



## **Migration: Key Stage 3** **SI – S3 in Scotland**

## **TEACHER NOTES**

### **Migration**

Migration means the movement of bird and animal populations occurring at predictable times of each year, between breeding and non-breeding areas. Species that migrate may do so because the climate offers a better environment for feeding, and on their breeding grounds better conditions for rearing young.

See [www.bto.org/migwatch/text](http://www.bto.org/migwatch/text) for more information

Migration can also refer to a daily migration, such as up and down a column of water, e.g. by deep sea anglerfish.

- Every species has a niche, a specific place within its environment and community that affects its survival as a species.
- Migrating species are unique in that they have adapted to at least two different habitats. Therefore they belong to two different ecosystems (two different communities of organisms) at different times of year.
- Climate helps to define an ecosystem. The climate of a place may be defined as a "composite" of the long-term prevailing weather that occurs at that location. It is the normal weather pattern for that place and we know that it will recur, with some small variations perhaps, from year to year. Climate is usually described in terms of the familiar elements of the weather: Temperatures and precipitation are the essential indicators, but others are sunshine, wind, cloud cover, atmospheric pressure and humidity.
- Many migrations, in one form or another, occur due to changes in local climate and the advantages (or disadvantages) conferred by these changes.
- Food supply is often the driving force behind migration. As seasonal changes in climate occur, then migrating species are forced to find supplies of food elsewhere.

When explaining migration, the students could be encouraged to think of other examples, not necessarily using birds, e.g. whales, turtles or salmon

### **Curriculum links England, Wales and Northern Ireland**

#### **Geography at key stage 3**

Can the earth cope? Ecosystems, population and resources

#### **Science at key stage 3**

Environment and feeding relationships; Variation and classification; Ecological relationships

### **Scotland**

#### **Social subjects levels C—E**

Environmental issues and sustainability

#### **Science levels C—E**

Interaction of living things with their environment

### **Discovery**

A variety of data has been recorded over the years. Often the data collection has been as a result of one or two enthusiasts. This has led, sometimes to data being fragmentary. Data collection relied on the individual recorder or recording instrument.

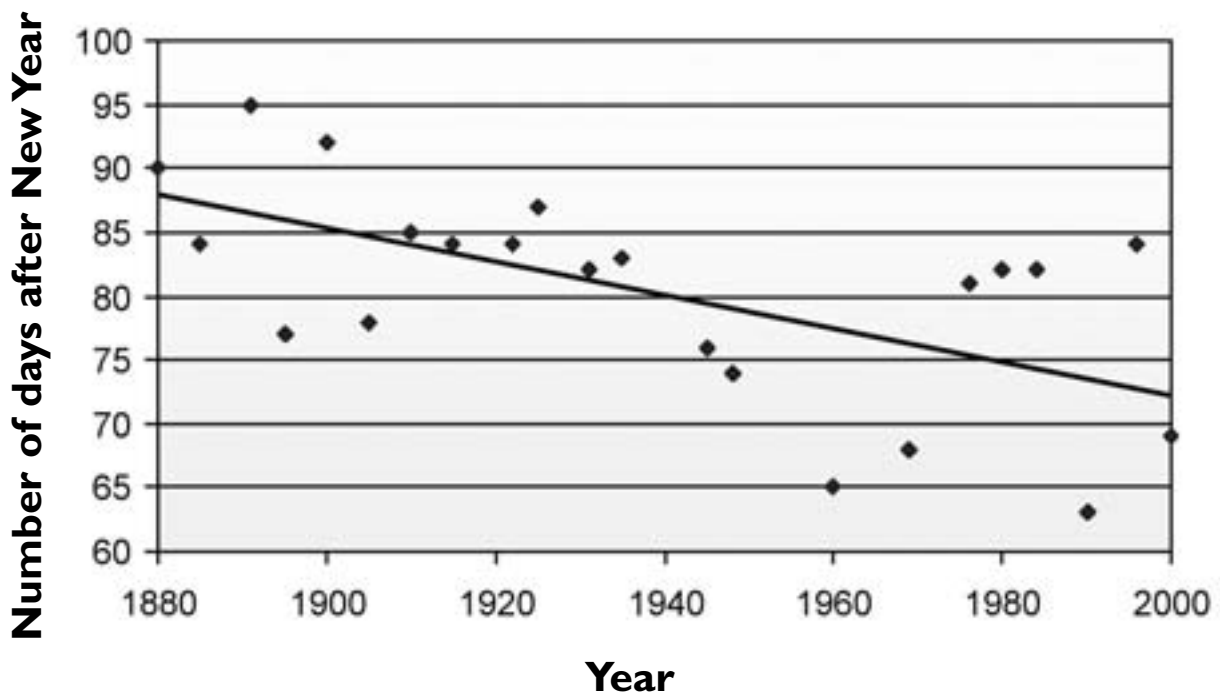
Nowadays the BTO, Woodland Trust and other organisations are co-ordinating a detailed recording of various seasonal changes. These include first bud break of many trees, such as oak and the arrival of migrating birds.

See [www.phenology.org.uk](http://www.phenology.org.uk)

[www.bto.org](http://www.bto.org)

**Q1 – Q3** The graph students draw should show a steady trend of an earlier arrival for these migrating birds over the period of time recorded.

### First arrival for migrating Chiffchaff in UK





## Phenology

- Q4.** The graph in the student worksheet shows increasingly higher mean temperatures recorded in the UK over the last century. The graph shows temperatures in April over the last 20 years. Spring appears to be starting earlier in the UK in recent years.
- Q5.** Scientists believe that there is a connection between warmer springs and earlier bird migration dates.
- Q6.** A variety of extra evidence would be needed to support this argument, e.g. climate data from other parts of the UK and for other months, plus the ability to cross check to see if warmer years meant earlier bird arrival.

## Climate Change

Records of global temperature and global carbon dioxide levels have been recorded since the early 18th century. In fact carbon dioxide levels before that time can be monitored using ice core samples. Data recorded so far shows that up until the 20th century carbon dioxide levels have been stable since before 1000. Over the last century the levels of carbon dioxide and other greenhouse gases have begun to rise and this has been matched by an increase in global mean temperatures. The increase has been exacerbated over the last 50 years. (e.g. see <http://www.umich.edu/~gs265/society/greenhouse.htm>). The year 2002 was the second warmest year on record, beaten only by 1998. It was the 24th warmest year in a row. 1998 was the warmest year of the warmest decade of the warmest century of the last millennium.

European natural ecosystems are generally fragmented and disturbed, making them very sensitive to climate change. Most of Europe experienced temperature increases this century that are larger than the global average, and

precipitation generally increased in the north but decreased in the south. The warming is clearly noticeable in mountain regions by the widespread retreat of glaciers in the Alps. The change of temperature as a result of projected climate change due to global warming might change the availability of food, space, shelter, or water; upset the predator/prey balance of an ecosystem; increase susceptibility to pests/disease; change the frequency of natural hazards such as fires, droughts, and flooding.

Plant and animal species are also responding to the changes by shifting their ranges northward and by changing the timing of their activities to coincide with changing temperatures. The fragmented nature of the European landscape, however, may make it difficult for less adaptive species to respond to continued climate change. These effects might lead to local population increases for those species that can adapt quickly. For species that cannot adapt, the species will decline or in some cases become extinct.

- Q7.** Hydrogen is NOT a greenhouse gas.
- Q8.** Sources of greenhouse gases include human activity – carbon dioxide and sulphur dioxide released during fossil fuel combustion and industrial processes, intensive agriculture (e.g. methane from cattle) as well as natural events in the carbon cycle, such as decomposition and in the water cycle, such as evaporation.
- Q9.** Increased atmospheric greenhouse gases mean that more infrared radiation is reflected back to the Earth's surface, causing increased warming of the Earth's surface and lower atmosphere.
- Q10.** Global temperatures are predicted to rise.

## Adaptation

Chiffchaffs migrate to the UK from sub-Saharan Africa

In the Savannah of Africa climate change will mean:

- Even hotter temperatures.
- A change in weather patterns may mean that droughts may become more frequent and at unexpected times of the year.
- The change in the timing of the seasons may change but this may be different to the change in timing in other countries.
- There may be more storms
- There will be less water available.

In the UK this will mean:

- The temperatures will be warmer throughout the year.
- Spring may start earlier and, therefore insects may be around earlier in the year
- The country will be more prone to flash flooding
- There may be more storms
- There will be more rain

Increased temperature in Africa may lead to, for example, a reduction in food supply. Overwintering birds may not find enough food to survive.

Increased chance of storms at unexpected times of the year means that the birds may have a much more hazardous migration journey.

There could be differences in the timing of seasons on different continents, so that they could leave Africa too early or too late. Providing that they managed the journey, birds leaving early may not be able to find enough food on arrival. Birds leaving too late may arrive in the UK and not find any nest sites, as they may have already been taken up by other birds.

Some migrating species, such as chiffchaff, have responded to climate change in the UK by increasingly overwintering here.

For further information on effects of climate change in Europe and the UK, see

[www.climatehotmap.org/euroruss.html](http://www.climatehotmap.org/euroruss.html)

**Q11.** Yes, chiffchaffs seem to be adapting well to changing conditions by changing their behavior to suit.

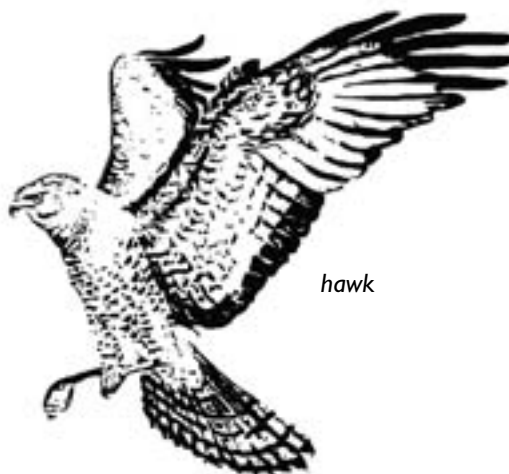
(You may wish to describe some of the likely impacts of climate changes in Africa and the UK as detailed above)

**Q12.** There may be negative aspects, such as competition for food and space with species that normally live in the UK all year round.

## Common sense solutions

**Q13.** It is thought that changes in temperature, season and arrival of migrating birds may all be linked.

The Union of Concerned Scientists website has some very good points, [www.ucsusa.org](http://www.ucsusa.org)



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