

Modern Dune Dynamics on the Inverloch Spit

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Introduction

Incipient dunes, are found closest to the ocean, forming small sand mounds, just above the elevation of spring high tide as sand accumulates in and around pioneer species of vegetation or swash deposited debris.

The formation of incipient dunes does not necessarily occur uniformly on the backshore. Hummock shaped dunes, often termed shadow dunes, form on the downwind side of debris and vegetation. It is the fact that the size and shape of plants changes over time (they grow), that results in the formation of dunes. As vegetation growth occurs the sand trapping process also changes, and more sand is deposited in and around the vegetation, and over time the dune shape increases both laterally and vertically, these larger dunes are termed foredunes.

There is currently a deficient in quantitative knowledge of the role which species of coastal plants such as *Spinifex sericeus*, *Thinopyrum junceiforme*, *Ammophila arenaria* and *Cakile edentula* play in the in the formation and morphology of incipient dunes.

Management Question

In 2014 a large spit was developed at the mouth of Andersons Inlet sourced from sand eroded from the west.

This bare sand spit was rapidly colonised by exotic species.

These species are known globally to fix sand to a greater ability than natives .

This may limit the natural recycling of sediment from the spit back onto the beaches to the west.

This project is focussed on understanding how these plants are affecting sand movement.

The formation of a sand spit and growth of incipient dunes at Inverloch Victoria



Figure 1: Google earth images of the growth of the sand spit at Inverloch from 2010 to 2017.

Studies of foredune dynamics occur on systems that are already established and have often existed for millennia. There is little understanding on the evolution of these systems from the first accumulation of debris to a mature dune form.

This project will quantify a complete foredune development cycle at Inverloch. A bare spit formed after 2010, in the former channel entrance to Anderson Inlet, on which a foredune of meter-scale relief has now developed. This project will document dune develop from time -zero and will reveal the role of specific plant species in foredune development.

Methods

Vegetation surveys and foredune mapping form the core of this project. The 2010 Future Coasts LiDAR provides a baseline dataset which will be combined with terrestrial UAV LiDAR collected in 2016 and supplemented by field quadrat-based vegetation surveys collected in November 2016 .

Citizen-science surveys as part of the Victorian Coastal Monitoring Program, will continue to monitor the sites using UAV-based photogrammetry supplemented by field quadrat-based vegetation surveys. Vegetation surveys will be conducted every 6 months.

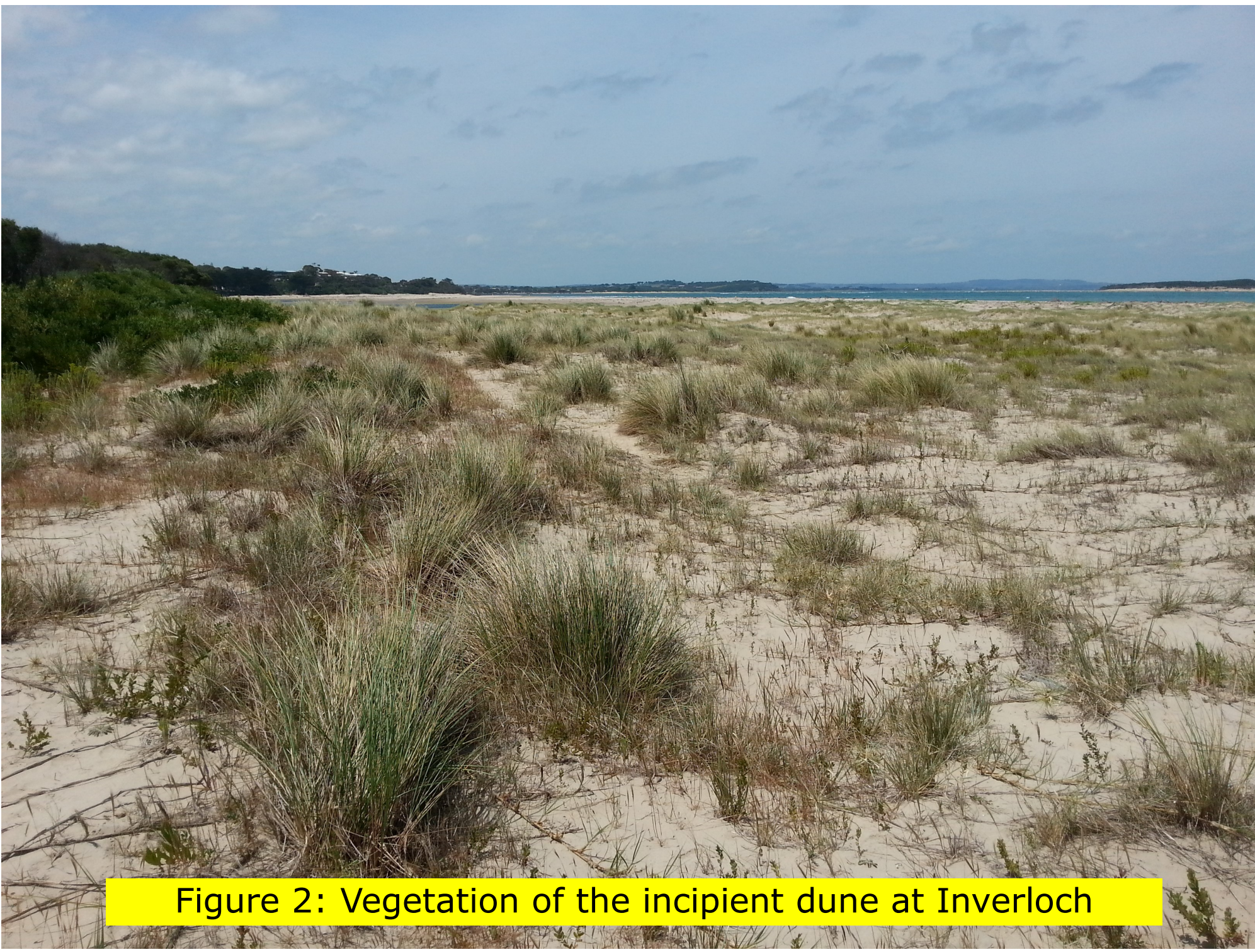


Figure 2: Vegetation of the incipient dune at Inverloch

Vegetation of the incipient dune at Inverloch spit

The incipient dune at the Inverloch spit was initially dominated by the exotic species of plants:

- *T.junceiforme* (Sea Wheat Grass),
- *A.arenaria* (Marram Grass)
- *E.paralias* (Coastal spurge).

Australian native grass *S.sericeus* (Spinifex grass) is also now colonising the site.

Plant growth attributes that influence sand capture

Spinifex sericeus: Spinifex Grass



Thinopyrum junceiforme: Sea Wheat Grass



The more hirsute leaves of the Spinifex plant in combination with greater length and width, enable it to trap sand at a greater rate than the Sea Wheat Grass

Figure 3: Comparison between different leaf structure of Spinifex Grass and Sea Wheat Grass.

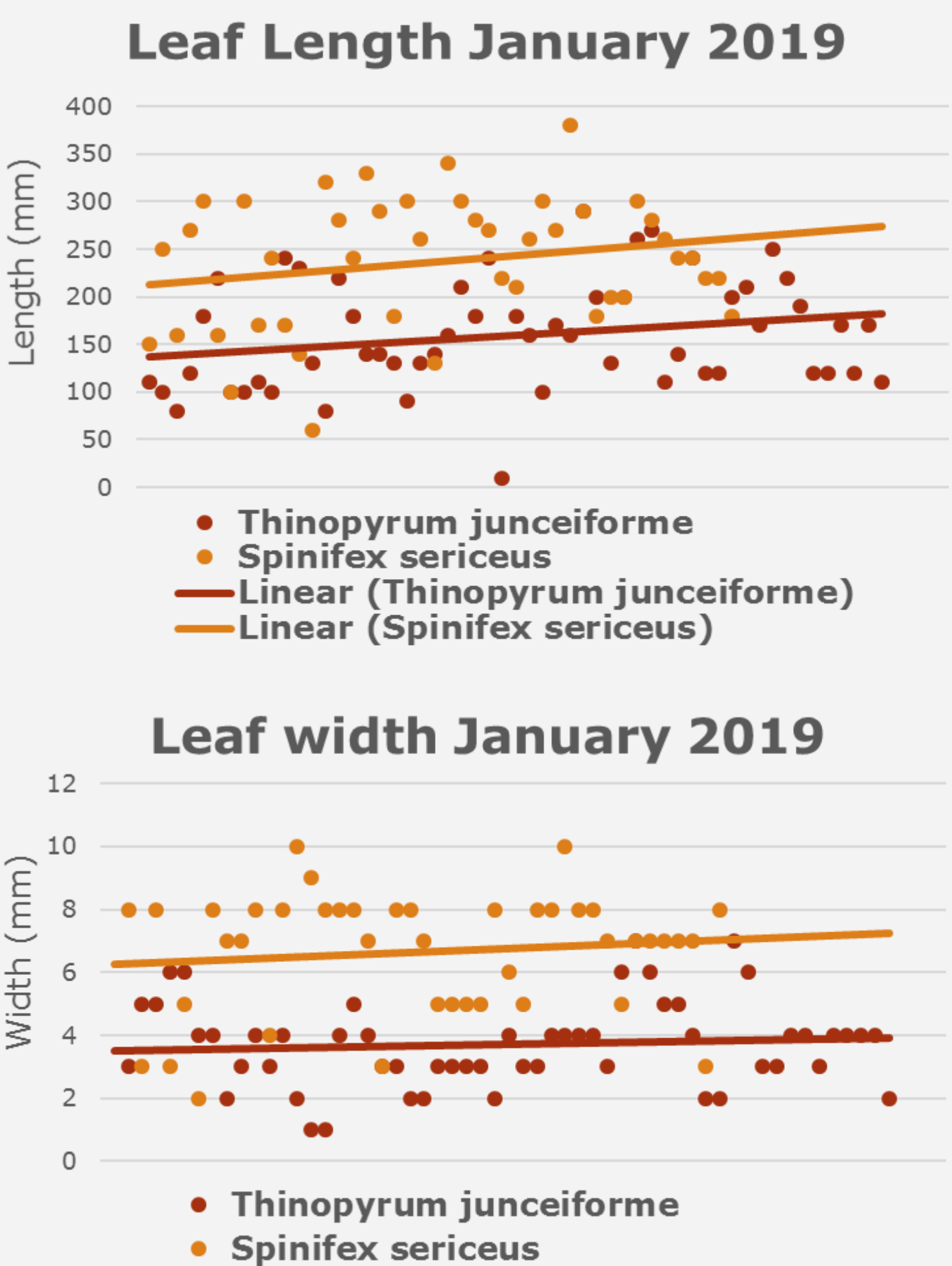


Figure 4: Comparison between leaf width and leaf length of Spinifex Grass and Sea Wheat Grass

Conclusion

The initial formation of the incipient dune at the Inverloch Spit has been dominated by exotic species, which have resulted in the formation of a hummocky dune morphology.

The more recent growth of Spinifex grass amongst the exotic species has the potential to change the morphology of the dune form.

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