

How Birds Tick.

Berwick Wildlife Group's first talk of 2012, "Birds, Brains and Breeding; timing events in the avian calendar" was delivered by Dr Alistair Dawson on the Centre for Ecology and Hydrology. Alistair has been working on the method birds use to time their major life activities – breeding, migration, moulting and so on – for several years, and his findings are fascinating.

Birds' calendars are complex. For example, shore birds like Oystercatchers, Redshank and Dunlin may winter on the Tweed Estuary but move inland to breed in spring. Others such as Sanderling and Turnstone must migrate further north to nest. Swallows arrive in Berwick to breed here in April and stay until September. House Martins arrive and leave a little later. Swifts also rear their families here but leave for the south much earlier. In late summer and early autumn Goosanders and Mute Swans congregate on the Tweed Estuary to moult. Other bird species, like Robins and Starlings, are with us all year round, although they may not necessarily be the same birds in your garden all year as some individuals of these species migrate.

All these events have to be carefully timed and co-ordinated, to make the most of opportunities for feeding, breeding and moulting at the optimum place and time of year. Getting it wrong will be costly for the birds. For instance, Great Tits in poor territories may try for a late second brood, but their moult will then be delayed, and the new feathers will be of low quality so the adults may not survive the winter. Long-lived seabirds may find it better to abandon breeding in a bad year or if they lose their chicks, so they can begin moulting at the right time and ensure high-quality plumage for their winter at sea.

Spring and early summer is the best time for birds to breed, indeed their sex organs are only able to function then. Birds grow them each year, going through "puberty" in preparation for breeding every autumn, a process that takes several months. Comparing the temperatures of last winter and this one (so far), it is obvious that temperature is an unreliable guide to tell birds, a few months in advance, when they need to be ready for breeding. Instead the changing length of days and nights triggers the development, acting directly on photoreceptor cells in the brain through the top of the head (not through the birds' eyes). The photoreceptor cells cause production of a cascade of hormones, changing the birds' body development and behaviour. Using diurnal changes as a trigger enables birds to adapt to different latitudes, for example Blackbirds in southern England start to breed 2 weeks earlier than those in Scotland, but they complete the breeding phase and enter moult at the same time.

Since the initiation of most birds' breeding seasons is caused by day-length, climate change does not alter the timing. However development of plants, and of insects, a vital food-source for nestlings, is temperature dependent, so if it is unusually warm they may not be available at the "right" time. Also, higher summer temperatures may cut short birds' nesting seasons by bringing on the moult. Great Tits in the Netherlands now usually only have one brood, rather than two as they did when summers were cooler. Therefore, although most temperate birds rely on day-length to manage their lives, climate change is already having an adverse effect on breeding success of some species.