

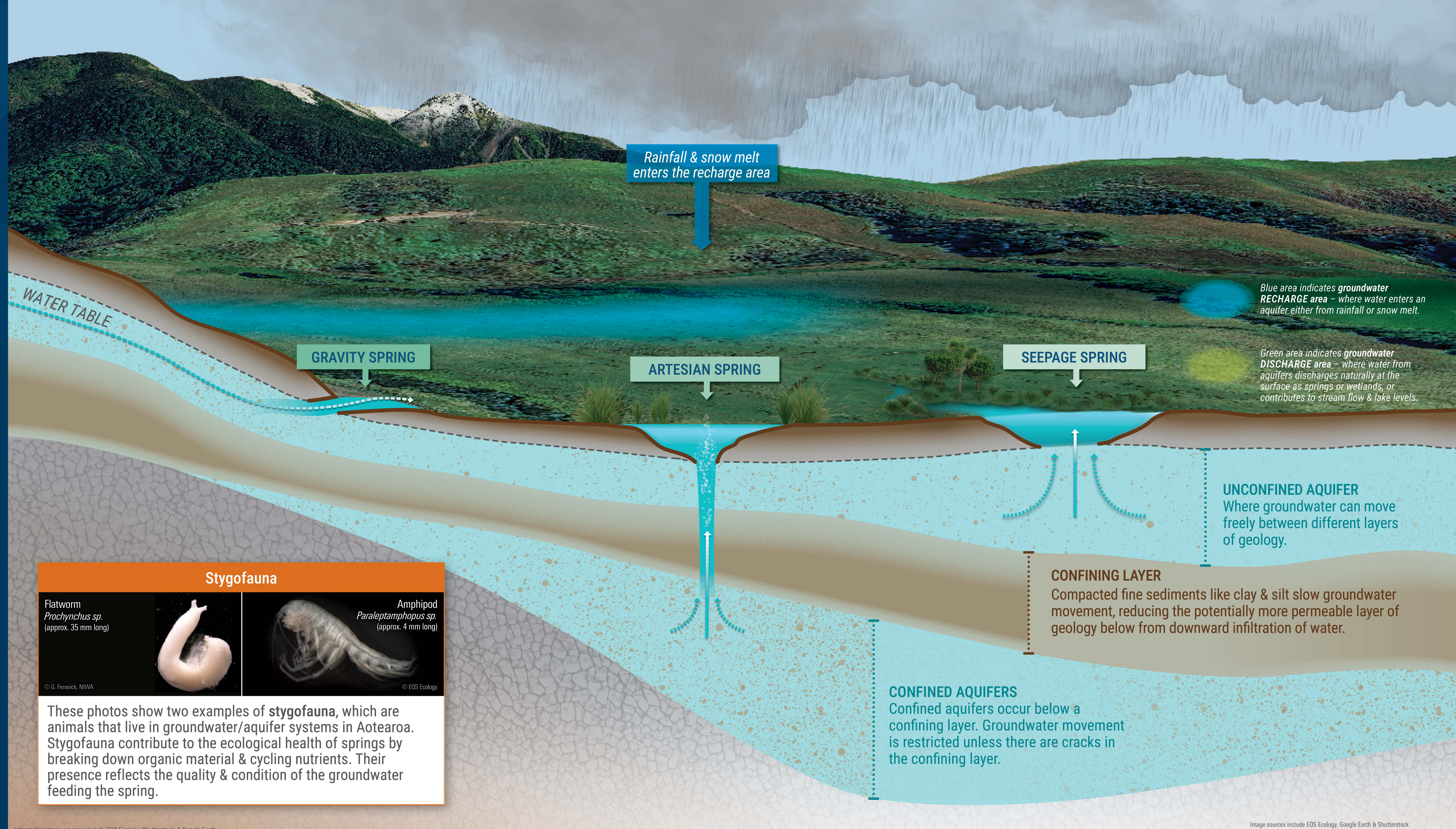
Understanding Freshwater Springs

Freshwater springs are locations where groundwater emerges at the Earth's surface.

This transition from groundwater to surface water occurs in a variety of geological settings – meaning that springs can vary greatly in size & flow rate – but all tend to result in freshwater habitats characterised by more stable water temperatures & flow.

The water in springs is mainly fed by groundwater from underground aquifers. A groundwater catchment that feeds a spring rarely reflects that of the surface water catchment due to the complex nature of the underlying geology & flow paths. This means that the area of land influencing a spring can be larger or smaller than what's indicated by its surface water catchment boundary.

Because springs & spring-fed streams are fed by groundwater, any changes in ground-water quality or quantity can impact the surface water habitats & biodiversity at the springhead. If we're looking after springs & the surface water systems that they feed, we should not only adopt a surface water ki uta ki tai (mountains to the sea) catchment-based approach, but should also look outside of the surface water catchment boundary to where the springs recharge areas are. For example, if nutrients seep into groundwater either in or outside of the surface water catchment, they can result in high nutrient levels in spring-fed surface waters.



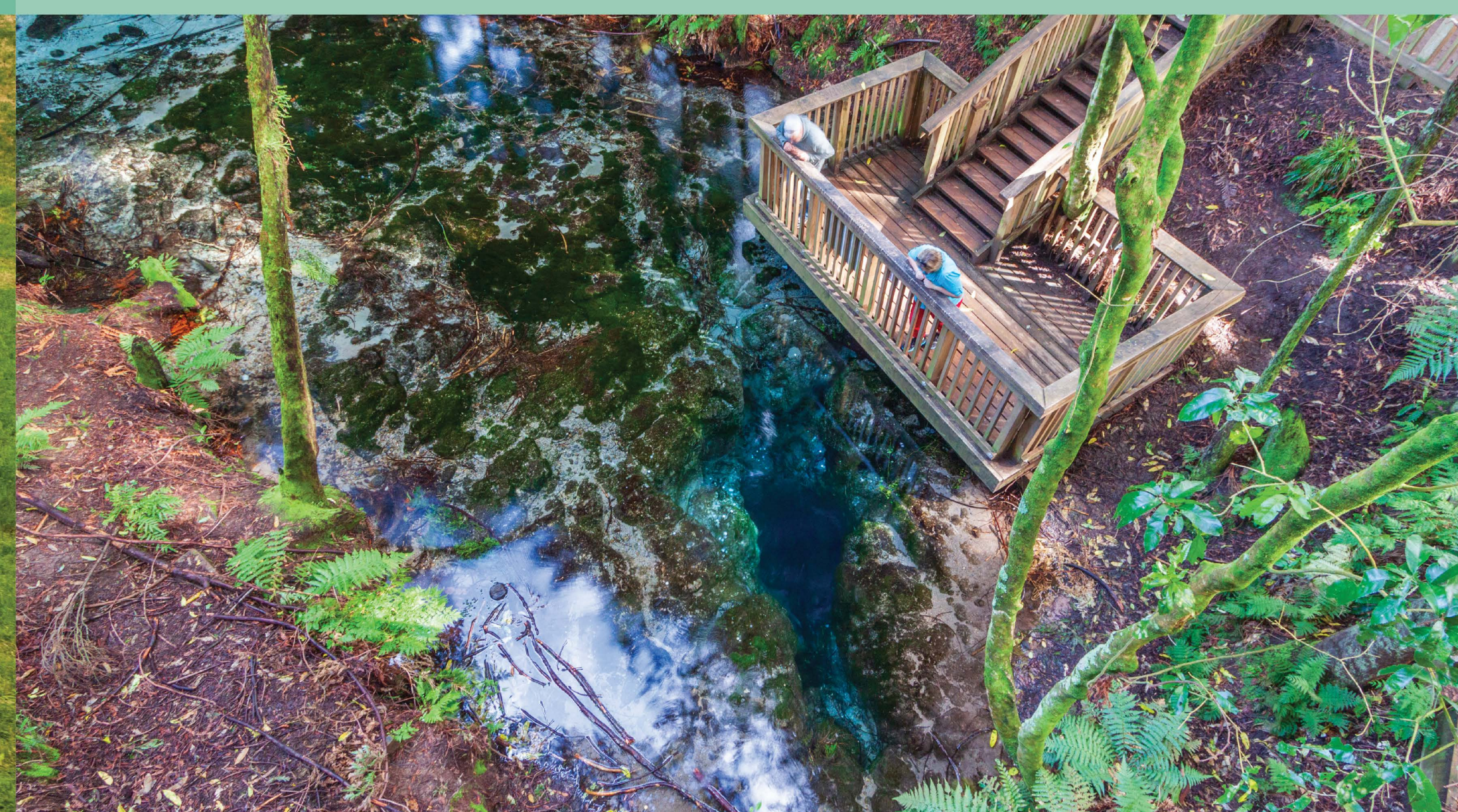
Types of springs (these are three spring types most likely to be found)

GRAVITY SPRING



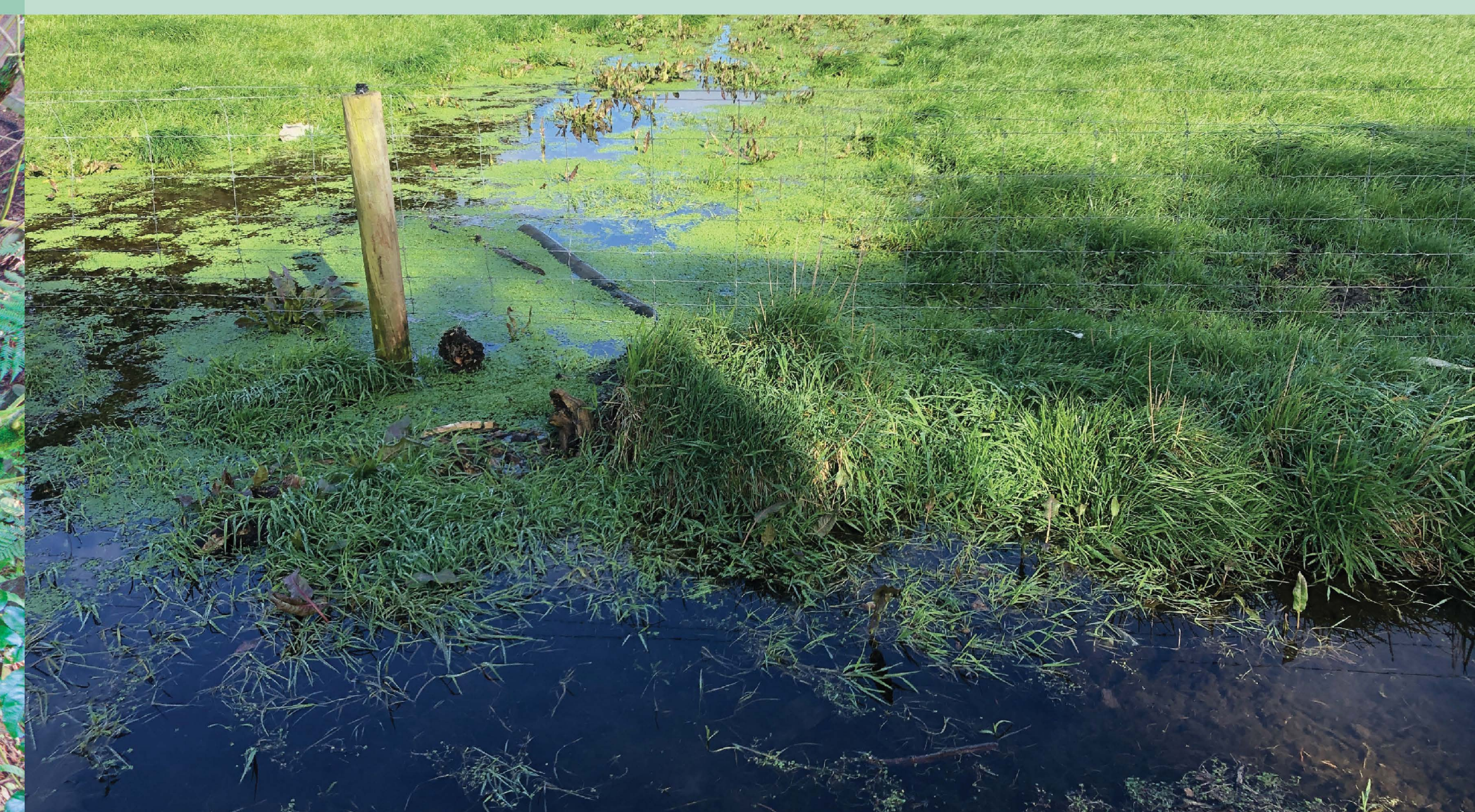
- » A **gravity spring** forms when groundwater from an unconfined aquifer gently moves to the surface under the influence of gravity. They are typically found at the base of hill slopes.
- » Gravity springs can look like wet ground at the base of a hill slope.

ARTESIAN SPRING



- » When groundwater is under pressure in a confined aquifer & has sufficient force to flow naturally to the surface, the resulting springs are known as **artesian springs**.
- » The water from artesian springs makes its way to the surface through fractures in the confining layer, without the need for pumping.

SEEPAGE SPRING



- » When groundwater emerges from a (typically) unconfined aquifer, the flow is typically more diffuse & not forced to the surface, resulting in a **seepage spring** when the water table is high.
- » Seepage springs are commonly associated with wetlands & exhibit slow, gradual flow where groundwater meets the surface, without the pressure seen in artesian springs.