Effective decontamination protocols for preventing the spread of freshwater pests

Tracey Burton
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

<table>
<thead>
<tr>
<th>Cleaning option</th>
<th>Amount</th>
<th>Treatment time&lt;sup&gt;2&lt;/sup&gt;</th>
</tr>
</thead>
</table>
| 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<sup>1</sup>            | Above 60°C                                  | Soak for at least 1 minute                                                                  |
|                                  | Above 45°C                                  | 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                                        |

<sup>1</sup> 60°C – hotter than most tap water; 45°C – uncomfortable to touch.
<sup>2</sup> Allow longer times for absorbent items.

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

20°C CT room
65 – 71% humidity
10:14 light/dark cycle
Light bank ~160μmol photons m⁻²s⁻¹
Snail experiments

15°C CT room
10:14 Light/dark cycle

Lindavia intermedia
Survival and recovery
Neutral Red staining method used to assess cell viability

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

*Lindavia intermedia*

*Kilroy and Robinson, 2017*
## Conclusions

<table>
<thead>
<tr>
<th>Cleaning option</th>
<th>Amount/treatment time</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dishwashing detergent or nappy cleaner</strong></td>
<td>5% solution, 1 minute</td>
<td>- Not 100% effective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Can damage equipment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Not environmentally friendly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Health issues</td>
</tr>
<tr>
<td>Bleach</td>
<td>2% solution, 1 minute</td>
<td>- Not 100% effective</td>
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<tr>
<td></td>
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<td>- Can damage equipment</td>
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<tr>
<td></td>
<td></td>
<td>- Health issues</td>
</tr>
<tr>
<td>Salt</td>
<td>10%, 1 minute</td>
<td>- Not always practical</td>
</tr>
<tr>
<td>Drying</td>
<td>Dry until dry to touch, then leave for at least 48 h</td>
<td>- Not effective &lt; 7 days</td>
</tr>
<tr>
<td>Freezing</td>
<td>Until solid</td>
<td>- Not practical</td>
</tr>
<tr>
<td>Hot water</td>
<td>Above 45°C, 20 minutes</td>
<td>- Not 100% effective</td>
</tr>
<tr>
<td></td>
<td>Above 60°C, 1 minute</td>
<td>- Most effective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Accessible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Environmentally friendly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Cost effective</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Safe?</td>
</tr>
</tbody>
</table>
CCD remains the most effective tool to prevent the spread of freshwater pests.
Aquatic pests in the BOP Region

- Ceratophyllum demersum (hornwort)
- Egeria densa
- Lagarosiphon major
- Brown Bullhead Catfish
- Gambusia
- Ear pond snail

In Rotorua lakes

2011 Rotomāhana > Rotoehu > Tarawera > Rotoiti > Ōkaro
Aquatic pests **not** in BOP Region but in NZ

**All naturalised already in New Zealand**

- Koi carp
- Rudd
- Perch
- Caboomba
- Didymo
- Lake snow
- Hydrilla verticillata (hydrilla)
- Eel grass
- Malaysian trumpet snail
Aquatic pests **not** in New Zealand

**Eurasian Watermilfoil**

**Asian Clams**

**Spiny water fleas**

**Quagga and Zebra Mussels**

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

*Photo: Andrew Sabai, Wisconsin.*

*Photo: U.S. Fish and Wildlife Service.*

*Photo sourced from www.lakegeorgeassociation.org*

*Photo: www.lakegeorgeassociation.org*
Preventing the spread – Catfish & other FW pests

• **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!

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
Acknowledgements

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


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