Effective decontamination protocols for preventing the spread of freshwater pests

Tracey Burton

Climate, Freshwater & Ocean Science

NIWA
Taihoro Nukurangi

Check Clean Dry

CHECK CLEAN DRY

WWW.BIOSECURITY.GOVT.NZ/CLEANING

Check *– remove any plant matter from your gear and leave it at the site, or put it in the rubbish.*

Clean *– there's more than one option for cleaning your gear. Choose the one that is best for your situation and gear.*

Dry *– ensure your gear is completely dry to touch, inside and out, then leave to dry for at least another 48 hours before you use it.*

Check Clean Dry recommendations

Cleaning option	Amount	Treatment time[2]
Dishwashing detergent or nappy cleaner	5% solution (500mls diluted to 10 litres in water)	Soak or spray all surfaces for at least 1 minute
Bleach	2% solution (200mls diluted to 10 litres in water)	Soak or spray all surfaces for at least 1 minute
Hot water[1]	Above 60°C Above 45°C	Soak for at least 1 minute Soak for at least 20 minutes
Freezing		Until solid
Drying	[at room temperature]	Dry until dry to touch, then leave for at least 48 h

[1] 60°C – hotter than most tap water; 45°C – uncomfortable to touch.

[2] Allow longer times for absorbent items.

Table reproduced from www.mpi.govt.nz/travel-and-recreation/outdoor-activities/check-clean-dry

Testing CCD protocols

Aim: **Evaluate the efficacy of Check Clean Dry protocols on a range of freshwater pests.**

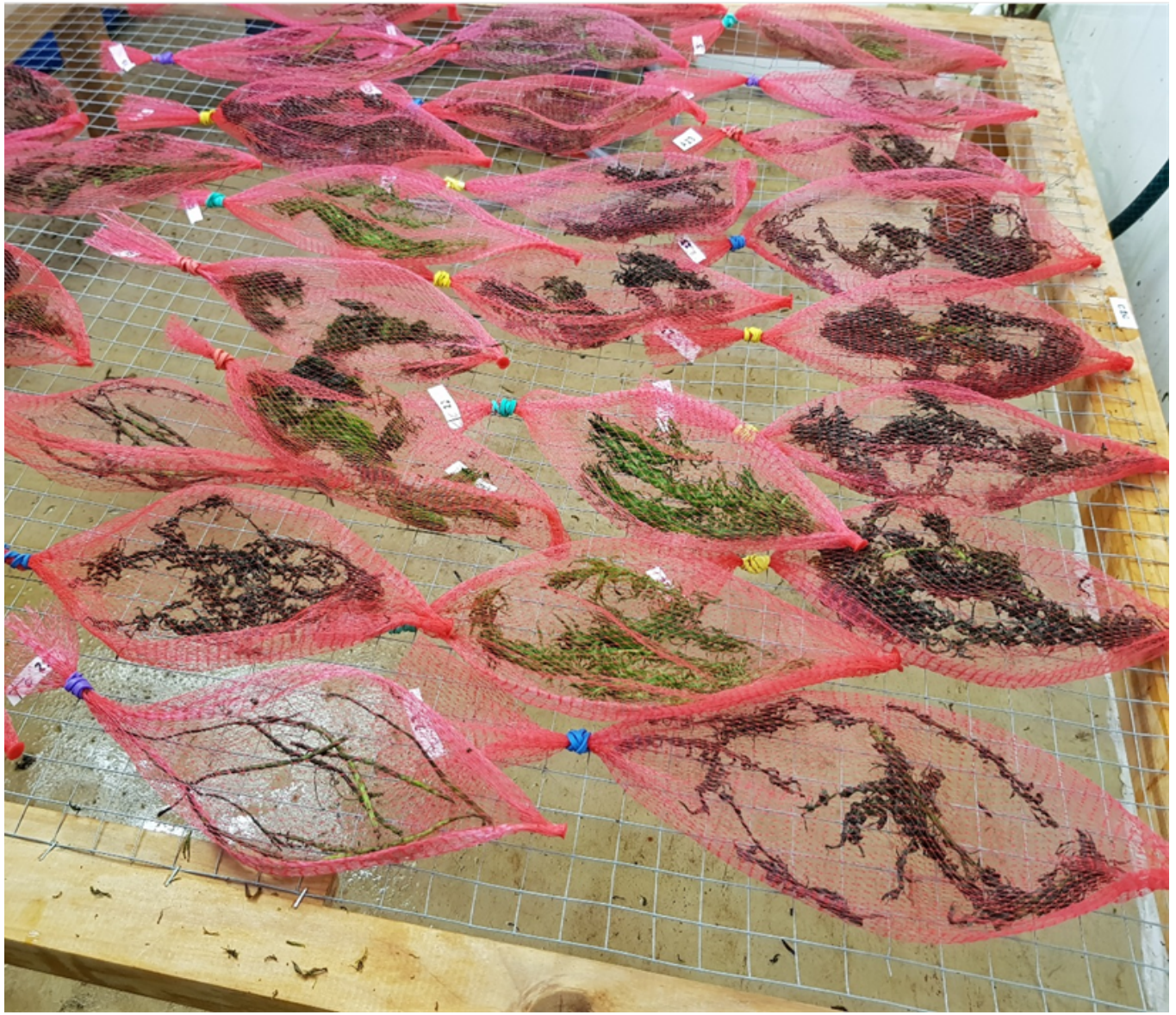
- 3 pest submerged plant species:
  - Hornwort (*Ceratophyllum demersum*)
  - Egeria (*Egeria densa*)
  - Lagarosiphon (*Lagarosiphon major*)
- Ear pond snail (*Radix auricularia*)
- Lake snow (*Lindavia intermedia*)

Decontamination methods

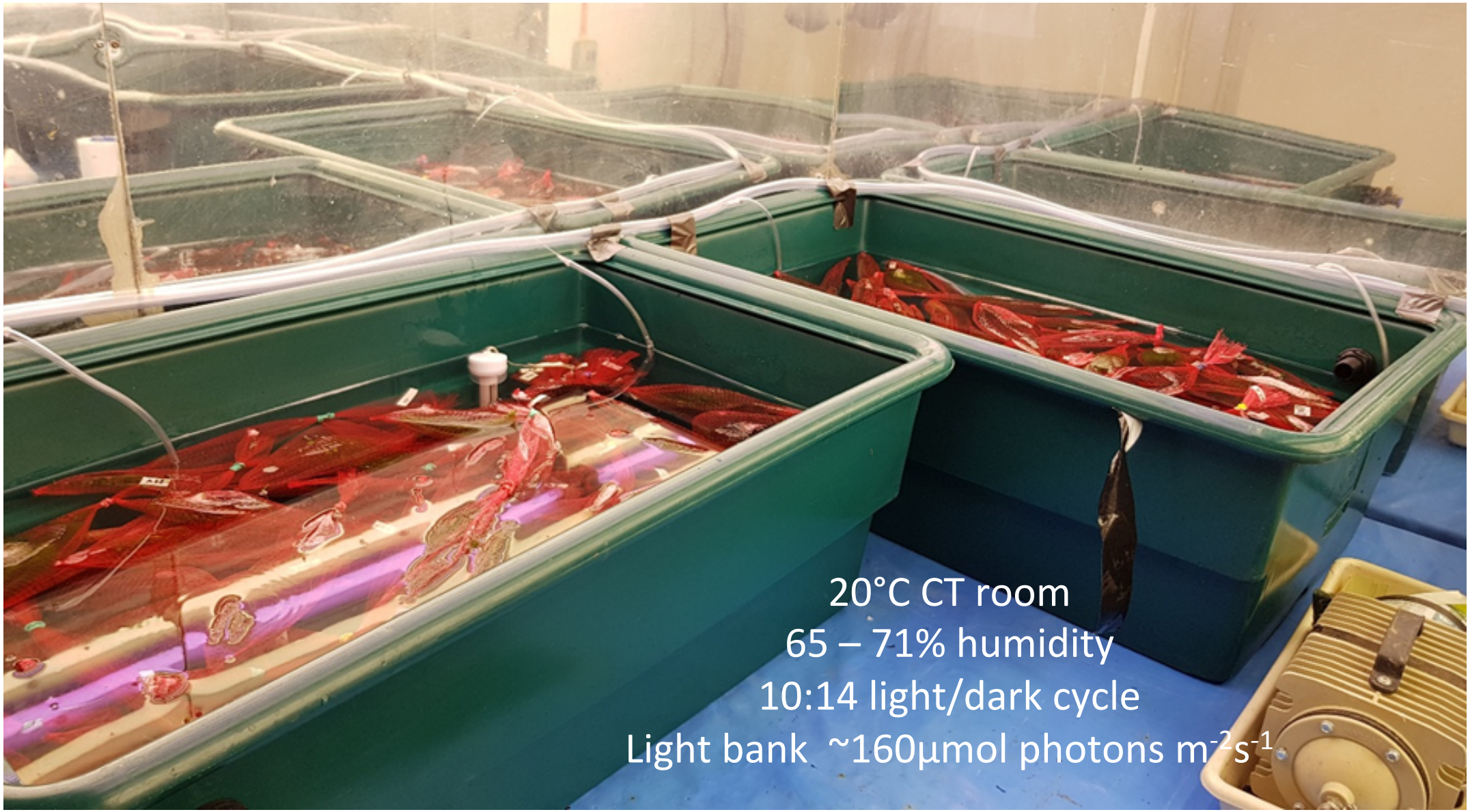
- Chemicals:
  - Household bleach
  - Dishwashing detergent
  - Nappy cleaner
  - Table salt (NaCl)
- Hot water
- Drying
- Freezing

Plant experiments

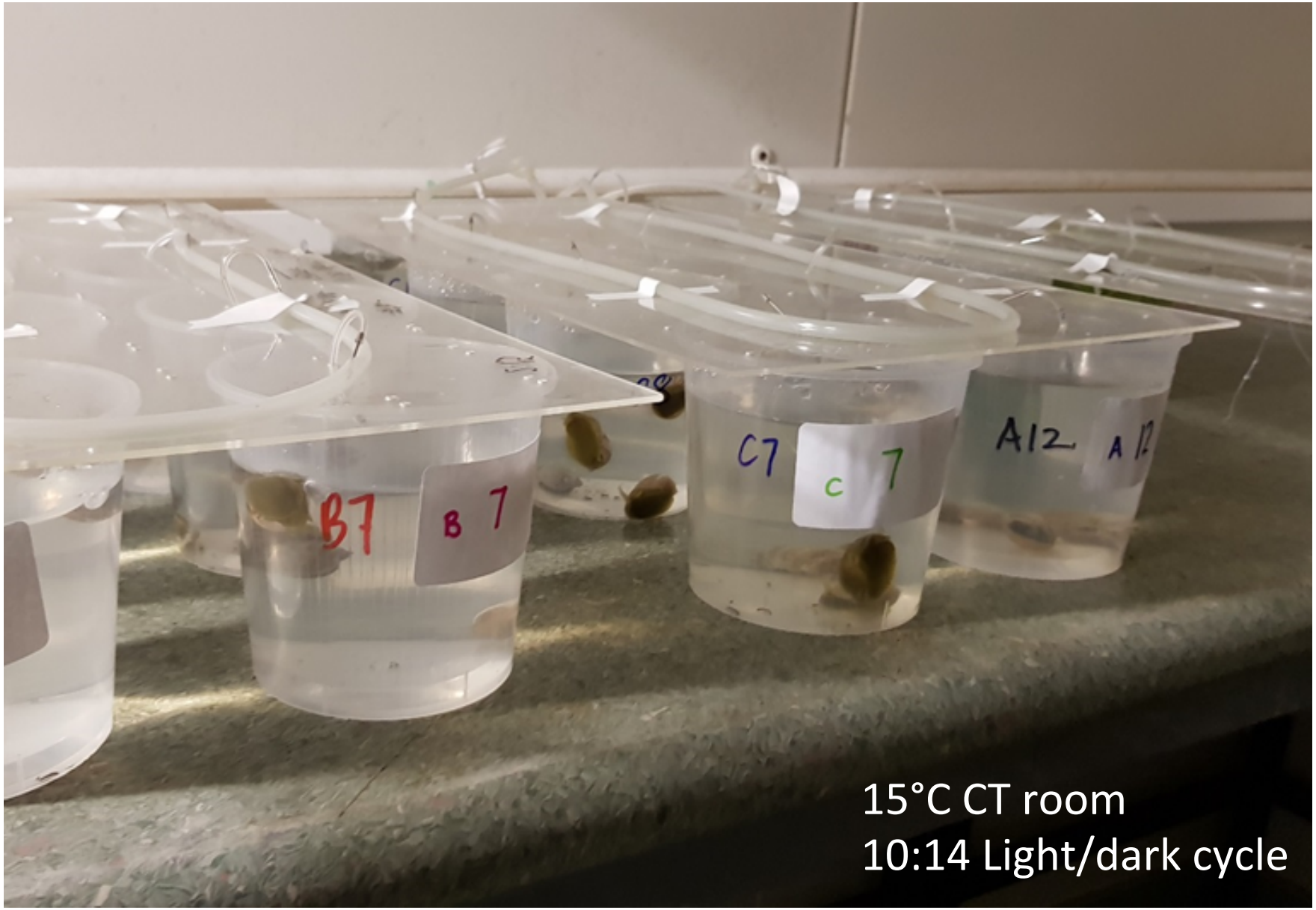
Treatment methods



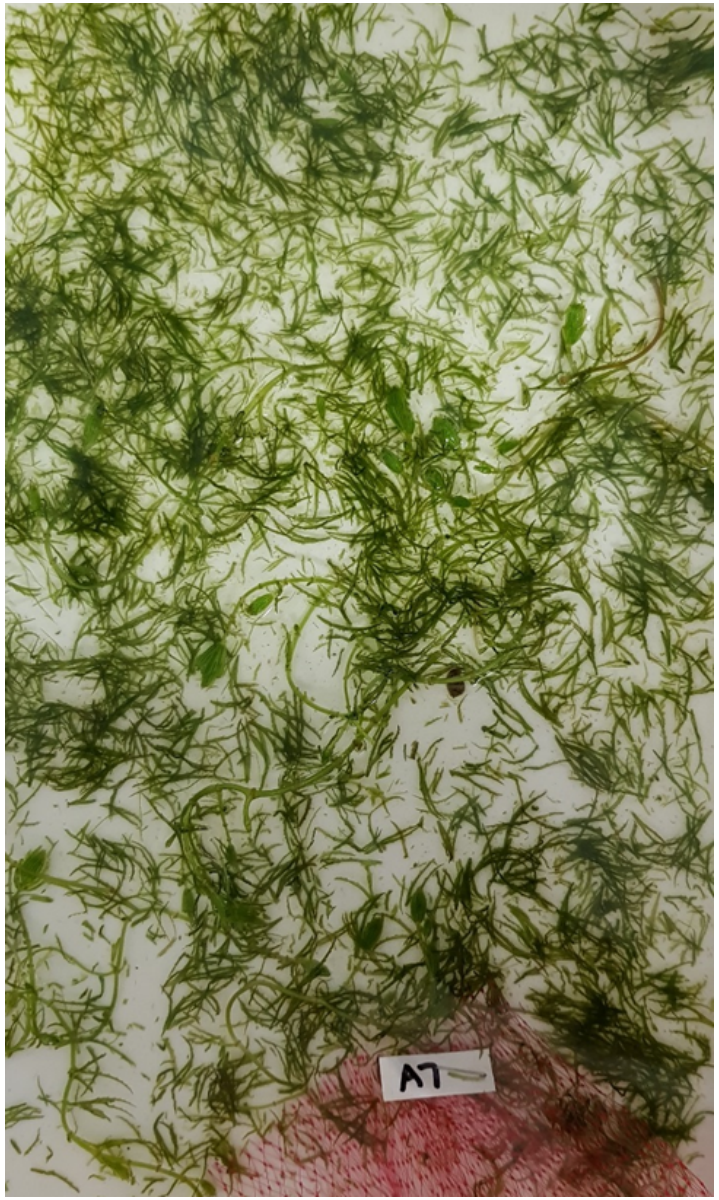
Recovery tanks



Snail experiments



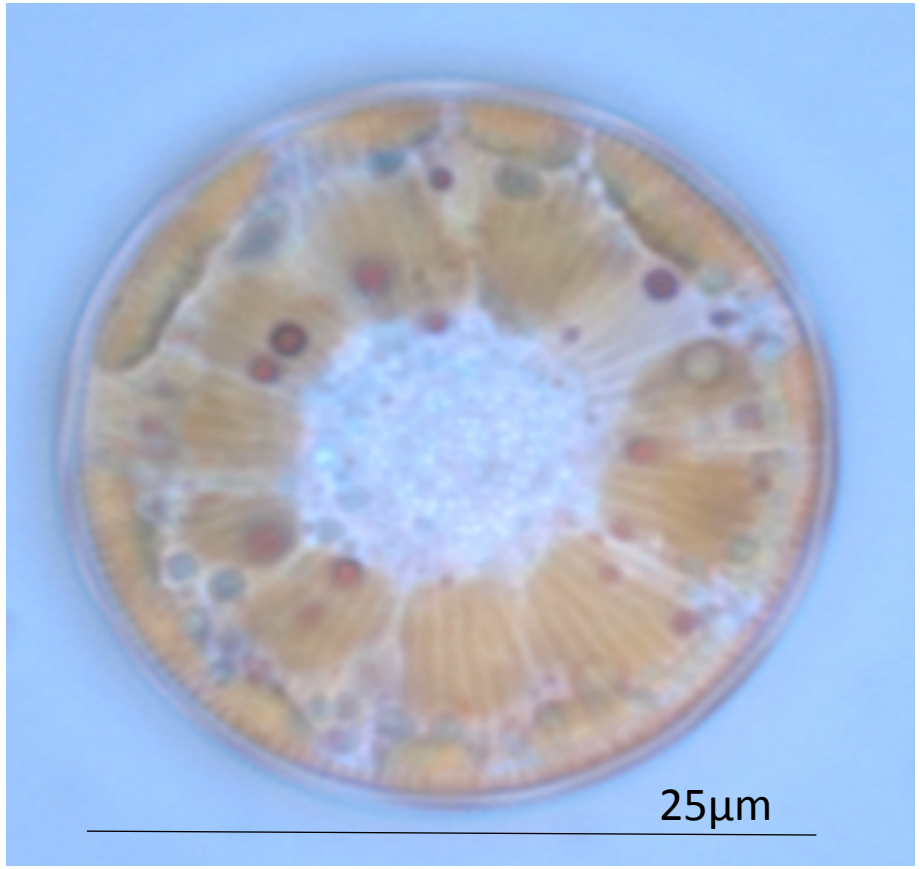
Survival and recovery



Lake Snow experiments

Treatment	Amount / level	Time (mins)
Detergent	5% solution	1 min
Bleach	2% solution	1 min
Hot water	Above 60°C	1 min
	Above 45°C	20 mins
Freezing	-20°C	Until solid
Drying	Room temp.	Dry to touch
	Room temp.	48 h later
Salt	4% w/v	10 mins
	10% w/v	1 min

Neutral Red staining method used to assess cell viability



Lindavia intermedia

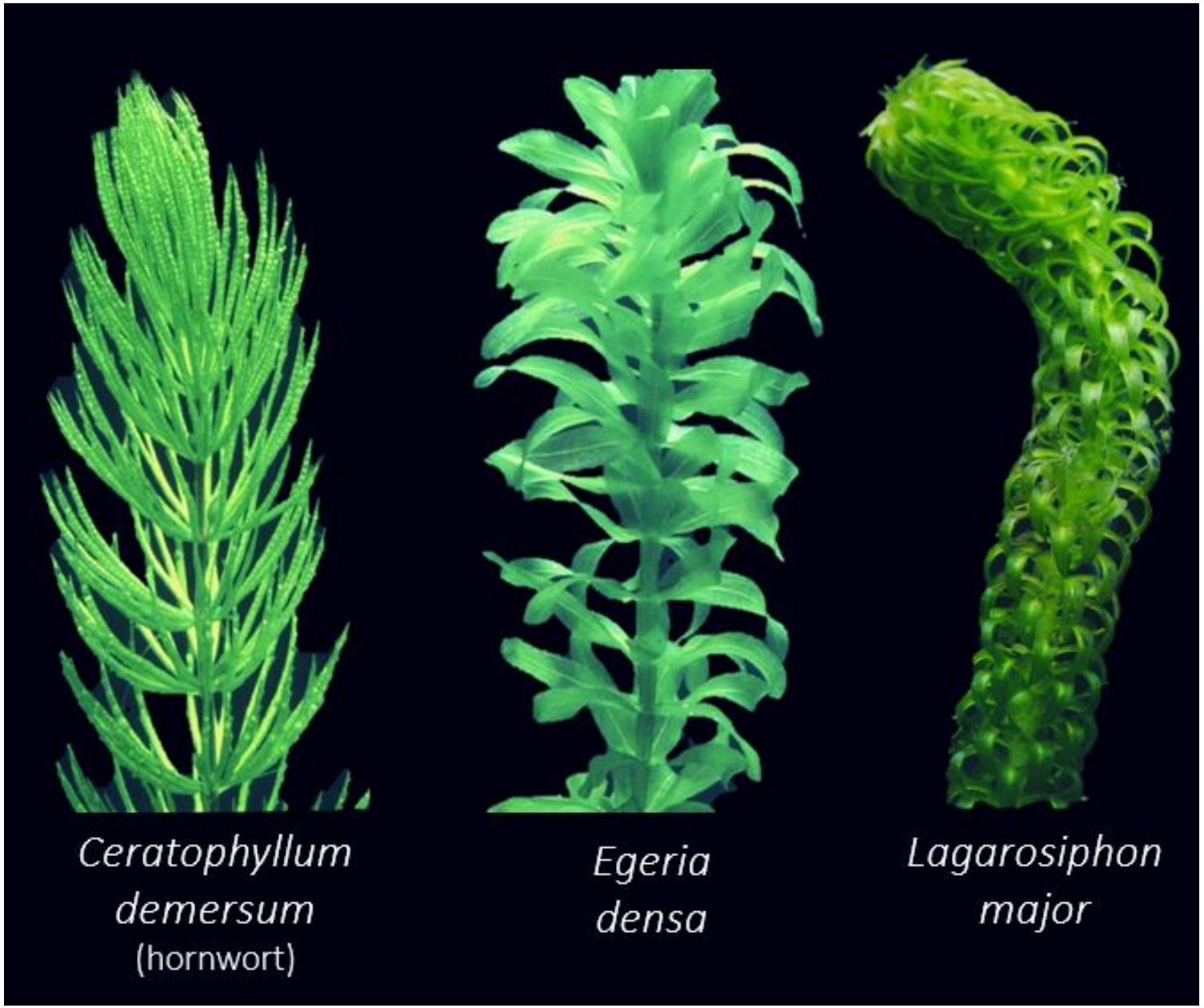
Kilroy and Robinson, 2017

Conclusions

Cleaning option	Amount/treatment time	Recommendation	
Dishwashing detergent or nappy cleaner	5% solution, 1 minute	✗	- Not 100% effective - Can damage equipment - Not environmentally friendly - Health issues
Bleach	2% solution, 1 minute	✗	
Salt	10%, 1 minute	✗	- Not always practical
Drying	Dry until dry to touch, then leave for at least 48 h	✗	- Not effective < 7 days
Freezing	Until solid	✓	- Not practical
Hot water	Above 45°C, 20 minutes Above 60°C, 1 minute	✗ ✓	- Most effective - Accessible - Environmentally friendly - Cost effective - Safe?

CCD remains the most effective tool to prevent the spread of freshwater pests

Aquatic pests in the BOP Region



In Rotorua lakes

2011 Rotomāhana > Rotoehu > Tarawera > Rotoiti > Ōkaro

Aquatic pests not in BOP Region but in NZ

All naturalised already in New Zealand

Malaysian trumpet snail

Aquatic pests not in New Zealand

Eurasian Watermilfoil

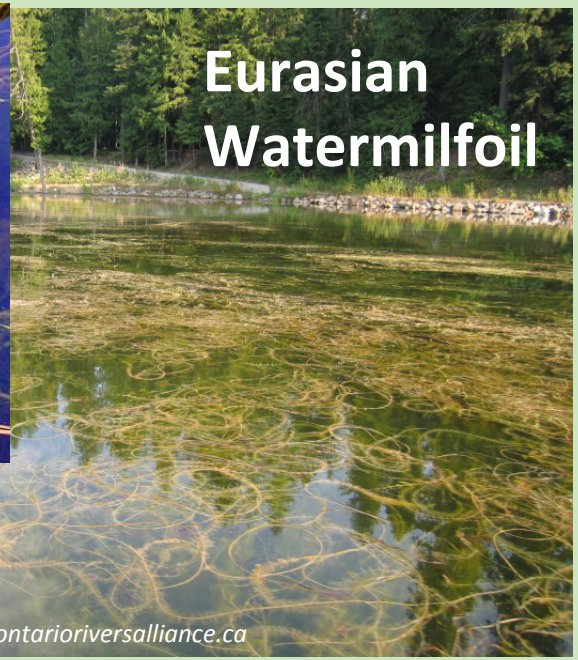


Photo sourced from www.ontarioriversalliance.ca

Quagga and Zebra Mussels

Photo credit: USFWS

Photo credit: www.nps.gov/glac/planyourvisit/ais

Photo: www.lakegeorgeassociation.org

Photo credit: www.ncrcd.org/index.php/links/weeds/quagga-zebra-mussels

Photo: Andrew Sabai,Wisconsin.

Photo: U.S. Fish and Wildlife Service

Asian Clams

Photo sourced from www.lakegeorgeassociation.org

Spiny water fleas

BE A HERO TRANSPORT ZERO

FIGHT THE SPREAD OF AQUATIC INVADERS

TRANSPORTZERO.ORG

TAKE ACTION

CLEAN - DRAIN - DRY

Preventing the spread – Catfish & other FW pests

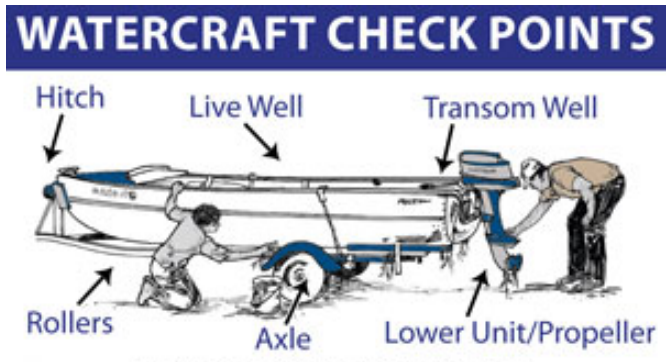

Photo source – https://youtu.be/Uk-8nnBy9ew

- **CHECK** – before leaving a lake, check boats (anchors and bilges), trailers, fishing gear and other equipment
- **CLEAN** - wash all equipment (e.g., nets, machinery and footwear) thoroughly using detergent (5% dishwash) or **salt* (1 cup /1 L of water / 1 hr)
- **DRY** – ensure gear is completely dry 'then' leave dry for at least another 48 hours

Avoid moving from lake to lake!

** Matheson, et al. (2004) Pest decontamination protocol for freshwater fishing nets using saltwater.*

Prevention & management is a shared problem



- No silver bullet
- Remain vigilant - **'Check, Clean, Dry'**
- Know your enemy
- Treat every lake as a potential risk
- Harness potential of community groups
- Remain proactive – new science & technologies

CHECK CLEAN DRY

BETWEEN WATERWAYS

Acknowledgements

Funding for Check Clean Dry testing provided by MPI (Freshwater Biosecurity Partnership Programme)

Burton, T. (2017) Testing 'Check, Clean, Dry' protocols: trials on hornwort, egeria, lagarosiphon and ear pond snails. *NIWA consultancy report:* 2017265HN:34

Kilroy and Robinson (2017) Testing of Check, Clean, Dry decontamination procedures: trials on lake snow (*Lindavia intermedia*). *NIWA consultancy report*: 2017158CH:21

NIWA
Taihoro Nukurangi