Bio-Protection
Bioprotection science for New Zealand

The drivers of weeds in gravel riverbeds

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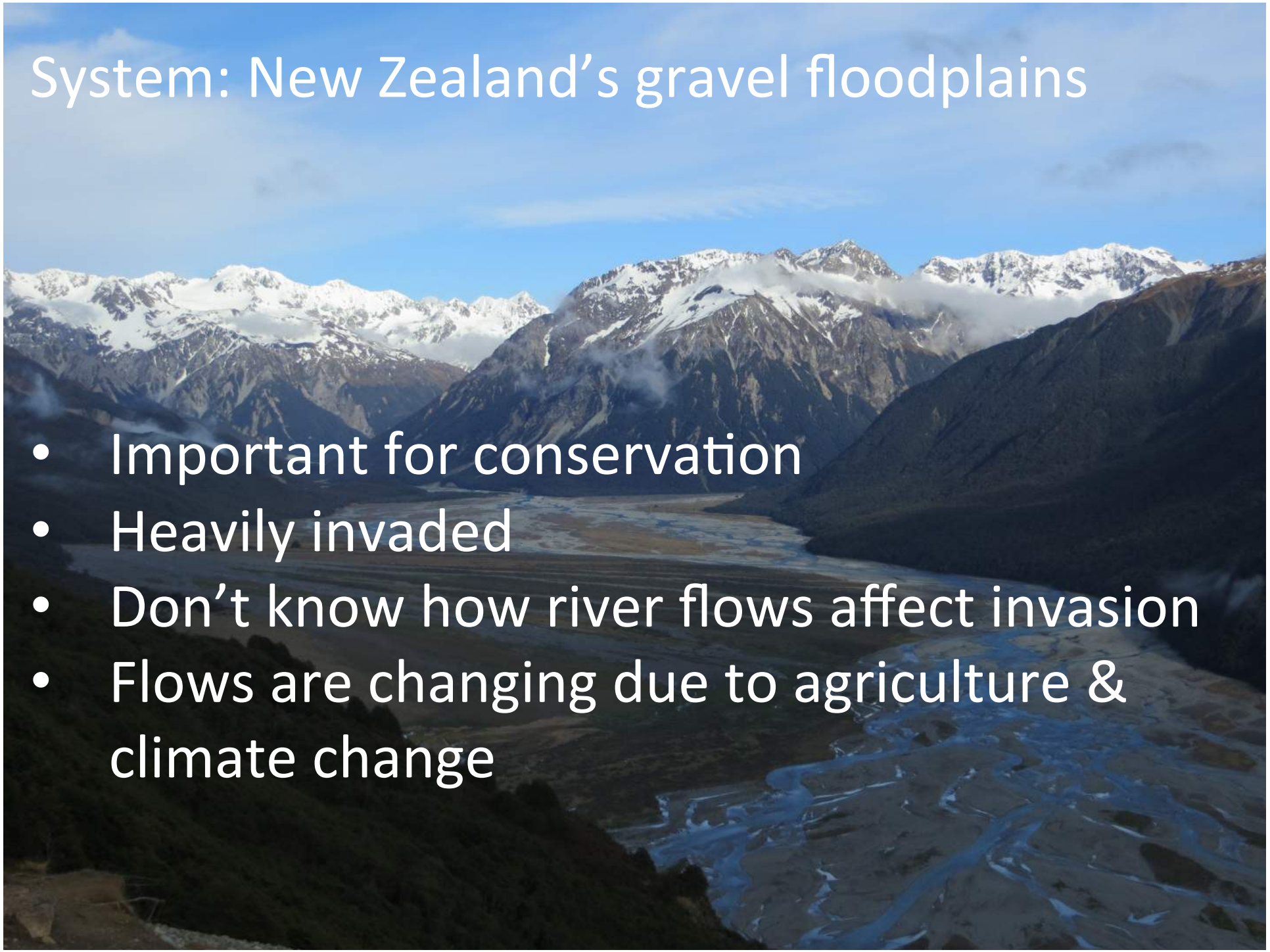
Landcare Research
Manaaki Whenua


System: New Zealand's gravel floodplains
• Important for conservation
• Heavily invaded
• Don't know how river flows affect invasion
• Flows are changing due to agriculture & climate change

What about the hill/plains rivers?

Three studies, three questions...

At a regional scale:

- 1) What variables drive alien and native total cover and richness (# of species)?

- 2) What are the traits of the most prominent weeds and are those traits related to drought and flooding?

- 3) What variables drive the woody legumes broom, gorse and tree lupin?

Drivers examined for all studies

Flow regime

-Disturbance (Flooding)

-Drought (Low Flows)

Climate

-Temperature

-Precipitation

Propagule pressure

-Human land-cover

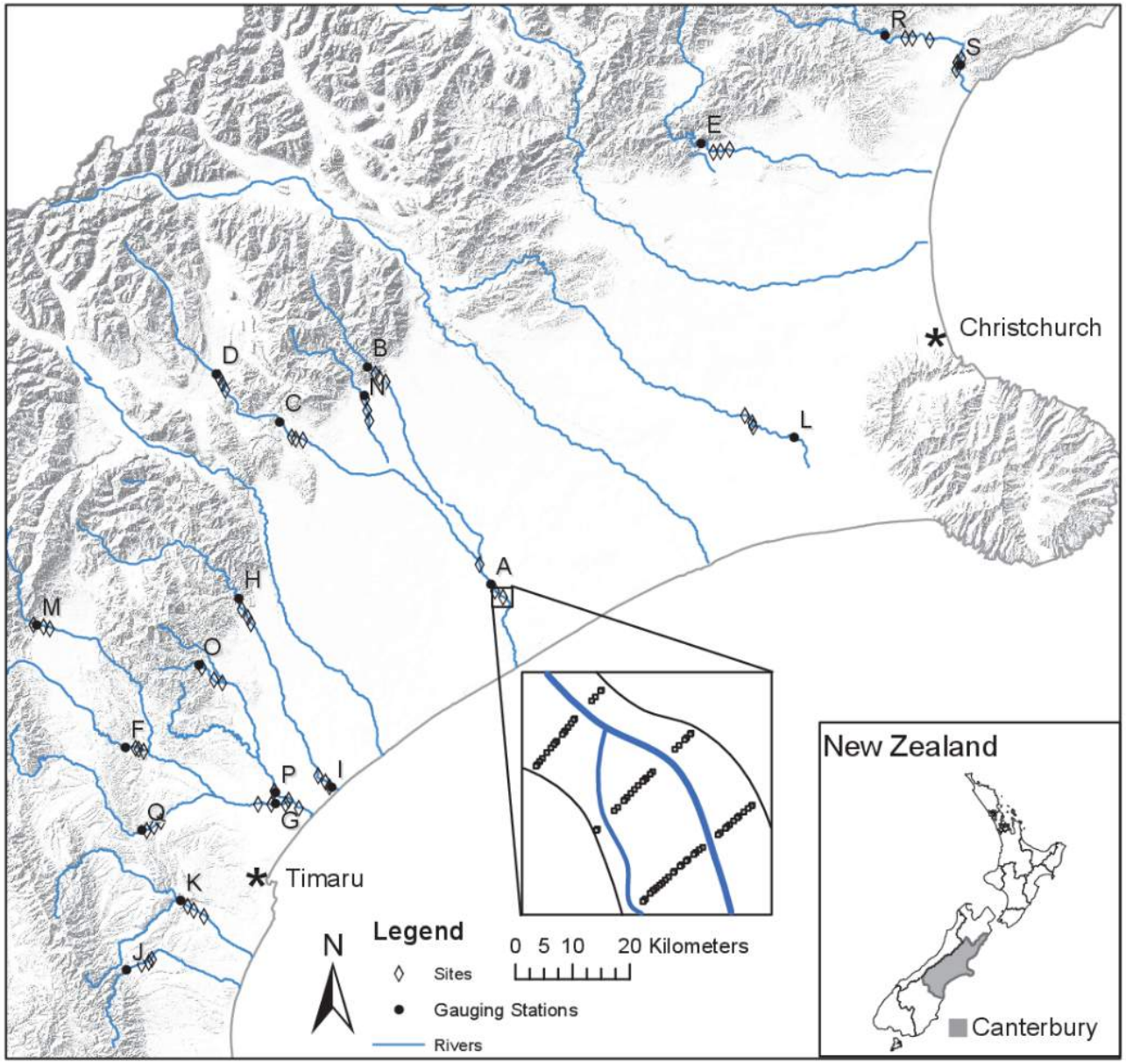
-Native land-cover

Floodplain

-Gravel/Sediment Size

-Isolation from active channels.

Sampling scheme

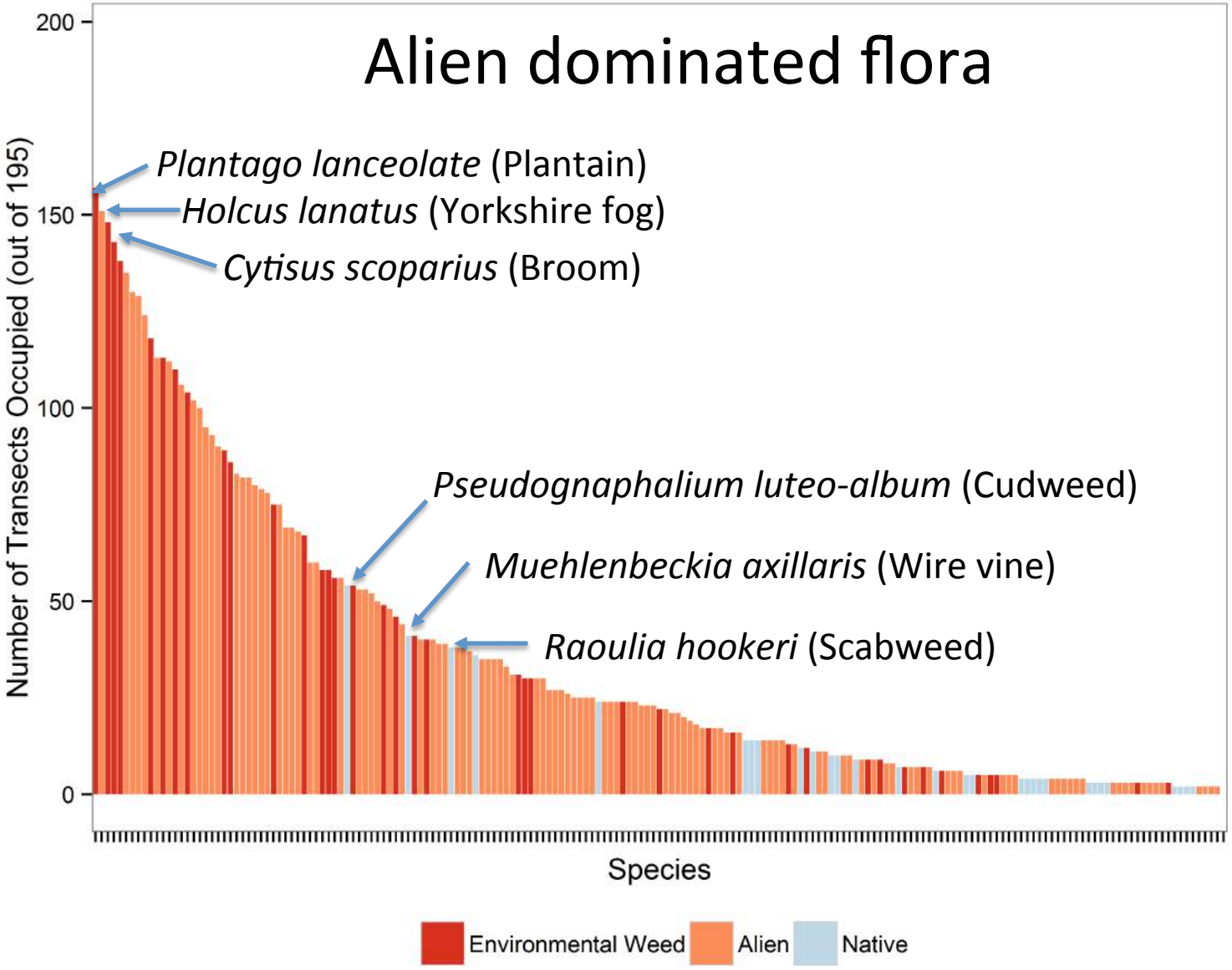


Sampled across **flow, climate, land-cover**, and **floodplain** gradients.

Vascular plant survey

Results!

How weedy are the rivers?



154 Aliens
31 Natives

Study #1: Aliens vs. Natives

Study #1: Key findings

What drives alien and native cover and richness?

Tested drivers: Flow, Land-cover, Climate, Floodplain

- **Aliens -** function of **flow** + **floodplain**
- **Natives** - function of **land-cover** + **climate**

- **Driven by completely different variables**
- **Aliens associated with winter flow variability**

Study #2: Profiling problem weeds

Study #2: Profiling problem weeds

Q: What are the traits of weeds that are dominating gravel riverbeds? N-fixation/Vegetative growth/Longevity/Woody

Most common on a species basis

Study #2: Profiling problem weeds

Q: What are the traits of weeds that are dominating gravel riverbeds?

Annuals and bienniels were the most dominant groups of species

Study #2: Future forecast

Q: How do river flows affect groups of species?

↑ Winter Flow Variability = ↑ Annual/Biennial Herbs


Fumitory


Catchfly


Catsear/Hawksbeard

Study #2: Future forecast

Q: How do river flows affect groups of species?

Low Flow Days = Perennial Herbs

Study #3: Woody legumes

Study #3: Drivers of woody legumes

- In general, Broom is the most problematic woody legume in the system.
- None are related strongly to river flows.
- But, may invade more of floodplain if river levels become consistently lowered.

Management

- Management against aliens ≠ management for natives.
  - Ecosystem restoration
- Flow alteration likely to affect aliens but not natives.

Climate change: possible outcomes

- If climate change increases drought periods.
  - More woody and perennial herb encroachment.

- If climate increases variation in flows (e.g. more frequent floods).
  - Increase the invasion of annual/biennial weeds.

Questions?

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