



NIWA

Taihoru Nukurangi

Why should we manage lake vegetation?

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Climate, Freshwater & Ocean Science



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Rotorua Te Arawa Lakes have vegetation that includes the bad, alien weeds,



and the good, indigenous plant species



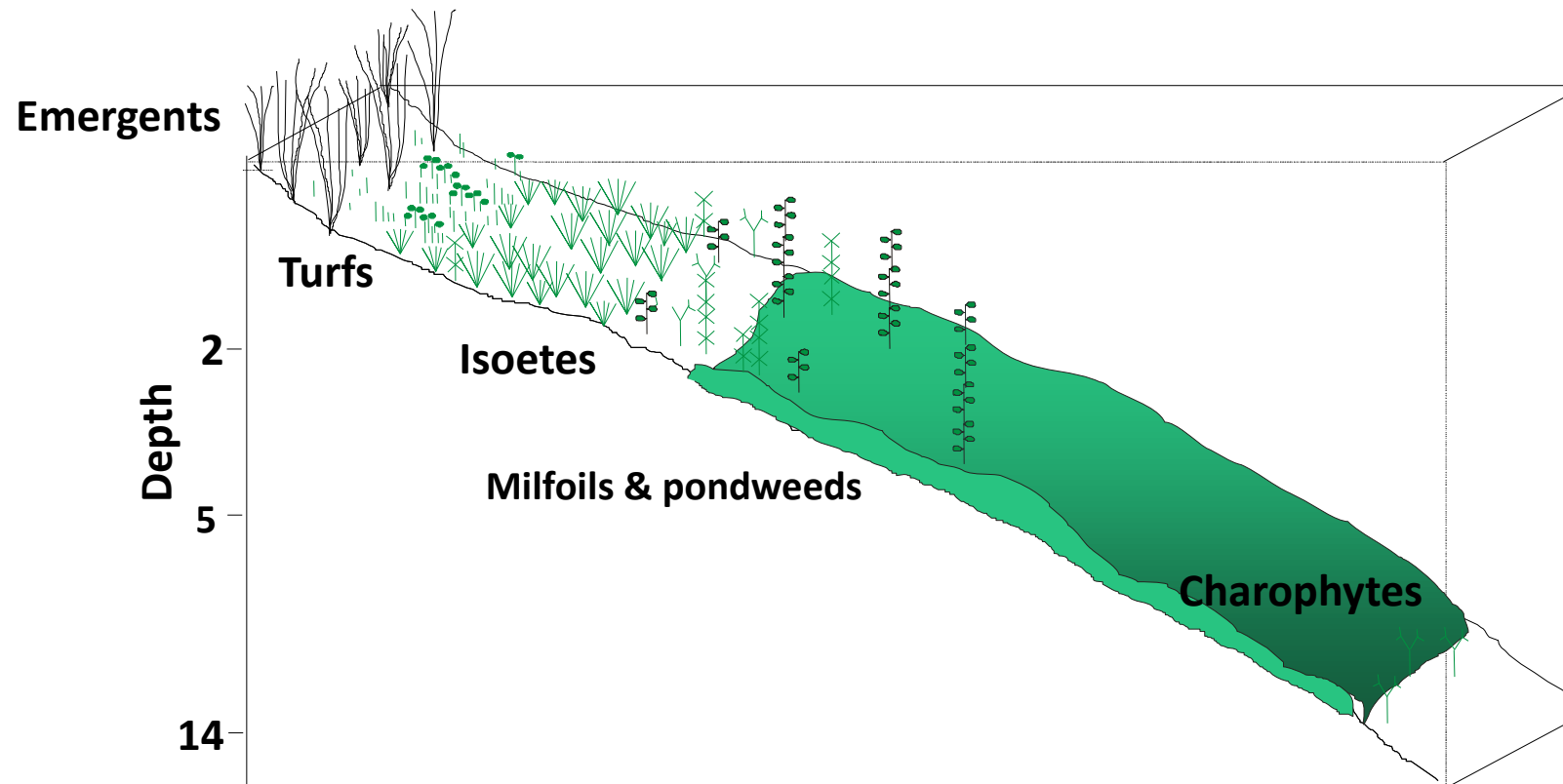
Why should vegetation be managed?

- Reduce recreational, cultural & utility impacts
- Prevent further weed spread (biosecurity)
- Improve ecological condition?



Introduction to native lake plants

- Five 'life-forms' by depth



Emergents (reeds & rushes)



- Require some shelter
- Soft sediments

Turf plants (amphibious)



- Tolerate moderate wave action
- Soft to sandy sediments
- Like regular water level fluctuation
- Often species grow intermingled

Isoetes (quillwort)



- Must be submerged
- Tolerate strong wave action
- Soft, sandy, even rocky sediments
- Decreased abundance since 1980s

Milfoils & Pondweeds



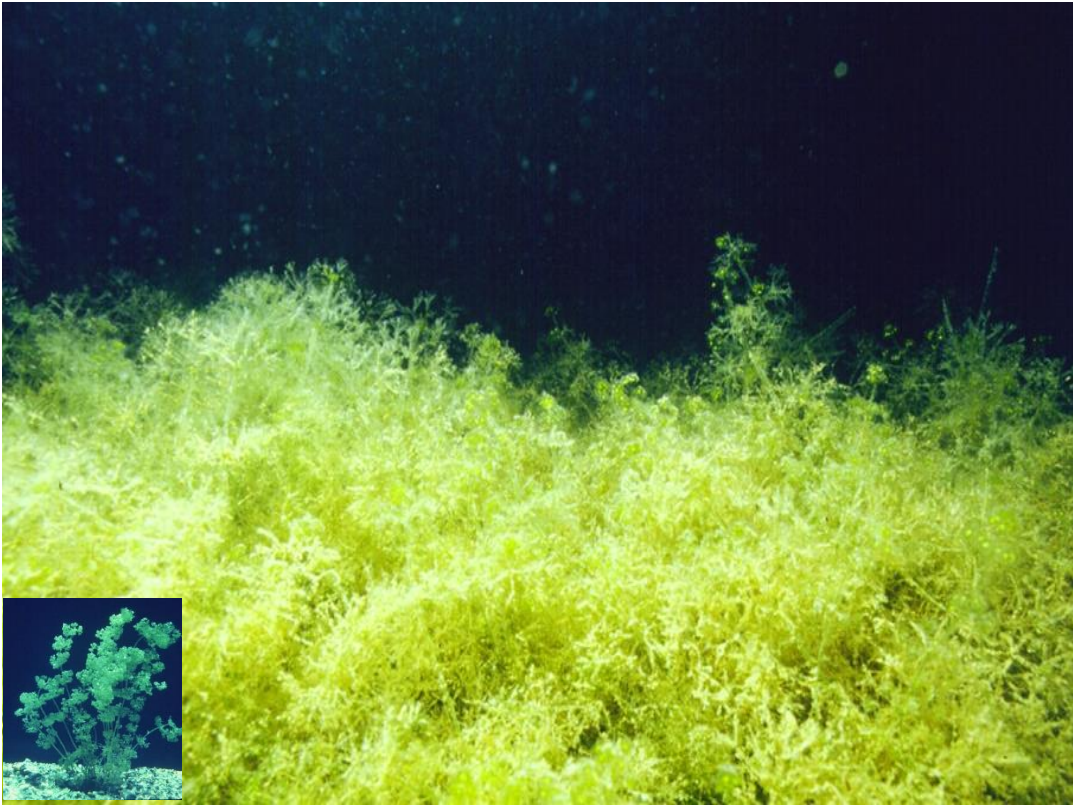
Pondweed



Milfoil

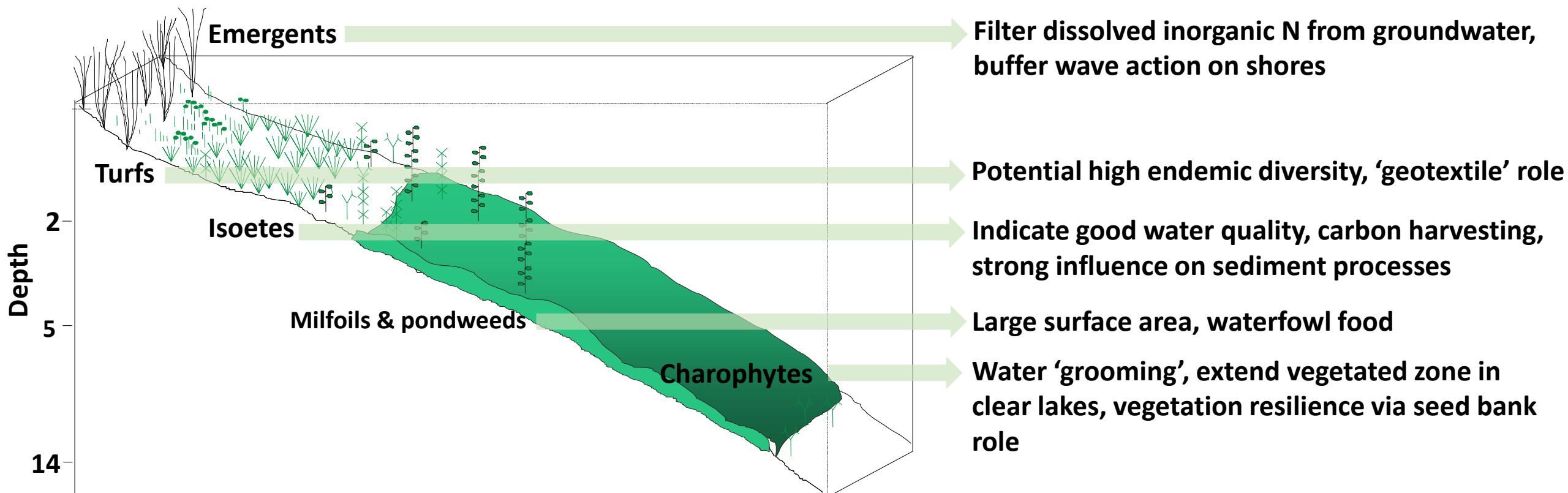
- Submerged, but flower at surface
- Open beds, co-exist with other plants
- Rarely deeper than 5 m, might be limited by pressure

Charophytes

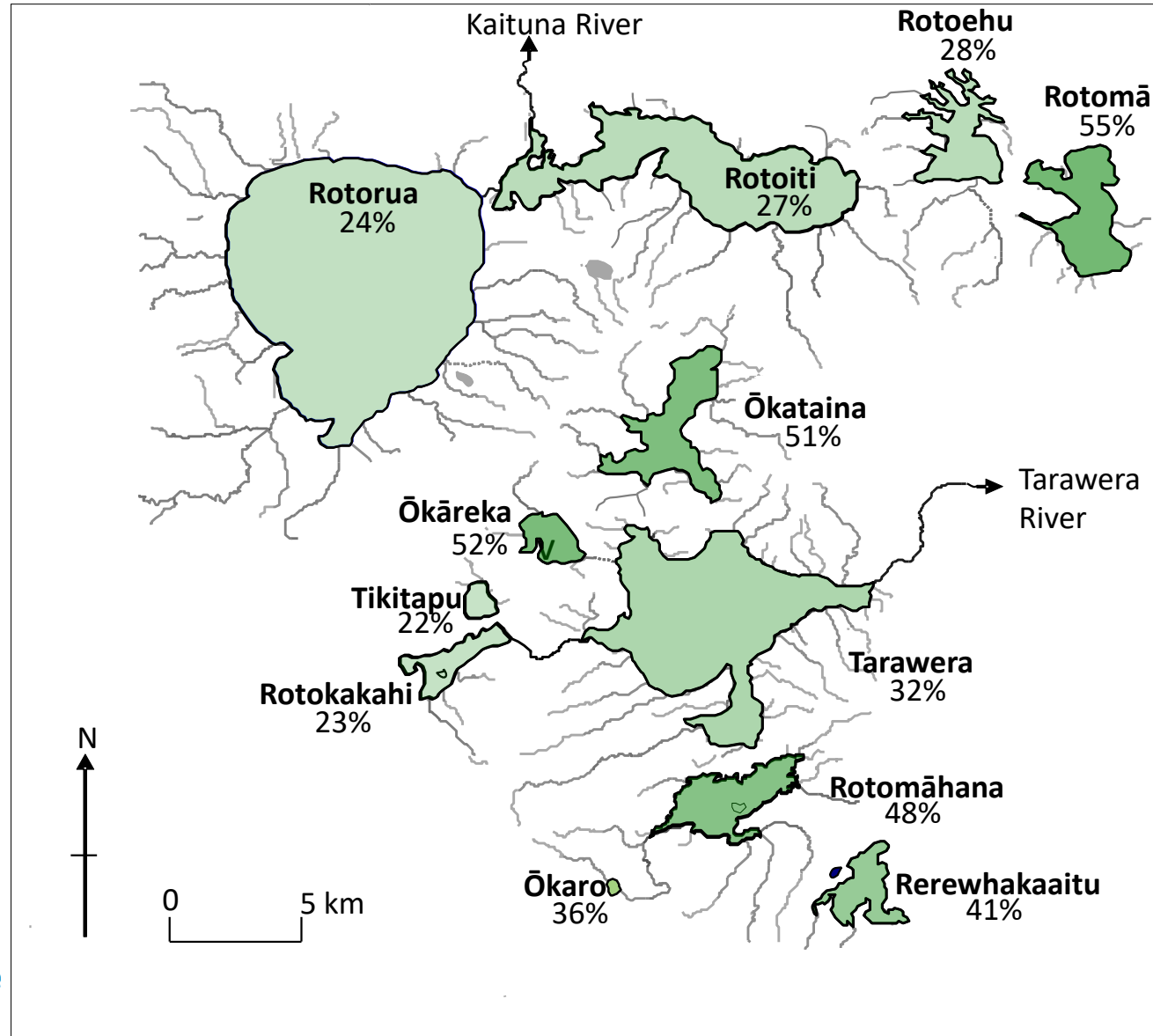


- Macro-algae, look like higher plants
- Found shallows to deep
- Depth only limited by light
- Can form carpets in deeper water

Roles of native plants



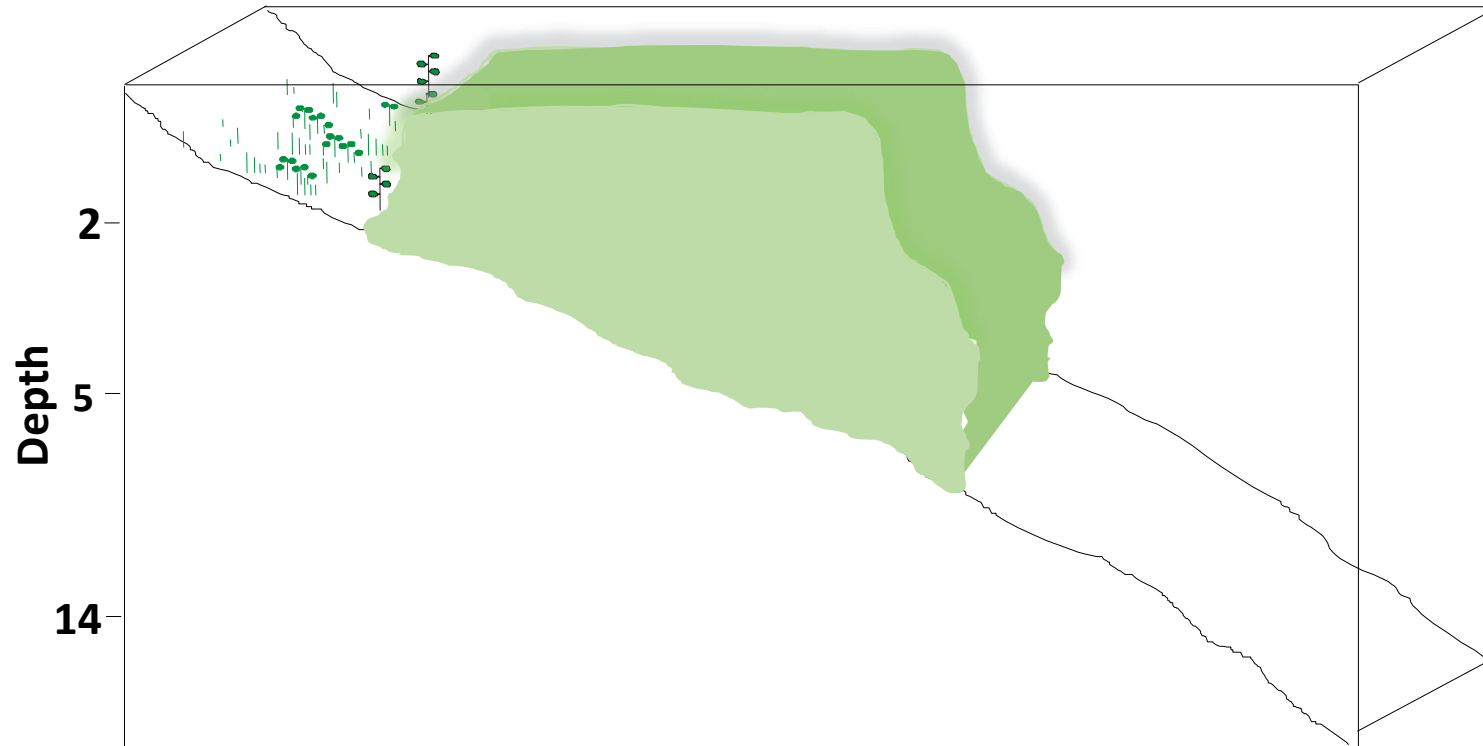
Native plant status



Darker green = higher native vegetation development using biomonitoring tool LakeSPI (Native Condition Index)

Introduction to invasive weeds

- Four major weeds invade mid depth range of lakes
- Form tall, closed canopy, weed beds. No seed – vegetative fragments



Hornwort



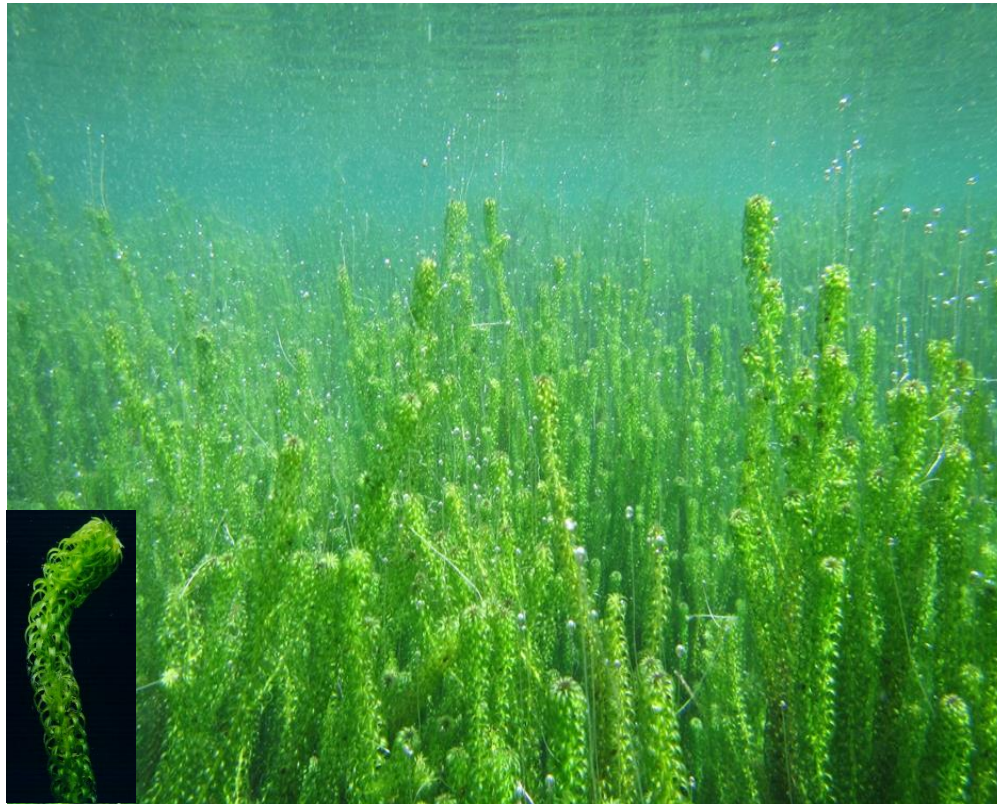
- No roots
- Invades wide range of nutrient conditions
- Can grow to >10 m depth
- Beds 3-4 m tall
- Illegal to propagate, sell, distribute

Egeria



- Less dominant under low nutrients
- Can have boom-bust growth
- Grows up to 8-10 m depth
- Beds 2.5-3 m tall
- Illegal to propagate, sell, distribute

Lagarosiphon



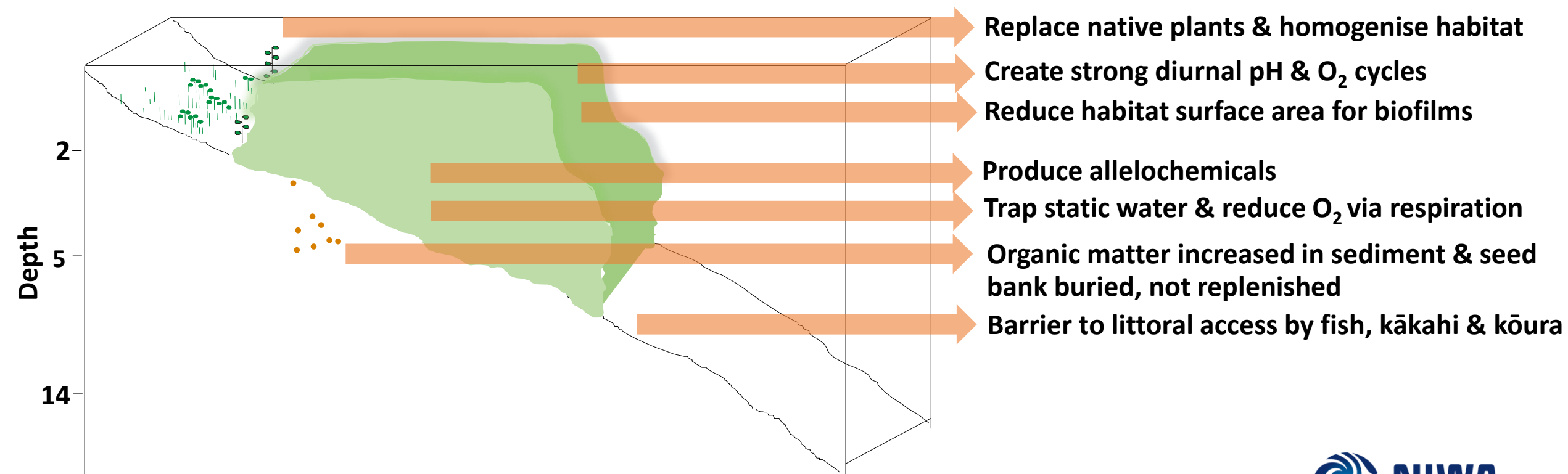
- Widespread in the lakes, hornwort & Egeria replace it
- Can grow to 6 m depth
- Beds 3.3 m tall
- Illegal to propagate, sell, distribute

Elodea (Canadian pondweed)

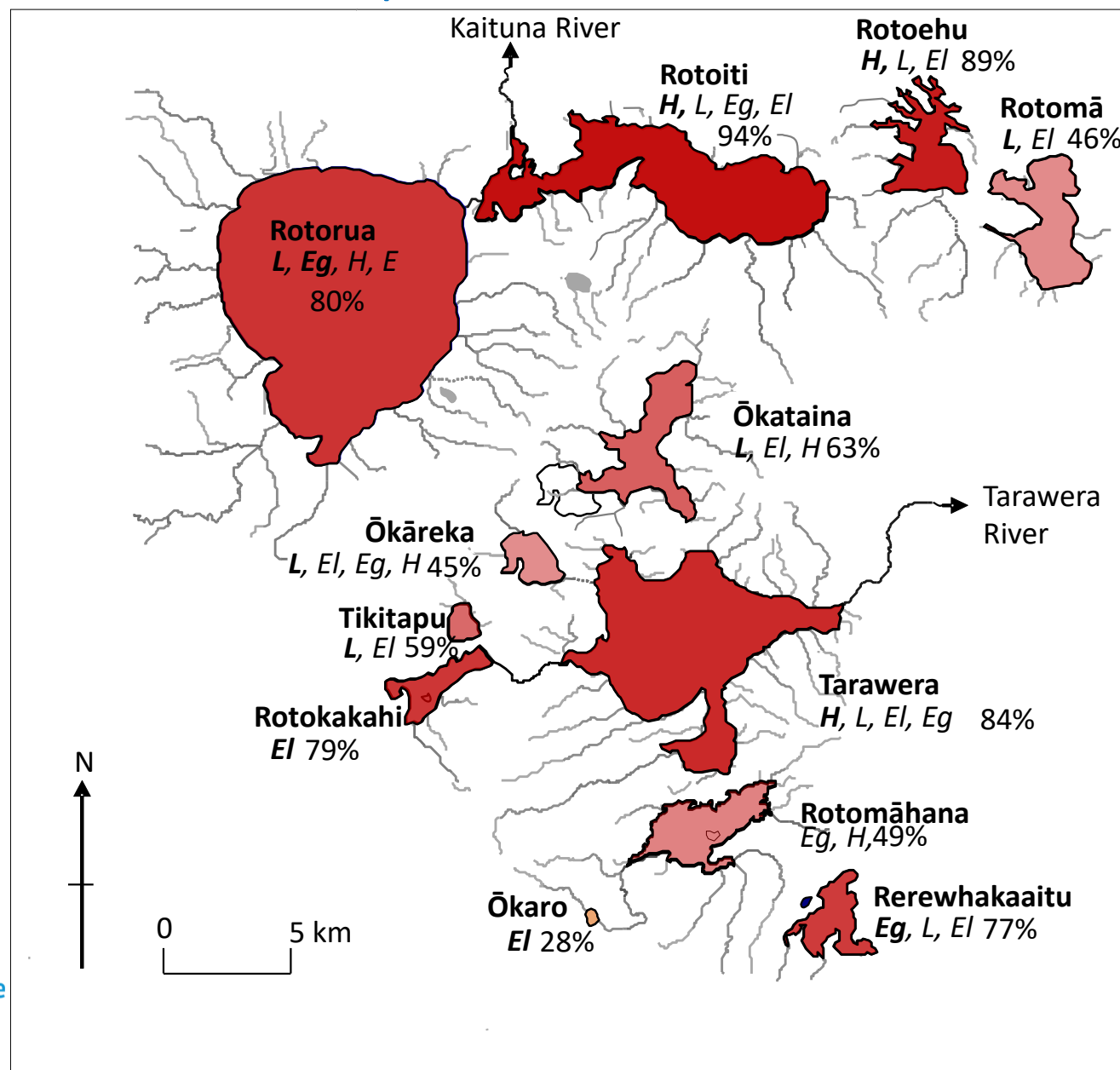


- Pioneer weed
- Can co-exist with natives- low nutrients
- Replaced by other invasive species
- Grows to 10 m depth
- Up to 3 m tall
- Is legal in trade as 'oxygen weed'

Impacts of invasive weeds



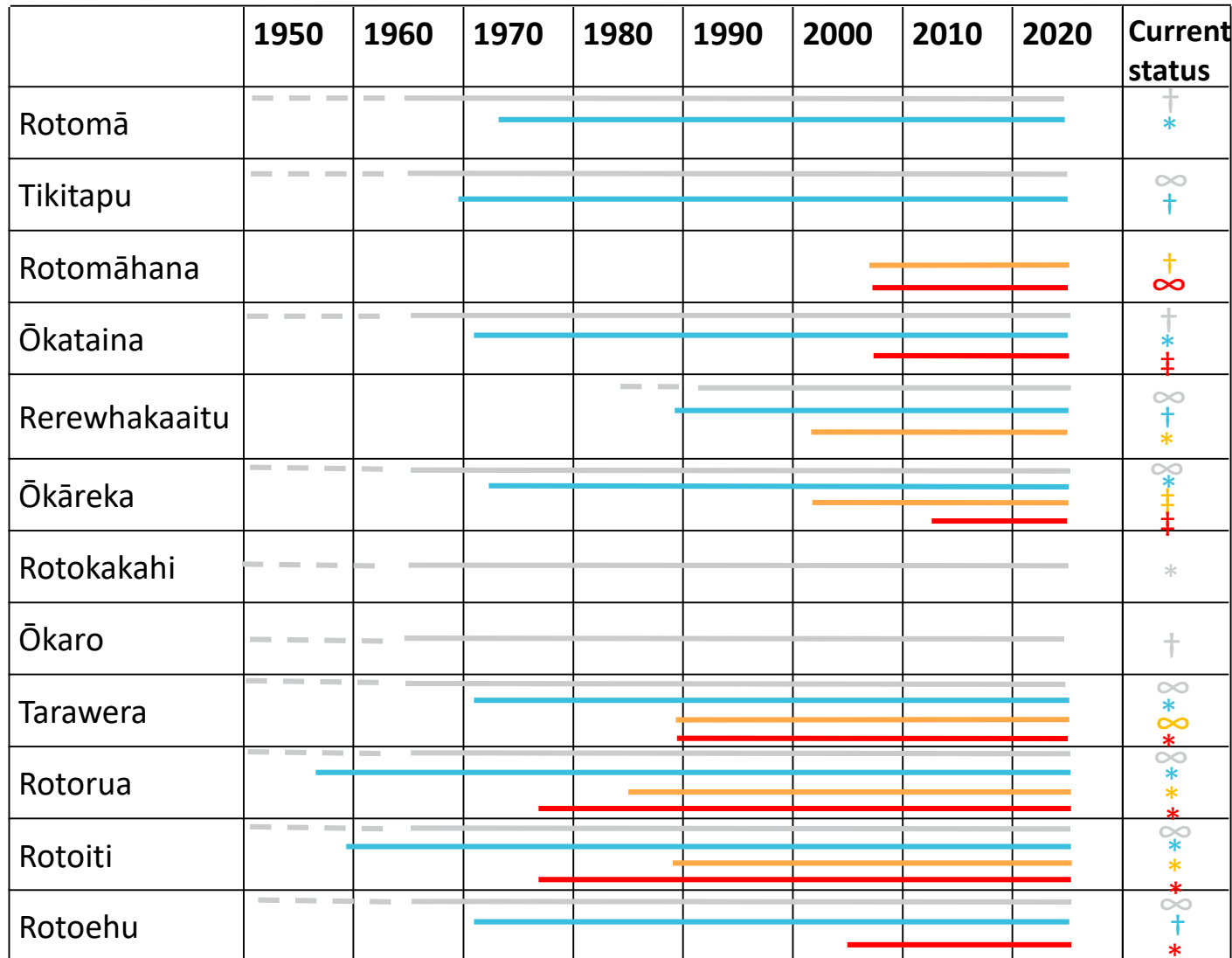
Invasive plant status



Darker red = higher weed dominance using biomonitoring tool LakeSPI (Invasive Impact Index)

Hornwort (H)
Egeria (Eg)
Lagarosiphon (L)
Elodea (El)

History of weed invasion



Species

- Elodea
- Lagarosiphon
- Egeria
- Hornwort

Status

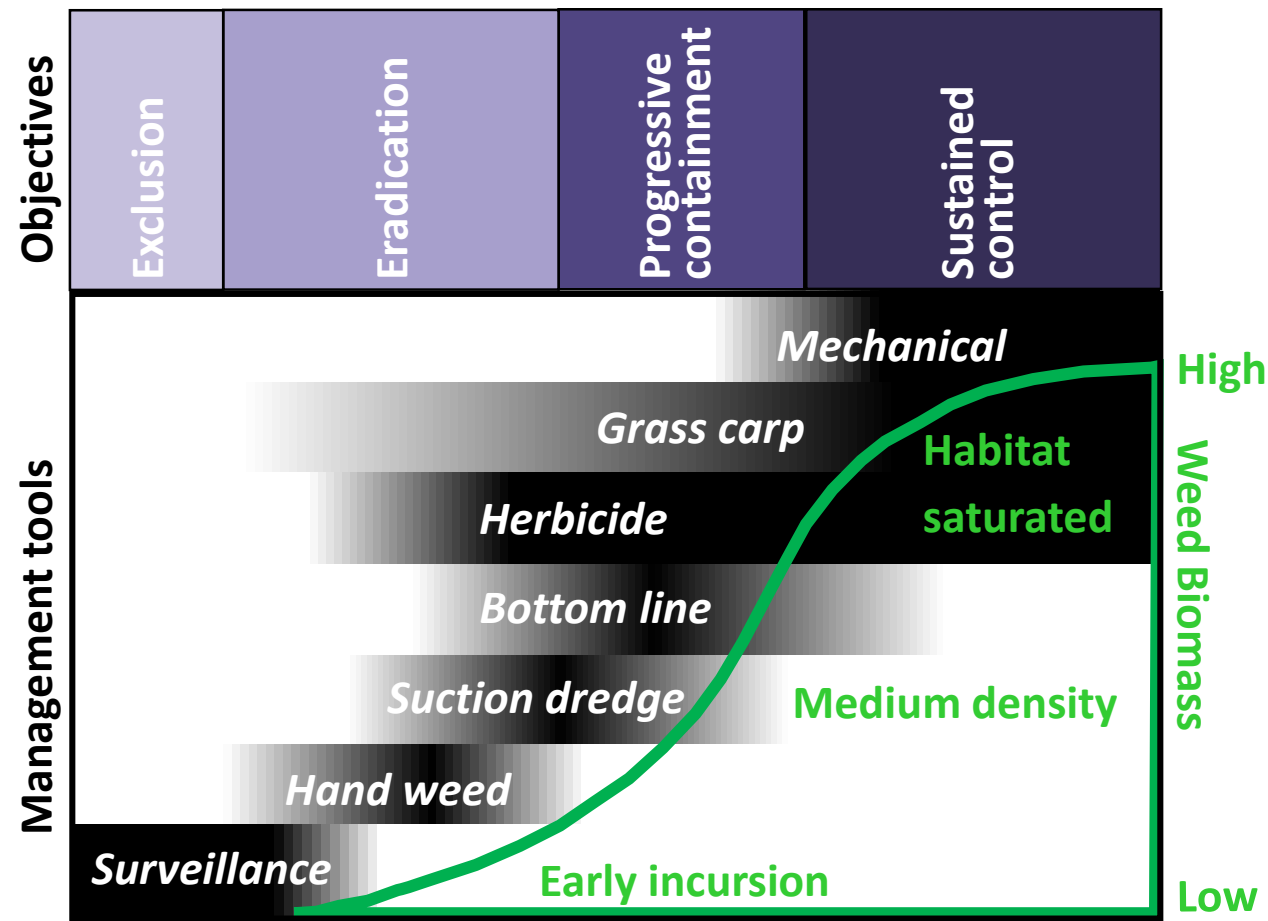
- * Dominant
- † Common
- ∞ Uncommon
- ‡ Contained

Weed Management

- Starts with protecting lakes, exclusion of weed, everyone's responsibility



Weed control tools



Hand weeding

- Used in conjunction with diver surveillance
- Only for scattered plants
- Need to remove all green material



Suction dredging

- Requires skilled operator & specialised gear
- Slow spatial progress, especially for dense weed
- Duration dependent on recolonisation
- Recolonisation fast where untreated adjacent areas



Hessian bottom lining

- Laid by divers
- Shades out weed (fine weave)
- Not for tall weed, large areas
- Not for exposed areas, uneven bottom, risk of propeller foul
- Allows native plants to grow through
- Breaks down by 18- 24 months



Grass carp

- Must be contained
- Mob stocked & graze all plants
- Are long lived & difficult to catch
- But, can eradicate weed over time



Mechanical

- Mows weed to 2m depth
- Can remove 50 ton per day
- Regrowth rapid, short duration control (2-3 months), can outstrip shoreline progress
- Impacts on some animals (bugs/fish)
- Not for very dense weed
- Noise



Herbicide

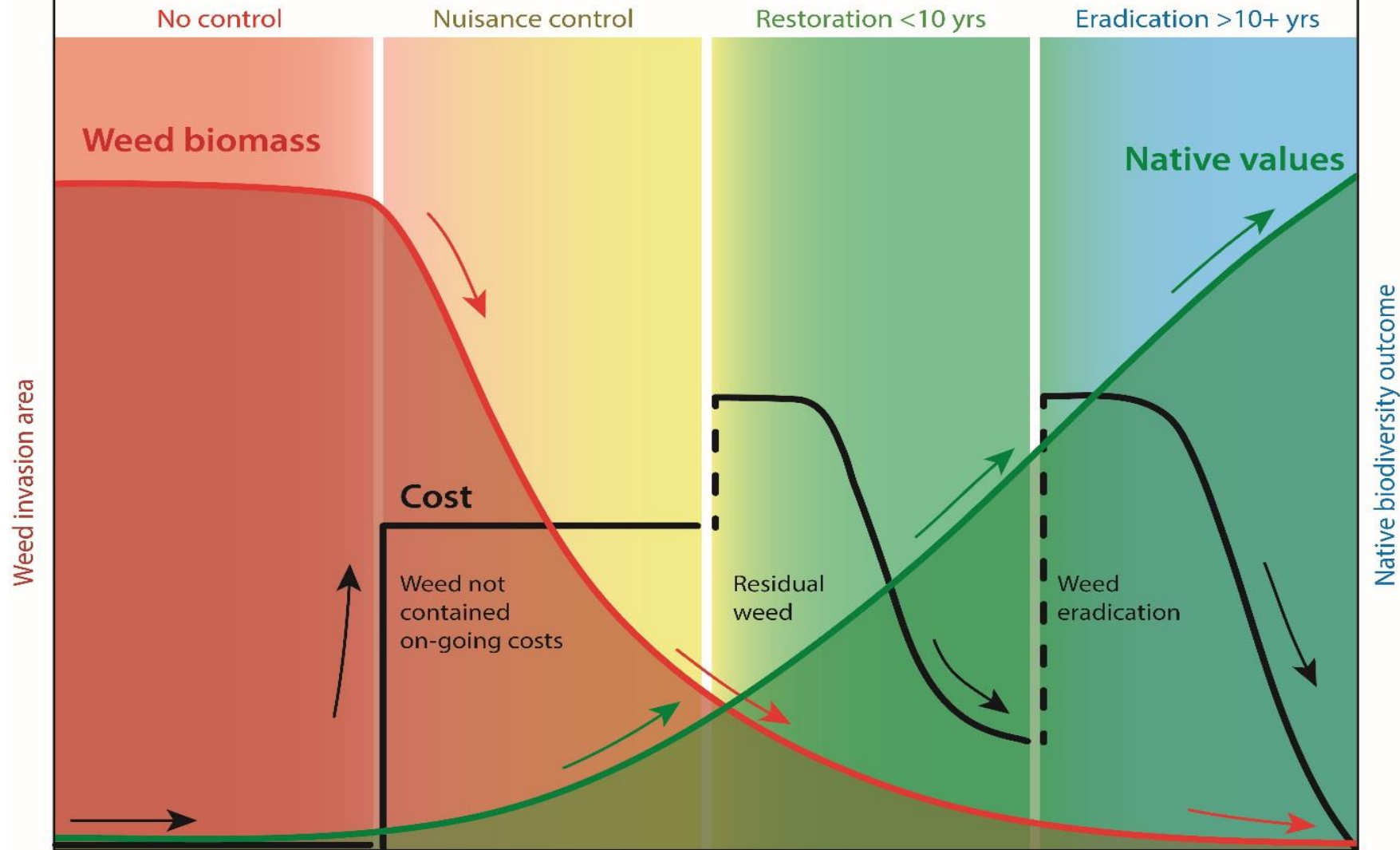
- Two herbicides for aquatic use (diquat, endothall)
- Reduces biomass, 'biostatic'
- Effective where contact time achieved, diquat for clean plants & water
- Little/no effect on native plants
- Achieves control at scale & within a short timeframe



Manage aquatic weed further than nuisance control?



Management targets for weed biomass and native values



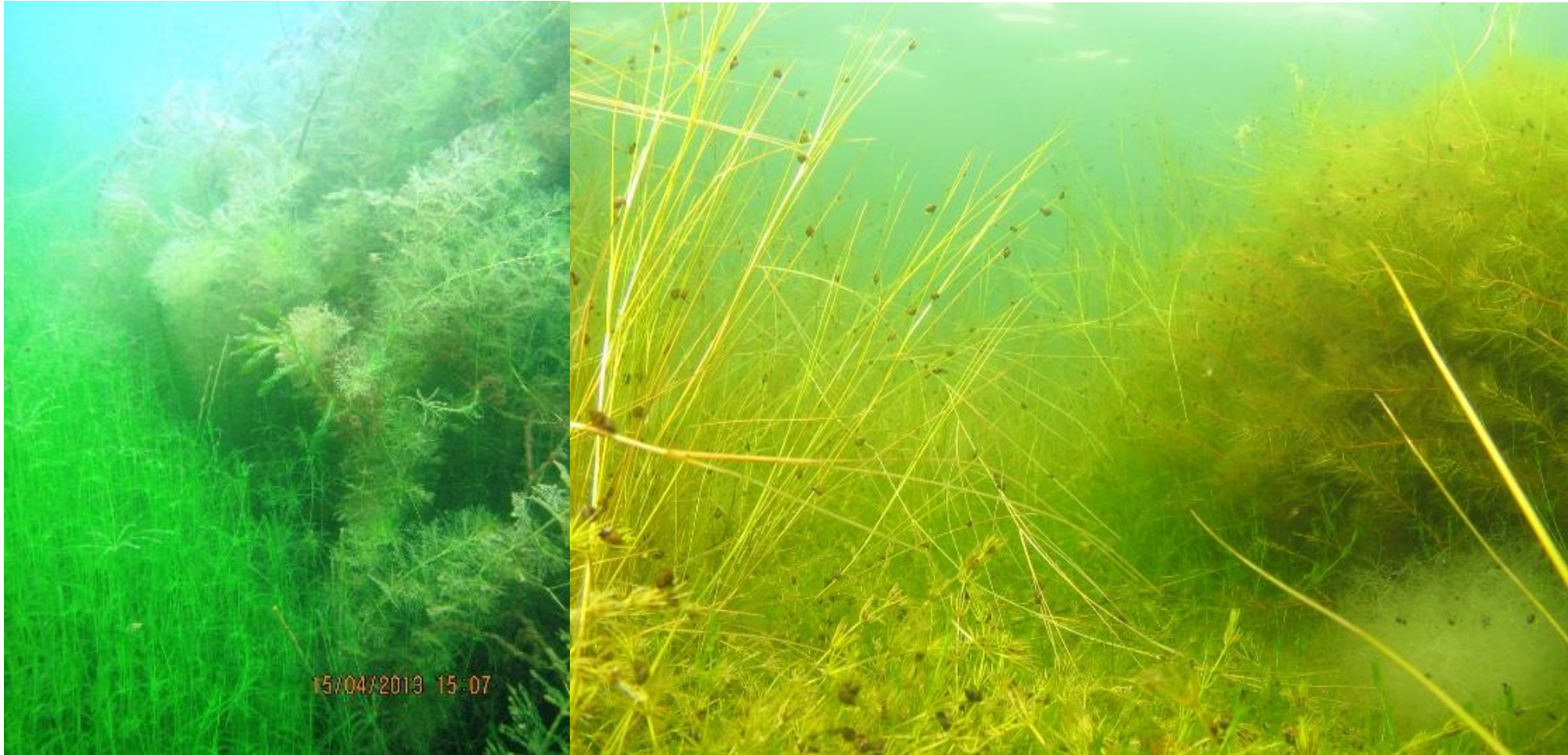
Changing management targets requires new actions with associated costs

Target - Nuisance control
Control cost high
Surveillance cost low

Target - Restoration
Control cost initially higher
Surveillance cost moderate

Target - Weed eradication and/or an increase in native biodiversity
Minimal control cost
Surveillance cost high & on-going

Biodiversity gains from aquatic weed control works?



Acknowledgements

Photos taken by the NIWA Aquatic Plant Group

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Thank you

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