SEAGRASS

- Seagrass beds are present and increasing in extent around some of our leases in the Dover area where we have farmed of over 30 years.
- The beds are an important habitat for many species.
- The presence of seagrass beds is linked to a variety of environmental conditions including water temperature, flow and nutrient levels.
- The presence of seagrass beds naturally waxes and wanes.
- Globally there are 72 species of seagrass with five occurring in Tasmania.

SEAGRASSES IN TASMANIA

Seagrasses are grass-like plants that have adapted for life underwater in coastal environments. Seagrass communities provide food and shelter for many fish, birds and other animals and are an important part in the marine food web.

Five seagrass species occur in Tasmania, *Amphibolis antarctica*, *Halophila australis*, *Heterozostera tasmanica*, *Posidonia australis* and *Zostera muelleri*, their presence or absence defining five zones around the Tasmanian coast.

Seagrasses are usually found in shallow water and as such, are susceptible to water pollution and temperature fluctuations. In addition, ambient nutrient levels in some coastal water bodies are likely to be a major cause of seagrass decline (Dr Christopher Grant Rees, 1993).

In areas where nutrients are high, seagrasses can develop thick mats of green slime—this is a natural response to nutrient enrichment. This slime can reduce sunlight available to the grasses and therefore have a negative impact on their health and growth.

As part of our ongoing environmental monitoring program, we regularly survey and monitor seagrass beds around our farms. Over the past 30 years, we have observed that not only are these beds present but they are also increasing.

SEAGRASS ANATOMY

Much like land grasses, seagrasses have roots, stems and leaves and even produce flowers. The presence of roots and an internal transport system is what differentiates seagrasses from seaweeds.

Chloroplasts in their tissues use the sun's energy to convert carbon dioxide and water into sugar and oxygen for growth through the process of photosynthesis. Veins transport nutrients and water throughout the plant, and have little air pockets called lacunae that help keep the leaves buoyant and exchange oxygen and carbon dioxide throughout the plant.

Like other flowering plants, their roots can absorb nutrients. Unlike flowering plants on land, however, they lack stomata—the tiny pores on leaves that open and close to control water and gas exchange.

Instead, they have a thin cuticle layer, which allows gasses and nutrients to diffuse directly into and out of the leaves from the water. The roots and rhizomes (thicker horizontal stems) of seagrasses extend into the sediment of the seafloor and are used to store and absorb nutrients, as well as anchor the plants (Smithsonian, 2018).

"FOULING" ON SEAGRASS

As with any surface in the marine environment, seagrass leaves provide a place for planktonic organisms to settle. When they settle on seagrass leaves, they are called epiphytes (sessile organisms that grow on plants). Epiphytes of seagrasses include algae (micro and macro), bacteria, fungi, sponges, bryozoans, tunicates, protozoa, hydroids, crustaceans and mollusks. Of all of these, algae are the most abundant and diverse group to colonize seagrass leaves. Algal epiphytes significantly contribute to the primary productivity of the ecosystem (20-60%), and form the base of many food webs within seagrass communities.

The distribution and abundance of epiphytes is influenced by several factors including light, temperature, water motion, nutrients, seasonal/successional changes as well as grazer/predator interactions.

Since seagrasses are constantly producing new leaves, they are constantly creating new areas for "fouling" organisms to colonize. For most seagrasses, the oldest parts of the plant are the most fouled, which are the oldest leaf and the leaf apexes (tips). These areas contain the highest biomass and diversity of organisms. Eventually the oldest blades, often heavy with epiphytes, are sloughed off by the plant. The load of epiphytes directly affects the amount of light that can reach the leaves of seagrasses. In healthy seagrass ecosystems, epiphyte/grazer/predator interactions help keep the system balanced, but algal epiphytes can become excessive due to nutrient loading and can lead to seagrass die-offs if the plants aren't receiving enough light.

BENEFITS OF SEAGRASSES

Seagrass beds provide an important habitat and food source for many species. In addition, seagrasses are often called foundation plant species or ecosystem engineers because they modify their environments to create unique habitats (Smithsonian, 2018).

They also remove carbon dioxide from the atmosphere, absorb nutrients, slow the flow of the water and stabilize the seafloor. Seagrass beds are the third most valuable habitat in the world, at an estimated $19,000USD per hectare (Costanza et al. 1997).