



Purple willow (Salix purpurea) Ferniehurst (Noelc iNaturalist)

Braided River Aid Seminar, Lincoln University, July 2025

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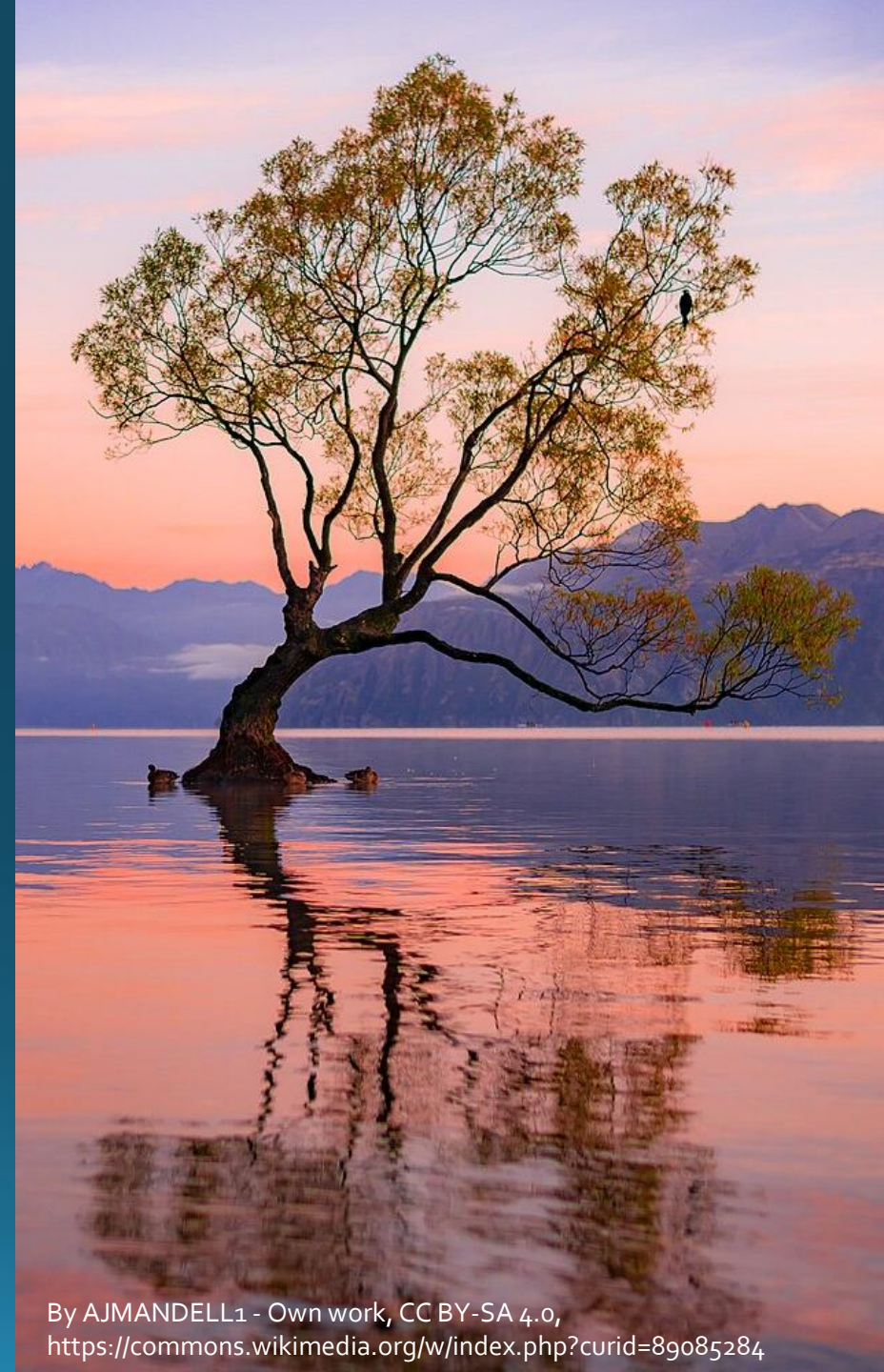
With significant input from many others

Wilding Willows – an exploding issue in Canterbury?

About willows

Second most abundant group of exotic trees

- Lots of current and potential habitat
 - Braided rivers
 - Banks of rivers, streams and lakes
 - Wetlands
 - Land slips
- Like conifers – loved and hated, beneficial and detrimental, and good at spreading ('wilding')



NZ - 2 main subgenera

Salix – the tree willows

- *S. x fragilis* (crack)
- *S. matsudana* (matsudana, tortured, twisted)
- *S. x pendulina* (golden weeping)

Vetrix – the shrub willows, osiers and sallows

- *S. cinerea* (grey)
- *S. atrocinerea* (rusty)
- *S. purpurea* (purple)
- *S. viminalis* (osier)
- *S. x reichardtii* (pussy willow)



Salix cinerea female catkin
Photo: Jason Butt

Salix purpurea male catkin –
note red/purple anthers.
photo Jason Butt

Landscape engineers



- Willows have value
 - Flood management
 - Aesthetics
 - Shade streams
 - Food for honey bees
 - Habitat for native biodiversity (pekapeka/bat roosts, Australasian crested grebe/pūteketeke nesting)
- But with uncontrolled spread ('wildings'), they cause issues
 - Impact biodiversity
 - Cause flooding, infrastructure damage, and/or erosion
 - Suck water from rivers (e.g. Waipara)
 - Reduce access and safety of rivers



Affect biodiversity by invading

- Wetlands
- Streams
- Braided Rivers



Dead indigenous Baumea sedges (*Machaerina rubiginosa*) under willow canopy

photo: Jason Butt

The nature of the weediness?

- Loss of dynamics and natural character
- Constrict river and decrease braiding
- Crowd out native plants or habitat for native birds and other wildlife



Purple willow explosion

- Purple willow (*Salix purpurea*) has been planted in New Zealand for over a century.
 - Historically for basket making (flexible, strong branches) and
 - Erosion control (cloned, “sterile” varieties)
- For reasons no-one can fully explain, at least one purple willow variety is now spreading explosively in Canterbury
- Spread is by seed - something it theoretically shouldn't be able to do



SCIENCE & ENVIRONMENT

Our deeply toxic relationship with willows

Willows can stop a river flooding a farm. Or they can turn a river dark and mean. Trying to control them, we're realising, has always been a fool's game. But we can't stop now.

Conway

- Planted - erosion control & flood protection ('sterile clone')
- Now seeding, expanding rapidly
- Tolerant of flood flows
- River engineering issues (flooding, bridge concerns)
- Survey and control work undertaken, \$152k to date (FY21-24), more committed (\$29k)



Figure 3 and 4 (above) Conway upstream of SH1 bridge, comparing the riverbed in c.2010 (top) and 2022 (bottom), with much of the increase in riverbed vegetation being purple willow, evident in Figure 5 and 6.

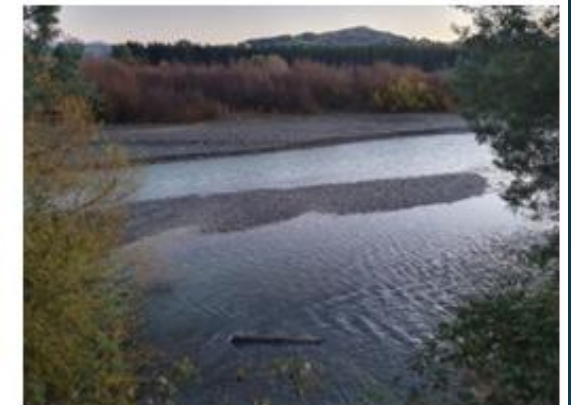


Figure 5 and 6 (above) Conway from SH1 after spraying, showing live purple willow adjacent to controlled vegetation. Possibly missed due to control when river flow was above average. Taken 25/05/23. Photo locations indicated by yellow arrows on Figures 3 and 4.



Waiiau Uwaha River

Photo: James Schaap

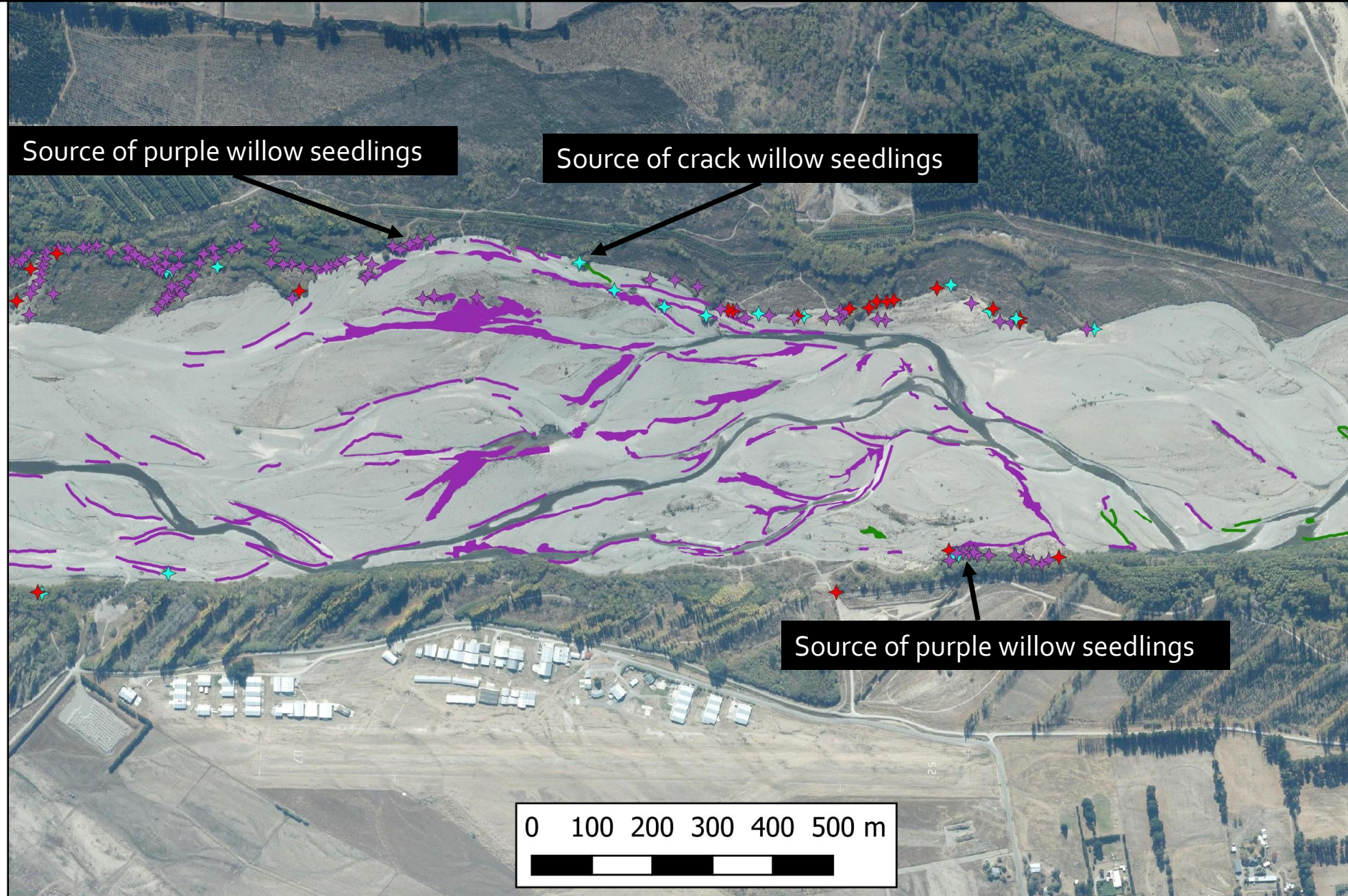
LEGEND

Willow Seedling Type

-  Purple Willow Dominant
-  Crack Willow Dominant

Tree Species

-  Purple Willow
-  Common Osier
-  Grey Willow
-  Alder

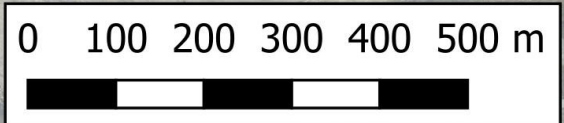


Source of purple willow seedlings

Source of crack willow seedlings

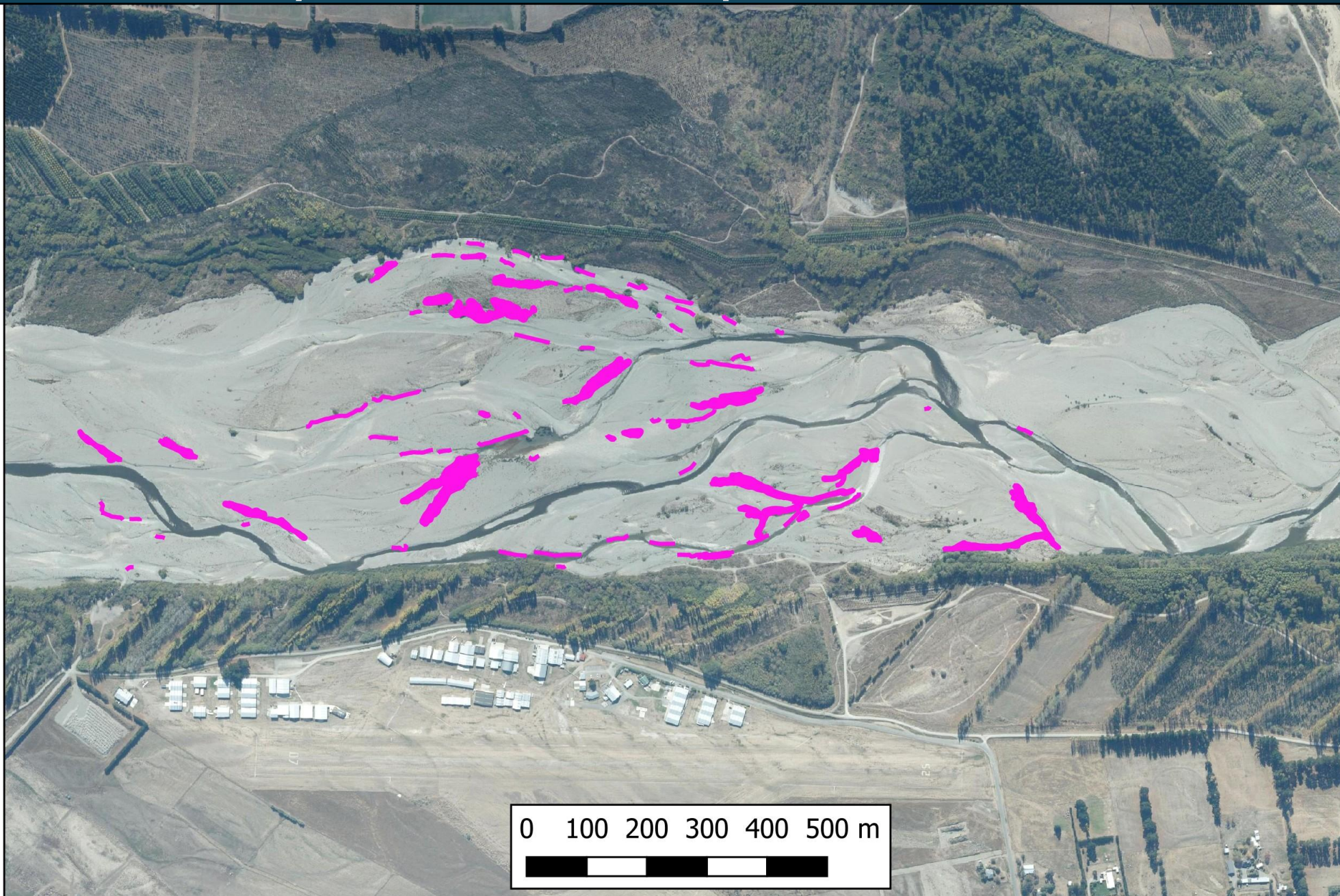
Source of purple willow seedlings

Airfield Area
Willow Seedling Species
and Trees

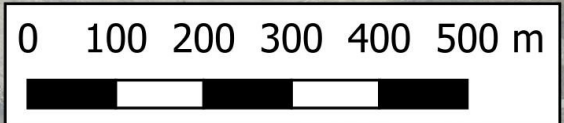


 Remnant Seedlings

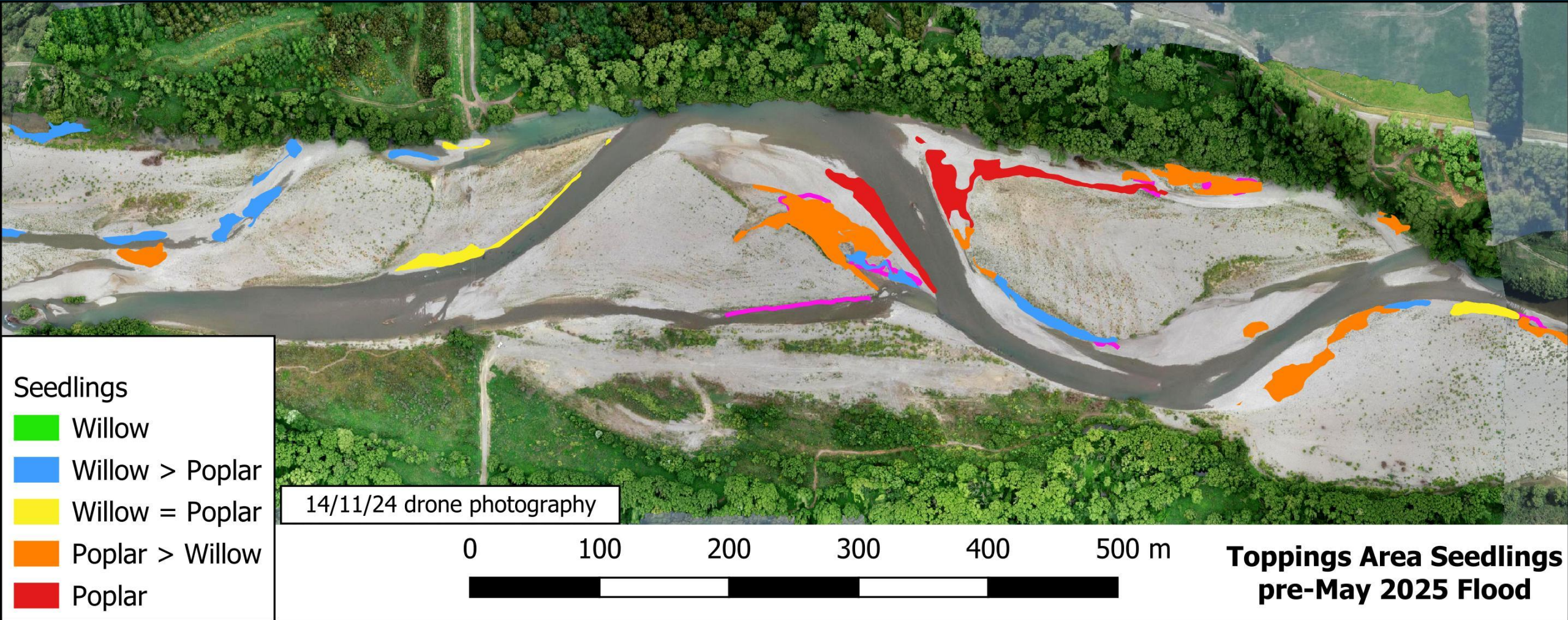
Post flood



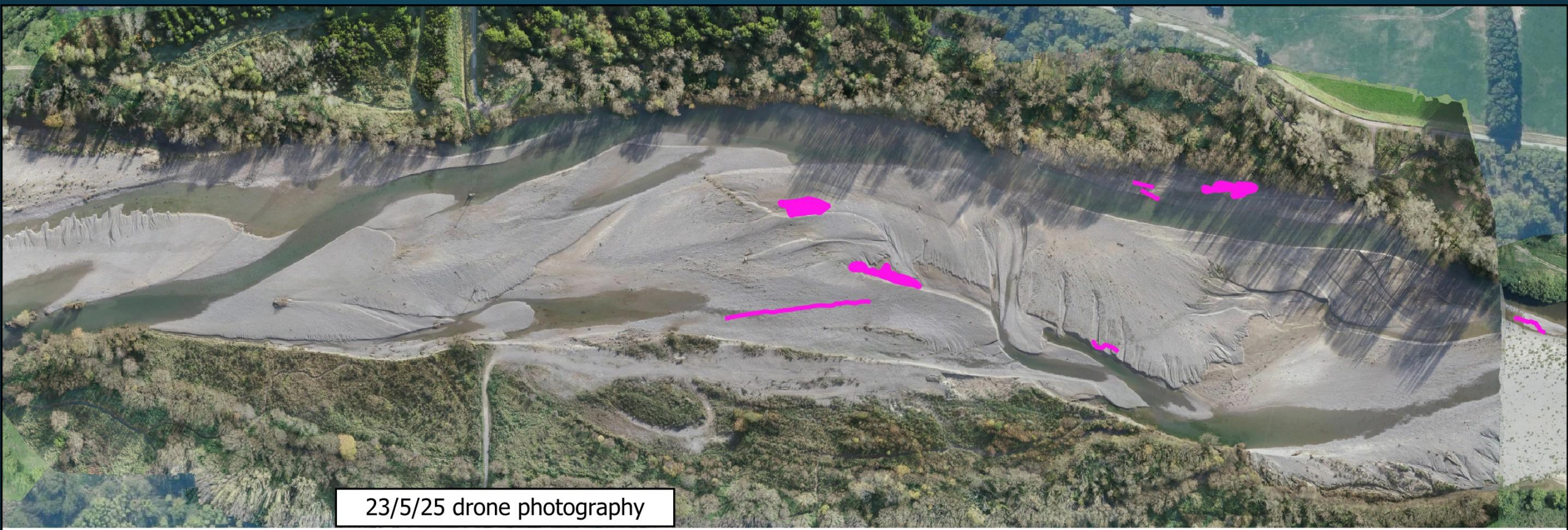
Airfield Area
Remanant Seedlings
Post-flood



Ashley Rakahuri example



Ashley Rakahuri example



 Remnant Seedlings



**Toppings Area Seedlings
post-May 2024 Flood**

Post flood



Purple willow tree and seedlings



Purple willow seedlings



Poplar seedlings



Crack willow seedlings



Zombie seedlings



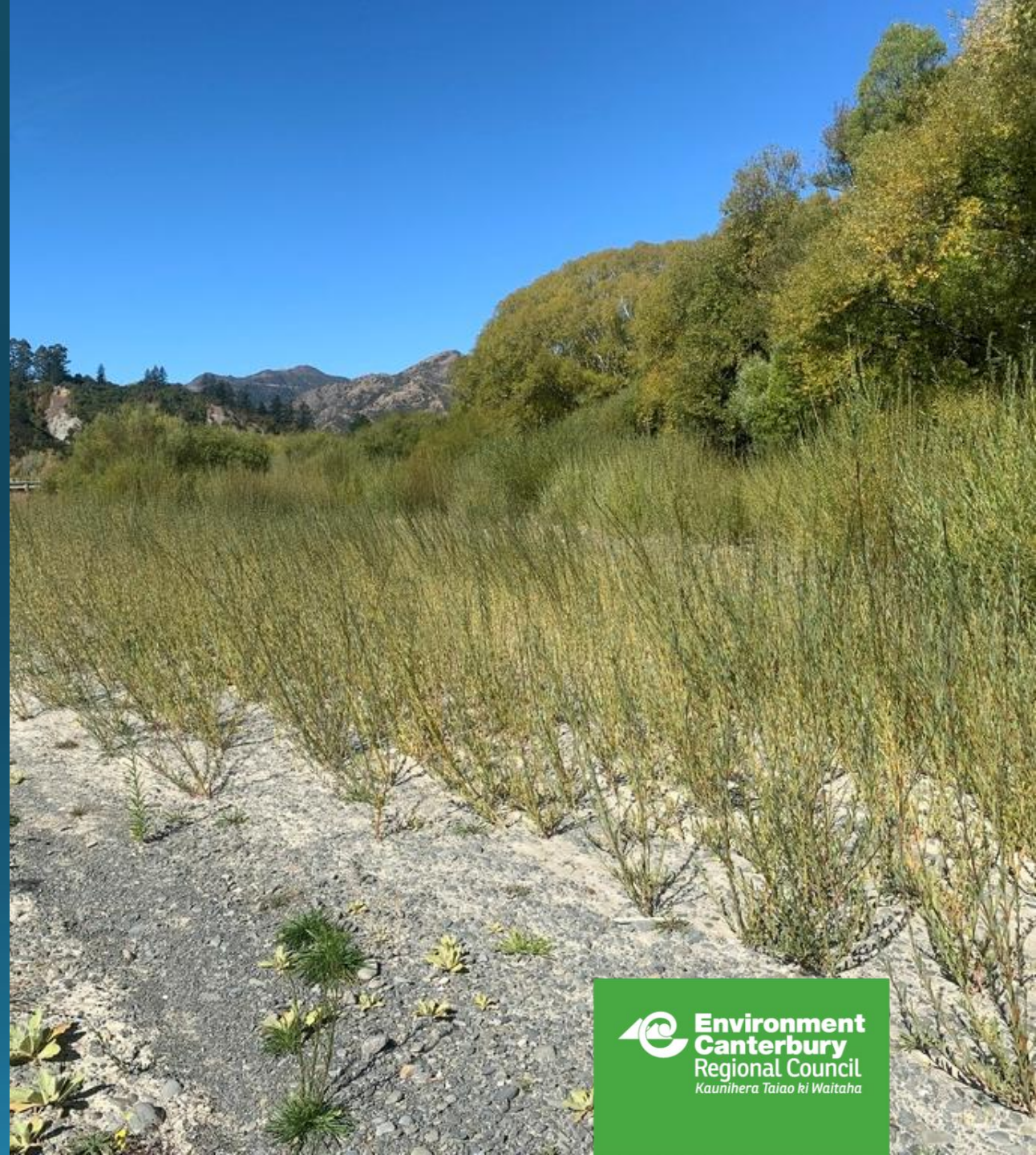
Assorted willow seedlings

Situation critical?



- Main willows of concern
 - Purple willow (*Salix purpurea*)
 - Osier/basket willow (*S. viminalis*)
 - Others including grey, rusty, & golden willows
- In response to reports – we drafted an ‘internal discussion document’ to explore the issue

Purple willow (*Salix purpurea*) Ferniehurst (Noelc iNaturalist)



'Time Bomb?' (Tane's Tree Trust)

The typical trajectory of pest species in NZ – arrival, followed by a long lag period, then sudden rapid expansion.

'Once a breeding population of any of the willows (or poplars for that matter) is established, transformation of the New Zealand landscape would be total. It would be faster, and less controllable, than the present nightmare of wilding conifers in the high country....' (2012)





How do you solve a problem like willows – it's tricky

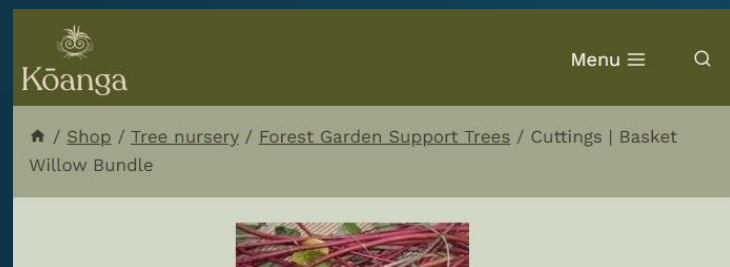
- Many naturalised species, hybrids, and cultivars in NZ (57+)
- Some clones are more invasive than others
- Confusing common names
- Some species are hard to tell apart
- Fortunately, there is a great interactive key and friendly expert out at Lincoln

Purple willow in Hogsback Ck, Upper Waimakariri catchment

Photo: Will Todhunter

Willow management

- Only two species (and their hybrids) are currently listed as 'unwanted organisms'
 - Grey willow (*Salix cinerea*)
 - Crack willow (*S. x fragilis*)
- Several fast spreading and invasive species are being propagated, sold, and recommended for planting
 - Purple (*S. purpurea*)
 - Osier/basket willow (*S. viminalis*)*



Cuttings | Basket Willow Bundle

\$24.00

- Common Osier x 3 (*salix viminalis*)
- Giganta x 3 — Yellow
- Purple Willow x 3 (*salix purpurea*)



Basket Willow/Osier – *Salix viminalis*

Multi stemmed shrub fast growing up to 6m. Prefers wet sites. Is also planted in small-scale water treatment systems. Used in basketry and living willow sculptures.

Uses: Fodder, Hedging, Basketry, Waterside planting, Coppicing, Early bee forage, Contaminated sites, Medicinal, Hedgerow.

Purple basket Willow/Osier – *Salix purpurea*

Broadly spreading, deciduous shrub reaching 2-5m. Widely utilised for basket weaving. Coppice annually to produce basket material.

Fodder, Hedging, Basketry, waterside planting, coppicing, contaminated sites, Medicinal, Hedgerow, Erosion Control.

*(noting 'Osier' is also a wider name, not species specific)



Tricky wilding willows...

- Use of herbicides over water can be challenging
- Biocontrol unlikely an option
- National Environmental Standard Freshwater (some problem willows are not listed as pest species, makes them harder to control)

Three-year-old male grey willow in “The Green Frame” behind Ecan office in 2020



"We should stop assuming that single-sex clones in New Zealand are safe to propagate..."

Willows perform a critical flood protection function very well...
...when very well managed. *Can we manage them?*

- Single-sex willow clones can still spread in the wild.
- Clear instances of spread that are single sex
 - *Salix purpurea* 'Eugenei' (male only) spreading in Clarence River – only males in NZ
 - *Salix eleagnos* (female only in NZ) but is wild in limestone riverbeds in Canterbury & Marlborough



Adaptable willows

- Globally, at least 18 willow species have been recorded as being sexually fluid - female flowers occasionally pop up on male trees, and vice versa
- It is more common in hybrids

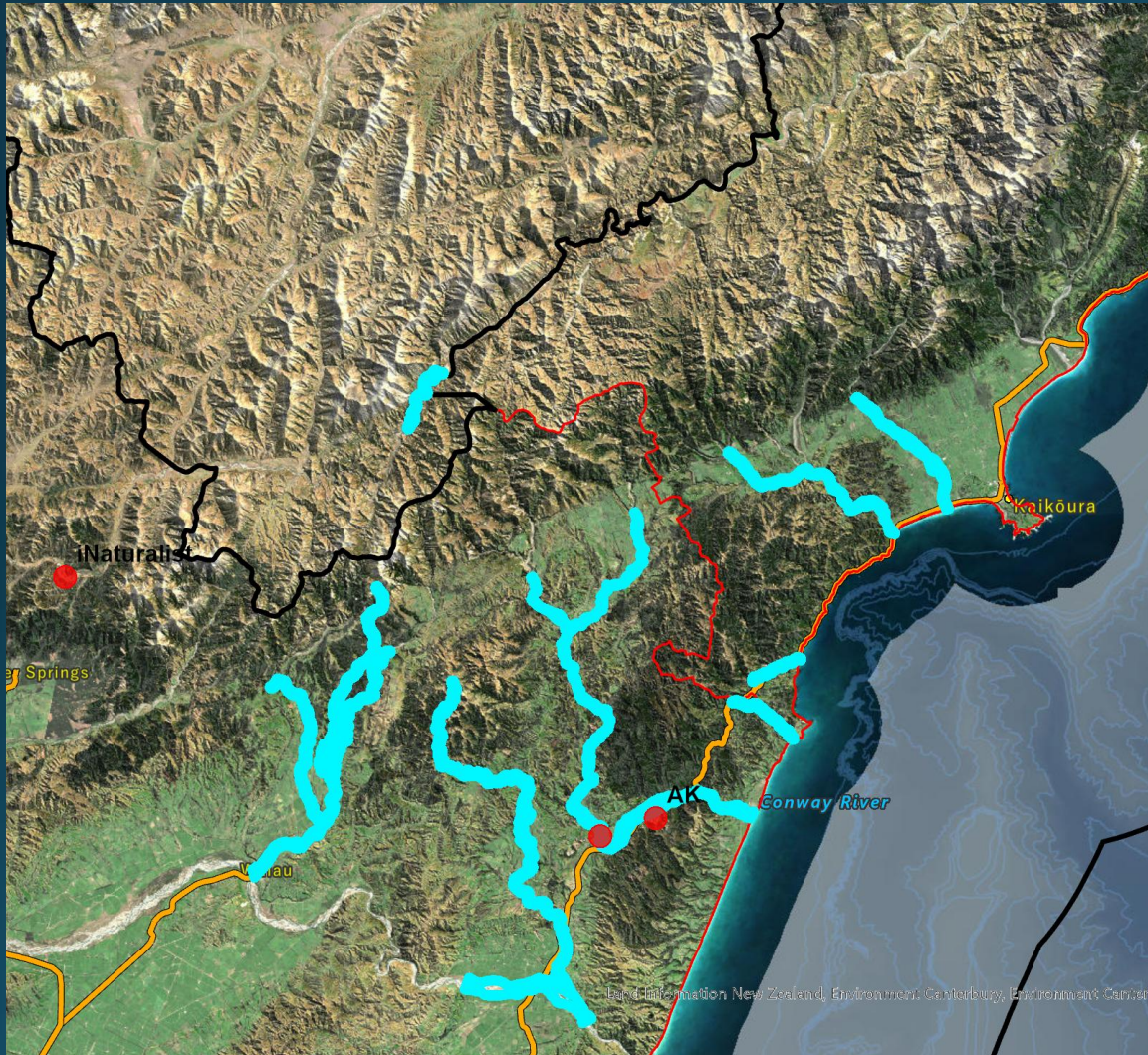
Tricky wilding willows...

- Grey willow
 - Seeds early - 3 years of age)
 - Fortunately, is visible at 2-3 years (can control before spread)
- Some high-country areas are still relatively free of invasion – opportunities to focus on these area

Purple willow Hogs Back Creek
Photo: Will Todhunter



More observations needed



- Especially helpful where there are few in the landscape

Blue - estimated extent of purple willow in North Canterbury

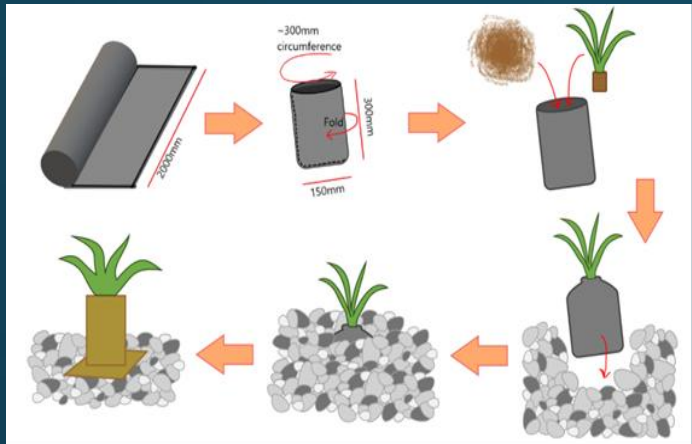
Red dots – the records in iNaturalist



Potential actions - underway

- Where willows are used for flood control, look at alternatives such as indigenous or non-invasive species that can perform the same functions
- Engage with the NZ Willow and Poplar Trust, District Councils, NZTA and others who use willows
- Raise awareness of the issue

Scour bays

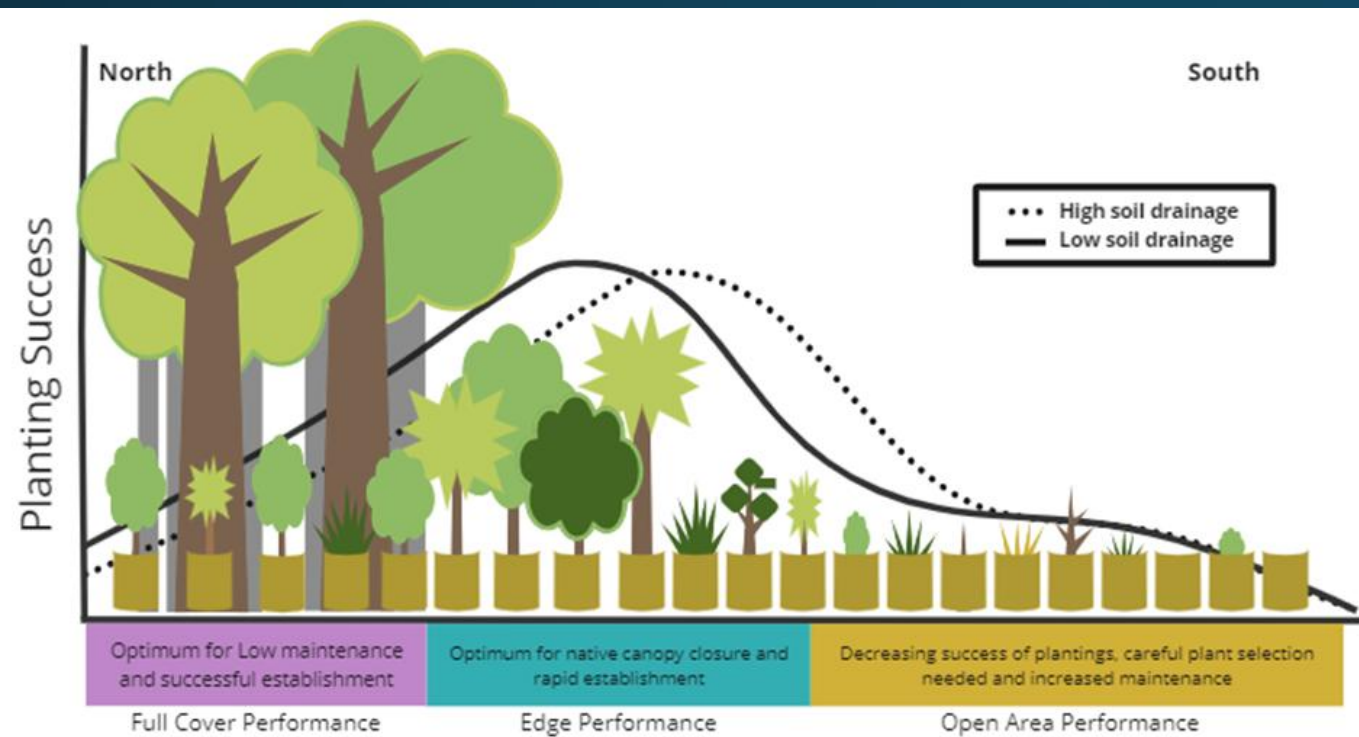


“Sub-canopy planting” Successional displacement on berms



Braided River Revival **Berm Transition Project: Sub-Canopy Native Planting**

Environment Canterbury Operational Report
R24/27





Sep 2023



Nov 2023



Selwyn 02, August 2022



Selwyn 02, February 2025

Other potential actions

- Categorise willows - by invasiveness and habitats
- Model – both area and speed of invasion into different ecosystems
- Ensure the most problematic willows have appropriate regulatory status to enable management



Potential actions

- In Canterbury control is occurring in locations where uncontrolled willows are right next door
- Good opportunities for a more coordinated strategic approach



Purple willow infestations Conway River, near SH1 (left) and looking downstream of Inland Rd State Highway 70 bridge (right)



Potential actions

- Undertake a willow survey across the region
- Develop a regional or national strategy for willow management
- Contain and eliminate seeding species/taxa where feasible

WoNS & willows

- All but 3 species of willows are designated Weeds of National Significance (WoNS)
- *'They are among the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts.'*
- *'They have invaded riverbanks and wetlands in temperate Australia, occupying thousands of kilometres of streams and numerous wetland areas.'*

<https://weeds.org.au/profiles/willows-except-weeping/>

Why Willows Won't Do!

Willows may look pretty but they are extremely damaging foreign plants. They are a Weed of National Significance (WONS) and must be controlled.

They can grow in the river rather than on the banks (like native trees) which allows them to alter the course of the river, causing sedimentation and erosion.

Water is important. Willows use up to three times as much water as river red gums annually.

Willows are invasive - they spread rapidly from broken branches and seeds.

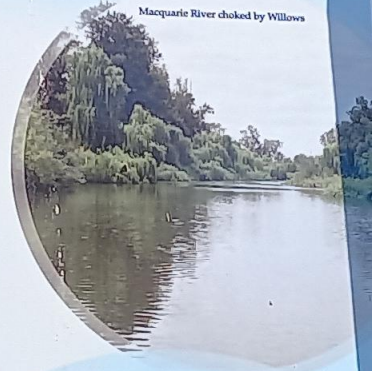
Willows drop all their leaves in autumn. This reduces water quality which impacts native fish populations.

Willows do not provide the specific types of food and shelter for native fish, insects, birds and mammals, that is provided by native trees.

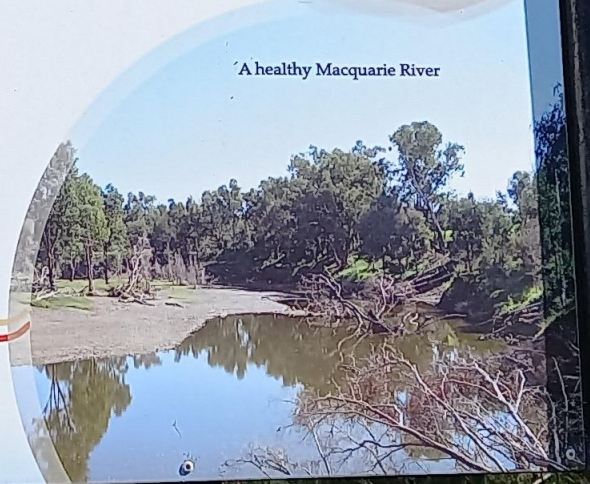
In summer, willows create dense shade. This reduces the ability of native plants to establish and flourish.

By replacing willows with native plants some natural balance is restored to the river corridor.

 [Big reds skitz adventures](#)



Macquarie River choked by Willows



A healthy Macquarie River



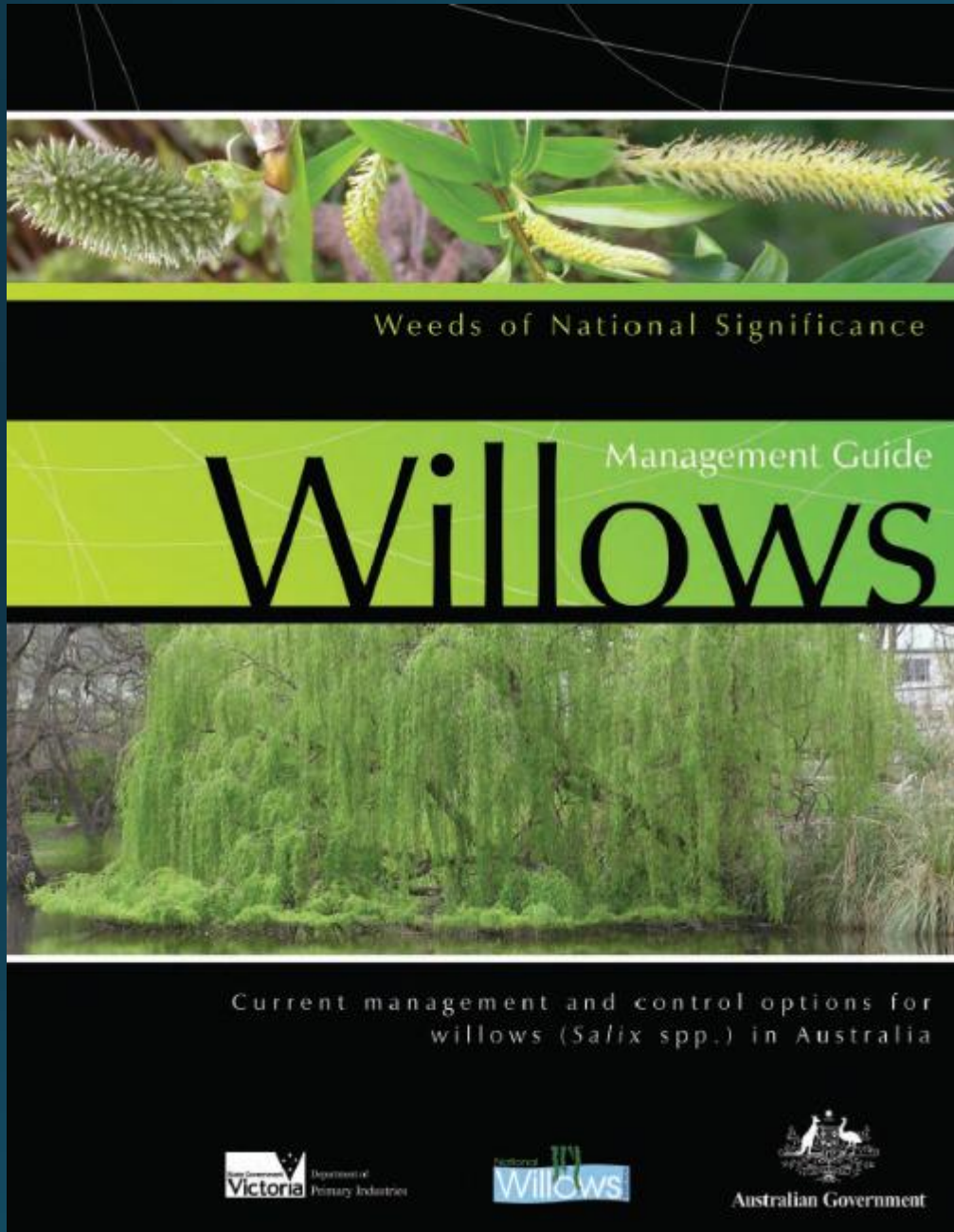
Dubbo Macquarie River
Bushcare Inc.



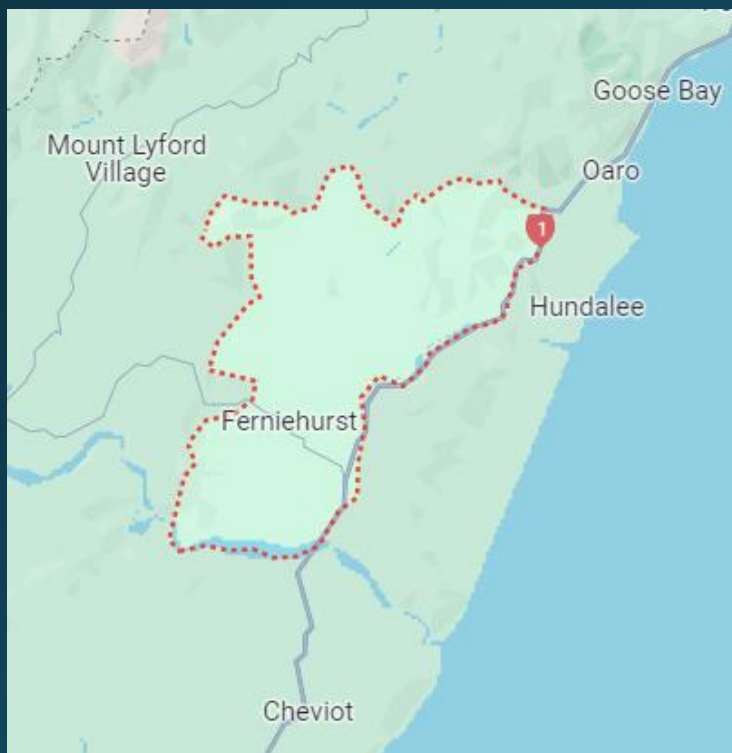
DUBBO
REGIONAL
COUNCIL

National plan

- Our near neighbours have had willows high on their list of weeds for 25 years
- Australian National Willow Plan was developed in 2000
- Is it time we took a nationally coordinated approach to this pest?



Questions?



Purple willow (*Salix purpurea*)
Ferniehurst (Noelc iNaturalist)





**Environment
Canterbury
Regional Council**
Kaunihera Taiao ki Waitaha

*Taking action together to shape a thriving and
resilient Canterbury, now and for future generations.*

Toitū te marae o Tāne, toitū te marae o Tangaroa, toitū te iwi.

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