

## An overview of bird phenology

### What is phenology?

"Phenology" is derived from the Greek word *phaino*, meaning to show or appear. Phenology refers to recurring, seasonal, plant and animal life cycle stages, such as leafing and flowering, maturation of agricultural plants, emergence of insects, and migration of birds. It is also the study of these plant and animal life cycle stages, especially their timing and relationships with weather and climate. Naturalists, farmers and gardeners, herbalists and hunters have always been attuned to these seasonal changes, and so there is much country lore about annual cycles and co-occurrences. In some European countries, the national weather service collects citizen reports on phenological data about common species, and these data are used in advising farmers about when to plant and harvest. Records of these data have provided important evidence about changes in climate in New England and around the world, and have other scientific value, as well.

This Brief provides basic background about key seasonal changes that are studied ("phenophases") in birds; other Briefs detail specific methods for data collection.<sup>1</sup>

### Bird phenophases

Here are some observations that are made of bird phenology:

*Individuals present* – e.g. at feeders, or noted in some other area regularly visited.

*Arrival of migrating birds.* Some species regularly travel great distances to specific wintering areas, some just shift southward as far as they need to, to find hospitable habitat for the winter months. Some species return one at a time, some in groups, for example, you are likely to see large numbers of male American Robins or Red-winged Blackbirds, which return some weeks before the females.

Note also that winter visitors, which are not long-distance migrants, may shift from further north into your area, either to spend the winter in your area, or just to pass through on the way further south. Spring coloration/mating plumage. In some species, the males change color as mating season approaches (a common sight in New England is male goldfinches replacing their dull winter plumage with bright yellow).

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<sup>1</sup> And see USA-NPN National Coordinating Office. 2012. *USA-NPN Plant and animal phenophase definitions*. USA-NPN Technical Series 2012-004. [www.usanpn.org](http://www.usanpn.org).

*First song.* There are numerous guides to bird song, including on websites such as the Cornell Ornithology Lab, which can help you learn to recognize species of interest by ear as well as eye.

*Courting, mating or nesting.* In many species, it's easy to tell that the male and female are negotiating their pair bond in the spring – the adult male is seen feeding an adult female, or displaying with wing gestures, or tail fanning, or persistent following or "dancing". A good guide to bird behavior (like those of Donald and Lillian Stokes) can tell you about typical behavior for species you're interested in, and of course the Web can provide a range of photos and other resources.

*Young visible* – either in nests or moving around (e.g. ducklings/goslings walking or swimming after parents).

*Fledglings.* Juvenile birds with flight feathers appearing – they may be seen flying, or attempting to fly.

### What does it mean? How does phenology tell us about climate?

Phenological events are triggered by environmental cues taking place during the year. Thus, one year's observations are interesting, but don't tell us about trends. If, however, a phenophase takes place earlier and earlier (or later and later) than reported in the past, it suggests that the organisms are reflecting a real trend or shift. Researchers, including those at Manomet, have shown that several species have altered their migration times in response to the changing climate; and many species are also changing their ranges northwards, following the warming temperatures.

There are some species that are able to adjust their behavior to match the change in climate, and some that cannot. This means that seasonal events like bird migration and insect emergence will start to fall out of synchrony with flowering and fruiting. This causes problems for the animals that don't have food when they expect it. There is evidence, for example, that some birds are arriving too late to get the caterpillars they need to feed their young – the insects are responding to the earlier warming of the spring in their location, but the birds, which have spent the winter far away in the south, have not gotten any "signal" to start north earlier in time to harvest the emerging caterpillars. Many such linkages are likely to be broken or altered as climate change continues, and your careful observations can help paint the picture!