

Big Beaks Go Global!



Black-capped Chickadee by Susan Fenn



The BTO's Big Garden Beak Watch has gathered hundreds of reports of birds with beak deformities. With birdwatchers keen to find out more, Tim Harrison teams up with Dr Colleen Handel, a leading researcher into beak deformities in Alaska, to provide an exciting international perspective.

CLOSE TO HOME

The response to Big Garden Beak Watch has been impressive. At the time of writing, over 300 birds with beak abnormalities - encompassing more than 25 species - have been recorded. A quarter of deformed individuals have been Blackbirds and nearly a third Blue Tits. The next most frequently affected species are Great Tit (8%), Starling (7%), Rook (5%) and Dunnock (3%).

MEANWHILE, ACROSS THE WATER

It is not just close to home, however, where big beaks are attracting attention. An alarming cluster of beak deformities, not caused by obvious injury, has arisen among wild birds in Alaska. Here, more than 2,500 individuals of 30 different species have now been documented, primarily during the past decade. Some of these deformities involve minor overgrowths or crossing of the tips, but many birds sport grotesquely misshapen bills. The form of the abnormalities and the species affected in Alaska are strikingly similar to those reported in Britain.

Two species comprise the bulk of the Alaskan records: the Black-capped

Chickadee (83% of reports) and the Northwestern Crow (6%). Chickadees are the North American relatives of the tits, with the Black-capped Chickadee being similar in size and appearance to our Coal Tit. Interestingly, two other chickadee species - the Boreal and Chestnut-backed Chickadee - have rarely been documented with beak deformities, a pattern similar to the puzzling discrepancy in numbers of reports between Blue and Great Tits here.

How does one make sense of these findings? Is there a global link? The sudden appearance of a large cluster of animals with gross abnormalities can signal a significant change in an ecosystem. In North America, these birds have garnered much attention from the media, and local birding and conservation groups, with the U.S. Government launching a comprehensive research program as soon as an abnormal cluster was identified in the 1990s.

Research has focused first on tracking deformities to determine the geographic scope of the problem, the species affected and any trends through time. This has been achieved through the help of the Alaska



Northwestern Crow by Charlie Finn

▲ Northwestern Crows, relatives of our Rooks, are resident along the Pacific Coast of North America. Steller's Jay, Black-billed Magpie, and Common Raven are also frequently affected.

Backyard Birders, who are the equivalent of BTO Garden BirdWatchers, with additional help from the Cornell Lab of Ornithology's FeederWatch Project, to define the pattern across the rest of North America. The second focus has been on the more difficult problem of what is causing these deformities. Both strands of this important research are being directed by scientists at the U.S. Geological Survey's Alaska Science Center.

WHY MIGHT DEFORMITIES OCCUR?

This is the big question, and Dr Handel and her colleagues have been narrowing down causes. Ringing studies have been set up at several sites across the region. Nest box studies of small cavity-nesting birds, such as Black-capped Chickadees, have also commenced. Individual chickadees with and without beak deformities have been kept in a controlled aviary setting to study the birds carefully. In addition, tissue samples are currently being examined for evidence of contaminants, disease organisms, nutritional imbalances and genetic problems.

The first important finding is that this phenomenon can be classified as an epizootic - a widespread disease attacking many individuals simultaneously. In Alaska, this epizootic appears to have begun in the early 1990s, increased exponentially until about 2000, and then levelled off. The cluster in Alaska is significant: 2,160 reports of chickadee beak deformities as of 2009 compared with only 31 reports from elsewhere in North America.

Physical examination of thousands of chickadees and hundreds of crows in Alaska, during ringing studies, suggests that these beak deformities do not appear until individuals are at least six months old. Currently about one of 15 adult chickadees and an astounding one of six adult crows in the affected region in Alaska has a beak deformity. Many ringed birds that had been apparently 'normal' for several years suddenly developed a beak deformity. Deformed chickadees were also found in remote areas, suggesting that the cause is widespread and not particularly associated with bird feeding stations.

High rates of congenital beak malformations have twice been found in North America, both associated with exposure to contaminants - organochlorine compounds in the Great Lakes and selenium in California. However, the virtual absence of beak deformities among young birds in Alaska suggests a different pattern

- a disorder resulting from a latent (hidden) developmental condition or exposure to something as an adult. Organochlorine compounds and selenium are unlikely to be causative agents in Alaska and, while there is evidence of some genetic damage among the affected birds, there is nothing to suggest that the condition is inherited. Some affected birds had evidence of infections, but these appeared to be secondary in nature, most likely arising because of the birds' impaired state of health. Abnormal effects on internal organs typically associated with nutritional imbalances have not been observed.

KERATIN DISORDER

The bones of the beak are covered by a thick, modified layer of skin that, in most birds, consists of hard, densely packed, dead cells filled with keratin. This keratin sheath is much like a person's fingernails in that it is constantly growing and being replaced as it gets worn or broken through use. Could the beak deformities be caused by problems with the underlying bone or by insufficient wear of the keratin sheath?

High-resolution radiography of abnormal beaks has not produced evidence of problems with the underlying bone. However, measurements revealed that the keratin layer was growing twice as fast among chickadees with beak deformities, on average, as among those with normal beaks! Thus, the abnormalities are being caused not by lack of wear but by extremely accelerated growth. Once the tips of the beak no longer meet properly, the keratin sheath can grow unchecked. Dr Handel and her colleagues are now digging deeper into the causes of this accelerated keratin growth.

FUTURE WORK

Big Garden Beak Watch is ongoing. If you have ever seen a bird with a beak deformity in your garden, please fill out a survey form. In Alaska, research continues into identifying the cause of beak deformities. Results will be posted on the Alaska Science Center website

Weblinks

Alaskan work: http://alaska.usgs.gov/science/biology/landbirds/beak_deformity/index.html

More about this interesting subject can be found in our special online supplement via www.bto.org/gbw

▼ Birds in Alaska and at home often adapt to overgrown beaks by feeding with their heads tilted to one side.



Black-capped Chickadee by Laurie Green