Sicilian Sea Lavender

a new and emerging threat to Victoria's saltmarsh

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Why are coastal habitats important?

Recreation

Tourism

Biodiversity

Fisheries

Ecosystem function - nutrients, filtration, erosion buffer

What are the threats?

Development

Recreation

Climate change

Erosion

Disturbance

Eutrophication

Grazing

Invasions

Three greatest weed threats to saltmarsh vegetation

Spartina

Tall Wheat Grass

Sicilian Sea Lavender

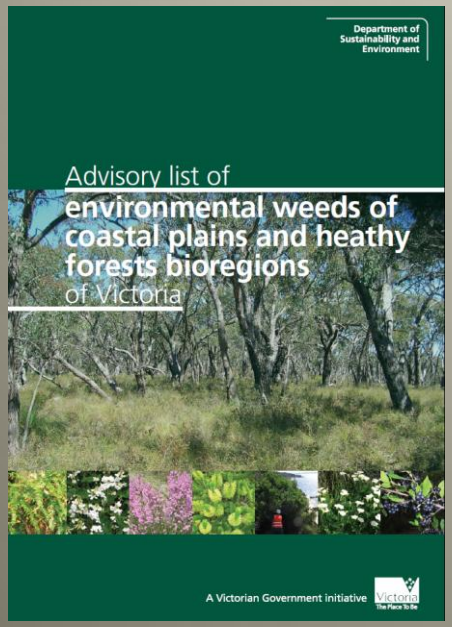
- transformers
- keystone weeds
- very high risk
- collapse native communities

Limonium hyblaeum
Sicilian Sea Lavender

Exotic plant

Not a declared noxious weed

Not illegal to grow, sell or transport it



Advisory list of environmental weeds for coastal bioregions

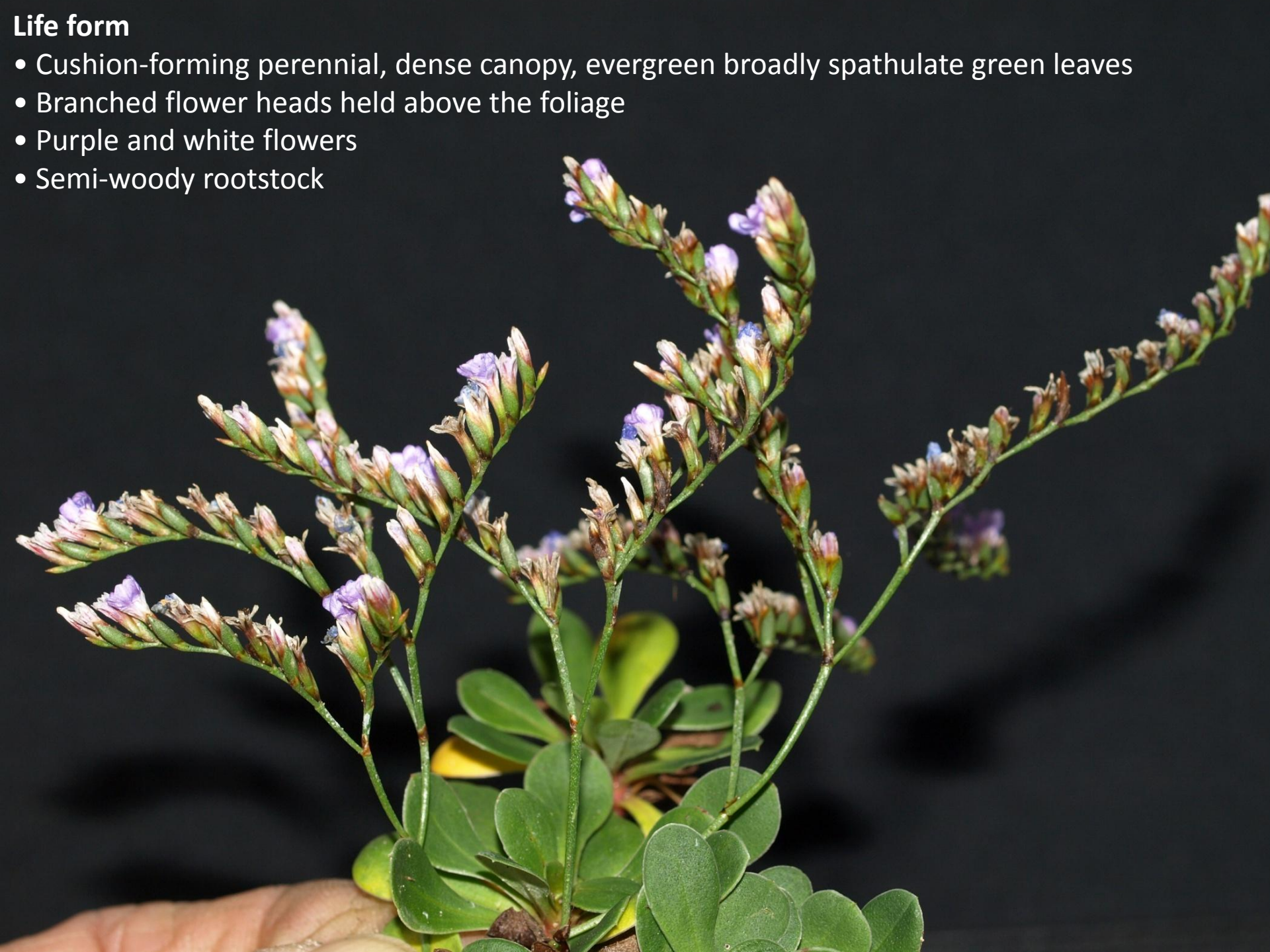
186 (243)

LOWER RISK WEEDS

Limonium companyonis	Riviera Sea-lavender	186
Limonium hyblaeum	Sicilian Sea-lavender	186
Limonium sinuatum	Notch-leaf Sea-lavender	185

Life form

- Cushion-forming perennial, dense canopy, evergreen broadly spathulate green leaves
- Branched flower heads held above the foliage
- Purple and white flowers
- Semi-woody rootstock



Limonium hyblaeum

Cheetham Salt Works 2012

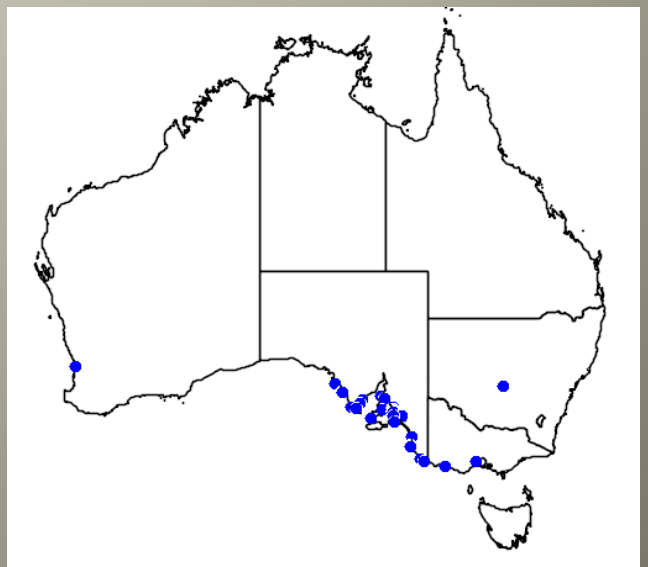
Photo: Denis Cox

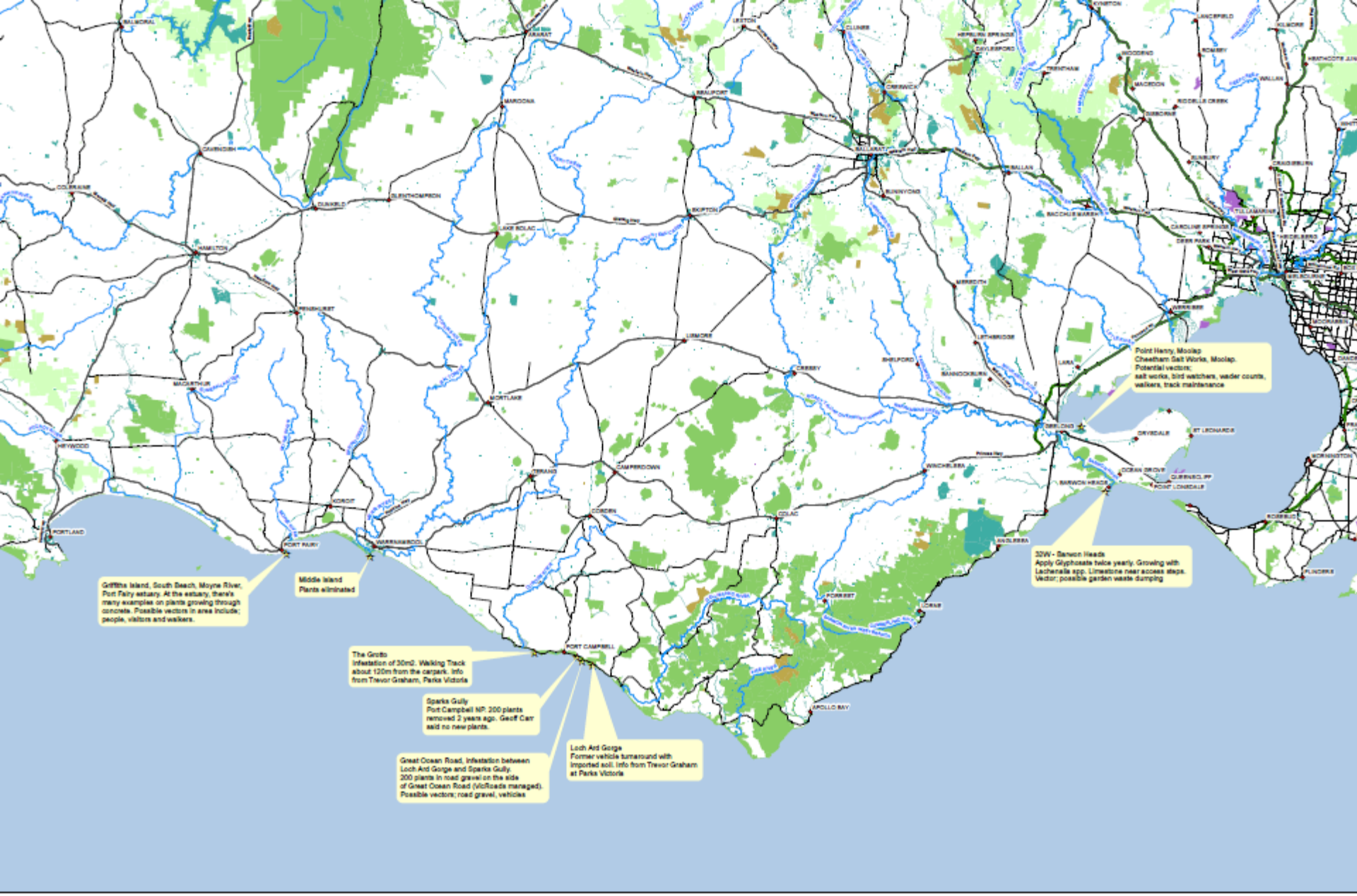
Habit and habitat

- Coastal
- Sand dunes, rocky boulder coast, saltmarsh
- Soils: sandy, shelly, rocky
- Grows in volcanic rock, crevices
- Hard-stand roadways, places with minimal soil
- Prefers high pH
- Tolerant of harsh conditions
- Survives tidal inundation and has very high salt tolerance
- Equivalent salt tolerance to *Sarcocornia quinqueflora* (Beaded Glasswort) and *Suaeda australis* (Austral Seablite)

History of invasion

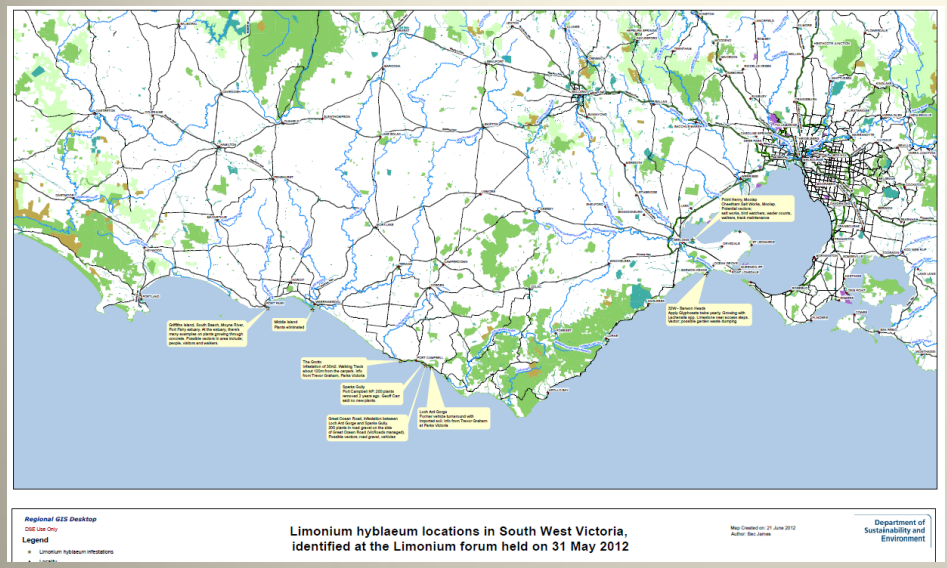
- First Australian record was at Port Adelaide in 1889
- Seen in Port Fairy in 1980
- First Victorian record - Port Fairy 1984 - Neville Walsh
- 2003 - NSW at Lake Cargelligo
- 2008 Trevor Prescott - Cheetham Saltworks, Geelong
- Photograph of unknown plant
- 2010 - 30m^2
- 2011 – 15,000m^2 (1.5 ha) with cover of up to 50%
- (500 fold increase)





Limonium hyblaeum locations in South West Victoria, identified at the Limonium forum held on 31 May 2012

Map Created on: 21 June 2012
Author: Bec James



Distribution

- SE South Australia
- Eight locations in Victoria (two small, now eliminated)
- Two relatively large infestations
- Port Fairy –dense and concentrated infestation ~ 5 km coastline
- Cheetham Salt works – Geelong (1.5ha)
- *L. hyblaeum* very similar to *Limonium companyonis* ~ problematic in NZ.
- Christchurch in 1993
- Spreading rapidly in saltmarsh.
- Possibly confused taxonomy.

Impact

- Saltmarsh ~ total exclusion of other plants
- Prevents regeneration
- Reduces biodiversity
- Change ecosystem functions
- Threat to RAMSAR wetlands
- Threat to orange-bellied parrot habitat
- a catastrophic invader of upper coastal saltmarsh

Current

- new and emerging weed (Vic)
- Extent and impact limited

Potential

- All Victorian saltmarsh ~ inland and coastal
- Alkaline soils, basaltic soils, rocky coastline
- Shell banks, well drained rises in saltmarsh
- Major threat to Victoria's halophytic communities ~ unique and valuable
- Eastwards of Port Phillip to the NSW border – no recorded distribution, but not surveyed for *Limonium*
- **High risk areas –visitor centres, car parks, walking tracks**

Sicilian Sea Lavender at Port Fairy

Taxonomy

- Plumbaginaceae
- Nth hemisphere ~ arid and maritime
- 25 genera (worldwide)
- Approx 840 species
- Australia – 3 genera *Limonium (*10 spp*), Aegialitis (*1 sp*), Plumbago (*1 sp*)*
- *Limonium* – cosmopolitan
- Approx 150 species
- Mostly herbaceous , subshrubs
- 5 in Victoria
- ***Limonium hyblaeum*** – endemic to east coast Sicily
- Endemic ~ described in 1980
- Brulle S. 1980 **Taxonomic and nomenclatural notes on the genus *Limonium* in Sicily.** Publ. Ist. Bot. Univ. Catania, (13p.) (1980)- illus. En First publ. in Bot. Notiser, 133: 281-293 (1980).
- Many *Limonium* rare ~ *L. dufourii* (Spain), 6 populations (red data book listed)
- *Limonium cavanillesii* ~ Spain, only 29 individuals known
- Australia – two natives
- *Limonium australe* – rare native in salt marsh
- *Limonium baudinii* (Tas)

European distribution of *Limonium*

Aegialitis
tree to 2m, mangrove

Plumbago zeylandica
herb, india, 1000yrs, abortifacient, contraceptive

Limonium australe
Yellow Sea Lavender,
Westernport, corner inlet

Limonium sinuatum
Notched leaf sea lavender
perennial, intense blue

Limonium lobatum
Winged sea lavender, NW,
annual, disturbed habitats

Limonium companyonis
Riviera Sea Lavender
pink, Localised (Mildura)
annual, slender tap root,
leaves oblanceolate

Limonium hyblaeum
Sicilian Sea Lavender
rounded green leaves,
perennial, purple & white
flowers, coastal, perennial,
thick tap root. Midrib on
calyx subterminal. Leaves
broadly spathulate

All weedy elsewhere in Australia

Limonium loganicum UK.

Ecology

- Apomictic – every flower produces seed but not by sexual reproduction
- 1 single plant has potential to cause an invasion
- Uncertain if sexual reproduction occurs
- Seeds dispersed by water, soil, human movement
- Seeds survive long periods in sea water
- Germination suppressed in sea water
- Sea water pre-conditions seed for germination in fresh water
- Sea water causes osmotic shock which weakens seed coat
- Common amongst *Limonium* species
- Salt excretor
- Sheds salt from leaves
- Halophyte adaptation
- Chromosome number 2n=36 (Sicilian *Limonium*)

A lot we don't know:

- Life span, ecological tolerance, photosynthetic pathway, genetic variation, breeding biology, seed longevity, quantified impact

Pathways of spread

Water

- Sea water

Animals

- Birds – Middle Island ~ Portland
- Rabbits ~ Geelong

Soil

- Vehicles ~ car parks
- Road equipment ~ The Grotto
- Gravel extraction and spread

Horticulture

- Backyard nurseries, a few specialist nurseries
- Mostly grown for cut flowers and ornamentals
- Port Fairy infestation ~ garden escape
- Hard to find at on-line nurseries
- Recently for sale on the Mornington Peninsula
- Garden dumping ~ Barwon Heads

Humans

- Shoes, cuffs, pockets, clothing
- Bird counters ~ OBP census
- Tourists ~ Port Fairy

Horticulture – a high risk pathway of spread

Limonium perigrinum

Limonium perezii

Control

• Surveillance, eradication, containment - priorities

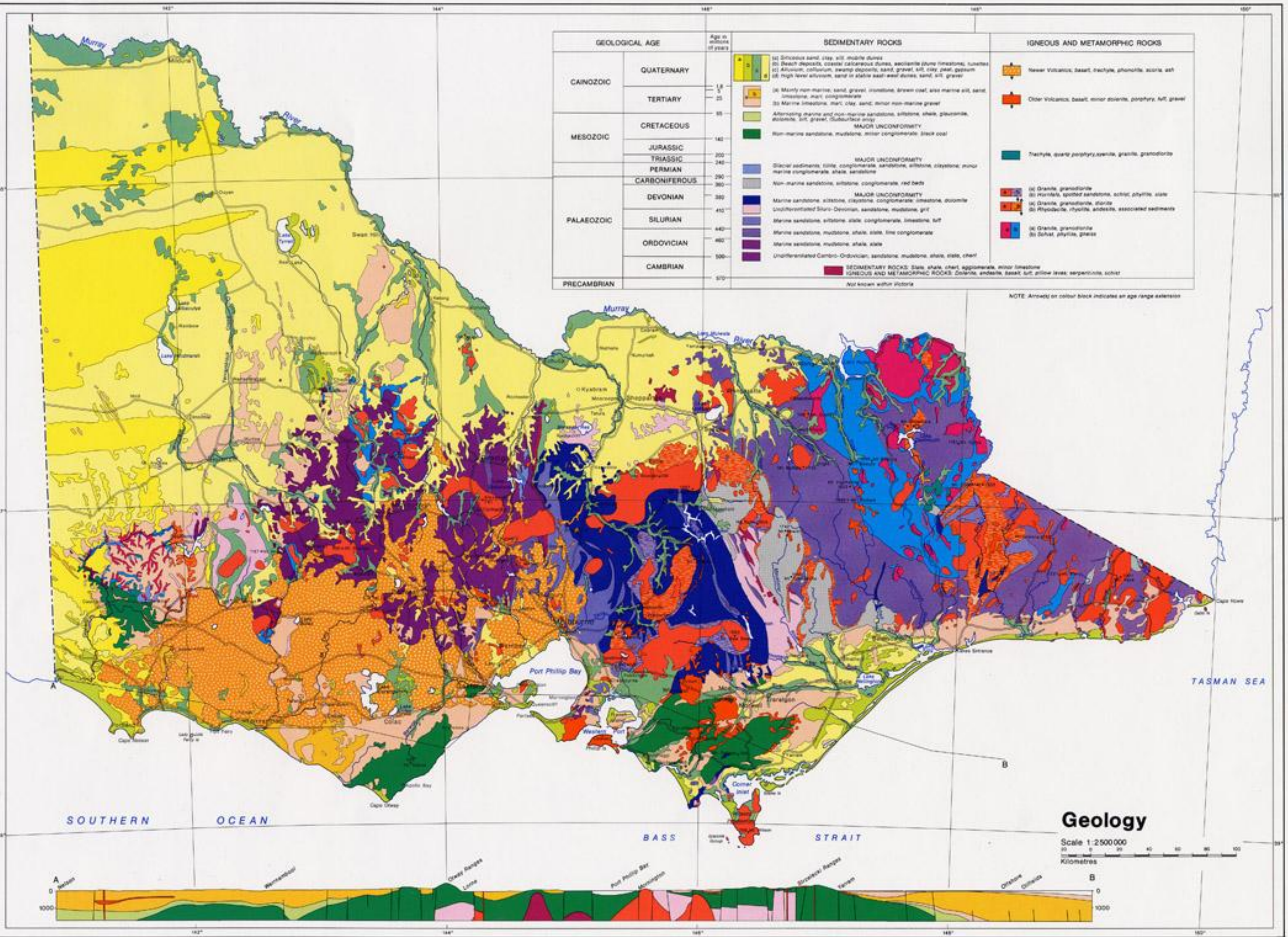
Surveillance

• Eastwards of Port Phillip to the NSW border – no recorded distribution but these areas have not been surveyed for *Limonium*

• High risk areas –visitor centres, car parks, walking tracks

• Basaltic and alkaline soils

• Phillip Island and Western Port are at high risk


GEOLOGICAL AGE
SEDIMENTARY ROCKS
IGNEOUS AND METAMORPHIC ROCKS
CAINOZOIC
QUATERNARY
TERTIARY
MESOZOIC
CRETACEOUS
JURASSIC
TRIASSIC
PERMIAN
CARBONIFEROUS
PALAEOZOIC
DEVONIAN
SILURIAN
ORDOVICIAN
CAMBRIAN
PRECAMBRIAN
MAJOR UNCONFORMITY
Newer Volcanics, basalt, trachyte, phonolite, scoria, ash
Older Volcanics, basalt, minor dolerite, porphyry, tuff, gravel
Non-marine sandstone, mudstone, minor conglomerate, black coal
Non-marine sandstone, siltstone, conglomerate, red beds
Marine sandstone, siltstone, claystone, conglomerate, limestone, dolomite
Undifferentiated Siluro-Devonian, sandstone, mudstone, grit
Marine sandstone, siltstone, slate, conglomerate, limestone, tuff
Marine sandstone, mudstone, shale, slate, fine conglomerate
Marine sandstone, mudstone, shale, slate
Undifferentiated Cambro-Ordovician, sandstone, mudstone, shale, slate, chert
SEDIMENTARY ROCKS: Slate, shale, chert, agglomerate, minor limestone
IGNEOUS AND METAMORPHIC ROCKS: Dolerite, andesite, basalt, tuff, pillow lavas, serpentinite, schist
Not known within Victoria
NOTE: Arrow(s) on colour block indicates an age range extension
Murray
River
Port Phillip Bay
Western Port
Corner Inlet
SOUTHERN OCEAN
BASS STRAIT
TASMAN SEA
Cape Howe
Geology
Scale 1:2500000
Kilometres
A
B

Eradication and containment

Herbicides

- Glyphosate plus adjuvant ~ partially effective. Turns plant red, but may still flower and seed.
- Parks Victoria ~ glyphosate and Smackdown ~ unsuccessfully
- Cheetham Salt Works ~ developed herbicide control
- glyphosate + adjuvant at high rates + Brushoff ~ 99% kill
- co-lateral damage, doesn't deal with seed bank
- Plant needs to be wet thoroughly

Mechanical

- Easily removed
- Effective
- Port Campbell N.P Geoff Carr pulled 200 plants at Sparkes Gully ~ not seen since.
- Barwon Head ~ population hand pulled
- Get it early

Cheetham Salt Works 2012

Photo: Denis Cox

Biological

- Not an option in Australia at present ~ conflicts of interest, not declared, problem not big enough (yet)
- Overseas agents do attack *Limonium*
- Some might already be in Australia
- Phytoplasmas – bacteria spread by sap sucking insects (leaf hoppers) (coconut, sugarcane)
- Affects *Limonium sinuatum* flower production in Israel, Poland
- Downey Mildew and leaf rusts, anthracnose fungi
- Collect and submit to DPI Biosciences

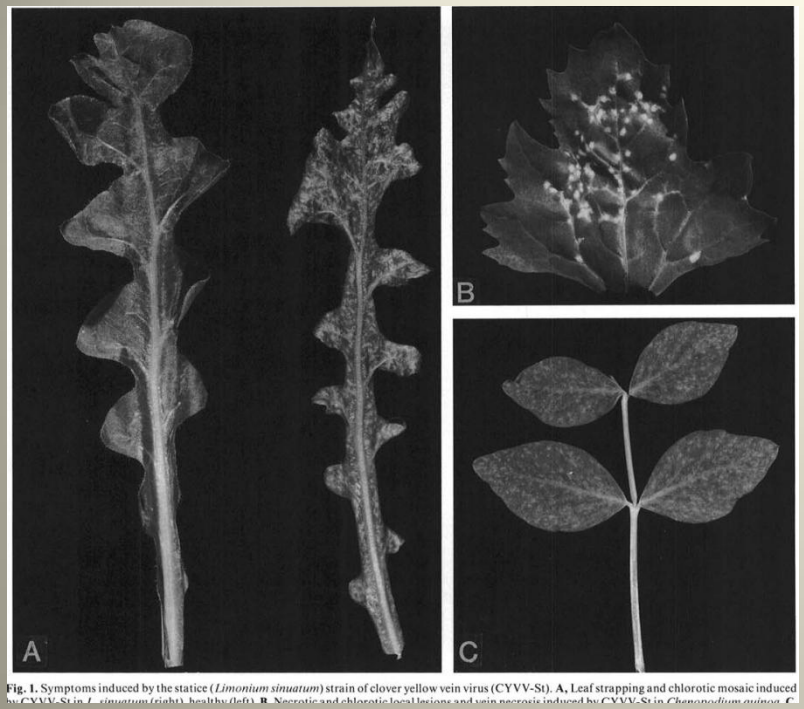


Fig. 1. Symptoms induced by the statice (*Limonium sinuatum*) strain of clover yellow vein virus (CYVV-St). **A**, Leaf strapping and chlorotic mosaic induced by CYVV-St in *L. sinuatum* (right), healthy (left). **B**, Necrotic and chlorotic local lesions and vein necrosis induced by CYVV-St in *Chenopodium quinoa*. **C**

Phytoplasma –Elm phloem necrosis

Uromyces limonii, *Colletotrichum dematium*

Limonium phytoplasma bacteria, dispersed by sap sucking insects.

Phytoplasma –Aster Yellows

Key Points

- Sicilian Sea Lavender is a high risk weed (saltmarsh)
- Can destroy native vegetation
- Currently restricted
- Threatens large areas of coastline
- Surveillance needed ~ eastern Victoria

Actions if you find it?

Actions if you find it?

- Confirm identification – voucher, key, herbarium
- Record position
- Note of size
- Report it to DSE Coastcare co-ordinator
- Remove (if safe to do so)
- Double bag
- Deep burial
- Prevent spillages

Questions

Acknowledgements
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