INCREDIBLE JOURNEYS ACROSS EARTH – BIODIVERSITY

Dr Susan Bliss

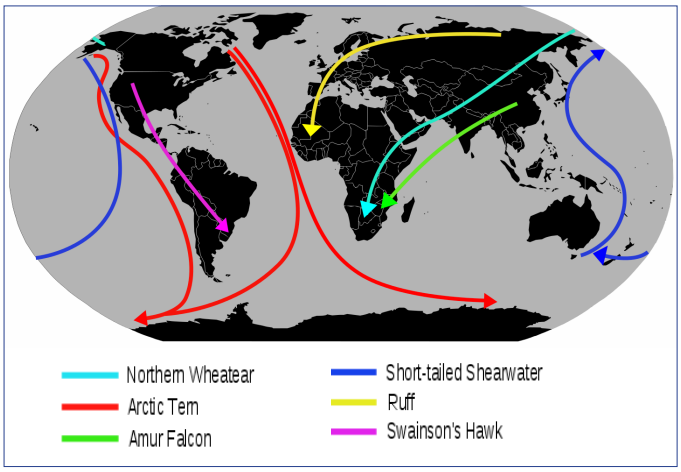
Have you wondered why migrating animals such as birds and whales, never get lost as these environmental resources do not possess a global positioning system (GPS)? Instead loggerhead turtles use the Earth's magnetic field for their 12,900 kilometres journey around the Atlantic Ocean, starlings use the sun and Mallard ducks use the stars.

Migrating for survival

Every second, millions of migratory species are on the move. Migration by hoof, wing or fin is usually tied to seasonal changes in weather, food and breeding patterns. Migration is crucial to the survival of species with some moving to find minerals (e.g. African elephant), to flee from overcrowded conditions (e.g. Norway lemming) or in search of a mate (e.g. Australian giant cuttlefish).

Of the 10,000 bird species about 1,800 are long distance migrants such as the tiny Arctic tern travelling 14,800 km annually between the Arctic and Antarctic circles. Millions of Canada's migratory birds nest in the Gulf of Mexico but species were threatened after an oil spill in 2010.

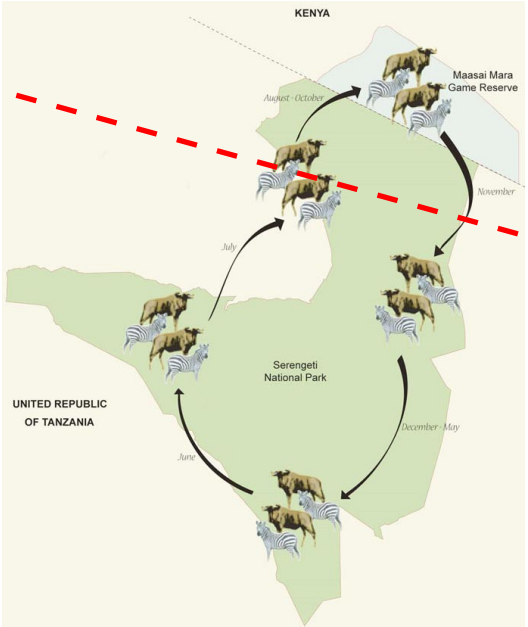
Figure 1. Migration of birds – flyways



Source: http://upload.wikimedia.org/wikipedia/commons/7/75/Migrationroutes.svg

Over six million hooves pound the Serengeti plains in Tanzania. More than 200,000 zebras and 500,000 gazelles join the 2 million wildebeest's trek for fresh grasslands and water. Along the ancient 500 kilometre migration route, lions feast on gazelles and elephants trample down trees. Baby giraffes keep pace with the migration as after birth as they stand in half an hour and run in ten hours. The proposed development of a highway through the Serengeti would threaten the migratory path of the wildebeest as their role of consuming vegetation and redistributing nutrients via their urine and dung would collapse.

Figure 2. Migration in the Serengeti, Africa



Source: http://www.yenwen.net/Tanzania11/Tanzania11_Serengeti.htm

Task

- Put on latitude, longitude and scale

– – – – Proposed Serengeti Highway would be a barrier for migrating animals

Figure 3. Zebra's migrating in the Serengeti

(Source: J.Bliss)

Patterns of migration under stress

Every year 120 million red crabs transform Christmas Island in Australia into a red carpet when they move from the plateau to the ocean to release their eggs. As migration takes 18 days 'crab crossings' have been built across roads and tunnels built under roads to reduce deaths. Other migration patterns include:

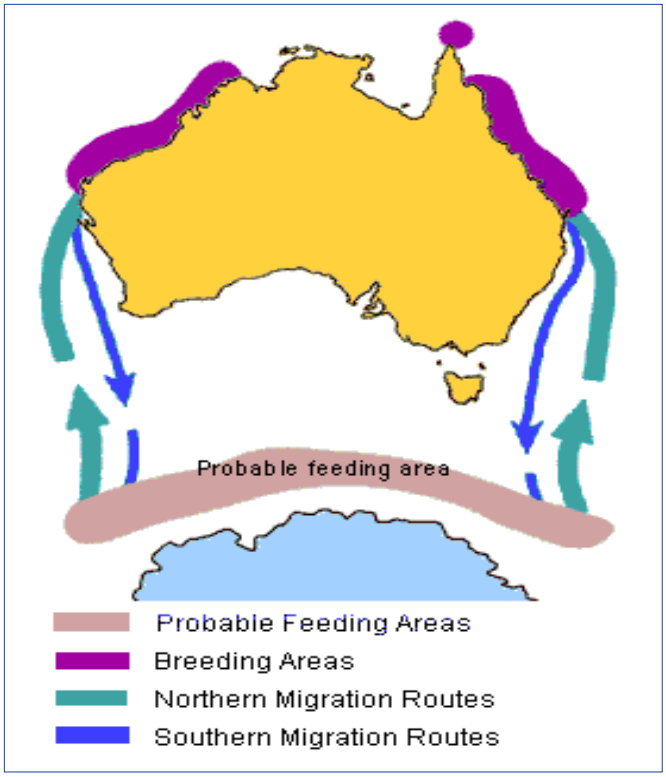
- **Altitudinal migration:** animals living in mountains move to lower altitudes in winter in Switzerland, referred to as transhumance.
- **Latitudinal migration:** in the northern hemisphere 3 million caribou travel south in winter to find fresh grazing grounds.
- **Vertical migration:** zooplankton swims a vertical distance of 900 metres every day in search of food.

The migratory patterns of animals are under stress from habitat destruction, fences, highways, agriculture, urbanisation, dams, wind turbines and climate change. In some cases species' habitat becomes permanently inhospitable from fire, flooding or when humans drain wetlands or log forests.

Wandering whales

Water depth, salinity, sea floor topography and location of food play a role in the migration of whales. Approximately 40 species of whales and dolphins migrate between June and October occur the Australian coast. Whales spend summer in Antarctica where they feed on prawn like krill and migrate north to warmer waters to give birth and mate. Human activities adversely impact on whales, such as boat collisions and poisoning from toxic wastes. The Australian **Environment Protection and Biodiversity Conservation Act** aims to protect migratory species.

Figure 4. Migration of whales around Australia



Source: http://www.abc.net.au/oceans/whale/spot.htm

Facts

- Whale watching generates $2.1 billion per annum in tourism revenue worldwide, employing around 13,000 workers.
- Whales stock up on food as they don't eat while travelling.
- Birds have hollow bones to enable them to stay high in the air for a long distance.
- Eels living 30 years in Sydney's Centennial Park, swim 2000 kilometres to New Caledonia's deep water to lay 20 million eggs, then die.

A pod of sperm whales off the coast of Mauritius. Photo: Gabriel Barathieu Source: Wikimedia Commons

Activities

1. Explain why animals migrate.
2. Describe the different patterns of migration.
3. Analyse the impact of an oil spill on migratory birds and marine species.
4. Refer to 1:
   a. Explain the movement of the Arctic Tern. Use Google Earth or an Atlas to measure the distance the bird travels.
   b. Discuss the movement of the Short-Tailed Shearwater.
   c. Australia's wetlands provide a range of feeding grounds for migrating birds. Discuss their importance. This website will assist your research http://www.environment.gov.au/biodiversity/migratory/waterbirds/wetbrds.html
5. Refer to 2:
   a. Explain the yearly movement of the wildebeest and zebra.
   b. Critique the impact of the proposed highway on migration.
6. Refer to 3:
   a. What seasons do whales move north and south?
   b. Explain why whales move.
   c. Discuss how these species are protected.
   d. There are whale watching businesses along Australian coasts. Imagine you were employed in the industry. Where would you locate the business? Present a poster or PowerPoint presentation promoting the business.
7. Explain how animal migration patterns will need to adapt to climate change, logging, hunting and fishing to survive.
8. Refer to the Internet or Atlas and draw a map locating Christmas Island. Discuss the problems of managing the migrating crabs.
9. Create a glogst on migrating species and the importance of global sustainable management in their interconnected world.
10. Fieldwork: Identify the different animal species in your local area. Find out where they migrate, when and why.
11. Google Earth and virtual fieldwork: Refer to the following websites and discuss the importance of migration to the survival of these species.
    a. Google Earth: Flight path of the Arctic Tern http://www.gearthblog.com/blog/archives/2012/02/the_tale_of_the_arctic_tern.html
    b. Google Earth: Track Sea Turtle migrations in Google Earth http://www.gearthblog.com/blog/archives/2012/01/track_sea_turtle_migrations_in_goog.html

ICT

Many Moves of Migration
http://education.nationalgeographic.com/education/activity/many-moves-of-migration/?ar_a=1

Loggerhead sea turtles face an uncertain future
http://education.nationalgeographic.com/education/multimedia/ocean-drifters/?ar_a=1&ar_r=999

Wildebeest Migration – Crocodiles Attack
http://education.nationalgeographic.com/education/multimedia/wildebeest-migration/?ar_a=1&ar_r=999

Monarch Migration Mystery
http://education.nationalgeographic.com/education/news/monarch-migration-mystery/?ar_a=1

To the ends of the Earth
http://education.nationalgeographic.com/education/news/ends-earth/?ar_a=1

Incredible Journey
http://education.nationalgeographic.com/education/news/incredible-journey/?ar_a=1

Red Crab Migration
http://education.nationalgeographic.com/education/multimedia/red-crab-migration/?ar_a=1&ar_r=999

Get an Animal's-Eye View
http://www.nationalgeographic.com/xpeditions/activities/08/virtualworld.html

Migrating birds at dusk
Source: Wikimedia Commons

Christmas Island red crabs. Photo: Max Orchard.
Source: http://blog.parksaustralia.gov.au

YouTube

Gulf Spill Still Threatens Millions of Migrating Birds (Animals) 22/1/2011, 5.11min
http://www.youtube.com/watch?v=49c0litiAuM.

- What are the impacts of an oil spill on migratory birds?

Wildebeest Migration 17/2/2008, 2.42min
http://www.youtube.com/watch?v=HYM6LqDJLiM

- How have animals adapted to the migration?

Gray Whale Migration 12/9/2008, 5.07min
http://www.youtube.com/watch?v=n7VqlWkFe60&feature=related

Animals That Travel (Salmon Migration) 29/1/2008, 8.33min
http://www.youtube.com/watch?v=XNqyYZONtMQ

Animals that travel 31/12/2007, 8.59min
http://www.youtube.com/watch?v=n9KoROEpOrM&feature=related

Survival: Can plants migrate fast enough to avoid extinction
http://scienceandpublicpolicy.org/originals/survival_can_plants_migrate_fast_enough_to_avoid_extinction.html

Protection of migratory species – Australia
http://www.environment.gov.au/biodiversity/migratory/index.html

Department of Crane-Land Security
http://www.nationalgeographic.com/xpeditions/activities/14/cranecam1.html

Maybe Not-So-Fine Feathered Friends?
http://www.nationalgeographic.com/xpeditions/lessons/08/g912/newsflu.html