. Numbers increased from 16,283 in 1984 up to 29,780 individuals in 1995, before falling to 18,057 individuals in 2010 (Rees & Beekman 2010; Nagy *et al*. 2012). In response to this 39% decline in numbers, an international species action plan (the Bewick's Swan Single Species Action Plan: BSSAP) was developed for the population and was adopted by the African-Eurasian Waterbird Agreement (AEWA) in 2012 (Nagy *et al.* 2012). More recently, the population has also been reclassified as Endangered on the European Red List of Birds (BirdLife International 2015). To understand why Bewick's Swan numbers have fallen, the BSSAP calls for information on demographic rates such as breeding success and survival. In an earlier study we found no evidence that breeding success had fallen over time, and whilst some very poor breeding years were evident, it appeared unlikely that low breeding success was the primary driver of the large fall in population size (Wood *et al*. 2016). Yet no information was available on the survival rates of Bewick's Swans, or how such rates had changed over time.

In a recent study we used a data set of 3,929 individually marked and resighted Bewick's Swans to address this key knowledge gap. We assessed temporal trends and environmental drivers of survival between winters 1970/71 and 2014/2015 using a capture-mark-resight approach, whilst accounting for effects of age, sex, and different marker types (Wood *et al*. in press). To allow individual identification, each swan had been caught and fitted with a plastic leg ring or neck collar bearing a unique alpha-numeric code (Figure 1). Swans were caught and marked with leg rings in the United Kingdom (1970 onwards) and Russia (1992 onwards), whilst neck collars were fitted to swans caught in the Netherlands (1988 onwards) and Germany (1989 onwards). A network of professional and amateur ornithologists across the winter range in northwest Europe reported their resightings of marked birds. Of the 3,929 individuals that were marked, 3,079 (78.4%) were resighted in at least one subsequent winter.

By comparing different possible models of temporal variations in survival rates, we found that the trend in apparent survival rates over our study period was best explained by different survival rates for each decade (Figure 2). For both marker types, mean survival rates were highest in the 1980s and lowest in the 2010s. Female survival was marginally higher than males (but only by 0.1%), whilst adults and yearlings both had apparent survival rates that were 4.6% and 5.1% higher, respectively, than cygnets. Swans marked with leg rings were predicted to have apparent survival that was 4.0% greater than individuals marked with neck collars; whether this difference is due to higher rates of marker loss among birds marked with neck collars, higher mortality, an effect of winter site, or a combination of these, needs further detailed investigation via controlled comparisons in future research.

Our analysis showed some support for our expectation that the Bewick's Swans' apparent survival rates would have varied in line with the observed population trend. Apparent survival increased slightly from the 1970s to 1980s, concurrent with the observed rising population size (Figure 2). Subsequently, a small decrease in apparent survival between the 1980s and 1990s was evident, which could have been sufficient to precipitate the decline in population size observed after 1995. Unexpectedly, the estimated survival rates showed a small increase between the 1990s and

Figure 1. A Bewick's Swan about to be fitted with a plastic leg ring, bearing a unique code to allow subsequent identification (photo: David Fotherby / WWT).

2000s, during which time the numbers on the winter grounds of northwest Europe were continuing to fall. A sharper drop in survival rates was only detected between the 2000s and 2010s, which a model of inter-annual survival rates suggested occurred from winter 2008/09 onwards. Hence, our results suggest that the biggest drop in survival rates occurred considerably later than the onset of the decline in population size which occurred after 1995.

Weather conditions in different areas across the flyway, food resources on the winter grounds, density-dependence, and the growth of swan numbers at a relatively new wintering site in southeast Europe (the Evros Delta in Greece), all performed poorly as explanatory variables of Bewick's Swan apparent survival. Of the 18 environmental variables that we tested in our study, none accounted for more than 7.2% of the deviance associated with our survival models, with a mean of only 2.2% of deviance explained. Thus, our research has shown a recent, but currently unexplained, reduction in the survival of the northwest European population of Bewick's Swans.

Our results provide valuable long-term demographic information needed to help us understand the population dynamics of Bewick's Swans in northwest Europe. The development of a population model is underway to assess the relative contributions of variation in survival rates and breeding success to the observed changes in population size. We look forward to discussing our findings in future issues of the Swan Specialist Group Newsletter.

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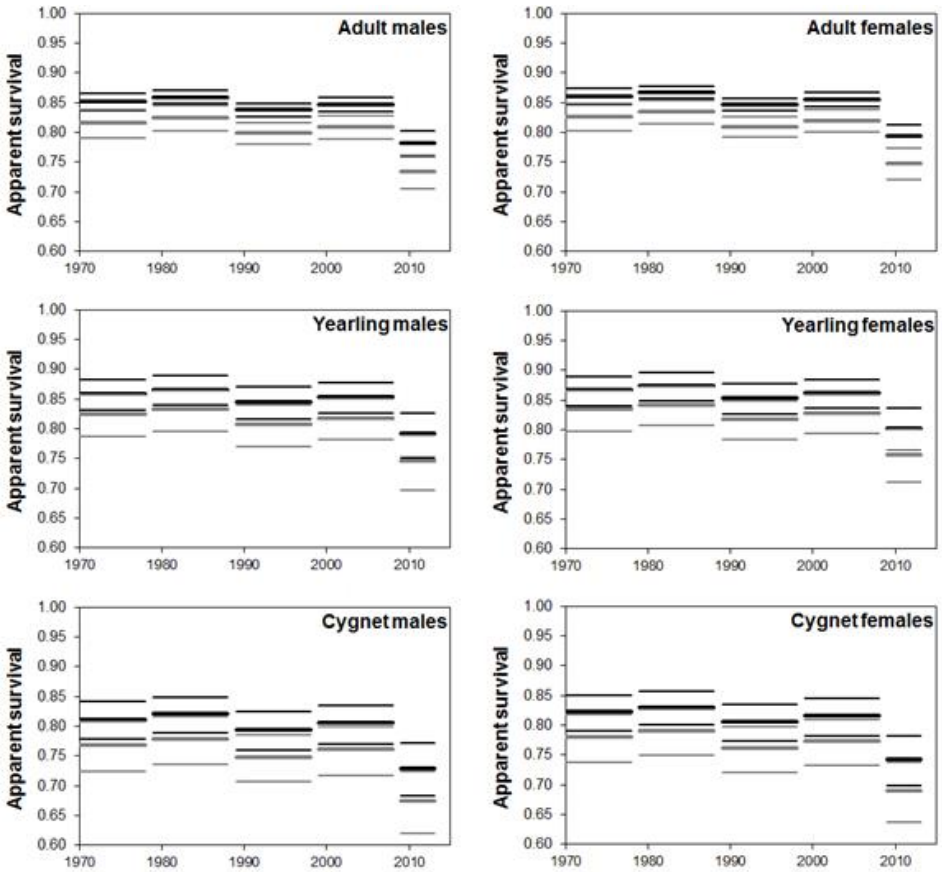

Figure 2. The apparent survival probabilities of Bewick's Swans, as estimated from birds marked with leg rings (black lines) and neck collars (grey lines). The mean and 95 % confidence limits are represented by the thick and thin lines, respectively.

Papers

Swans killed by poison in China

Xu Liu & Roller Ma Ming

Abstract

Of the seven *Cygnus* species distributed around the world, three occur in China: the Mute Swan *Cygnus olor*, Whooper Swan *C. cygnus*, and Bewick's Swan *C. columbianus bewickii*. All are included in the National Key Protected Wild Animals checklist, but poaching of swans remains rampant in China. We therefore made field observations and also internet searches (*i.e.* using www.baidu.com), and organized all the information provided in the media, including news items, government reports and publications, to classify and qualify poaching from 1999–2016. A total of 79 cases of swan poaching was recorded across 13 provinces, including the wetlands on the borders of the Shanxi, Shaanxi and Henan Provinces, Rongcheng in Shandong Province, Panyang Lake, Dongting Lake and Chongming Island, all of which are important habitats for migratory birds. Poachers used various (> 10) methods for taking the swans, including guns, crossbow, nets, snares, steel traps, poison baits and searchlights. Poisoning was the method commonly used; at least 907 swans were found poisoned, of which 640 died. We believe this is an underestimate of the actual number of casualties. Huge profits from the swan trade is a significant incentive, and has promoted swan poaching.

Introduction

With the high value of rare wildlife, poaching and illicit trade in species such as the Tiger *Panthera tigris*, pangolins *Manis* sp., elephants, rhinos and vultures is a global problem. These animal parts are used as medicines, luxury foods and curios (Biggs *et al*. 2013; Buij *et al*. 2016; Underwood *et al*. 2013). From 1969 to 2014, about 404 species and 8,340,921 specimens were involved in illegal wildlife use (IWU), with a mean extraction rate of 185,354 individuals/year. Birds were the most diverse group targeted (248 species), although more individuals were taken from some of the other animal taxa (*e.g*. reptiles; Sánchez-Mercado *et al*. 2016).

Of the seven *Cygnus* species and sub-species in the world, three occur in China: the Mute Swan *Cygnus olor*, Whooper Swan *C. cygnus*, and Bewick's Swan *C. columbianus bewickii*. The breeding area for Mute Swans in the country is quite localized, with birds nesting at Aibi Lake, Sailimu Lake and Ili River in Xinjiang, the basin of Chaidamu in Qinghai, Hei River in Gansu, and Wuliangsu in Inner Mongolia. They begin to migrate before the onset of winter, and fly to Qinghai Lake and Yangtzi River via Heilongjiang Province, Jilin Province, Lvshun in Liaoning Province, Hebei Province and Shandong Province for the winter months (Zhao & Su 2016). Whooper Swans breed in Zhalong, Xingkai Lake and Sanjiang Plain in Heilongjiang Province and at Bayanbulak in Xinjiang. During the winter they migrate to Rongcheng, Dongying, Chengkou in Shandong Province, the Yellow River, Qinghai Lake and Xinjiang (Ma *et al*. 1993; Ma & Cai 2000, 2002). China is one of the main wintering areas for the Eastern Bewick's Swan population, which breeds in the northeast of arctic Russia. Historically the species was more widely distributed throughout China's floodplains, but now most of the population is confined to five wetlands in Anhui Province and to Poyang Lake in Jiangxi Province, where the majority of Bewick's Swan occur. Up to 113,000 birds may congregate at these sites in winter (Cong *et al*. 2011). Although all of the swans have been listed as species protected by law, poaching continues to confound the conservation of swan species. This article is intended to introduce and summarize the situation on the poaching of swans within China.

Materials and methods

We made field investigations and also searched the internet for incidents of swan poaching. All information recorded in the media in the years 1999–2016, including news items, government reports and research papers, were organized in order to classify and qualify the level of swan poaching during this period. We listed and counted the cases by date, location, method and the number of swans involved. Any duplicate data were omitted from the assessment.

Results

We found records for a total of 79 cases of swan poaching, which we believe is much lower than the number of incidents that actually occur. Poaching often goes undetected, and so only some is reported. For instance, an investigation on the poaching of Scandinavan Wolves *Canis lupus*, estimated that more than two-thirds of total poaching was undetected by conventional methods (Liberg *et al*. 2011). If this is also true for swans in China, the actual number of cases could be more than 237. One poisoning incident at Panyang Lake in Jiangxi Province caused the death of 40 Bewick's Swans (Table 1). During that winter a volunteer bird protector found that swans had been poisoned about 10 times in more than 50 surveys (www.xinhuanet.com). This estimation suggests the true number may be as high as 790 cases.

Our results show that swan poaching has occurred in at least 13 provinces, up 44% of the country, including the wetlands on the borders of the Shanxi, Shaanxi and Henan Provinces, at Rongcheng in Shandong Province, Panyang Lake in Jiangxi Province, Dongting Lake in Hunan Province and Chongming Island in Shanghai, all of which are important habitats of migratory birds (Figure 1).

Methods used to poach swans

Poison. Poison is the simplest and most efficient way of illegal poaching. About 46% of poaching incidents and 68% of cases of waterfowl taken into captivity involved poisoning in China (Ma Ming *et al*. 2012). Poisons used to hunt swan include carbofuran, borax, methamidophos, monocrotophos, triethylenemelamine and sodium diphacinone (Wang 2000; Zhang 2010; Wang *et al*. 2016). Of all of these, carbofuran is the most common because it is the cheapest in price.

The methods used to poison the birds also varies. Baits such as wheat, corn or sand are soaked with pesticide, then scattered on the ground in swan feeding habitat. These poisoned baits can also be soaked in gasoline but the swans can detect such baits from the odour. Poachers sometimes excavate a puddle or depression to hide the baits or the pesticides in the wetland, so that the birds might be harvested only by the poacher. Alternatively poachers might distribute the poisoned food along the shore of a wetland and harvest the birds after just one night. No matter which method is used by the poachers, the birds must be recovered quickly. The use of poison is indiscriminate and kills any birds that consume the baits.

Net and jig. Nets known as "sky nets" are used to capture birds in areas frequented by the swans. The nets tangle birds as they take off or land. Another net is woven using a jig so that it is close (5 cm) to the surface of the lake. The harder that the swan struggles once it has been caught, the tighter it is twisted. Bamboo fences erected several kilometers along the shore of a wetland and fitted with iron wire and nets also catch migratory birds effectively.

Muskets. Muskets are old weapons using black powder, including arquebus and flintlock, and are still used for shooting birds or small animals. As it is a

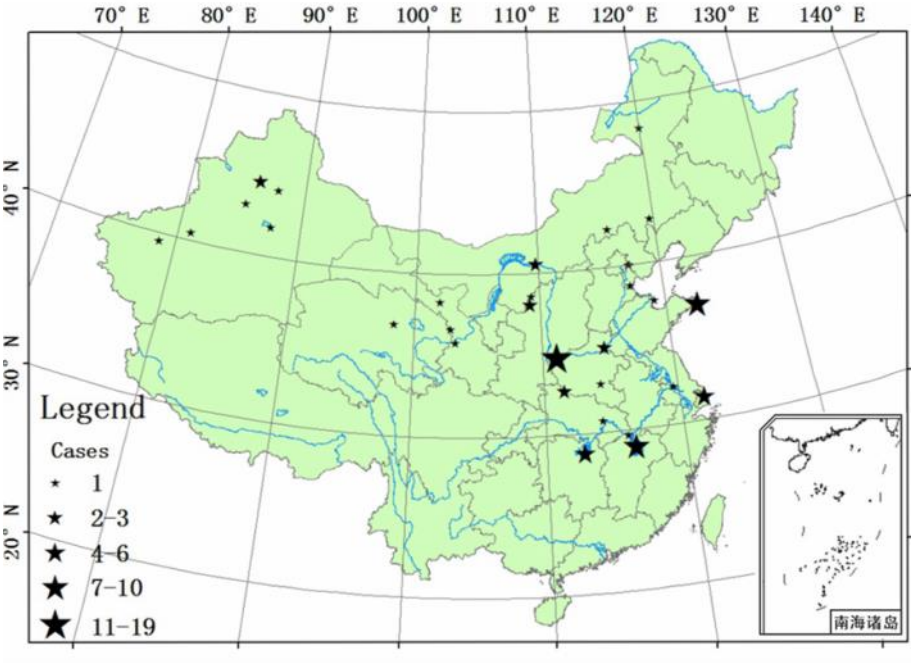

Figure 1. The distribution and number of cases of swan poaching in China, 1999–2016.

Table 1. Cases of illegal poaching by poison during 1999–2016 in China

Date	Poison (where recorded)	Location	Whooper Swans: number died (number involved)	Bewick's Swans: number died (number involved)
1999 (Aug)	Carbofuran	Border*	27（44）	
2001 (Mar)		Tianjin	5	
2001 (Dec)		Shandong Province		
2004 (Feb)	Borax	Shaanxi Province	17（23）	
2004 (Mar)	Methamidophos	Inner Mongolia	8（17）	
2004 (Dec)		Border*		
2006 (Jan)		Border*	4（113）	
2006 (Feb)		Border*	3（100+）	
2006		Hunan Province		1
2006 (Dec)		Border*	37	
2006 (Dec)		Border*	30+	
		Border*	5（11）	
2008 (Feb)		Border*	5（11）	
2008 (Feb)	Pesticide	Jiangxi Province		15（20）
2008 (Dec)	Monocrotophos	Border*	121	
2009 (Jan)	Sodium diphacinone	Xinjiang	4（7）	
2009 (Jan)	Carbofuran	Panyang Lake		40+
2009 (Nov)		Shanxi Province	11	
2009 (Dec)	Pesticide	Hubei Province	3	
2011 (Jan)	Carbofuran	Henan Province		1
2011 (Jan)	Carbofuran	Chongming island		3
2011 (Mar)		Shaanxi Province	23	
2012 (Feb)		Hubei Province		2
2012 (Mar)		Inner Mongolia	2	
2012 (Nov)	Carbofuran	Tianjin	1	
2012 (Jan)	Triethylenemelamine	Henan Province		
2013 (Jan)	Carbofuran	Dongting Lake		20（27）
2013 (Dec)	Pesticide	Panyang Lake		0（1）
2014 (Jan)	Pesticide	Panyang Lake		0（1）
2014 (Dec)	Borax	Inner Mongolia	2	
2014 (Nov)		Dongting Lake		16
2015 (Jan)	Carbofuran	Dongting Lake		1
2015 (Jan)	Sodium diphacinone	Xinjiang		
2016 (Jan)	Carbofuran	Inner Mongolia		233
Total			**308 (561)**	**332 (346)**

* Border = the wetlands between Shanxi, Shaanxi and Henan Provinces

simple design it isn`t difficult to make one at little cost. In 2001 five swans were collected from a fisherman who had shot them with an old fowling piece. There were > 8,800 feathers on the boat, representing 73 individuals (Nie *et al*. 2002). Additionally, there are rows of guns, called “paichong” and “pedrero”, which are used for illegal hunting. In the 1990s, a number of boats called “Dayan Boats” were equipped especially for poaching. These boats were fitted with 4 m long “paichong”, which shoot lead balls, and 3 m long “pedrero”. The effective range of these weapons is 100 m, but they have now largely vanished as a result of law enforcement measures.

Traps. Small clamps for poaching can be made easily and cheaply. No matter which kinds of bird are captured in these traps, it is impossible for them to escape because they cannot fly away. If the clamps are connected to ropes, poachers can harvest the birds easily. There is a more elaborate design made of steel cable. One end is a slip noose with the other is fixed by an iron stake in the ground. A group of these snares can cover a large area.

Shotgun, crossbow and slingshot. Shotguns are common tools for hunting but their use has been phased out because of gun control laws and the fact that they are noisy. The sophisticated and silent crossbow, which can be obtained easily, has replaced the shotgun in recent years. With the improvement in the quality of the materials and provision of an optical sight, the power of the crossbow is sufficient for poaching. The slingshot (or catapult) is cheaper, is sold on the internet (*e.g*. Taobao and Jingdong websites), and has been used to shoot smaller birds such as pheasants, doves and quails. A catapult projectile could break a swan’s wing or neck.

Searchlight. Poachers search the region where swans nest at night and the birds are so dazzled by the glare that poachers can catch them effortlessly.

Discussion

Poison is one of the most effective methods of poaching; it has the highest efficiency and is the lowest in cost. Our results indicate that carbofuran is the most commonly used poison, accounting for 24.2% (eight cases recorded) of the poisons used. Carbofuran is one of the carbamate insecticide group, and is classified as a highly toxic pesticide (with an LD50 of < 50 mg/kg) according to the classification standards of pesticide toxicity in China. It has been banned for use as a pesticide on fruits and vegetables because of the risk to human health, so the possibility that swans poisoned by carbofuran may be traded as food in the market and eaten by humans is a serious concern. The toxicity of carbofuran is especially high for birds. For example, the LD50 (*i.e.* lethal dose that kills 50% of a test sample) for pheasants is 573 mg/kg (see **www.chemicalbook.com**), which means almost any species of bird could be killed by about five poisoned grains. These poisoned birds are likely to trigger secondary poisoning in raptors such as eagles, falcons and vultures. Carbofuran also has a long residual period in the soil, with a half-life of 30–60 days and water solubility of 700 mg/L. The poisoned shores of a wetland therefore may become a hazard to all the creatures in the region, either directly (*e.g*. Table 2) or via the food chain.

Trade and price chain. Poaching and the trade of wild animals can make an unbelievable profit. As an example, the cost of the trap or baits for swans merely about a dozen Chinese Yuan (RMB), but a swan can

Whooper Swans (adults and cygnets) in China (photo: Ma Ming).

Table 2. Other species found to be poisoned in the cases of swan poaching, and the sale price per bird in Chinese Yuan (RMB).

Species	Number	Price / one bird (RMB)
Duck	309	100
Goose	22	400
Oriental Stork	22 (59)	200
Heron	100+	200
Eurasian Coot		100
Crane	5	
Magpie	4	
White-tailed Eagle	1	
Cormorant	10	
Eurasian Spoonbill	5	
Common Moorhen	10	
Sparrow		10

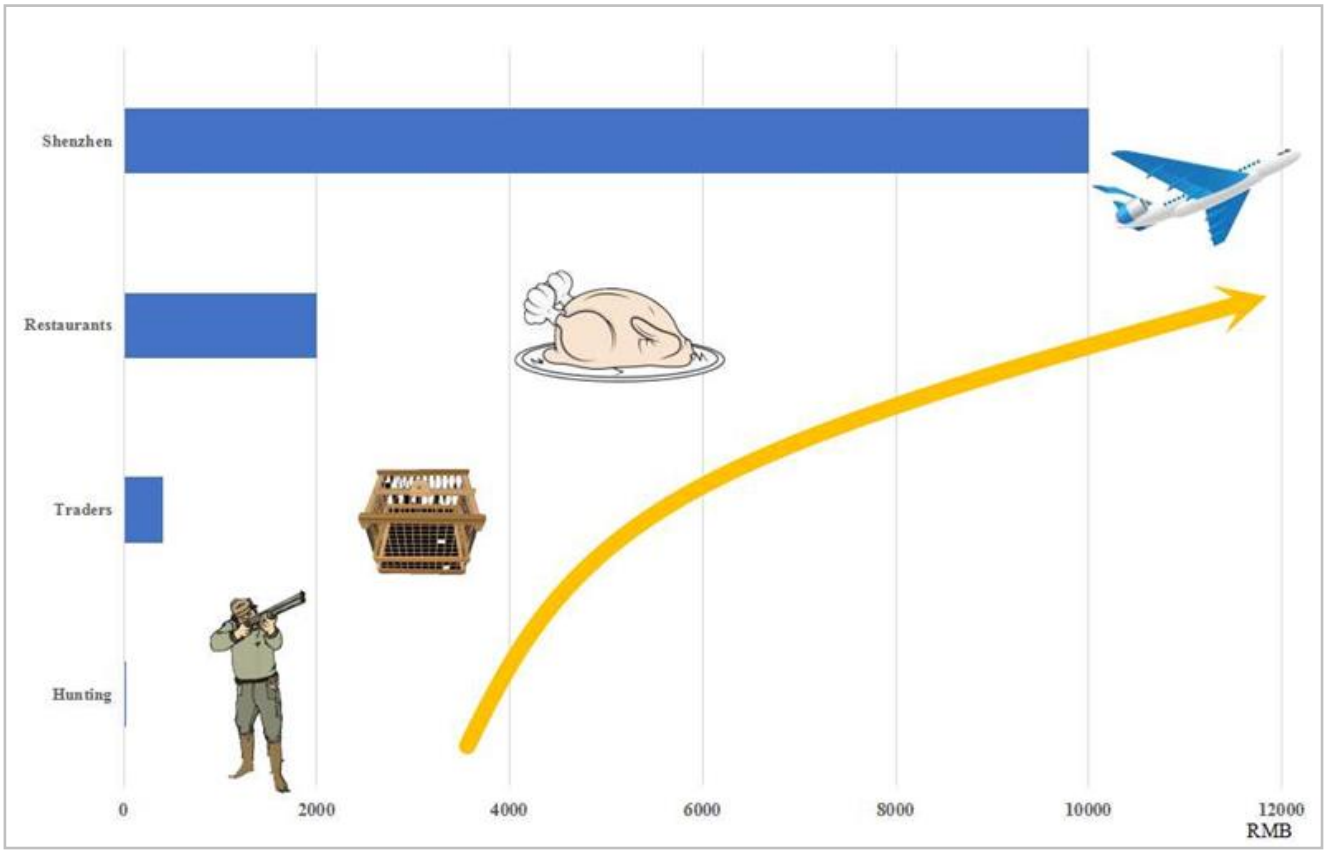

Figure 2. The price chain in the swan trade.

fetch 1,000–2,000 RMB when sold to restaurant, where the customer pays a few thousand RMB for meat and 400 RMB/kg for feathers. The price for a live swan transported to Shenzhen, China's wealthiest city, is up to 10,000 RMB (Figure 2).

Poaching professionals. The huge demand for rare wild animals and the amazing profits that they can yield contributes to people becoming professional poachers. Several cases found in our review of swans being taken illegally occurred in important wintering regions, which suggests that the birds may have been taken by professionals. These poachers understood the migration patterns and concentrated their efforts on poaching migrant swans. They know where to find the species with the highest value, and can then harvest and trade them with minimal trouble. Furthermore they can control the dose of the poison so that the swans just lose consciousness, after which they can be detoxified by atropine sulfate and vitamin C. This is considered worthwhile because of the high prices obtained for live swans taken from the wild.

Acknowledgements

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Ambassadors for Conservation: how swans engage communities in caring about nature and conservation

Margaret Smith

Editor's note

This article is not about swan research, biology or management *per se.* However, it is critically important that the results of scientific studies are communicated to the public. Many of our research projects are geared towards answering questions critical for swan management and conservation. Although not all of us get involved with education and outreach, some of us do so, and for this it is useful to know something about how best to ensure that the information we assemble is transferred to those who will need it. It is a lengthy article but there are common approaches employed.

At the 24th Swan Conference in November 2016, in Duncan, British Columbia, public outreach and engagement programmes were highlighted in a number of presentations. These included four models showcasing different kinds of outreach: Yukon's *A Celebration of Swans*, and Iowa's, Montana's, and the Teton Regional Land Trust's (Idaho) swan restoration releases. Each uses "swanbassadors" to achieve different goals and at different scales.

Each programme uses creativity and passion to reach the general public to create a connection and caring for nature. I hope that you will find here some inspirational ideas to use in your community outreach work.

Yukon's A Celebration of Swans

A six week festival, *A Celebration of Swans*, is held near Whitehorse in southern Yukon each year. Art, family events, tours, guided walks, school programmes, music, and story-telling are all part of Yukon's largest birding festival. The festival is organized by the Yukon government's "Wildlife Viewing Program".

The *Celebration* was a result of the government and local community working together to address growing concerns in the 1980s about disturbance by humans of resting birds at important staging areas in southern Yukon. Snowmobiles and boat-use were of particular concern. In 1992, the Yukon government began consultations and planning. Local residents were largely supportive of managing human use of the lake and local properties.

Part of the solution included the creation of a dedicated location and facility for bird viewing and education about the returning birds. The facility – the Swan Haven Interpretive Centre – is the result of a cooperative agreement between Ducks Unlimited Canada, Girl Guides of Canada, and the Yukon government.

The first of the annual *A Celebration of Swans* events was a one week festival in 1994. Over the following 20 years, it has grown into a six week festival held in April –May which attracts about 10% of Yukon's population. The focus of the *Celebration* is the returning swans, but the festival celebrates more than swans. Programmes are included about the many waterfowl that are migrating through southern Yukon during the festival period, heading for their northern breeding grounds. The returning birds are easily seen by the public at four staging sites: M'Clintock Bay, Tagish River, Johnsons Crossing, and Carcross. These are areas of open water in southern Yukon, where rivers and lakes are mostly still frozen in late winter/early spring as the birds arrive on migration to their nesting areas. Eighty percent of Yukon's population live less than an hour away from these important staging sites.

Youth education is an important component of the six week *Celebration of Swans* event in southern Yukon. (photo: Yukon Government).

A Celebration of Swans has three main pillars: an interpretive centre, public events and school programmes.

The Swan Haven Interpretive Centre, a 30 minute drive from Whitehorse, is the hub of the festival. Both inside and out, the facility is a place of discovery, learning and enjoyment. It is operated during a small window each spring, coinciding with peak waterbird migration. In April and early May it is open daily, during the evenings and weekends, and it is free. Hours of operation allow visiting after a typical work day and week. It is closed for the remainder of the year.

Several elements combine to make the programme a success. Events are designed in a variety of styles, targeting diverse audiences. A unique annual commemorative festival poster provides great local marketing. One thousand posters are printed and distributed, free to the public and local businesses, who often post them in their front store windows (Yukon Energy provides funding). A daily "*Swan Haven Report*" of returning birds is produced and posted on the department's website, with hardcopies available at the Swan Haven Interpretive Centre.

Favourite programmes and events during the festival include: bird banding demonstrations and presentations (by the Society of Yukon Bird Observatories), walks and talks which occur at migration hotspots throughout the festival, a family weekend event, art-themed workshops including watercolour painting, music nights used to attract new, non-traditional visitors, and local First Nations peoples provide story-telling activities.

School Programmes during the Celebration. Thousands of students have participated since the *Celebration* began, under the principle that Yukon's youth is a key audience for long-term conservation success. Grades 2–6 (ages 6/7–10/11 years) visit the Centre for three weeks in April, with two groups attending per day. A school visit includes rotating activity stations so that students can view the birds and learn about them through game-based play. An art contest is held within grades, with resulting artwork displayed at the Centre, where visitors vote for their favourites. Prizes are awarded and winning entries are also displayed at the recreation and fitness centre in Whitehorse.

The *Celebration* is a phenomenal regional success in bringing together residents and visitors to appreciate and learn about the importance of their area for migratory birds. Given that its original purpose was to reduce human disturbance at important migratory bird resting sites it is worth noting that, although disturbance still occasionally occurs, local residents are now quick to report it. Local media outlets highlight these incidents and discourage them, often of their own volition. Social media has also been an increasingly powerful and cost-effective means of sending conservation messages.

Overall, *A Celebration of Swans* has facilitated learning and discovery about migrating waterbirds in southern Yukon for over 20 years, and is a popular, effective tool for increasing appreciation of wildlife in the region.

Iowa restores swans and promotes wetland conservation

For the past 20 years the Iowa Department of Natural Resources (IA DNR) has been restoring Trumpeter Swans to the species' historic breeding range. They have built strong and extensive networks of partnerships with 25 Iowa County Conservation Boards, conservation organizations, private individuals, businesses and volunteers. These partnerships have been behind the tens of thousands of people reached each year in Iowa to support Trumpeter Swan restoration and wetland habitat improvements.

The last of the original Trumpeter Swans in Iowa was reported more than a century ago in 1883. During the 20th century, the state drained about 98% of its wetlands to increase arable farm land. In 1993 the IA DNR developed a plan to restore Trumpeter Swans to their former breeding range in Iowa. Building support for wetland restoration was at the centre of the project and the key slogan (used in all the state's outreach

College students help capture and band Trumpeter Swans in Iowa prior to a spring release (photo: Terri Rogers).

This 2017 release in southern Iowa includes two zoo-reared cygnets and a crowd of delighted students and adults who moments earlier had a chance to touch the swans and learn about them and wetland habitat (photo: Margaret Smith).

messages) was: "*Trumpeting the cause for wetlands*." Thousands of acres of wetlands have been restored in Iowa since the 1980s, and there is increasing interest in the federal "Wetland Reserve Program".

In addition to strong, focused messages about wetlands, the programme gained strategic strength by creating broad, diverse and effective partnerships within and outside the state. Partnerships multiplied its effectiveness beyond the level that the IA DNR could have achieved on its own. These private and public partnerships drove the state's success in breeding/obtaining swans for release, funding the restoration programme, and in creating outreach and education events/activities for students and the general public.

***Restoration and tracking enhance outreach*.** The state commenced its restoration programme in 1995, with an original goal of having 15 free-flying nesting pair by 2003. The first pair nested in 1998 and by 2016 Iowa had obtained swans from 26 states (lots of networking!) and placed 55 flightless pairs at partnership sites. By 2016, nearly 1,200 one and two year old swans have been released at > 80 sites across the state. Today the state has *c*. 50 free-flying breeding pairs, with a revised goal of maintaining a self-sustaining population across the entire state.

Neck-banding birds to track their migration is effective in drawing public attention to the swans in encouraging them and to report any sightings of the birds. Over 800 swans have been neck-banded in Iowa, which has the largest swan banding database of any state restoration programme. Iowa swans have been reported in 17 states and two Canadian provinces, with > 4,200 sightings of Iowa swans sent to the IA DNR.

Swan source partnerships build awareness of Iowa programme. Zoos: by 2016, 17 zoos had sent cygnets to the Iowa restoration programme. Zoo partnerships have provided Iowa enhanced opportunities for outreach, publicity and public engagement on the restoration of Trumpeter Swans through the zoos themselves. Zoo clients and visitors are excited and proud to have "their cygnets" used to restore a species. Social media postings by zoos raise awareness and pride in the Iowa swan restoration programme.

Swan breeders and wildlife rehabilitators. Iowa has a dedicated network of swan breeders and propagators who foster cygnets. Most cygnets spend the winter at certified private locations and are released in the spring at one of several well publicized swan release events. Injured swans and cygnets rehabilitated by wildlife rehabilitation centres in Iowa and other states often find a home with an Iowa breeder or may become part of a swan release, with the story behind the rehabilitation being told at the swan release event. These stories raise public awareness about wildlife health and mortality issues, such as lead poisoning, powerline collision, poaching and avian disease. Wildlife rehabilitation centres often promote the placement of their healed swans in the Iowa programme through social media.

Funding partnerships. Iowa has raised > 1.5 million US$ in funds and non-monetary donations to support the swan restoration programme. Money has come from a wide variety of swan enthusiasts, conservation groups, charities, events such as the Swan Soirees (see below), and an annual banquet. The primary funders are private individuals, corporations and businesses, > 25 Iowa County Conservation Boards, Iowa State University's Trumpeter Swan Committee, zoos, conservation organizations, schools, and state and federal agencies. All are treated as important partners by the IA DNR.

T-shirt sales (with the logo message "Trumpeting the cause for wetlands") increased public awareness and engagement as well as raising funds. A newsletter, *Trumpeting the cause for wetlands,* was created by volunteers and funded through Iowa State University's Trumpeter Swan Committee.

Public outreach: "Swan Soirees" since 1995. To inform and engage the public regarding swan restoration and the importance of wetland habitats, Ron Andrews (former IA DNR Trumpeter Swan Restoration programme manager) initiated the state's exceptional outreach work in 1995. By 2016, > 400

swan releases and 30 winter swan viewing events ("Swan Soirees" generally held late December through January) had been sponsored by the IA DNR and County Conservation Board staff members. The goals of these events are to educate, engage and connect people to Trumpeter Swans and their wetland habitat, and are highly successful with *c*. 5,000–15,000 students and citizens attending the Swan Soirees each year since 1995.

Several hundred enthusiastic people of all ages were at each of the two Swan Soiree events I attended. Activities included a live swan for people to see and touch, and presentations on nature topics such as Trumpeter Swans, wetlands, birding and photography. Children's activities and crafts were led by AmeriCorps volunteers. Outside swan viewing included assistance by volunteers and staff with spotting scope expertise. Free food and snacks were available with a free will donation jar nearby.

School education programmes and swan releases. Engaging and educating school children and university students about conservation, especially the importance of wetlands, is a goal enthusiastically embraced from the start. Iowa offers a curriculum-based *Trumpeter Swan and Wetland Education and Activity Manual* (developed by IA DNR staff in 1996 and distributed to Iowa school teachers), a *Swan Education Touch Kit* (feathers, egg, wings and feet) which is available to schools, the Clear Creek Outdoor Classroom at Clear Lake, coordination with college/ university ornithology classes, and swan releases (elementary and middle school level).

Clear Creek Outdoor Classroom is a unique facility located *c.* 50 yards from a Clear Lake, Iowa elementary school. This outdoor wetland is used by Clear Lake elementary schools to learn about wetlands and prairies. The wetland was home to Iowa's first captive breeding pair and for > 20 years has been home to nesting swans. Some cygnets released in the spring overwinter there each year. Clear Lake students have a chance to see nesting and wintering swans in their own school backyard, and there is also a live webcam of the nesting swans.

College and university students have been involved in the Iowa swan catching and banding programme. In 2017, students will be involved in a research project, funded by Iowa State University, the IA DNR, The Trumpeter Swan Society (TTSS) and others, which aims to capture and collar swans with solar and battery powered GPS collars to track their movements for three plus years. Locations will downloaded weekly from each collar and uploaded to a student-created website available to the public, similar to the famous "Eagle Watch" nest camera in Decorah, Iowa. Locations will be displayed on a Google Map so individuals can follow each Trumpeter Swan throughout the study.

Spring swan releases are one of the best ways for ensuring that Iowa's Trumpeter Swans stay front and centre in the public eye. The releases in late April (coinciding with Earth Day events) and early May are organized through the IA DNR and County Conservation Boards who arrange programmes on a variety of topics (wildlife habitat, water quality, flood control, International Bird Migratory Day, Trumpeter Swan restoration in Iowa). There may be up to 2,000 or more elementary and middle school students from 20 or more schools attending the spring swan releases

Tundra Swans (photo: John Stanton / USFWS).

each year. If a school can't attend the releases, presentations are made at the school with soon-to-be released swans. In 2017 a swan was also taken to a nursing home for residents to have the "swan experience" before it went to the release site. Don't forget other potential audiences in your outreach.

Each swan release event may last for 1–1.5 h, with students and adults gathering outside at the wetland release site. There are opportunities for questions and answers, and everyone participates in the countdown as the swan is released. There are lots of smiles and laughter all around as swans make their way to the water.

Promotion. Press releases to the newspapers, television, and radio give excellent coverage of swan programmes and activities. Schools, dignitaries, and politicians are invited to be part of the releases. Social media, especially Facebook, gets the word out, as does sharing of the events on Facebook by swan enthusiasts. TTSS is funding a film by Steve Harryman and Iowa swan releases will be part of story of the "*Return of the Trumpeter Swan*." This will give Iowa's swan releases a national audience.

Going forward. Iowa has been successful in restoring swans to the northern part of the state. Current releases are targeted for the southern part of Iowa. As the number of swans has reached the original project goal, the IA DNR is transitioning to non-swan projects. However, more volunteers are being trained to offer the swan and wetland programmes in schools. Strong public outreach will continue as volunteers take up the mantle of leadership in outreach activities.

Blackfoot Challenge in Montana integrates education into its diverse programmes

Trumpeter Swan restoration is one of a portfolio of programmes containing an education component at the Blackfoot Challenge. Wildlife, habitat, land and water are being protected by the non-profit Blackfoot Challenge in this remote area in western Montana using a consensus-based model. Education is fundamental to its outreach, and the Challenge has a Teachers Steering Council with representatives from all schools in the watershed, meeting semi-annually to advise the Challenge on school education projects.

Partnerships and trust underpin the collaborative conservation efforts since this non-profit's founding in 1993. The Blackfoot Challenge has been around for almost 25 years and has built trust and effective relationships between landowners and resource managers. When the organization first began to consider a Trumpeter Swan restoration programme for the watershed, creating a sense of ownership and interest through education and outreach was considered essential.

The Trumpeter Swan education programme joins the Challenge's other education programmes including Youth Education, Public Education and Citizen Science. Educators have access to lesson plans on Trumpeter Swans, stream monitoring, forest monitoring, and climate change. Programmes are geared for different school grades levels and the general public.

Education and outreach. From the beginning of the programme in 2005, students and the public have been invited to attend swan releases and can see

Montana Governor Steve Bullock (front row in black jacket, next to the teacher holding a swan) joins seventh and eighth grade students from seven watershed schools at one of the Blackfoot Challenge swan releases. Students stand with "their" swan, banded by their teacher (photo: courtesy of Blackfoot Challenge).

swans being neck-banded and ringed while learning about the history of Trumpeters in the Blackfoot, including gaining information on restoration efforts and swan biology. Swan releases are about three hours in length. There is an introduction about the programme and swan biology, with time for questions and answers. The swans are released simultaneously. After the releases, students participate in learning stations set up outside on topics such as aquatic invertebrates, wetland food webs, wetland plant ecology, birdwatching and identifications, aquatic invasive species, and nature journaling. The learning stations are led by local volunteers, Blackfoot Challenge staff, and some local partner organizations and/or agency personnel. Usually about 200 people attend the releases, with most being students from the seven watershed schools.

The Challenge's website includes a curriculum guide for teachers to extend the learning into the classrooms. Students and teachers can track particular swans online or even report sightings through the website. An online camera of nesting swans is linked to the Wyoming Wetland Society.

Funding. The Blackfoot Challenge provides funding to schools for transporting students to the release site. The Challenge also uses the swan releases as funding opportunities. Donors giving at a certain level, or raffle winners, may also have the chance to release the birds.

Promotion. In addition to schools being contacted, the public is reached through local media, the Blackfoot Challenge's newsletter and its Facebook page. A blog is maintained on the website with updates about the swans.

The Trumpeter Swan restoration programme in the Blackfoot has been popular and well received. It generates positive comments, donations, and good will, and people are interested in knowing how the swans are doing and excited to hear about their successes. Overall, it has been a positive way for people to learn about local wildlife, the importance of wetlands, and bird migration through active participation.

Teton Regional Land Trust uses "swanbassadors" for land and wildlife conservation

By the 1930s, it was thought that a small group of 69 Trumpeter Swans found in the Greater Yellowstone region of the US was the last known remnant of Trumpeter Swans in North America. While that turned out not to be the case (swans were later found in Alaska and Canada), the Rocky Mountain Population (RMP) swans nesting in the United States remain among the most isolated nesting pairs and flocks in the Lower 48 States.

In the US, non-profit land trusts are important organizations for land conservation. Through conservation easements, land purchases, and habitat restoration on private land, the land trusts work with local individuals and communities to protect important land and waterbodies within a service area, which might be defined by a watershed, political boundaries, or other criteria.

While once historically present in the Teton Valley, nesting Trumpeter Swans have remained scarce in the region. Four years ago, the Teton Regional Land Trust (TRLT) began to introduce Trumpeter Swans back to the Teton Valley, with the help of partners such as the US Fish and Wildlife Service, Idaho Department of Fish and Game, The Trumpeter Swan Society, the Wyoming Wetlands Society, Intermountain Aquatics, and other foundations and donors. The original goals for the project were to develop nesting and summer use by subadult swans in the valley and to help increase connectivity among swans in the historic

Fourth grade students have their first up-close experience with a Trumpeter Swan at the Teton Regional Land Trust's swan release in 2017 (photo: courtesy of Teton Regional Land Trust).

nesting areas to the north in Island Park, Idaho, along with an expansion of the nesting range in southern Idaho.

Initially, the release of Trumpeter Swans by TRLT did not involve a school component, although children and adults attended the releases. More recently, however, TRLT has started adding to their outreach activities to support larger strategic goals. These goals include: 1) re-establishing Trumpeter Swan nesting in the Teton Valley and improving the connectivity of nesting swans in the Teton Valley; 2) engaging the community's youth in conservation science, both inside and outside the classroom; and 3) increasing interest and support of the land trust's work of private land conservation and conservation easements that protect land in perpetuity. In May 2017, a swan release therefore included an in-class presentation to the 30 students prior to the outdoor release. The presentation included interpretive materials and taxidermy to give an overview of conservation, the role of wetlands and their importance, basic swan biology and information about the project.

TRLT received a grant to purchase binoculars for the students to use at the release, so students also received a lesson in basic use of binoculars. Following the classroom presentation, the students headed to a TRLT conservation easement wetland for the release. The students had a chance to get an up-close and personal experience with the soon-to-be-released swans. They, and the general public, also had a chance to learn more about Trumpeter Swans at the release site from the US Fish and Wildlife Service and TRLT staff. Like Iowa, TRLT has a designated "Trumpeter Swan Trunk", a toolkit for local teachers to use. The Trunk includes lesson plans, posters, diagrams, literature and taxidermy.

TRLT has also created an easy-to-use website and a Trumpeter Swan sighting form, accessed via smartphones, as a public engagement and swan tracking tool. This keeps the public and TRLT members engaged in the project and provides sighting locations on this new programme's neck-collared swans. Two of the males released in 2016 returned to their release site in 2017, where they joined the 2017 newly-released yearlings.

In addition to the swan releases, TRLT hosts interpretive swan talks intermittently during the year. Getting the word out to the general public about the Trumpeter Swan programme is undertaken in various ways including social media, electronic newsletters, press releases and local media. Passion, excitement and satisfaction are truly wonderful things being experienced by a new generation of biologists and conservationists!

For more information about any of these programmes please contact:

- Scott Cameron, Yukon government, Department of Environment: scott.cameron@gov.yk.ca; **http://www.env.gov.yk.ca/animals-habitat/wildlifeviewing.php**
- Elaine Caton, Blackfoot Challenge: elaine@blackfootchallenge.org; **http://blackfootchallenge.org/**
- Bill Dell'Isola,Teton Regional Land Trust: bill@tetonlandtrust.org; **https://tetonlandtrust.org/**
- David Hoffman, Iowa Department of Natural Resources: David.Hoffman@dnr.iowa.gov; **http://www.iowadnr.gov/Conservation/Iowas-Wildlife**
- Margaret Smith, The Trumpeter Swan Society: ttss@trumpeterswansociety.org; **http://www.trumpeterswansociety.org/**

Tundra Swans wintering at Pocosin Lakes, North Carolina (photo: John Stanton / USFWS).

News items

Trumpeter Swans featured on U.S. migratory bird hunting stamps ("Duck Stamps")

A pair of Trumpeter Swans was selected to appear on the Federal "Junior Duck Stamp" for 2017/18. The design for the new stamp, which was painted by Isaac Schreiber, of Duffield, Virginia, was chosen at the national "Junior Duck Stamp" Art Contest held in Charleston, South Carolina. The stamp featuring Schreiber's design will go on sale in June. Junior Duck Stamps, which sell for $5, raise money for environmental education programmes.

Last year, Trumpeter Swans were also featured on the US Migratory Bird Hunting Stamp Act (or "Duck Stamp"), which have been produced each year since President Franklin D. Roosevelt signed the Migratory Bird Hunting Stamp Act (or "Duck Stamp Act") in 1934. The "Duck Stamps" are conservation revenue stamps produced annually by the U.S. Fish & Wildlife Service, and 98% of the purchase price ($25 USD) by law goes directly to help protect wetlands and associated habitats through fee acquisition, lease and conservation easements. The habitat acquired with Federal Duck Stamp dollars becomes part of the National Wildlife Refuge System, a network of U.S. lands and waters set aside specifically for wildlife conservation.

Mute Swan management in New York, USA

After vetoing bills to protect Mute Swans in 2014 and 2015, on 28 November 2016 New York Governor Andrew Cuomo endorsed into law a bill which imposes a two-year moratorium on a New York Department of Environmental Conservation (NY-DEC) scheme to extirpate Mute Swans from the state by 2025. The new law also requires the NY-DEC to hold at least two public hearings before adopting any plans to "manage" Mute Swans. In addition, the new law obliges the NY-DEC to prioritise "any non-lethal management techniques and include scientific evidence of projected and current environmental damage caused by the Mute Swan population."

http://www.animals24-7.org/2016/12/04/speaking-up-wins-a-reprieve-for-mute-swans-in-new-york-state/

Mute Swans (photo: Brian Dunning / WWT).

Use of high-resolution satellite imagery for nest censuses

Recently, Fretwell *et al*. (2017) used 30 cm resolution imagery from the WorldView-3 (WV-3) satellite to count albatross nests directly. They tested the accuracy of the satellite method for directly counting individuals by comparing the satellite results to ground counts. Satellite-based counts were comparable to ground-based counts of Wandering Albatross nests on South Georgia, with a small overestimate due to the presence of non-breeding birds. In the Chatham Islands, satellite -based counts of Northern Royal Albatross in the 2015/2016 season were similar to ground-based counts undertaken on the 44 islands in 2009/2010, but much lower than ground-based counts undertaken on The Sisters islands in 2009/2010. They concluded that the ground-breaking resolution of the newly-available WV-3 satellite will provide a change in the ability to count large birds directly from space without disturbance, at potentially lower cost and with minimal logistical effort. This may have application for censusing breeding swans, and other waterfowl, in remote areas. Further information can be found in:

Fretwell, P.T., Scofield, P. & Phillips, R.A. 2017, Using super-high resolution satellite imagery to census threatened albatrosses. *Ibis* 159: 481–490. doi: 10.1111/ibi.12482).

Lead poisoning of swans in North America

Oregon (USA) Public Broadcasting has an article and an audio report on lead poisoning in Trumpeter Swans at **http://www.opb.org/news/article/how-to-save-a-swan-from-lead-poisoning/**

Max Planck Institute for Ornithology: Animal Tracker

The Max Planck Institute for Ornithology's Animal Tracker programme has an application for cell phones that allows one to track GPS marked animals. This might be of interest to swan biologists using GPS trackers. **https://www.orn.mpg.de/animal_tracker**.

US Fish and Wildlife Service swan survey reports available online

Trumpeter Swan survey reports and data are available at the following websites:

- **https://www.fws.gov/mountain-prairie/species/birds/trumpeterswan**
- **https://www.fws.gov/birds/surveys-and-data/reports-and-publications.php**

Tundra Swan identification by behaviour

Tundra Swans *Cygnus columbianus columbianus* can be distinguished from Trumpeter Swans at a distance by a particular display; Carrol Henderson has sent a photo of Tundra Swans near Dassell, Minnesota, USA on 6 April 2009 to illustrate. The behaviour is the "neck-stretching" display, in which Tundra Swans thrust their heads and necks forward, either to reinforce bonds with their mates or threaten other swans. This display is also commonly performed by the conspecific Bewick's Swan *Cygnus columbianus bewickii* but, in contrast, Trumpeter Swans *Cygnus buccinator* can be identified at a distance as they thrust their heads vertically up and down in display.

Tundra Swans near Dassell, Minnesota (photo: Carrol Henderson).

In memoriam

Roberto P. Schlatter: 1944–2016

Eileen Rees, Francisco Rilla & Yerko Vilina

Professor Roberto Schlatter at the 10th meeting of the Conference of Parties to CMS in Norway, 2011 (photo: Francisco Rilla).

It is with great sadness that we have learnt of the death of Professor Roberto Schlatter, who passed away in May 2016 at the age of 72 years. He was widely acknowledged for his expertise on the waterbirds and wetlands of South America; for many years, his research provided the main source of knowledge on Black-necked Swans and Coscoroba Swans in the region. He was also actively involved in international conservation frameworks – the Convention on Migratory Species of Wild Animals (CMS; also known as the "Bonn Convention"), the Ramsar Convention and the International Waterfowl and Wetlands Research Bureau (IWRB, now Wetlands International) – where he provided much-valued expert opinion on the protection of migratory species and their habitats not only in the Neotropical region but globally.

Roberto Schlatter was born in Santiago de Chile in January 1944 and took his first degree in veterinary medicine at the University of Chile in 1967. In 1972 he obtained his PhD in Ecology and Comparative Behaviour under the tutelage of Bill Sladen at the John Hopkins University, Baltimore, USA. At subsequent swan meetings, Bill delighted in reminding the now eminent Roberto that he was his student, which Roberto would take in good part!

Coscoroba Swans (photo: Pablo González).

Following completion of his PhD, Roberto joined the Universidad Austral de Chile as an academic and reached the position of Professor in 1981. From 1985 to 1987 he was the Director of the Graduate School of the Faculty of Science and was also Director of the Zoological Institute on two occasions, from 1993–1996 and from 2002–2008. Throughout his illustrious career he was actively involved in linking scientific research with conservation action. In Chile, he was a founding member and regional director of the Committee for the Defence of Fauna and Flora (CODEFF) office in Valdivia, founder and the first president of the Union of Ornithologists and Chile (UNORCH) in 1986, and also a founding member of the Association of Veterinarians of Wildlife (AMEVEFA).

Internationally he was renowned not only for his numerous scientific publications but for his work as a conservationist, including being involved in the work of the CMS from the outset. He was appointed to the Scientific Council of the CMS as the expert on neo-tropical fauna at the 3rd Meeting of the Conference of the Parties in 1991, and continued in this role for 20 years until 2011. He also served on various committees for the Ramsar Convention, including the Scientific and Technical Review Panel, the Wise Use Group (representing the Neotropics) and the Permanent Committee. Chile was the first country in

the Americas to join the Ramsar Convention and Roberto promoted the “Carlos Anwandter Sanctuary" wetland on the River Cruces as the first Chilean Ramsar site. The site, which supports numerous waterbirds including Black-necked Swans, was included on the Ramsar list when Chile became a signatory to the Convention in 1981, and it remains the only Ramsar site in the world to have resulted from an earthquake! At Roberto’s suggestion the Black-necked Swan also became the symbol of the region of Vadivia, “the River Región of Chile”.

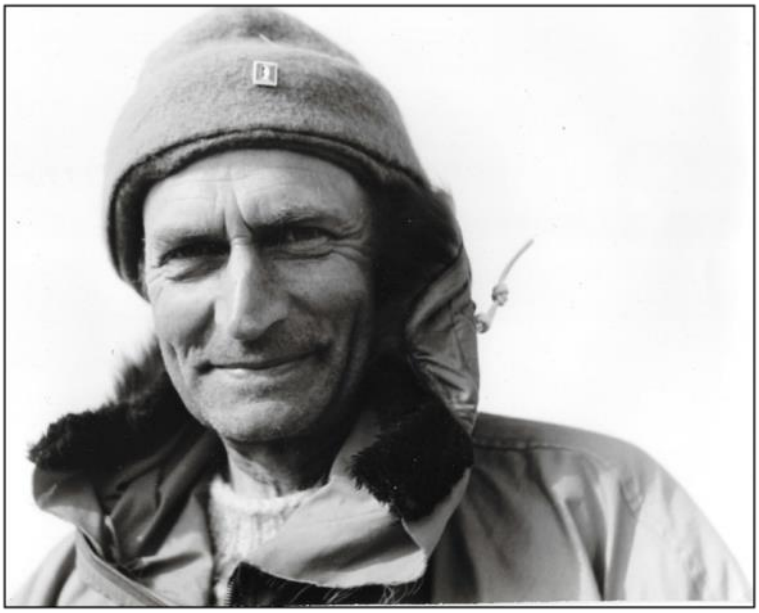
Roberto was long involved in swan research and conservation, presenting papers on Black-necked Swan demography and reproductive biology at the 3rd International Swan Symposium held in Oxford in 1989. At the meeting he consented to take on the roles of Species Coordinator for the Black-necked and Coscoroba Swans, and from 1994 onwards that of Regional Coordinator (Neotropics) for the Wetlands International / IUCN SSC Swan Specialist Group. Throughout the many years that he contributed to the Swan SG, he readily gave his valuable time and advice. He also continued his swan research among other commitments, for instance in analysing the effects of El Niño Southern Oscillation events and other more immediate anthropogenic influences on the numbers of Black-necked Swans at River Cruces Ramsar Site.

Roberto was invariably wise, kindly, generous with his time and passionate about the conservation of waterbirds and wetlands, in particular the Black-necked Swans and their habitats the River Cruces in southern Chile, for which he fought tirelessly. He was a delight to work with, will long be remembered and will be greatly missed by all those who had the honour of knowing him.

William J.L. Sladen 1920–2017

Eileen Rees & John Cornely

The pioneering avian researcher and conservationist, Dr. William (Bill) J.L. Sladen, died at his home in Warrenton, Virginia, USA in May 2017 at the age of 96 years. Throughout his long and remarkable life he embraced the use of innovative methods to study migration and was keenly aware of the importance of undertaking long-term studies. These, along with his immense energy and enthusiasm, were important for the development of his renowned research into Adelie Penguins in Antarctic and of migratory swans in North America.



Professor Bill Sladen on Wrangel Island in 1974.

Bill, born in Newport, Wales, was a great-grandson of William Booth (founder of the Salvation Army) and his parents (Hugh Sladen and Catherine Motee Booth-Tucker) were Divisional Commanders of the Salvation Army in Newport. Bill trained in medicine, completing his M.D. degree in London during the mid-1940s. Shortly thereafter he travelled to Antarctica for the first time, as medical officer on a two year expedition led by Sir Vivian Fuchs, where his observations of penguins at Hope Bay led him to divert from medicine to zoology. He sledged with dogs between study areas and was once spent 17 days alone there, living in a tent after a fire destroyed the base hut. On returning to the UK, he gained a D.Phil studentship at the Edward Grey Institute, Oxford University, where under the supervision of David Lack he wrote up his penguin research in a thesis entitled “*The Biology of the Pygoscelid Penguins*”. He was then awarded a Rockefeller Fellowship and moved to the United States, a move cemented by his appointment to the Faculty of Medicine at John Hopkins University where he taught comparative behaviour and ecology to graduate students and continued Antarctic ornithological research, up until his retirement as Emeritus Professor in the early 1990s. Here he embarked on the swan studies which engaged him throughout his career, with early works including colour-marking programmes to describe the Whistling (Tundra) Swans’ migration routes, and also use of radio telemetry to determine their flight height.

Following his relocation to America, Bill continued to maintain good contacts with scientists and conservationist in Europe and Asia. He joined Peter Scott on an expedition to ring Pink-footed Geese in Iceland in 1953 and was first coordinator of the International Waterfowl & Wetlands Research Bureau's Swan Research Group (which in due course became the Wetlands International / IUCN SSC Swan Specialist Group) following the first international swan symposium (held at Slimbridge) in 1971. IWRB had few contacts in the USA during the mid-20th century, so Bill together with the late Hugh Boyd brought North America into the IWRB fold. Bill was also instrumental in bringing the renowned Chilean ornithologist Roberto Schlatter (who had been his PhD student) into IWRB at an early stage.

During the Cold War period, Bill was active in forging relations with Soviet ornithologists at a time of when communication between scientists in western countries and those in the Soviet Union was particularly difficult, making an expedition to Wrangel Island to band Snow Geese with Russian colleagues in 1974, and attending the IWRB Meeting in Alushta, Crimea, in 1976. With Pelle Andersen-Harild from Denmark, Bill developed the international protocol for the use of neck collars on swans globally. His enthusiasm for this marking method (important for generating sightings of migratory swans in North America), which he felt was much more useful than plastic leg rings, led to some lively debate with swan researchers (including Peter Scott) at Slimbridge where Bewick's Swans are observed at closer quarters, but the protocol which aims to minimize the chances of duplicate markings remains in place to this day.

Dr. Sladen worked on a number of projects in North America with both Trumpeter Swans and Tundra Swans. His work with marked Tundra swans in Alaska, Maryland, and North Carolina helped delineate migration routes, stopover locations, and population range for the Eastern Population of Tundra Swans. This work also documented sex and age specific survival rates for these birds.

Bill advocated for ultra-light aircraft research to assist Trumpeter Swans to re-establish long lost migration traditions in eastern North America. Later on he supported using Tundra Swans as guide birds and considered ultra-light guided migration too costly and too dangerous for the pilots. Although he supported control of Mute Swans introduced into North America to reduce conflicts with native swans, Bill was opposed to killing swans of any species for any reason.

Bill Sladen and James King with a Whistling Swan caught for ringing in Alaska (photo: James G. King).

Because of that philosophy, he advocated oiling eggs of Mute Swans and utilizing same sex Mute Swan pairs on wetlands.

On retirement Bill concentrated on his swan studies and conservation work (particularly on Trumpeter Swans) at the Airlie Centre near Warrenton, Vigininia, which became his new research base. There he hosted the 4th International Swan Symposium at Airlie in 2001, which was a great success, with the proceedings subsequently published as a Special Issue of the *Waterbirds* journal. Bill was a longtime member and supporter of The Trumpeter Swan Society (TTSS) and the Society's endowment, the North American Swan Fund. Although he was missed at the 5th ISS hosted by TTSS in Maryland in 2014 – the first swan symposium that he had been unable to attend – he sent encouraging messages of support. At the TTSS/ISS Banquet, Bill was honoured with a Life-time Achievement award for his work with swans and support of swan conservation.

Throughout his long and illustrious career, Bill was a pioneer of long-term studies, regularly published papers from his swan research programmes, and was a passionate advocate against the hunting of swans. In a life that involved a wide range of interests and activities, was a leading figure in the swan research and conservation world for 50 years, from the 1960s well into the 21st century. He was awarded Member of the British Empire (MBE) from King George VI, the Polar Medal from Queen Elizabeth II, and the 1991 Explorers Medal (Explorers Club, NY). Two mountains in Antarctica are named after him. We will not look on his like again.

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Whooper Swans (photo: Robert BJ Falcon / WWT).

Announcements

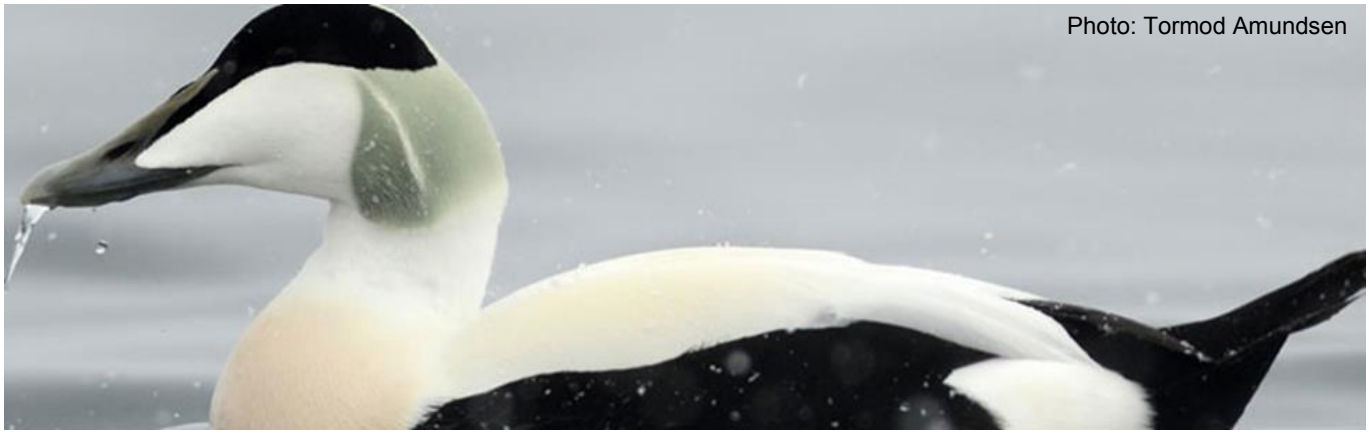

Photo: Tormod Amundsen

5th Pan-European Duck Symposium: Scotland

The 5th Pan-European Duck Symposium is to be held at the Field Studies Centre at Millport, on the Isle of Great Cumbrae in Scotland on the 16th–20th April 2018. Great Cumbrae is a small, but accessible, island in the Firth of Clyde, on the west coast of Scotland. The venue can be reached directly by public transport from Glasgow International Airport.

There will be three full conference days and one day for a field excursion. The Organising Committee comprises Chris Waltho, Richard Hearn, Colin Galbraith and Matthieu Guillemain. The Scientific Programme Committee is chaired by Prof. Colin Galbraith. If you have specific enquiries, please contact the chair of the Organising Committee, Chris Waltho.

Check this website **http://www.ducksg.org/events/** for updates on the programme and registration.

Photo: Juliius Morkūnas

18th Conference of the Wetlands International / IUCN Goose Specialist Group, Lithuania

The 18th conference of the Goose Specialist Group of the IUCN Species Survival Commission and Wetlands International will be held at the campus of Klaipėda University, Klaipėda, Lithuania, on 27–30 March 2018.

The event will be hosted by the Klaipėda University and the Baltic Valley Association, on behalf of the Goose Specialist Group. The conference will include plenary talks by leading goose experts, oral and poster presentations, symposia and round table discussions, as well as a field trip to the Nemunas River floodplains.

Topics will include a variety of research fields, including the impacts of global change on waterfowl and populations, migration and reproduction ecology, eco-physiology and the management of waterfowl. Other topics related to goose ecology, research and threats are also most welcome.

Abstract submission and registration is now open on the conference website. Proposals for organising the symposia, special workshops and round table discussions should be submitted by 1 October 2017.

Important dates are: 15 November 2017 deadline for abstract submission; 15 January 2018 deadline for early bird registration; 20 March 2018 deadline for all registrations.

For additional information and updates, please visit the conference website: **http://apc.ku.lt/geese**.

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Whooper Swans (photo: Dan Evans / WWT).