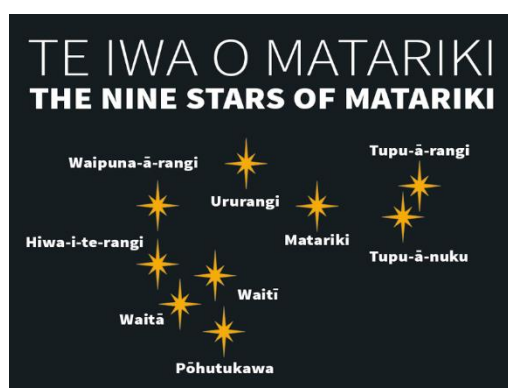


Pukaha: The Forest and the Night Sky

Winter - Māori used the Maramataka, a moon calendar based on the Moon cycles. There are 12 cycles per year, and each moon cycle is 29.5 days long. A lunar year therefore is 354 days long. A solar year is 365 days long. Matariki (the star cluster) rises exactly in the same place as the Sun on the Shortest day in the North East in the morning.

Matariki is first seen in the early dawn sky around June/ July and when the next moon cycle starts the beginning of the new year begins (a period of roughly 11-14 days in between is when we celebrate “Matariki”)



We use this to ‘restart’ the lunar calendar, otherwise the months would be out of sync.

The star cluster is only called Matariki in the early morning in Winter, other times of the year is called the official term ‘The Pleiades’.

Spring- The Milky Way is along the horizon, representing the Great Waka. This sky occurs in the Spring and early summer and tells ocean voyagers that

the sea is calm for the next few months so it is a good time to explore.

Summer- We have a great view of Orion in the Summer (and the Pleiades on the left hand side of Orion) Orion is easily noticed because of the three belt stars called Tauroru (line of three). Orion is also recognised in Aotearoa as the Bird Snare.

The bird snare is a carved perch used for catching the Kaka or sometimes a kereru, bright red Betelgeuse is sometimes likened to the berries to encourage the bird closer.

Autumn- the rise of Virgo and the bright star Spica tells us that it is time to harvest.

The Moon: Lunar cycles

Surprisingly, many creatures, birds and plants use an internal lunar calendar.

- Eels regulate themselves by the Moon. At full moon, eels hide and are very shy, while at new moon they are most active. When eels migrate, they have been found that they mostly go between last quarter moon and new moon.
- While it may not be as widely recognized yet, it is becoming more clear that the moon also affects the flow of water through plants: sap moves more vigorously during the waxing phase as the moon grows to full, and slows down as the moon wanes to a thin morning crescent.
- Birds may be more active at night in spring and autumn. In the spring, the dawn chorus may break out several hours before daybreak as birds seek to claim territories and attract mates with their melodious tunes. Some birds may even sing at night when there is enough light to

trigger their vocalising instincts, such as during a full moon. In the autumn, many otherwise daytime birds may migrate at night, thus avoiding the attention of migrating hawks and other aerial predators and taking advantage of star patterns for clearer navigation.

- Birds across the world have been identified as being more active during a full moon, as are their predators.

The Milky Way and stars



Nocturnal moths first evolved long before humans invented bright lights. They learned to navigate by using distant celestial objects such as the Moon and stars. Moths navigate by positioning themselves and flying on a fixed angle relative to these celestial light sources. If the position of the Moon or stars is not obvious, moths instead use geomagnetic signals – the Earth’s magnetic field.

Studies are currently looking into how nocturnal animals use ‘visual stimulus that conveys directional information’ and the evidence available for the ‘different stellar orientation strategies’ proposed to date.

Nocturnal animals

There are advantages to being active in the night. Fewer parasites are active and the same goes for predators. There are not as many competitors for food as there are during the day.



For animals that migrate or search for food over vast distances in particular, the cooler hours of the night are preferable to the heat of the Sun. A key requirement for nocturnal animals is that they can hold their course in the dark.

Birds that take off at sunset rely on their magnetic compass, but also the star compass when they use individual stars for orientation.

Dung beetles do not use individual stars but instead use the Milky Way which contrasts to the surrounding dark sky. Moths, frogs and other animals use the starry sky to navigate at night. Insects with compound eyes can interpret the starry sky and the Milky Way as distinctive patterns of light.

Scientists are now investigating whether nocturnal animals see in colour in the dead of night, looking at geckoes, lizards, insects and bats in particular.



Figure 1 Long-tailed bat, Department of Conservation

Nocturnal animals are adapted to the dark, they have dull, muted colourings so they are difficult to see at night. Heavily camouflaged patterns in birds are common as their mottled plumage helps them blend into their surroundings during the day. Birds also have larger eyes, helping them to collect the limited light to enhance their

vision. Other senses may be enhanced also. There is more and more evidence that the moon affects all plants and living creatures.

The effect of artificial blue light on animals

Artificial lights are everywhere now - from street lights, mobile phones, torches and housing lights (inside and out). Lights on the bluer end of the spectrum are more harmful to wildlife and humans and they also wash out the Night sky. Blue light also has the potential to influence plant/animal interactions. For example, blue/green light has been shown to reduce activity and mating in some moths. Artificial lights can disrupt seasonal light cues which can change and affect seed dispersal and pollination. It is important that when in a dark space, like the forest, we keep artificial lights to a minimum. Red lights (from torches) are the least harmful so if light is required outside, this colour light is preferred. Red lights also do not wash out the Milky Way and Sky as much as blue lights. Try and avoid using your smart phone while in the forest.

It is important to be aware that plants and animals are also sensitive to light; some are strongly affected by blue wavelengths whereas others may be more strongly affected by other colours. Try and use outdoor lighting only when and where needed and ensure light does not spill into unintended areas. Consider changing the colour of outdoor light by filtering or by the light source if it will benefit species in your area.