Fantastic journey: why animals are driven to migrate

As the seasons turn, millions of birds and animals cross oceans and continents in order to stay alive. But climate change might have unpredictable consequences for what is a healthy ecosystem

Graphic by Pete Guest

With the beat of a wing, the splash of a flipper, or the stomp of a hoof, they're off. As the seasons start to turn, animals gather in every corner of the world. Assembling in groups measured in millions, travelling thousands of miles through air, water and snow, they often have one thing in common: the search for food.

"Generally, most migrations are driven by food and its seasonal availability," says Dr Grant Hopcraft from Glasgow University. "That changes either across things like latitude – for instance, birds flying from the tropical regions to the temperate zones – or often you also have animals moving up elevation gradients, such as elk in North America moving up the Rockies. An excess of food allows animals to put on weight quickly and if you get fat fast, it means you can [produce] offspring."

While working in the Serengeti, Hopcraft and his team have been able to track wildebeest and zebra using GPS collars as they travel. But this is only one of many methods employed by scientists over the years to work out where animals roam.

"Some of the traditional techniques have been aerial censuses, and more recently, camera traps. In some animals they're using [chemical] isotopes [in teeth], because isotopes can give quite a defined signature of the location at a specific time," says Hopcraft.

What these migrations tell us can be very interesting: "Here is an organism, a biological indicator that is sampling a huge part of the globe within a year, in fact sometimes within just one month." While they travel vast distances, crossing oceans and continents, these animals can also help us to understand the spread of diseases such as the 2004 outbreak of Avian flu (H5N1) in Asia.

As humans continue to alter the environment and climate change progresses, this poses many problems for migrating species. "I think [climate change] is the pressing question at the forefront of the minds of people who are studying migrations," Hopcraft says. "Migrants have typically evolved over systems which are very predictable, and suddenly we're potentially going into a period of time which is less predictable."

Even with many migrations in decline due to mankind's meddling, there is a glimmer of hope. The past 50 years has seen the population of wildebeest in the Serengeti rise to a tumultuous 1.3 million animals thundering across the savannah as they chase the rains. This has been down to a number of aspects, including the eradication of rinderpest (introduced by European farmers), the successful management of tourism, and allowing the herbivores to migrate in a landscape free of barriers.

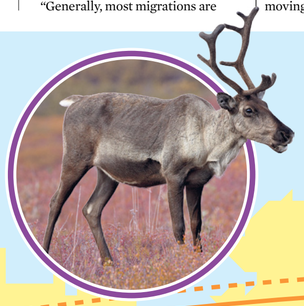
"I kind of like to think of migrations as inhalations and exhalations of a healthy ecosystem," says Hopcraft. "If their populations decline ... then that's a fairly good indicator that something global, something big, is happening."

Josh Davis

WILDLIFE ON THE MOVE

1. THE GREY WHALE

These whales spend summer in their northern feeding grounds before migrating south to winter and breed. The western population, found off the coast of Asia, is thought to stand at fewer than 150 whales, while the eastern population numbers nearly 20,000. An eastern grey whale heading to waters around Baja, California, can cover up to 20,000km in a round trip



2. PORCUPINE CARIBOU

Caribou, or reindeer, roam across North America, northern Europe, Asia and Greenland. The Porcupine herd, whose migration patterns are shown here, have been well studied thanks to the use of satellite collars.The herd spends spring on the Arctic coastal plains, with winter ranges including the Ogilvie mountains. The Porcupine river running through the latter gives the herd its name

3. THE ARCTIC TERN

This small bird covers around 70,000 km in a round trip. Strapping trackers to the backs of these birds, scientists mapped their S-shaped route in 2010, revealing that they take a pit stop just north of the Azores. The birds begin to head south in August and spend around five months in northern Antarctica before starting their return journey to the Arctic in April

4. THE EUROPEAN EEL

With European eel populations in decline the multinational Eeliad project was set up to shed light on adult migration from European freshwaters to the Sargasso sea, where the eels spawn and die – larvae drift back in a journey that is thought to take up to three years. Tagging experiments elucidated details of the early stages of the eels' migration, as well as insights into predation

5. NORTHERN WHEATEAR

Northern wheatears have breeding grounds across the northern hemisphere. In 2012 researchers revealed that those breeding in Alaska fly up to 15,000km across Asia to sub-saharan Africa where they winter, while those from the eastern Canadian Arctic cross the north Atlantic in a 3,400km journey to Britain where they stop off before heading around 4,000km south

7. BAR-TAILED GODWIT

The bar-tailed godwit is no stranger to a long-distance flight. Recent satellite tagging has revealed the the Alaskan breeding subspecies can travel 11,500km across the Pacific Ocean to New Zealand (without stopping) in fewer than 10 days. The return journey takes the birds from New Zealand to eastern Asia where they refuel before returning to Alaska

8. MONARCH BUTTERFLY

It takes around four generations of Monarch butterflies to complete the annual migration cycle, with the first generation emerging in northern Mexico and the southern states of the US before flying to northern America and Canada. It is the fourth generation that make the epic journey to Mexico where they hibernate over winter before flying north to breed – and the cycle begins again.

10. WHITE-BEARDED BLUE WILDEBEEST

The 1.3 million western white-bearded wildebeest of the Serengeti Mara ecosystem migrate in a clockwise loop every year in search of new land to graze. But they aren't the only ones: 250,000 zebra and around 300,000 gazelle also migrate across the plains of Kenya and Tanzania. A recent study found both wildebeest and zebras take action to avoid humans

6. ORANGE-BELLIED PARROT

Orange-bellied parrots nest in south-west Tasmania but by March they head north to their wintering grounds in the salt marshes of Victoria and south-east Australia, stopping at King Island en route. These bright birds are one of only a tiny handful of migratory parrot species, but they are on the verge of extinction with fewer than 50 thought to remain in the wild

9. GLOBE SKIMMER DRAGONFLY

Recent work by biologist Charles Anderson, drawing on observations and isotope studies, suggests these dragonflies cross the ocean in a multi-generation migration from India to the Maldives and then on to east Africa – and back – in a journey that is estimated to cover around 18,000km. It is thought the insects hitch a ride on high-altitude winds to follow the rains

Area of detail

Area of detail

PACIFIC OCEAN

ATLANTIC OCEAN

INDIAN OCEAN