The WONDER WEEKLY

FREE COPY

Published by the Peter Underwood Centre

Follow us on Facebook
www.facebook.com/UnderwoodCentre/

May 2, 2022

IMAGE: CSIRO, the Wealth from Oceans Flagship and the Australian Climate Change Science Project.

THE ocean is always moving.

We can see waves on the surface, which are caused by wind, and swells, the rolling waves that travel long distances and are generated by storms.

Then of course there are the tides, the advance and retreat of water along our coastlines.

But let's focus instead on currents, which are harder to see, but very important.

They flow like giant rivers, transporting water, nutrients, reproductive cells, sea life and ocean debris all around the world.

Ocean currents are driven by wind, tides, changes in water density and the rotation of the Earth. The topography of the ocean floor and shoreline causes those currents to slow down, or speed up, or change direction.

There are surface currents, which are driven mainly by the wind, and deep ocean currents.

Surface currents form big loops called gyres that spin clockwise in the northern hemisphere and ani-clockwise in the southern hemisphere because of the Earth's rotation.

If the Earth didn't rotate wind and ocean water would simply move backyards and forwards between the low pressure at the equator and high pressure at the poles. Because water stores heat better than air, currents help move warmth around and keep the Earth's climate stable.

Deep ocean currents, hundreds of metres under the water's surface, are driven mainly by differences in sea water density caused by temperature and salinity (salt content).

As water moves towards the poles it gets colder.

It also has a higher level of salt because the ice crystals that form trap water while leaving salt in the ocean.

Lower temperatures and increased salinity both increase the density of water masses.

This colder, salty water is more dense, so it sinks, and lighter surface water takes its place.

This process, called `thermohaline circulation', creates a current.

Thermohaline circulation of deep water, and wind driven surface currents, combine to form a system of ocean currents scientists call the `global conveyor belt'.

It moves a few centimetres per second.

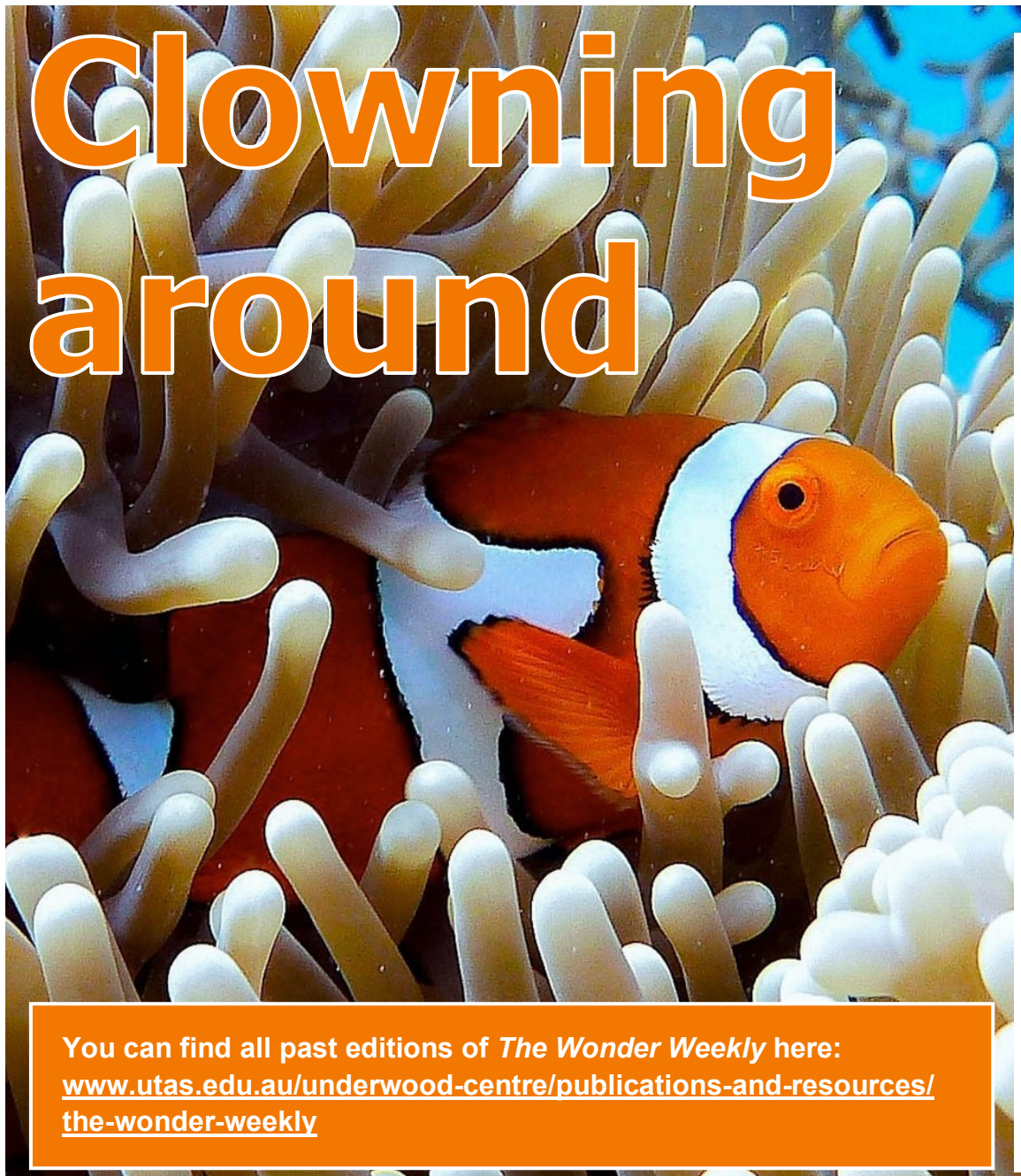
It takes a droplet of water in the global conveyor belt about 1000 years to get right around the planet.

You might like to try an experiment which demonstrates how thermohaline

Continued Page 2

"Education perhaps more than anything else is a passport to a better life." - Peter Underwood AC

Clowning around



HAVE you ever watched the movie *Finding Nemo?*

If you have you will remember that Marlin, the father of the little clownfish Nemo, hitches a ride on the East Australian Current all the way from the Great Barrier Reef to Sydney.

Well, we know that movies never let the truth get in the way of a good story, but the EAC does indeed flow southward from the Great Barrier Reef.

It is almost 100-kilometres wide, more than 1.5-kilometres deep and transports about 40 million cubic metres (that's about 16,000 Olympic swimming pools) of water southward each second.

When the EAC reaches New South Wales it breaks up into eddies, giant whirling masses of water which continue moving south while spinning anti-clockwise at 5-10 kilometres an hour.

Scientists believe climate change is warming the water south of Sydney much faster than the rest of the ocean.

This warmer, nutrient poor water is being carried further south to Tasmania and having an impact on marine life here.

Scientists believe it has been a major contributor to the decline of giant kelp forests in waters off Tasmania's East Coast.

If you are a regular reader of *The Wonder Weekly,* you may remember the article (August 30, 2021) about the work of researchers at the Institute for Marine and Antarctic Studies (IMAS) at the University of Tasmania, who are growing heat-tolerant kelp in the laboratory and replanting it in the ocean.

Tropical species of marine life are also arriving in Tasmanian waters.

The team at Redmap encourage citizen scientists - fishers, divers, boaters - to report any species of marine life they spot outside their normal range.

Founded by Professor Gretta Pecl - Professor of Marine Ecology at IMAS and Director, Centre for Marine Socioecology at the University of Tasmania—in 2009, Redmap is now a national project to track possible changes in the distribution of marine species.

You probably won't spot a clownfish, but if you see any unusual marine life in Tasmanian waters, take a photo and send it to Redmap: www.redmap.org.au

You can find all past editions of *The Wonder Weekly* here: www.utas.edu.au/underwood-centre/publications-and-resources/the-wonder-weekly

The ocean is always in motion

From Page 1

circulation works. You will need:

- A large shallow tray which is either see-through or white, such as a baking dish.
- A jug of cold and a jug of warm water.
- Ice blocks.
- Two colours of food colouring, such as blue and red.
- Some other objects to act as islands, such as some small rocks.

Start by colouring your water - cold could be blue, and the warm water could be red.

Pour the cold water into your dish, and add the ice cubes.

Allow some time for the water to get really cold, before adding your `land'.

Then add the warm water.

What happens?

Children's University Tasmania members can earn stamps in their passport for this challenge at the discretion of their school/ hub coordinators.

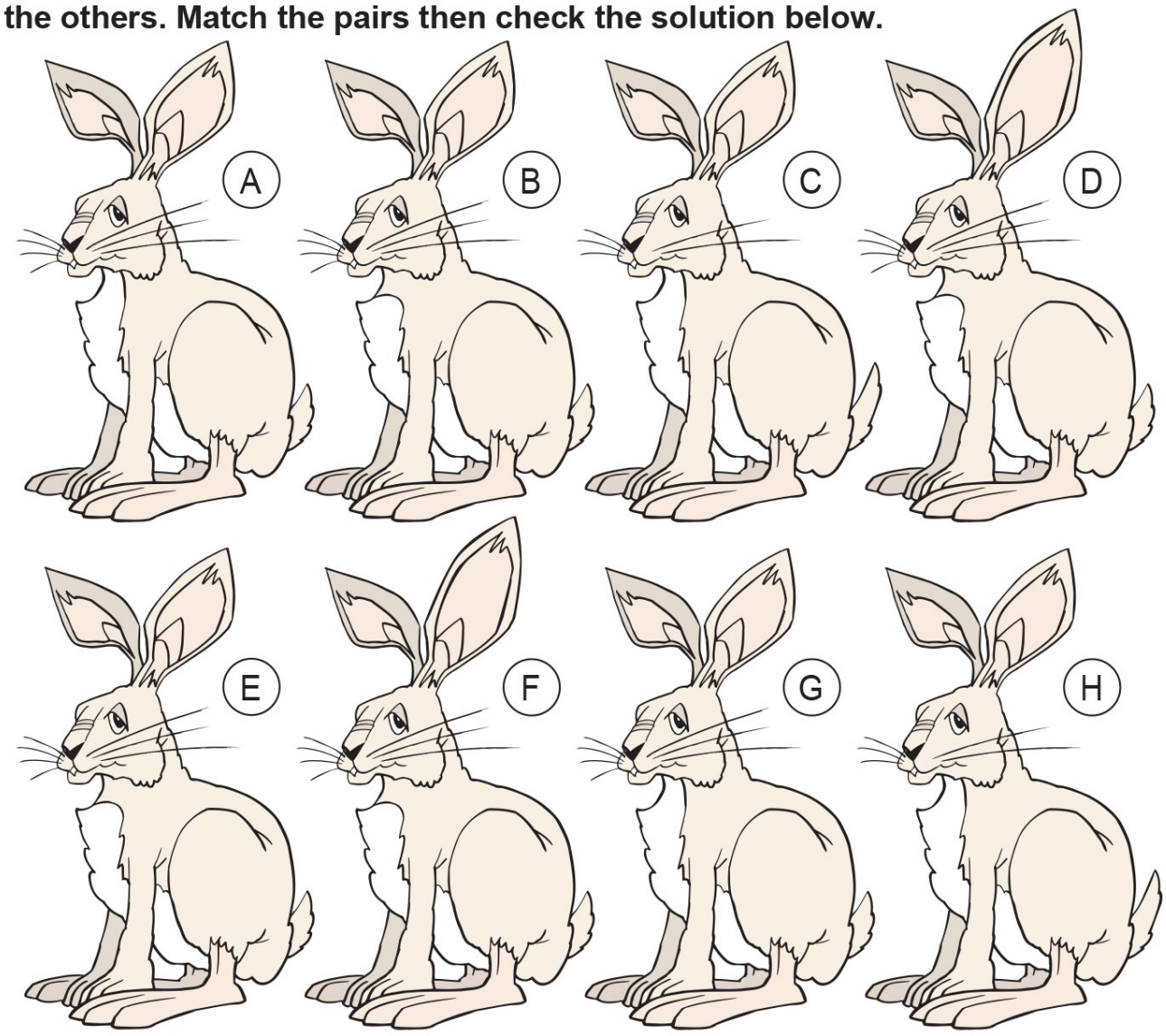
There are four major currents in Australian waters - the Indonesian Throughflow, the East Australian Current (EAC), the Leeuwin and Zeehan Current and the Antarctic Circumpolar Current.

The EAC travels southward from Queensland to the eastern shores of Tasmania.

The Zeehan Current reaches the western coast of Tasmania in summer, but is stronger in winter and can round the southern coast of the state and travel up the east coast.

Mixed up ARCTIC HARES

Four pairs of Arctic hares are mixed up. Each pair is slightly different from the others. Match the pairs then check the solution below.



Artwork: www.johnpollyfarmer.com.au/

DID YOU KNOW?

Arctic hares change colour from brown in summer to white in winter. This helps them to hide in the snow.

SOLUTION:
A + G, B + E,
C + H, D + F.