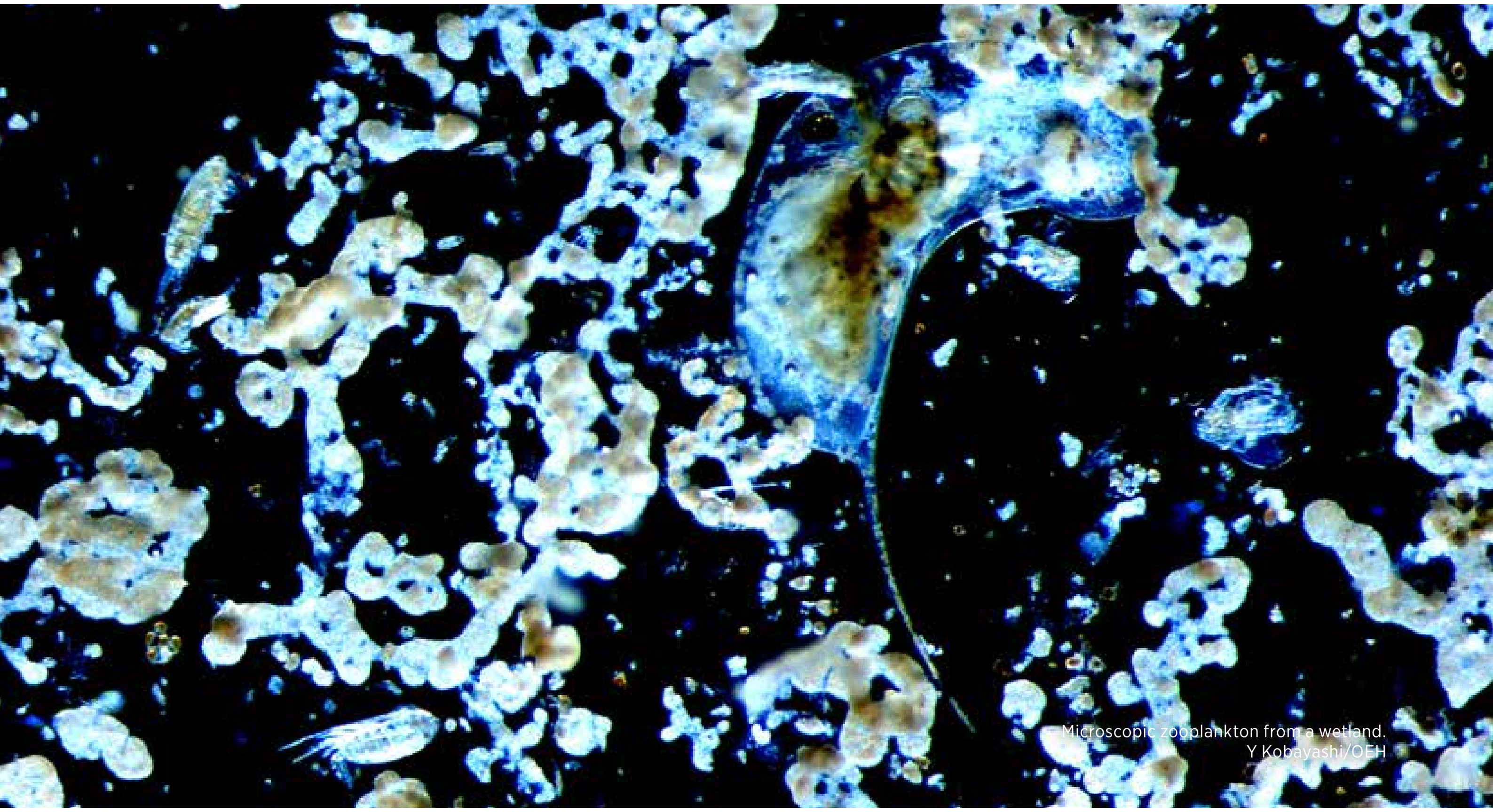
Building a wetland food web

The important role of carbon



Microscopic zooplankton from a wetland.
Y Kobayashi/OEH

The importance of carbon in wetlands

Rivers and wetlands are highly productive ecosystems. They support a vast array of native plants and animals that rely on the movement of water to transfer carbon throughout the system and sustain the wetland food web.

Carbon is the basic building block of all living things. It is found in DNA, fats, proteins, starches and sugars, which are critical for the growth and functioning of all creatures. When carbon joins with these molecules, we call it 'organic carbon'.

River regulation has altered the pattern of carbon transfer within local river systems. This has affected food supplies for native fish and other wetland dependent animals.

The Office of Environment and Heritage (OEH) is working with communities to deliver water strategically in order to provide a steady transfer of carbon throughout the system.

In doing so, OEH and its partner agencies are supporting the native plants, animals and processes that contribute to healthy rivers.

How does carbon enter the wetland food web?

Much of the organic carbon present in a wetland is formed by plants during photosynthesis, using carbon dioxide from the atmosphere.

Water triggers the release of organic carbon from leaves, sticks, bark and grasses that have accumulated

on the wetland floor. Some carbon will also be released from the soil. This carbon dissolves into the water where it is taken up by plants and animals.

Mould and bacteria in the water begin to feed on the dissolved carbon and other nutrients released from the plant litter.

A thin film of mould and bacteria begins to form on the leaf litter. This slimy substance is known as bio-film.

As the bio-film continues to feed, it forms clumps that become a source of food for slightly larger organisms. And, so, the wetland food web begins to grow.

Not all carbon is equally digestible. The presence of other nutrients and the temperature of the water will affect the speed at which the bio-film develops.

In wetlands, carbon may also be present as particles attached to fragments of soil, pieces of leaf, seeds or other fragments of plants or algae. These particles may be eaten directly by small wetland animals.

Rivers provide transport for carbon moving in and out of wetlands. Strategic flows and natural high-river events allow juvenile fish to access these sites and move between the river and wetlands during their lifecycle.

These fish then become a source of food for birds, frogs and other fish.

It is a dynamic system that requires a 'big-picture' approach to ensure key populations of native wildlife, and the habitat they require, are in peak condition to ensure a sustainable future.

Carbon transfer in action

You can see the process of carbon release in action by conducting a simple experiment.

You will need:

- two glass jars filled with water
- a handful of brown (dry) gum leaves
- a handful of green (fresh picked) gum leaves.

Method:

1. Submerge brown leaves in one jar.
2. Submerge green leaves in another jar.
3. Cap the jars.
4. Set them aside for a couple of hours (or overnight) and observe the change in water colour.
5. Over the next few days, keep watch for bio-film – a slimy substance that forms on the leaves and inside the jar (this is the mould and bacteria consuming the carbon released from the leaves).

Note:

The jar holding the brown (dry) gum leaves will turn a darker colour much sooner than the green gum leaves due to changes that happen after the leaf dies and starts to break down.

The green gum leaves will take longer to release their carbon because of their waxy coating, which prevents the molecules from inside the leaf dissolving as quickly.

Try this experiment with green and dried grass, pieces of bark and other vegetation you collect.

Photos: top ,left to right, J Ocock/OEH, Y Kobayashi/OEH, Gunther Schmida.

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Published by:
Office of Environment and Heritage
59 Goulburn Street, Sydney NSW 2000
PO Box A290, Sydney South NSW 1232
Phone: +61 2 9995 5000 (switchboard)
Phone: 131 555 (environment information and publications requests)
Phone: 1300 361 967 (national parks, general environmental enquiries, and publications requests)
Fax: +61 2 9995 5999
TTY users: phone 133 677, then ask for 131 555
Speak and listen users: phone 1300 555 727, then ask for 131 555

Email: info@environment.nsw.gov.au

Website: www.environment.nsw.gov.au

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