The cost of ‘second-rate’ for native plant communities

Sandra Anderson, University of Auckland

Dave Kelly, University of Canterbury

Alastair Robertson, Massey University

George Perry, University of Auckland

Acknowledgements : Vivian Ward, Jennifer Ladley


• Necessary management (planting vs. protection) ?
• Appropriate plant species ?
• Availability of mutualists (pollinators / seed dispersers) ?
• Condition of the site (weeds / pests) ?
• Success(ion) ?

Considerations:

- Necessary management (planting vs. protection) ?
- Appropriate plant species ?
- Availability of mutualists (pollinators / seed dispersers) ?
- Condition of the site (weeds / pests) ?
- Success(ion) ?

1. 2nd rate pollination:

Does selfed seed survive?

Do those seedlings grow and reproduce?

2. 2nd rate dispersal :

Do small seeds germinate?

Do they grow and reproduce?

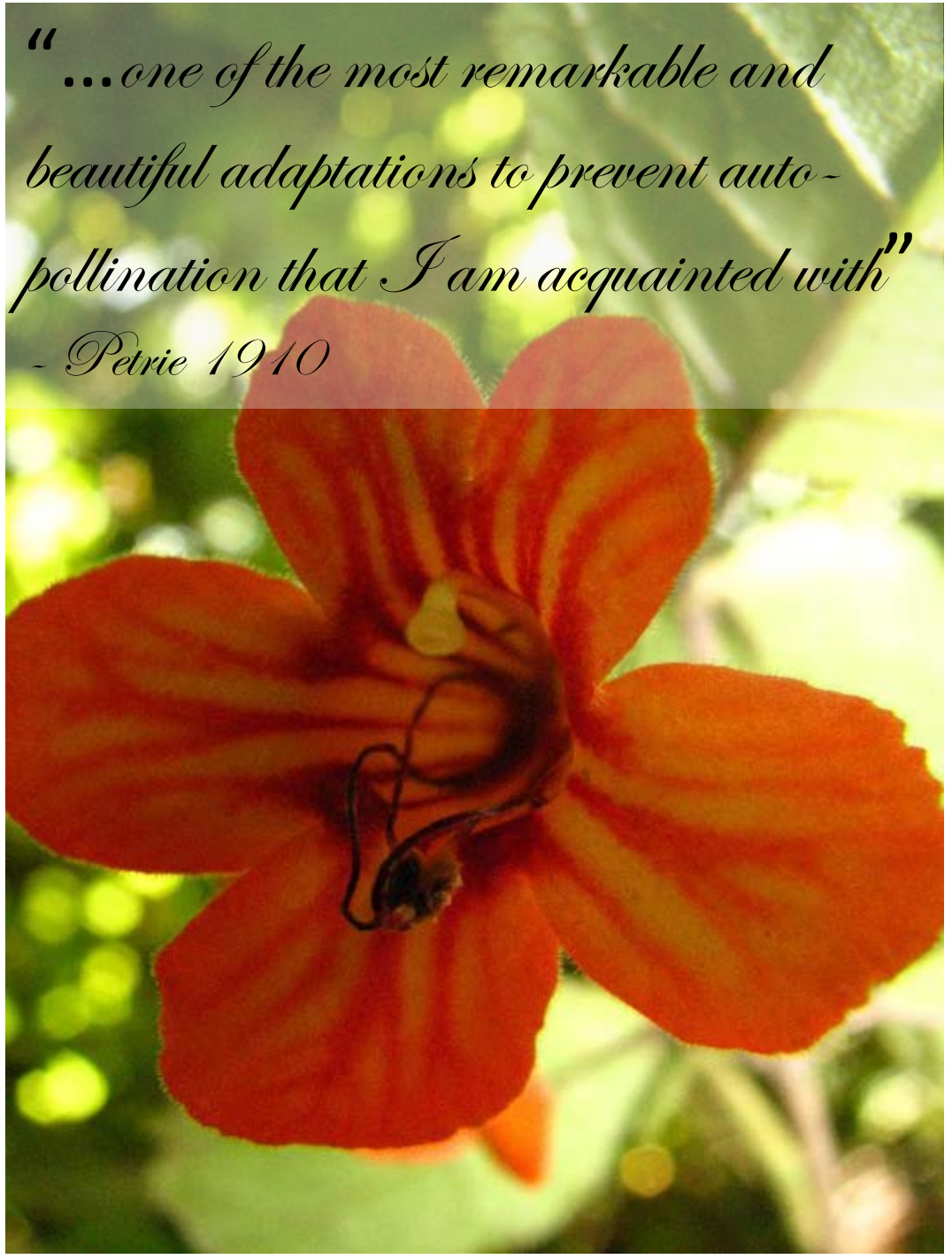
Theres a degree of resilience…

but where native pollinators and seed dispersers are missing, native plants often now ‘get by’ with the least effective service.

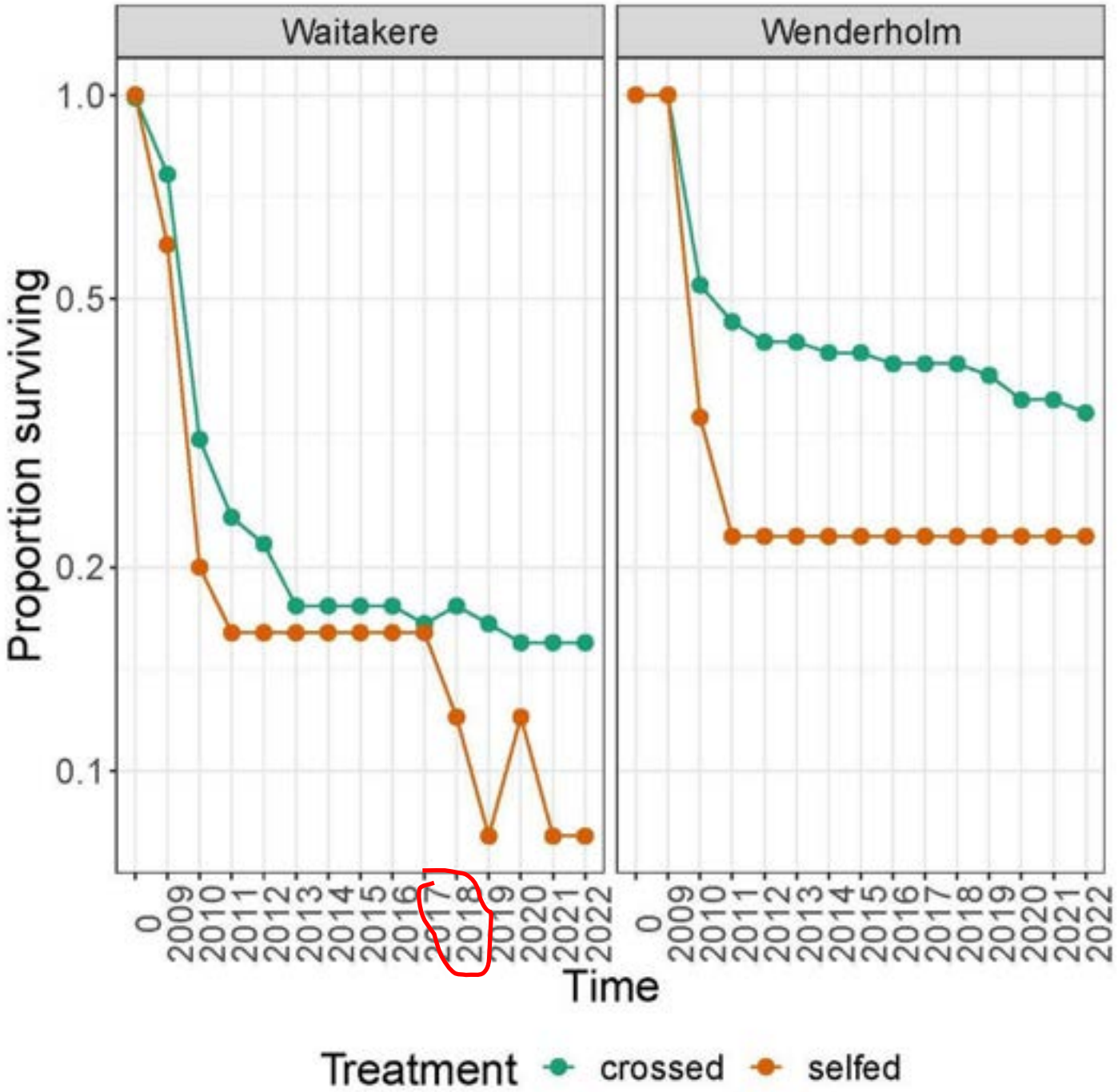
Many plant populations look as if they are managing despite operating in quite modified circumstances…

but are they?

1. Pollination




162 cross + 32 self = 196

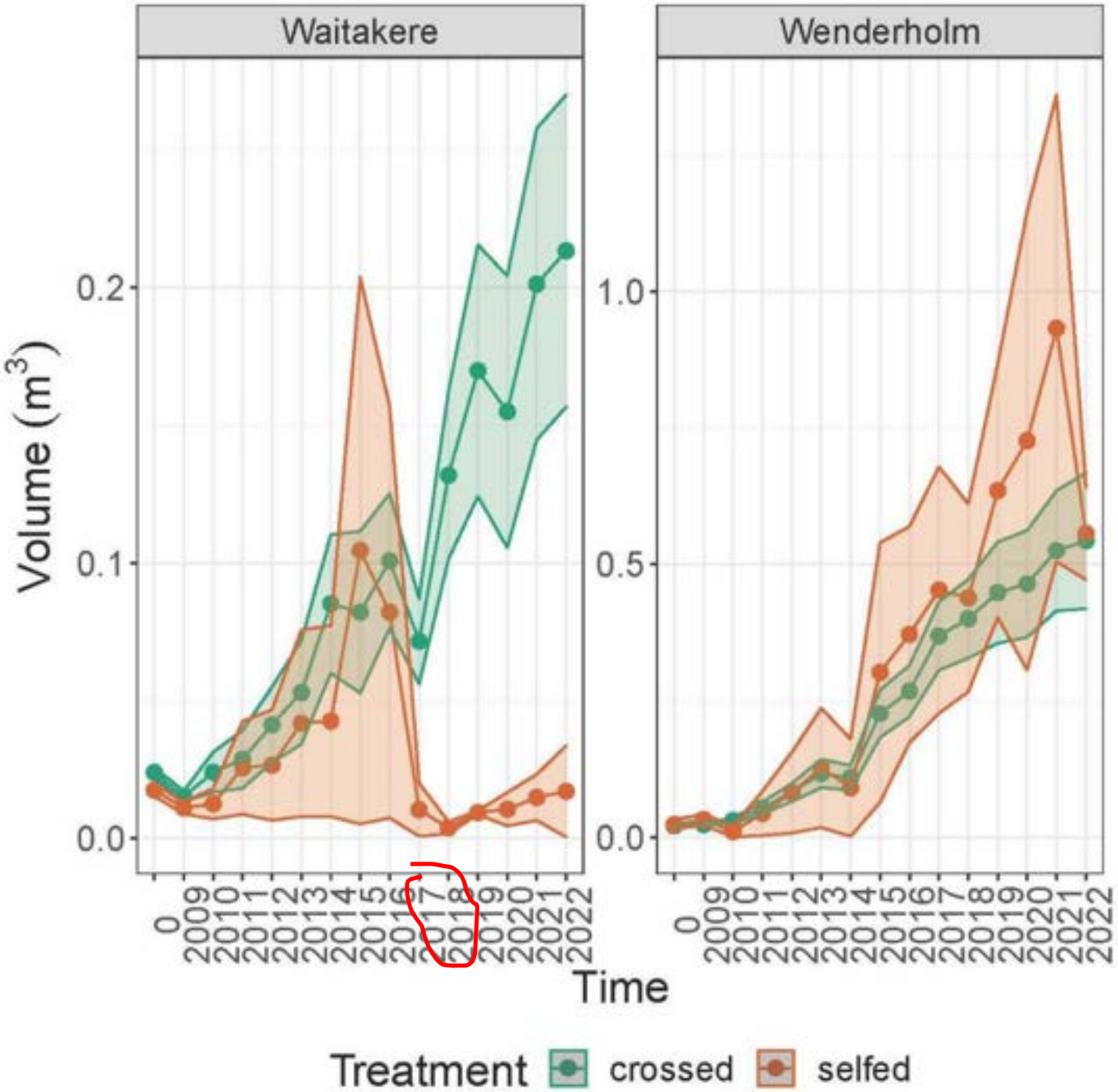


1. Pollination:

variation between the sites (***)

survival in crossed plants consistently higher than selfed (***)

stress knocks out the selfed progeny



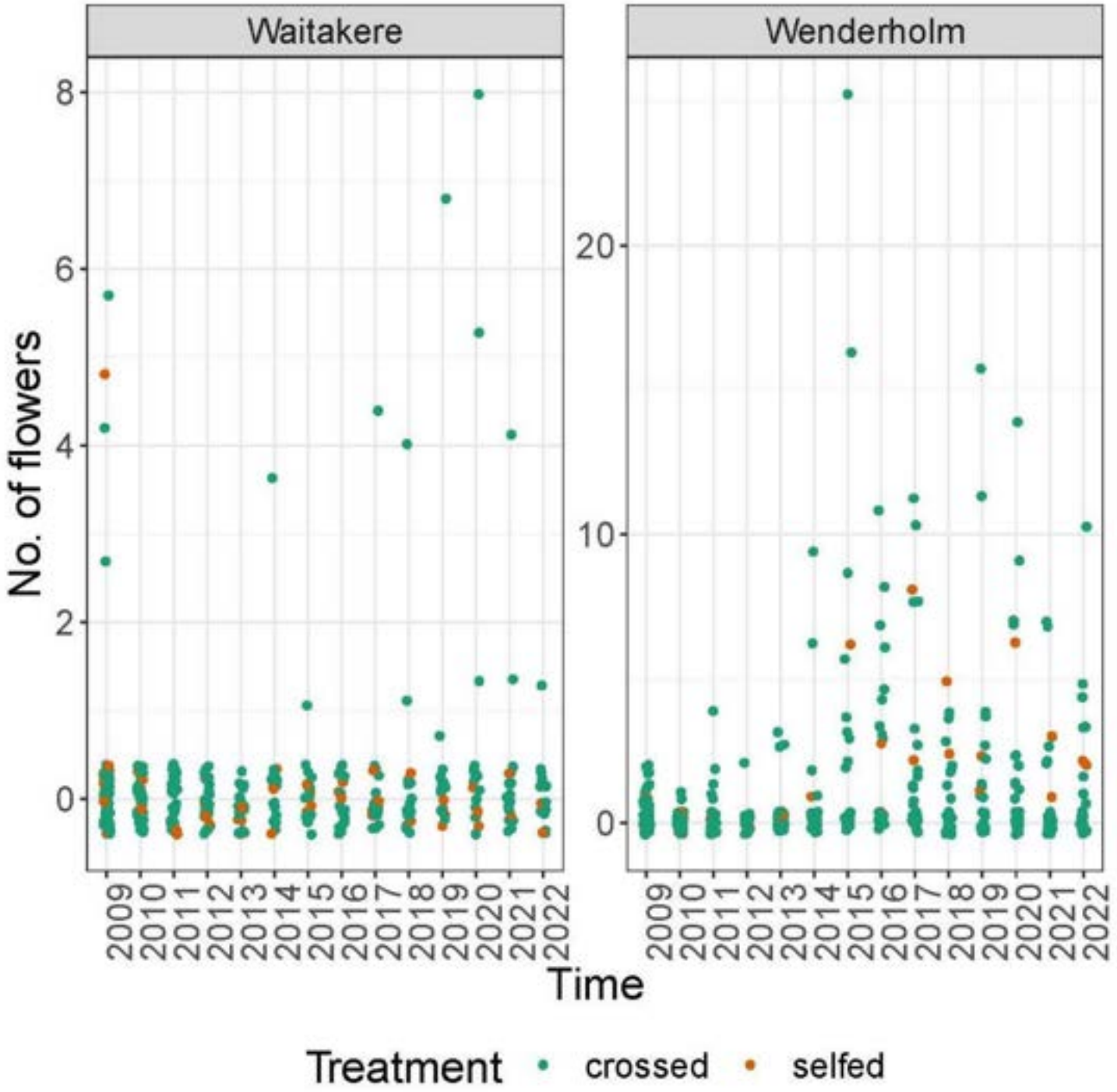
1. Pollination:

variation between the sites

growth rate in crossed plants similar to selfed

BUT

selfed plants don't recover from stress



1. Pollination:

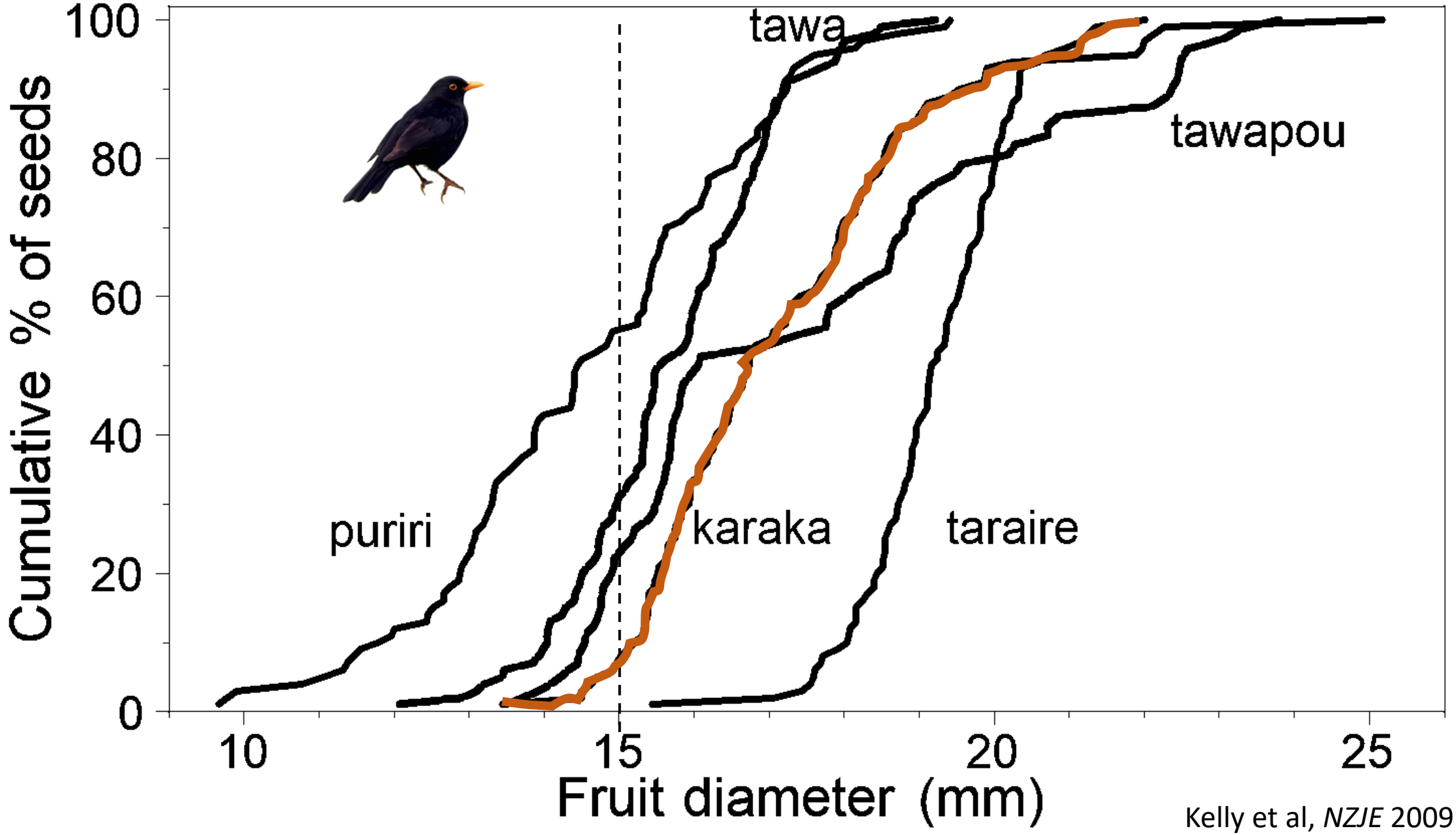
variation between the sites (***)

flowering in crossed plants similar to selfed

1. Pollination: Getting by with lower quality seed works …….until there is stress

2. Dispersal

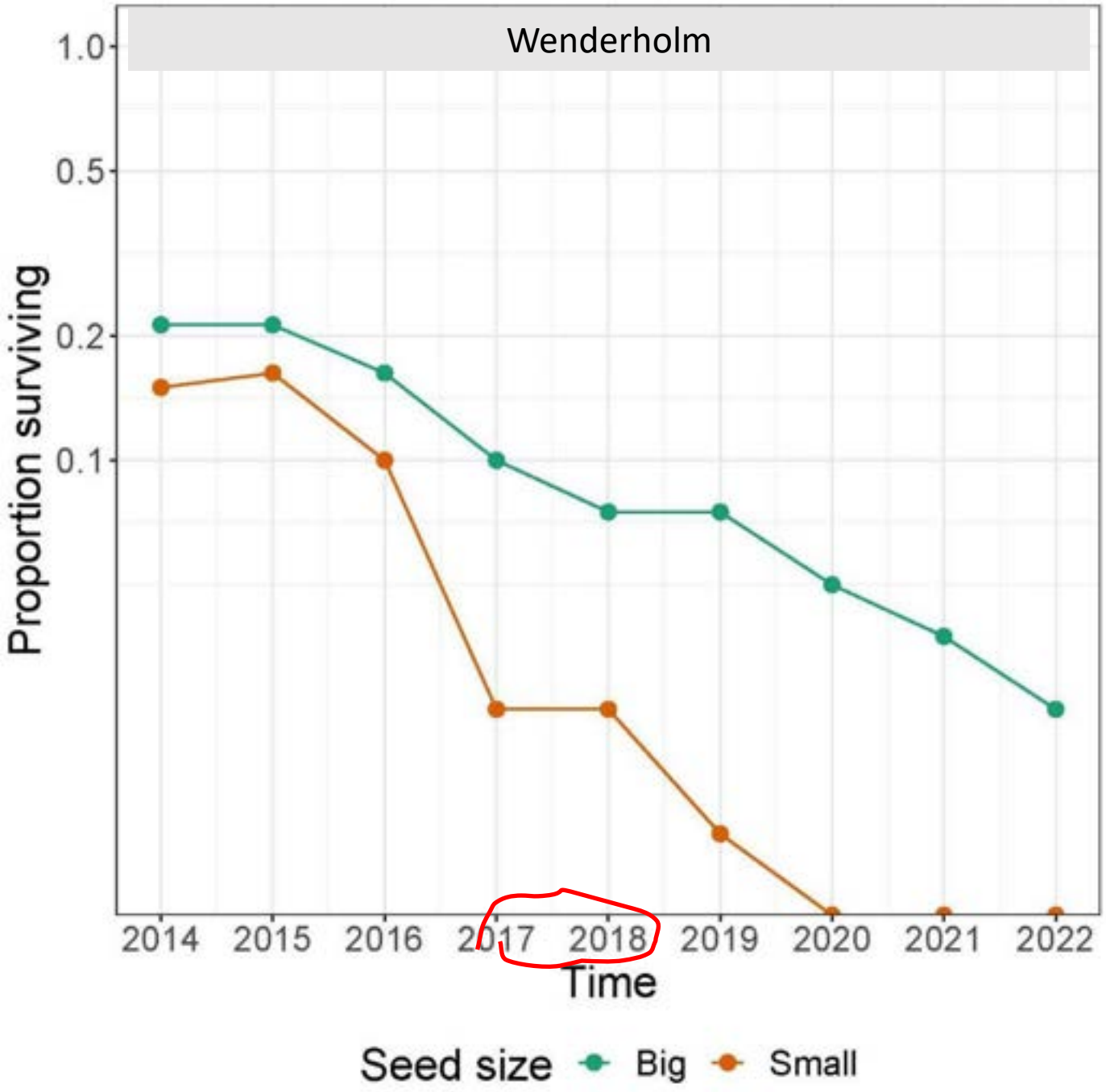

0
1
2
3
4
5
6
7
8
9
10
11
12



Kelly et al, *NZJE* 2009

8 x 10 = 80 per treatment

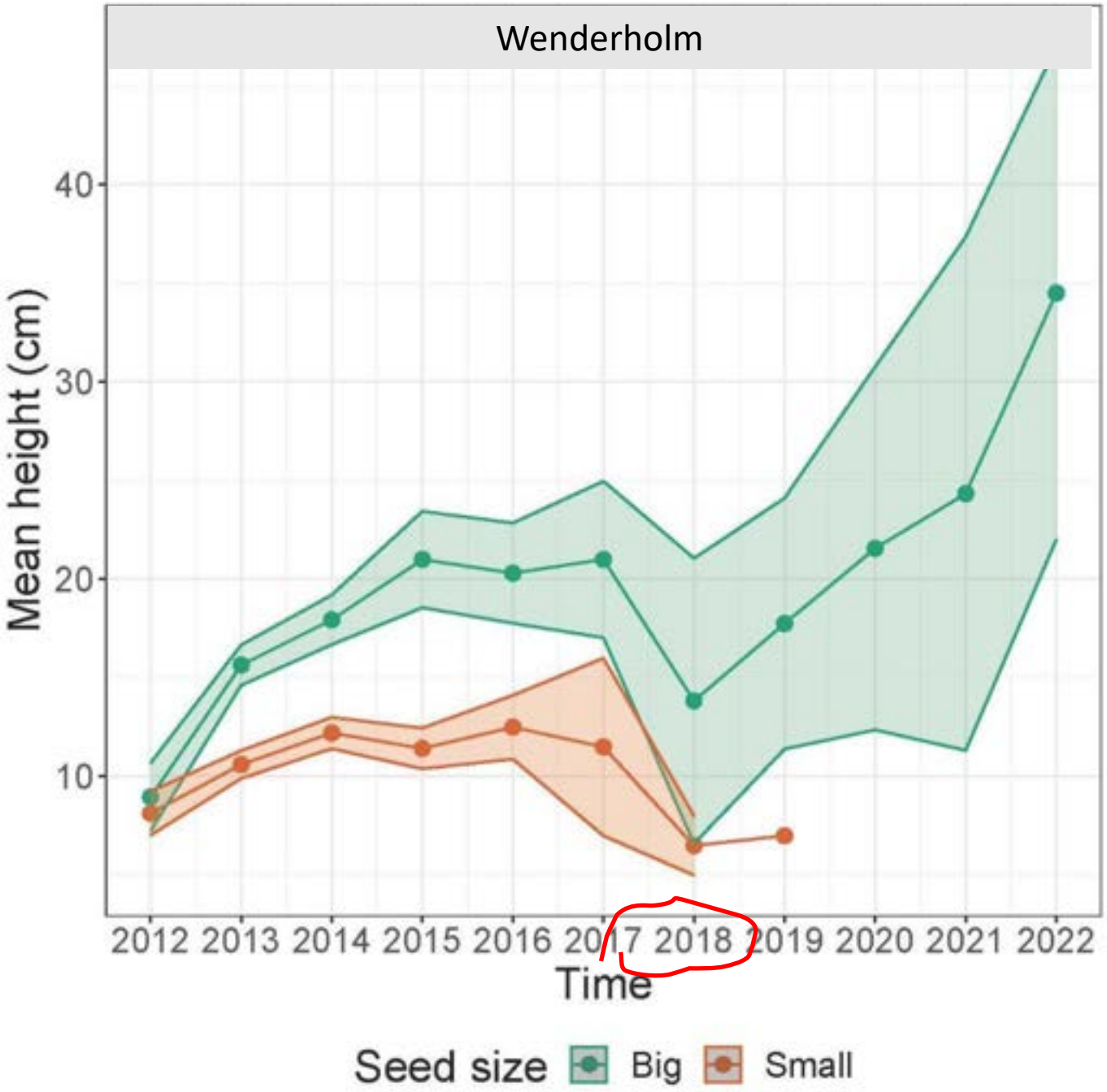

862



2. Dispersal:

survival in big seeds consistently higher than small seeds (**)

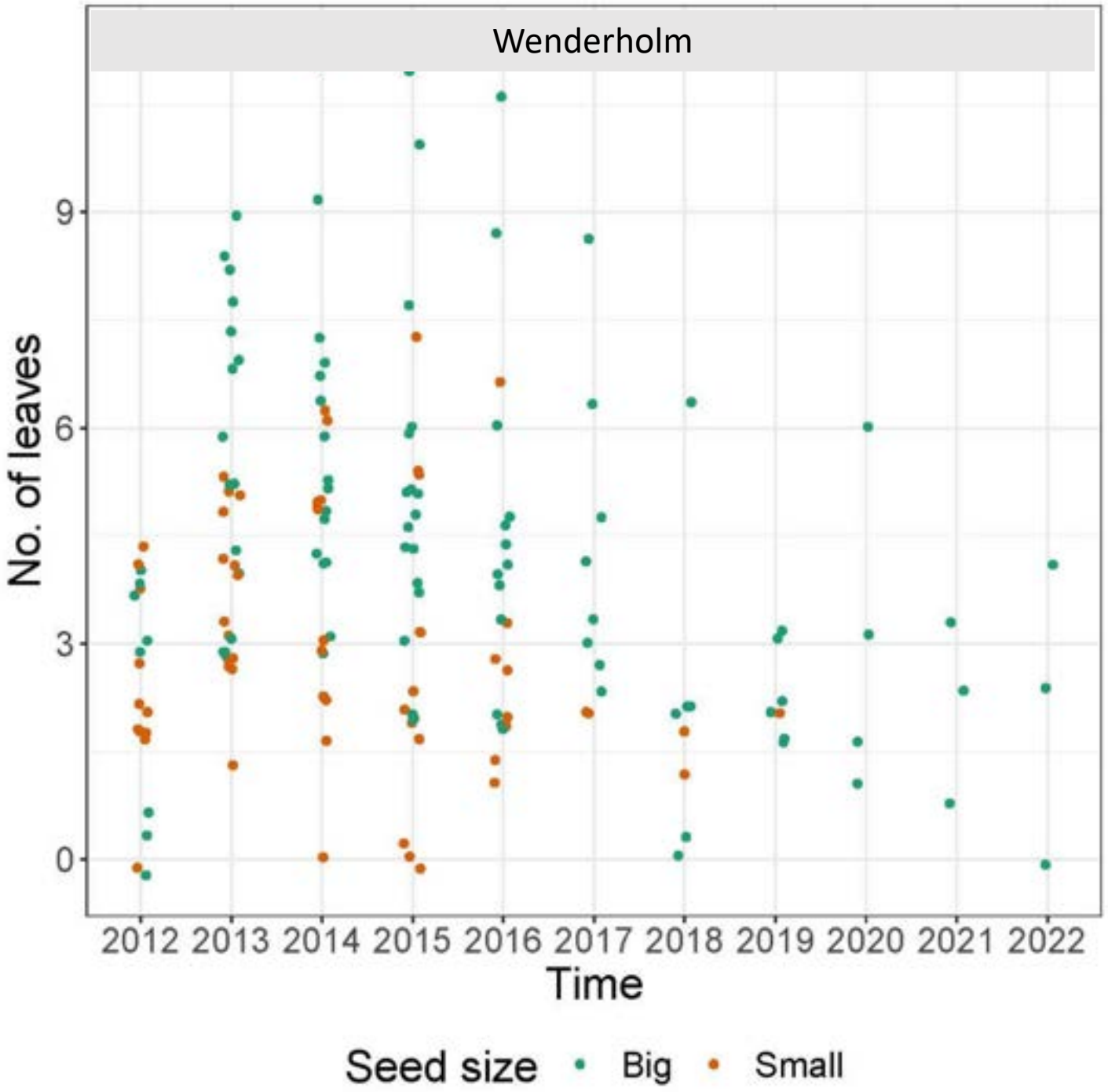
stress knocks out the small progeny



2. Dispersal:

growth rate from big seeds consistently higher than small seeds (***)

Small progeny don't recover from stress



2. Dispersal:

leaf number consistently higher in big cf. small seed progeny (***)

2. Dispersal:

Getting by with lower quality seed doesn't work

…and then there is stress

Outcomes of second-rate service

for selfed and small seeds:

- survival is lower
- growth may be lower, and does not recover from stress
- productivity (flowers/leaves) may be lower

plants may be able to make do with a 2nd rate service while conditions are good, but…

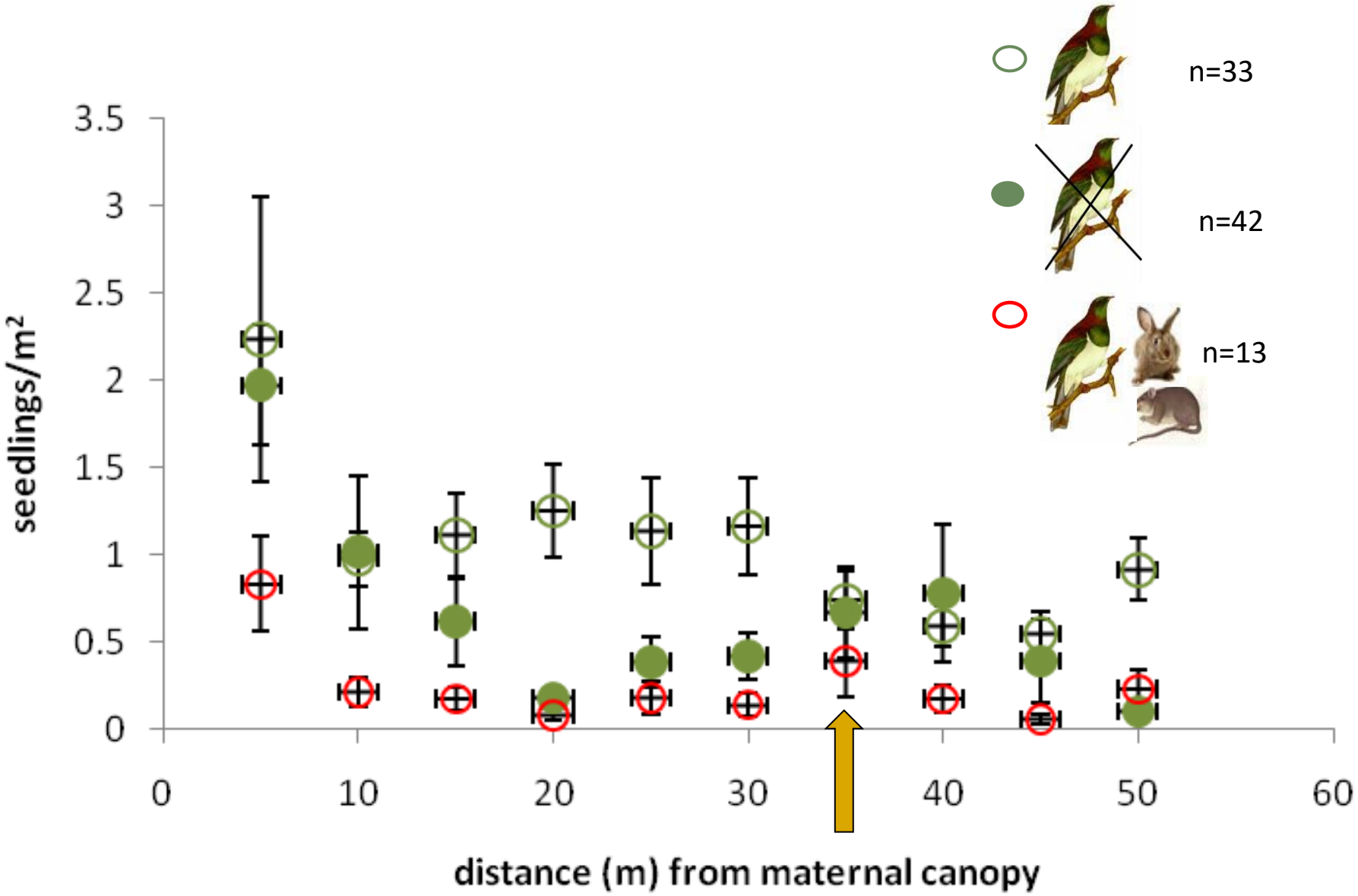
there's unseen consequences for long-term population resilience

What to do?

Seedling density under maternal karaka

seedlngs/m^2	50 ± 8	21 ± 2	12 ± 2

Seedling density vs. distance from maternal karaka



What to do?

What to do?

What to do? before you start:

- Notice what's already there, and how it works

What to do? **before you plant:**

- Notice what's already there, and how it works

- Include pest control from the outset (to protect seeds from predation, flowers & plants from browse, and pollinators and seed dispersers from predation)

What to do? **before you plant:**

- Notice what's already there, and how it works
- Include pest control from the outset (to protect seeds from predation, flowers & plants from browse, and pollinators and seed dispersers from predation)
- Prioritise weed control (to favour natural regeneration)

What to do? **before you plant:**

- Notice what's already there, and how it works
- Include pest control from the outset (to protect seeds from predation, flowers & plants from browse, and pollinators and seed dispersers from predation)
- Prioritise weed control (to favour natural regeneration)
- Measure the outcomes of any management (photo-points, bird-counts, seedling surveys)