KEEPING IT CLEAN

A **Tasmanian field hygiene manual**

to **prevent the spread** of

freshwater pests and **pathogens**

MARCH 2010

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Published by:
NRM South
313 Macquarie Street
South Hobart TAS 7004

March 2010

Web version: ISBN: 978-1-921082-09-2
Print version: ISBN: 978-1-921082-08-5

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Cover boat illustration:
Courtesy of Boating Industry Association of Victoria

Back inside cover photo:
Hydro Tasmania

Acknowledgements:
This project was funded by NRM South, Hydro Tasmania, NRM North and Cradle Coast NRM. Sincere thanks to the many people who reviewed the draft manual and provided photos, including staff from DPIPWE, Forestry Tasmania, Hydro Tasmania, Inland Fisheries Service, Parks and Wildlife Service, Quarantine Tasmania and National Institute of Water and Atmospheric Research (New Zealand).

CONTENTS

INTRODUCTION

Key Messages

If you spend time in wet areas make sure you don't move pests and diseases from one area to another.

- **Check** and **Clean** your clothing, footwear, equipment and vehicles **before you arrive** and **before you leave** an area.
- Ensure all footwear, clothing, equipment and vehicles are **thoroughly Dry before going into the field.**
- **Disinfect** your footwear, equipment and vehicles when undertaking **high risk activities** (see page 8) or when it is **not possible to thoroughly dry equipment between sites.**
- **Don't move** water, soil, gravel or plants **from one area to another.**
- **Avoid using felt-soled** boots or waders.

Help to keep Tasmania's waterways and wetlands free of new pests and diseases and limit the spread from infected areas.

This manual provides information on how to prevent the spread of freshwater pests and pathogens in Tasmanian waterways, wetlands, swamps and boggy areas. It is intended primarily for people who work in these areas, but also will help recreational visitors to understand the risks and act accordingly.

WHY FRESHWATER PESTS AND PATHOGENS ARE A PROBLEM

Native freshwater species and habitat are under threat from freshwater pests and pathogens including *Phytophthora cinnamomi* (root rot), *Batrachochytrium dendrobatidis* (Chytrid frog disease), *Mucor amphibiorum* (platypus Mucor disease) and the freshwater algal pest *Didymosphenia geminata* (Didymo). See Appendices B, C, E and F for information on each of these. Although Didymo has not yet been found in Tasmania or on the mainland there is a high risk that it may be introduced from overseas in fishing and other freshwater recreational equipment.

Freshwater pest sand pathogens are spread to new areas when contaminated water, mud, gravel, soil and plant material or infected animals are moved between sites. Contaminated materials and animals are commonly transported on boots, equipment, vehicles tyres and during road construction and maintenance activities.

Once a pest pathogen is present in a water system it is usually impossible to eradicate.

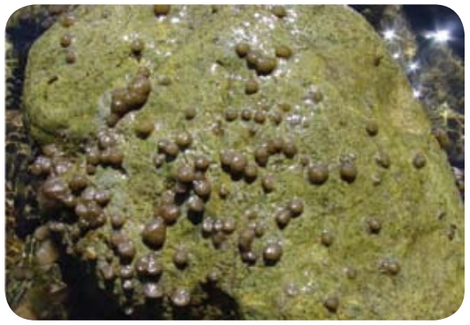
The infection status of a waterway is never fully known and distribution will change over time, so it is crucial that strict hygiene practices are implemented at *all* sites when working **in** or **adjacent** to waterways, wetlands, swamps and boggy areas. Hygiene principles are generally the same for known and probably most unknown Tasmanian disease threats.

Phytophthora cinnamomi causes plant disease and death in native Tasmanian vegetation. The photo shows a roadside table-drain in western Tasmania with dead swamp heath and white waratah in the foreground. Photo courtesy of Tim Rudman, DPIPWE.

A healthy striped marsh frog (Limnodynastes peroni). Photo courtesy of Hans and Annie Wapstra.

Batrachochytrium dendrobatidis (Chytrid) infects the skin of frogs causing death. The photo shows a striped marsh frog (Limnodynastes peroni) displaying clinical signs of Chytrid including fatigue, reddish and peeling skin, splayed hind legs and loss of righting reflex. Photo courtesy of Jamie Voyles.

Mucor amphibiorum (Mucor) causes a deadly ulcerative infection in Tasmanian platypuses. The photo shows a Tasmanian platypus with Mucor disease. Photo courtesy of Nick Gust, DPIPWE.



Didymosphenia geminata (Didymo) colonies at an early stage in the Mararoa River, New Zealand. Photo by Maurice Rodway, courtesy of NIWA, New Zealand.

Didymo blooms can completely smother a stream or lake bed, adversely affecting water quality and fauna (including invertebrates and fish). The photo shows thick Didymo colonies in the lower Waiau River, New Zealand. Photo by Shirley Hayward, courtesy of NIWA, New Zealand.

Didymo on cobbles in the lower Waiau River, New Zealand. Photo by Environment Southland, courtesy of NIWA, New Zealand.

HYGIENE STANDARDS FOR WORKING IN THE FIELD

The hygiene protocols and risk assessment information in this manual are designed to be applied to any activities that involve waterways, wetlands, riparian zones and boggy areas. The information is designed to be incorporated into:

- existing field protocols.
- agreements with contractors.
- legislative planning processes such as Forest Practices Plans, environmental impact assessments and development plans.

Ideally employers and land managers will have active field hygiene protocols that specify the minimum hygiene standards required. It is also important that workplaces and contractors provide sufficient budget and time to implement the necessary procedures and have facilities for cleaning and drying field equipment and vehicles.

Appropriate contacts and links are provided in this manual where additional information may be useful.

Preparing to sample water quality at Lake Fidler, TWWHA. Photo courtesy of Hydro Tasmania.

HOW TO USE THIS MANUAL

When you work in or adjacent to waterways, wetlands, muddy or swampy sites in Tasmania please follow these procedures and protocols.

Step 1.

Become familiar with the hygiene protocols – **CHECK CLEAN DISINFECT DRY** page 14.

Step 2.

Determine if you will be undertaking **high risk activities:**

- working in a **Phytophthora Management Area** (PMA) (refer to Appendix B).
- working in an area where there are **endemic or threatened frog species** (refer to Appendix D).
- working in a **remote area** - large areas with no vehicle access (on public or private land), Tasmanian Wilderness World Heritage Area (TWWHA) or off-shore islands.
  Infected water, frogs, gravel, soil and plant material can be transported on construction equipment, helicopter skids, footwear, bushwalking and field equipment.
- visiting multiples sites in the one field trip where it is **not possible to thoroughly dry** footwear and equipment between sites.

High risk activities require rigorous planning and hygiene protocols (including disinfection). **Check Clean** and **Disinfect** **before you arrive** and **between sites.**

Step 3.

Identify the additional **hygiene actions** required for different activities:

- Simple field activities (involving few people/sites and no heavy machinery/ boats) → page 16.
- Vehicles and heavy machinery → page 20.
- Boats and trailers → page 26.
- Amphibian fieldwork → page 30.
- Platypus fieldwork → page 32.
- Firefighting → page 34.
- Moving gravel/soil between field sites and road construction/maintenance → page 38.

Step 4.

Plan your field hygiene procedures → page 10.

Once you have completed all these steps you are ready to implement your hygiene plan.

Washing skid steps of helicopter prior to departure (Knob helipad above Gordon power station, TWWHA). Photo courtesy of Hydro Tasmania.

Disinfecting pedestrian path to helicopter (Knob helipad above Gordon power station, TWWHA). Photo courtesy of Hydro Tasmania.

PLAN YOUR FIELD HYGIENE PROCEDURES

Avoid using felt-soled boots/waders in the field. Gumboots and PVC waders are the least absorbent and the preferred choice, followed by neoprene and then leather (see Appendix H). Less absorbent materials are less likely to hold and retain spores and cells. Where neoprene and leather products are used, allow adequate drying time between use.

USE THE PRE-FIELDWORK CHECKLIST

The Pre-Fieldwork Checklist (Appendix K) details all the things you need to think about before going into the field.

PLAN YOUR FIELD SCHEDULE

If you are working in more than one area during a field trip, plan the order in which you visit each site. First visit those sites that are known to be least disturbed or free of known pests/pathogens. Then visit the more highly disturbed or infected areas, leaving the worst sites until last. Where possible, plan the schedule for visiting field sites to also account for terrestrial weeds – visit non-weed infested sites first.

Try to work in upstream sites first and progressively work down a catchment. Downstream sites are generally more affected by human activity than upstream sites, and some pests or pathogens are spread downstream.

CHECK YOUR EQUIPMENT

- Check all equipment before going into the field (including boots, waders, clothing, field equipment and camping equipment) to ensure that it is free of all debris (including soil, seeds, plant material, algae, leaf litter etc.) and completely dry.
- Check equipment for wear and tear e.g. cuts and irregularities on the soles of waders, gumboots and boots. Replace equipment where necessary.
- Check all vehicles, heavy machinery (tractors, mowers, slashers, bulldozers, graders, excavators etc.), boats and trailers to ensure they are clean and completely dry. For more detailed information refer to the *Hygiene protocols for vehicles and heavy machinery.*

PLAN YOUR FIELD CLEANING SCHEDULE AND EQUIPMENT

IF YOU WILL BE VISITING ONLY ONE SITE

Where there is no risk of transferring pests and disease to a new site:

- **Check** and **Clean** equipment on site to remove visible mud and debris and when back at base complete the **Disinfect** (where necessary) and **Dry** procedures (so equipment is clean and ready for the next field trip).

OR

- Complete all **Check Clean Disinfect** (where necessary) **Dry** cleaning protocols back at base. All items should be transported back to base in sealed waterproof containers or plastic bins and cleaned as soon as possible after return.

IF YOU WILL BE VISITING MULTIPLE SITES IN THE ONE FIELD TRIP

Where it is not possible to thoroughly dry footwear and equipment between sites:

- Plan how you're going to **Disinfect** footwear, equipment, vehicles and machinery between sites, and how you're going to dispose of the disinfectant – see Appendix A for detailed information on using disinfectants.
    - o Ensure that the cleaning program involves the use of a disinfectant – either Phytoclean or F10 Super Concentrate (F10) in the final rinse (see Appendix A).
    - o If disinfecting on site is not practical or desirable, then bring enough field equipment to have separate clean clothing and equipment for each waterway/site. This is particularly important for absorbent boots and equipment (e.g. leather, neoprene items, gaiters, nets, ropes). Transport all items back to base in sealed waterproof containers and clean the items as soon as possible after return. Disinfecting back at base helps to reduce the amount of disinfectant released into the environment.
    - o Plan to bring water from a treated town water supply for cleaning boots and field equipment if you are aware that the supply of local water (from the site) will be limited or contain large amounts of sediment or organic material, or if you are unsure. Disinfection cannot be guaranteed if water is murky. Where local water is available and clear it will be suitable for cleaning and will be made safe by adding the disinfectant.
- Plan the cleaning locations, the equipment you'll need and how to dispose of disinfectant water/waste (see Appendix A).

Disinfecting neoprene waders in footbath after monitoring and prior to visiting next site. Photo courtesy of Inland Fisheries Service.

Disinfecting PVC waders in footbath prior to flying by helicopter into TWWHA. PVC waders are non-porous and do not harbour live cells/spores. Photo courtesy of Hydro Tasmania.

PLAN YOUR FIELD CLEANING EQUIPMENT

- Spray bottles for disinfecting. Spraying footwear, waders and equipment with disinfectant solution (with no rinse off) can minimise the amount of disinfectant released into the environment. Spray bottles are particularly useful in remote locations or when bushwalking.
- Portable wash baths (e.g. large plastic bins), ideally with secure lids so (if necessary) disinfectant wastewater can be safely returned to base. Two wash baths may be useful, one for the first wash to remove visible mud and debris and the other for disinfecting. Fit the wash baths with an open weave plastic doormat to separate the debris from the equipment as it comes off. If you get muddy in a wet area wash baths are advised.
- Scrubbing brushes (with plastic or metal handles) to remove clumps of dirt and other debris.
- Safety gloves.
- A large container (20 litres) for removing disinfectant wastewater or debris from the site, and/or for transporting clean water from the base to your field cleaning site.
- Disinfectant (Phytoclean or F10 SC - see Appendix A) and measuring device.
- Mobile washdown units or small self-assembled cleaning systems can be used in the field. Refer to Appendix J for the equipment recommended.

Field washdown equipment for simple field activities – spray bottles, footbaths, gloves, brush, disinfectant, measuring device. Photos courtesy of DPIPWE Water Assessment and Hydro Tasmania.

Mobile washdown unit with high pressure pump, hose and compressed air unit. Photo courtesy of NRM South/Southern Tasmanian Councils Authority.

ON YOUR RETURN TO BASE

- **Check Clean Disinfect Dry** all equipment and vehicles as necessary.
- If you find any water, soil, seeds, algae or other plant material in or on any clothing, footwear, equipment or vehicle then clean them as soon as possible and dispose of any cleaning water/waste and solid debris according to the protocols in Appendix A.
- Complete the Post-Fieldwork Checklist (Appendix L).

CHECK CLEAN DISINFECT DRY – HYGIENE PROTOCOLS

*Use these protocols when you are **on site** doing fieldwork, **between field sites**, or **back at base**. These protocols are effective against Phytophthora, Chytrid, Mucor and Didymo.*

Additional information is found under specific sections for simple field activities, vehicles and heavy machinery, boats and trailers, amphibian fieldwork, platypus fieldwork, firefighting and the movement of gravel/soil between sites/road construction/maintenance.

Reduce risk of contamination

Use non-absorbent footwear (e.g. gumboots or PVC waders) and equipment. Avoid felt-soled boots and waders.

Avoid disturbing, driving or walking beyond the worksite.

Minimise time that equipment, footwear and clothing are in contact with water, soil and other debris.

Disinfecting neoprene waders prior to flying by helicopter into TWWHA. Photo courtesy of Hydro Tasmania.

1,2,4

Apply **Check Clean** and **Dry** protocols to all your clothing, footwear, equipment and vehicles when undertaking activities that are **not** high risk (page 8). Disinfection is not necessary however **thorough drying** is critical before using clothing, footwear, equipment and vehicles in another wet area.

3

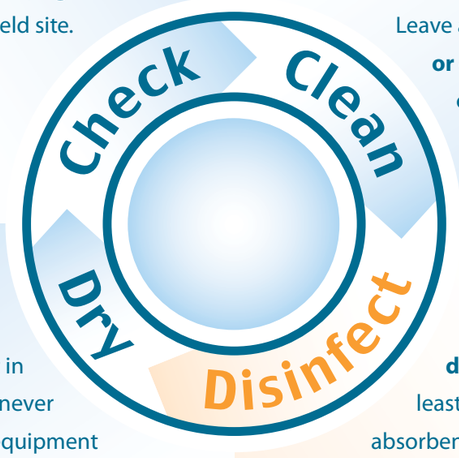
Apply **Check Clean** and **Disinfect** to all footwear, equipment and vehicles when undertaking **high** risk activities (page 8), including when it is not possible to **thoroughly dry** between sites. **Check Clean** and **Disinfect** **before you arrive** and **between sites**. Wherever possible also **Dry** as an additional precaution.

1

Thoroughly check all equipment, footwear and clothing for mud, soil, seeds, algae and other plant material at the field site.

Remove all mud, soil and debris at the field site.

Scrub equipment in local water or water from a treated town supply (**without disinfectant**) as close as possible to the site of origin. Thorough cleaning is **essential** whether or not a disinfectant is then used.



Leave all debris at the original site **or** dispose in sewerage system **or** treat with disinfectant, dry and dispose of in rubbish (see Appendix A). **2**

4

Before using equipment in another wet area, whenever possible, **drain** and **dry** all equipment until it is completely dry to touch.

Ideally wait an extra 48 hours before using equipment in another waterway. This longer waiting time is **critical** if a disinfectant has not been used or when using absorbent materials (e.g. leather, neoprene).

Spray and scrub or soak and scrub equipment in **disinfectant solution** for at least one minute. When cleaning absorbent material (e.g. leather boots, neoprene waders, gaiters, nets, ropes) soak for at least 5 minutes and up to 30 minutes.

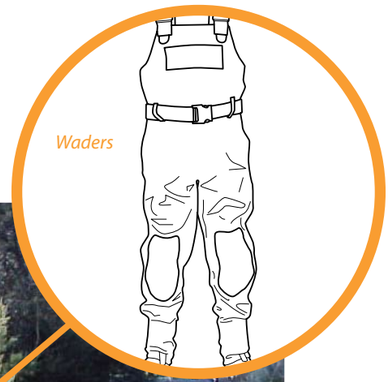
See **Appendix A** for where and how to disinfect (recommended disinfectant strengths, application procedures and disposal methods). **3**

HYGIENE PROTOCOLS
FOR SIMPLE FIELD ACTIVITIES

Simple fieldwork involves a few people and simple field equipment (no heavy machinery/boats).

Freshwater pests and pathogens are spread by transporting contaminated water, mud, soil, plant material, or by transferring infected animals. Wading through water, carrying mud, debris, seeds and water (even droplets) on boots, equipment and vehicle tyres are typical causes of spread.

EXAMPLES OF FIELD EQUIPMENT THAT REQUIRE CLEANING PROTOCOLS

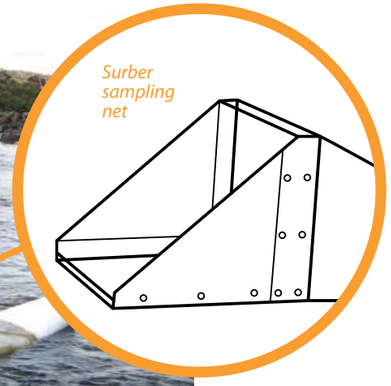


Testing water quality.
Photo courtesy of DPIPWE Water Assessment.

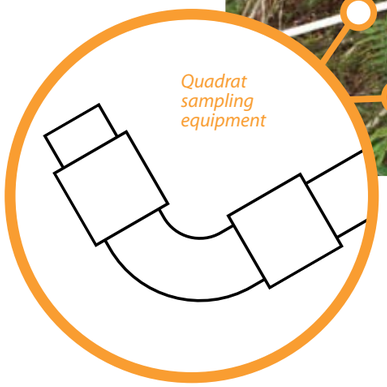
EXAMPLES OF FIELD EQUIPMENT THAT REQUIRE CLEANING PROTOCOLS

Collecting water for testing.
Photo courtesy of Forestry Tasmania.

EXAMPLES OF FIELD EQUIPMENT THAT REQUIRE CLEANING PROTOCOLS



Sampling macroinvertebrates. Photo courtesy of Hydro Tasmania.



Sampling vegetation on the banks of the Gordon River. Photo courtesy of Hydro Tasmania.

GENERAL HYGIENE PROCEDURE

Standard planning and hygiene protocols must be applied:

- Plan your field hygiene procedures → page 10.
- As a minimum, apply the standard **Check Clean Dry** protocols (page 14) to all your clothing, footwear, equipment and vehicles when undertaking activities that are **not** high risk. While disinfecting is not necessary, **thorough drying** is essential before using footwear, equipment and vehicles in another wet area.
- Apply rigorous planning and hygiene protocols (including **Disinfection**) when *undertaking high risk activities:*
  - working in Phytophthora Management Areas (refer to Appendix B).
  - working in areas with endemic or threatened frog species (refer to Appendix D).
  - working in remote areas - large areas with no vehicle access (on public or private land), TWWHA or off-shore islands.
  - where it is not possible to *thoroughly* dry equipment between sites.

  In all high risk activities ensure you **Check Clean** and **Disinfect** all footwear and equipment **before you arrive** and **between sites** → page 14 and Appendix A.
- Where necessary implement any additional hygiene actions required for the different activities you will be undertaking → pages 16 - 40.

Washdown equipment ready for transport. Photo courtesy of DPIPWE Water Assessment.

Cleaning waders, chainsaw and grass cutting equipment with disinfectant prior to flying by helicopter into Gordon River World Heritage Area. Photo courtesy of Hydro Tasmania.

HYGIENE PROTOCOLS
FOR VEHICLES AND HEAVY MACHINERY

The following protocols have been adapted from the *Tasmanian Washdown Guidelines for Weed and Disease Control: Machinery, Vehicles and Equipment* (DPIPWE, Edition 1, 2004) and *Flora Technical Note No. 8: Management of Phytophthora cinnamomi in production forests* (FPA 2006). For more information refer to the full guidelines at:

- DPIPWE website - www.dpipwe.tas.gov.au (then follow links to Weeds Pests and Diseases, Plant Diseases, Phytophthora, Phytophthora Publications, Washdown Procedures).
- Forest Practices Authority website - www.fpa.tas.gov.au (then search for Flora Technical Notes).

BACKGROUND

Passenger vehicles and heavy machinery (including trucks, tractors, mowers, slashers, trailers, backhoes, graders, dozers, excavators, skidders and loaders) are major vectors for the spread of soil borne fungal diseases such as *Phytophthora cinnamomi* (root rot) and terrestrial weeds.

As a minimum, apply the standard **Check Clean Dry** protocols (page 14) to all your clothing, footwear, equipment, vehicles and heavy machinery **before** going into the field.

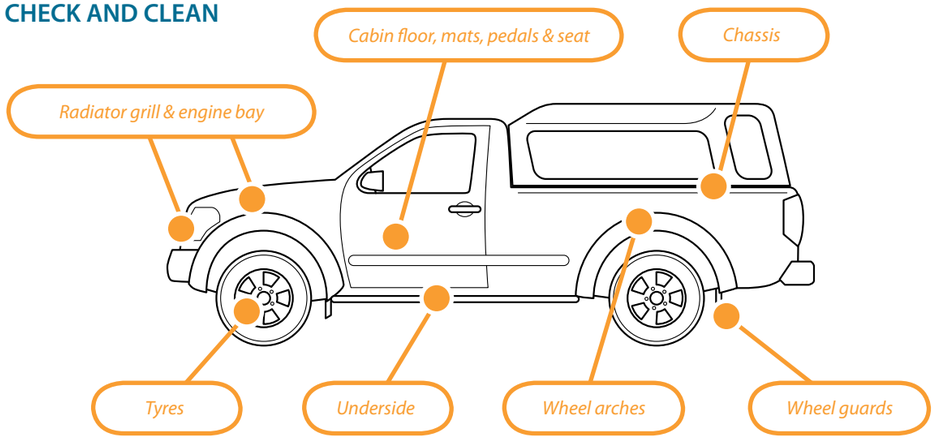
Vehicles and heavy machinery that stay on formed and sealed roads have a low risk of spreading disease and weeds and on-site cleaning is not essential. However on-site vehicle washdown is particularly important when using vehicles and machinery off (sealed) roads.

Apply rigorous planning and hygiene protocols that include **Disinfection** when working in Phytophthora Management Areas (refer to Appendix B), areas with endemic or threatened frog species (refer to Appendix D) or remote areas and where it is not possible to *thoroughly* dry vehicles, heavy machinery and equipment between sites. Ensure you **Check Clean and Disinfect before you arrive** and **between sites.**

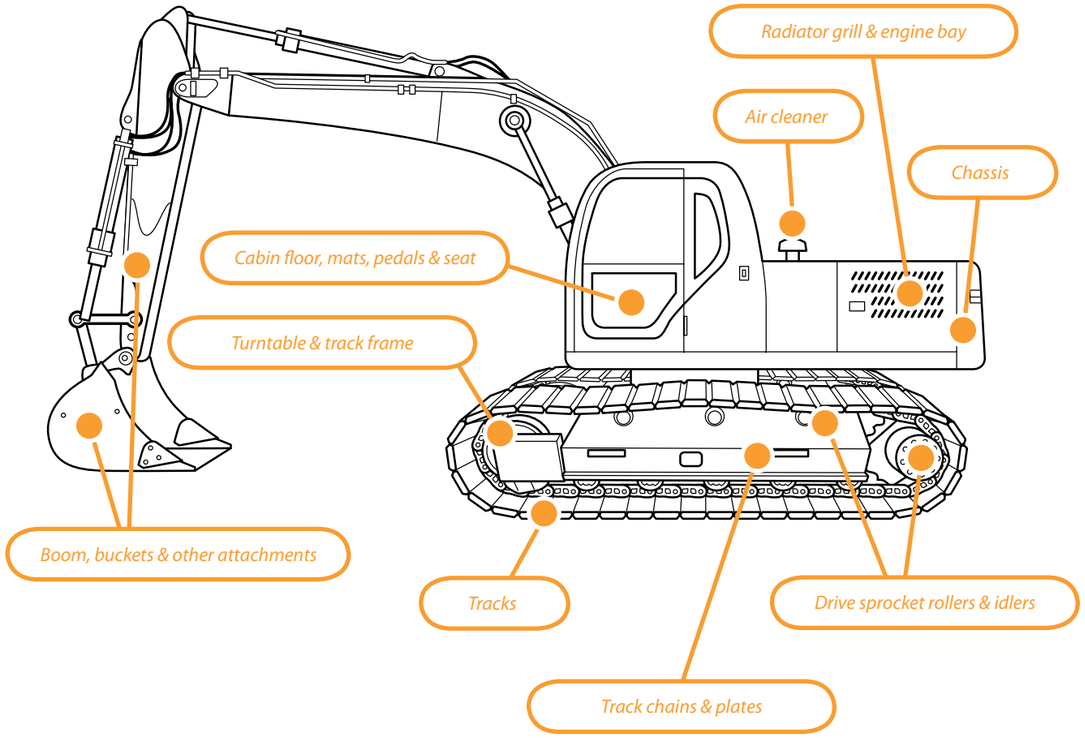
BEFORE GOING INTO THE FIELD

- Consult with the relevant land manager to identify any specific hygiene protocols that apply to vehicles and machinery.
- Inspect vehicles and heavy machinery for mud, soil, plant material and debris and ensure they are clean and dry. Pay particular attention to the underside, tracks, rollers, tyres, wheel arches, guards, blades, bucket, other attachments, spare tyres, chassis, engine bay, radiator and grill, tray, cabin, foot wells, pedals, mats and seats.

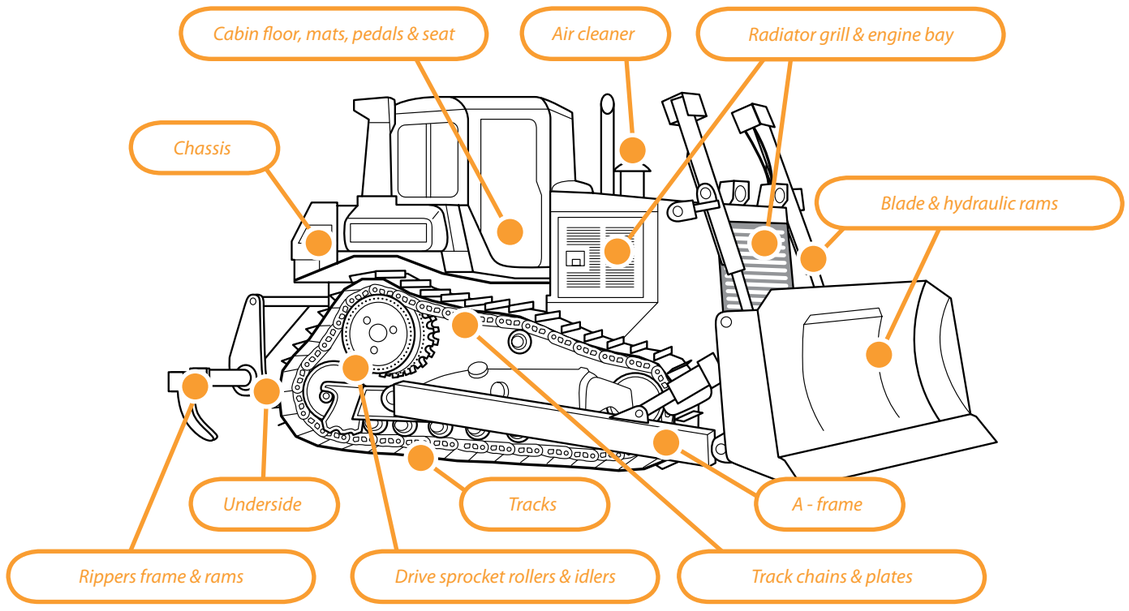
4WD VEHICLE WITH KEY SPOTS TO CHECK AND CLEAN



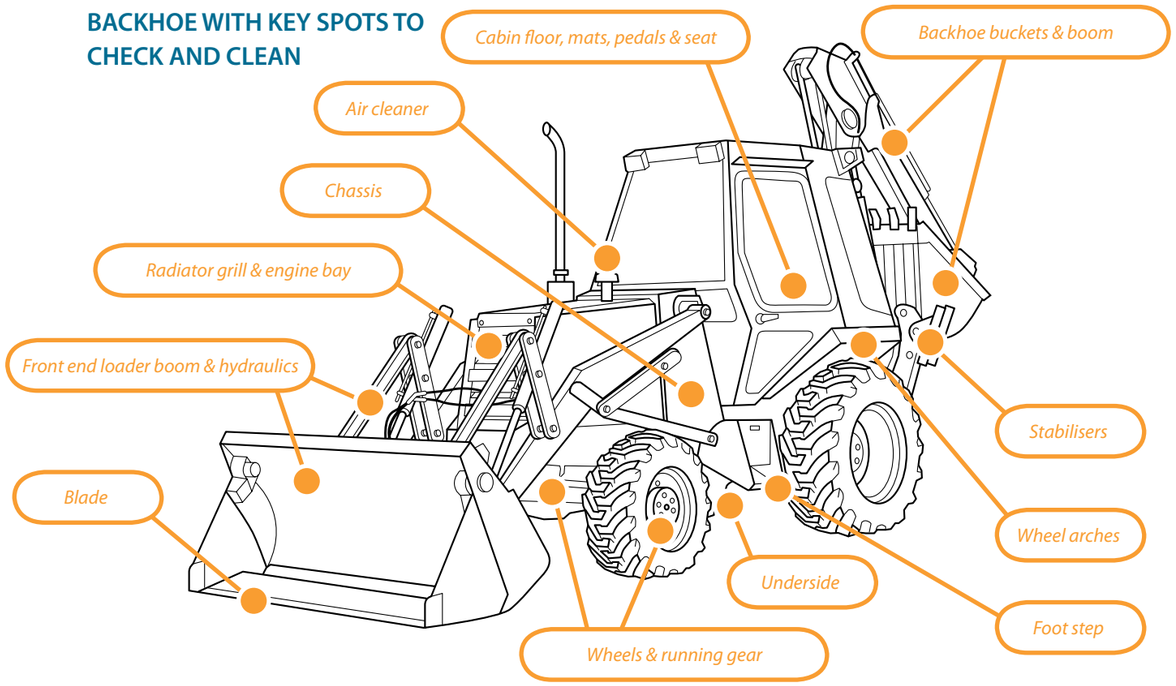
EXCAVATOR WITH KEY SPOTS TO CHECK AND CLEAN



BULLDOZER WITH KEY SPOTS TO CHECK AND CLEAN



BACKHOE WITH KEY SPOTS TO CHECK AND CLEAN



SELECTING A FIELD WASHDOWN SITE FOR VEHICLES AND MACHINERY

Vehicle/heavy machinery washdown is most effective where access can be controlled and entry points, roads or tracks are not open to general use. When selecting a washdown site, consider the following:

- Washdown should be done at the point of departure from a previous operation, preferably at a designated washdown facility with a well-drained hard surface.
- Where there are large quantities of effluent or there is a risk of extensive run-off (e.g. during road construction), the washdown area should be bunded i.e. an impervious spill area constructed.
- Washdown at the edge of (or near) any areas where pests, weeds or pathogens need to be contained. Ideally choose a site where the land slopes gently away from the washdown area and back into the potentially infected area, or into an adjacent area not susceptible to the problem (e.g. a paddock).
- Select a site where the run-off will not enter a watercourse, waterbody or roadside drain: A buffer of at least 30m is required.
- Select a mud-free site (e.g. well grassed, rocky, gravel, bark or timber corded).
- Avoid sensitive vegetation or wildlife habitat e.g. remnant native vegetation and areas with threatened species.
- Mark or record washdown sites for the land manager to enable subsequent monitoring and weed control.

GENERAL HYGIENE PROCEDURE

For general vehicle/machinery cleaning, the following standards apply.

- Elevate heavy machinery with boom arm to enable underside to be accessed. Tyres can be placed under equipment to allow underside to dry.
- Remove any guards, covers or plates that can quickly and easily be removed and replaced.
- Check the vehicle inside and out for any lodged mud, soil, seeds, algae, plant and other debris or substrate material.
- Knock off large clods of dirt with a crowbar or stiff brush.
- Clean with a high pressure hose and stiff brush or crowbar to further remove clods, starting from the top of the vehicle and working down to the bottom. Remember to clean undersides, tracks, rollers, tyres, wheel arches, guards, blades and buckets, chassis, engine bays, radiator and grill, tray, spare tyres and other attachments.
- When spraying with disinfectant solution be sure to only use the minimum amount of water needed to adequately disinfect all equipment and only add the amount of disinfectant required (see Appendix A). Before adding disinfectant to tank release any surplus water (present in tank).
- Allow the disinfectant solution to remain in contact with surfaces for at least 1 minute and wherever possible allow vehicles and equipment to drip dry.
- Avoid driving through any cleaning water/waste.

- Clean the interior (including floor, foot wells, mats, pedals, seats, under seats), air cleaners, radiator grills and engine bays with vacuum, compressed air device or brush off.

No clods of dirt or debris should be present after washdown. If smeared soil stains or soil lodged in difficult-to-access areas remain then ensure these areas have been thoroughly treated with disinfectant solution and allowed to drip dry.

Removal of soil and dirt from bulldozer treads using crow bar. Photo courtesy of Forestry Tasmania.

After physical removal of soil and dirt a high pressure hose is used to further remove clods. Machinery has been elevated with boom arm to enable cleaning underside. Photo courtesy of Forestry Tasmania.

Portable vehicle washdown unit is used to provide water with disinfectant. Note any surplus water present in the tank should be drained to limit the amount of disinfectant released into the environment. Photo courtesy of Forestry Tasmania.

After cleaning and disinfecting, bulldozer is left to dry. Maintaining elevation with tyres allows the underside to dry. Photo courtesy of Forestry Tasmania.

PORTABLE VEHICLE/MACHINERY WASHDOWN UNITS

Mobile washdown units and/or small self-assembled systems are one option. A pump and high pressure hose is the best means to remove all dirt and debris, particularly from places that are difficult to access. A shovel, crowbar and stiff brush are also needed to remove stubborn dirt. A blowdown device, compressor or portable blower can also be used along with a small brush to remove dry dirt (e.g. from air cleaner and radiators).

Refer to Appendix J for the prototype and specifications required for a mobile washdown unit.

Mobile washdown units with high pressure pump, hose and compressed air unit (for blow down of slasher decks, interior, air cleaners, radiator grills etc). Photo courtesy of NRM South/ Southern Tasmanian Councils Authority.

DESIGNATED WASHDOWN FACILITY

Purpose built wash bays are the best option for cleaning large vehicles or machinery. These washdown facilities should have a well drained hard surface and include effective effluent management systems to protect the environment. Commercial washdown facilities are available for vehicles and small trucks at most large towns. However on-site checking and cleaning of vehicles should be undertaken first, especially after working in contaminated areas (areas with known Phytophthora or Chytrid – refer to Appendices B and C).

HYGIENE PROTOCOLS
FOR BOATS AND TRAILERS

BACKGROUND

The following protocols have been adapted from information provided by the National Institute of Water & Atmospheric Research, New Zealand.

As a minimum, apply the standard **Check Clean Dry** protocols (page 14) to all your clothing, footwear, equipment, boats and trailers **before** going into the field and as soon as possible **after** leaving the water at any given site.

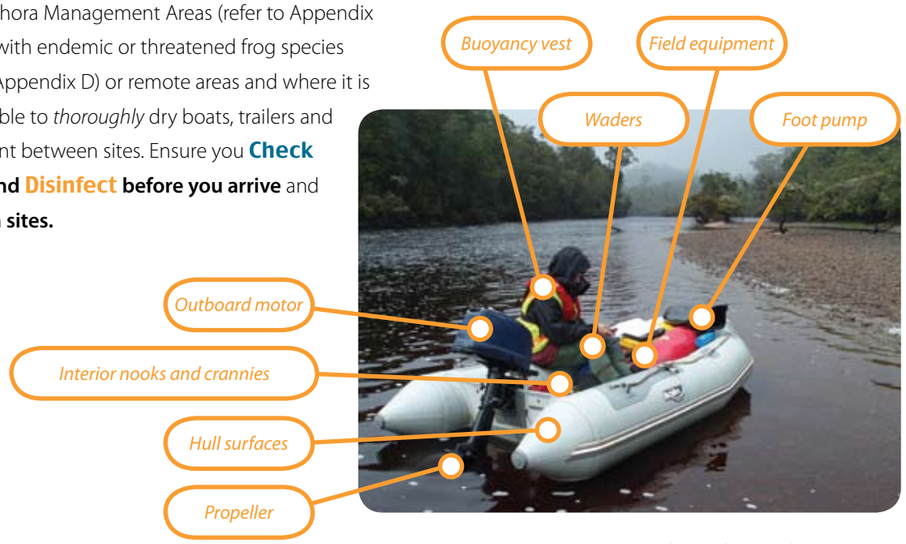
Check and **Clean** to remove all mud and debris at the waters edge. Where necessary, **Disinfect** on higher ground away from the waters edge, preferably on a dry, stony or gravel site or a well-drained hard surface. This helps to minimise re-contamination and the release of disinfectant into the environment.

Apply rigorous planning and hygiene protocols (including **Disinfection**) when working in Phytophthora Management Areas (refer to Appendix B), areas with endemic or threatened frog species (refer to Appendix D) or remote areas and where it is not possible to *thoroughly* dry boats, trailers and equipment between sites. Ensure you **Check Clean and Disinfect before you arrive** and **between sites.**

BEFORE GOING INTO THE FIELD

- Consult with the relevant land manager to identify specific boat and equipment hygiene protocols that apply.
- Inspect the trailer and boat to ensure they are clean and dry. Pay particular attention to engines, hull, deck, deck sump, interior areas, cockpit, bilge, buoyancy chambers, anchor locker, anchor rope and chain, and other onboard field equipment.

EXAMPLES OF BOAT EQUIPMENT THAT REQUIRE CLEANING PROTOCOLS



Accessing monitoring sites on the Gordon River by boat. Photo courtesy of Hydro Tasmania.

GENERAL HYGIENE PROCEDURE

- Decontamination (**Check Clean Dry**) must include the hull, decks, interior areas, cockpit, bilge, buoyancy chambers, anchor locker, anchor rope and chain, engine, trailer, vehicle, and field equipment.
- Where necessary also drain equipment and parts of the boat where water can collect (e.g. carpets, ropes, bilge and buoyancy chambers, anchor lockers, box sections of trailers).
- Use a **Disinfectant** rinse if boats and trailers are to be used in a high risk area or if it is not possible to thoroughly dry all equipment and parts.

Applying disinfectant solution to hull of inflatable boat between sites in remote location. Photo courtesy of Hydro Tasmania.

- When **Disinfecting** use the minimum amount of water needed to adequately disinfect all equipment and only add the amount of disinfectant required (see Appendix A).
- Drain the bilge and buoyancy chambers, and then re-secure bungs.
- Run clear water or disinfectant solution through the bilge pump.
- Fill the deck sump with clear water or disinfectant solution and soak the bilge pump for at least one minute.
- Drain disinfectant solution from the deck sump into a container for disposal away from the waterway and then re-secure bung.
- Fill the anchor locker with clear water or disinfectant solution and soak the anchor, chain and line for at least one minute.
- Drain disinfectant solution from the anchor locker into a container for disposal away from the waterway.
- Use a brush to scrub any absorbent or rough materials such as ropes, chains, carpeting, mats, nets, leather and neoprene items, to make sure that the water or disinfectant solution penetrates fully.
- Soak carpets and sponges for at least 10 minutes to ensure complete saturation with disinfectant solution.
- Where necessary, flush treated surfaces with clean fresh water using the minimum amount to adequately rinse, otherwise leave disinfectant to dry on surfaces.
- Check the box sections of the trailer to ensure they are fully sealed and watertight. If any water has entered the box sections the internal surfaces must be treated with disinfectant solution (as it is difficult for these areas to thoroughly dry).
- Clean and disinfect (where necessary) trailer frame, tyres, wheel arches and guards.

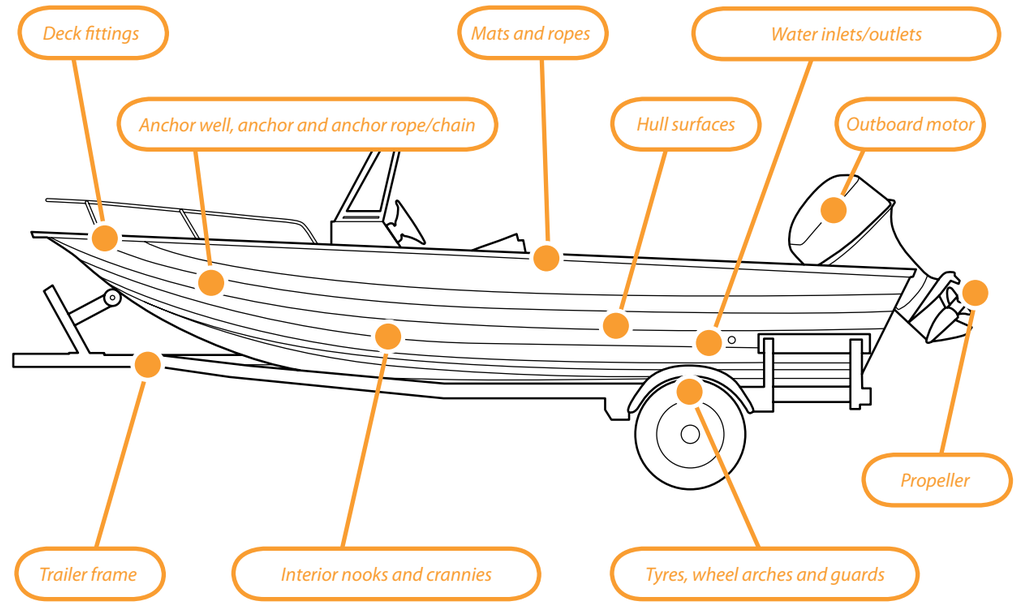
OUTBOARD ENGINES

- Allow the cooling system to drain at the ramp before leaving the waterway.
- Use a flush bag or container to submerge the lower unit of the engine.
- Use a return hose from the tell-tale to recycle clear water or disinfectant solution back into the flush bag or container.
- Flush the engine with clear water or disinfectant solution for five minutes. After disinfection ideally it should also be flushed again with clean fresh water from a treated town water supply.
- Use clear water or disinfectant solution to clean external surfaces of the engines.
- Where necessary flush treated surfaces with clean fresh water using the minimum amount to adequately rinse, otherwise leave disinfectant to dry on surfaces.

ON RETURN TO BASE

- Check boat and trailer for moisture, mud and debris.
- Where necessary thoroughly clean the boat, trailer, vehicle, and equipment. Use a disinfectant rinse if they are to be used in a high risk area or if not possible to thoroughly dry.
- Use a designated area for washing down and disinfecting the boat and trailer to ensure wastewater is disposed of safely away from stormwater drains and waterways.
- Allow adequate drying time.
- The boat skipper or fieldwork leader should ensure that the field washdown equipment is fully replenished at the conclusion of fieldwork.

EXAMPLES OF BOAT EQUIPMENT THAT REQUIRE CLEANING PROTOCOLS



Base illustration courtesy of Boating Industry Association of Victoria.

HYGIENE PROTOCOLS
FOR AMPHIBIAN FIELDWORK

BACKGROUND

Amphibians are at risk of disease from contact with infected water, soil, moist substrates, and other amphibians. Chytridiomycosis (Chytrid) is the most significant disease threat to Tasmanian frogs and has the potential to devastate frog populations (refer to Appendix C). Other pathogens such as ranaviral disease and platypus Mucor disease (Appendix E) also have the potential to affect frogs.

Working with frogs has a high risk of contamination and requires rigorous planning and hygiene protocols (including disinfection). This is particularly crucial when working in areas where there are endemic or threatened frog species (refer to Appendix D).

GENERAL HYGIENE PROCEDURE

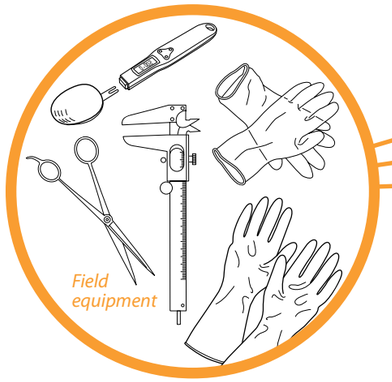
In addition to applying the standard **Check Clean Disinfect Dry** protocols to regular clothing, footwear and equipment, specific hygiene procedures for amphibian fieldwork apply.

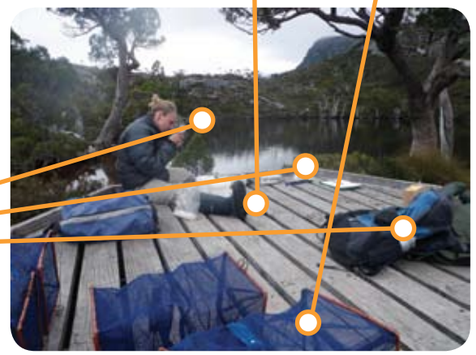
- Treat equipment with F10 disinfectant because it is effective against Chytrid at very low concentrations and it does not foam, so does not require washing off.
- Soak used non-absorbent equipment (including surgical instruments such as scissors, scales, calipers) in 0.8% F10 SC solution for 1 minute or use 70% ethanol (wipes or soaked in liquid).
- Soak absorbent materials (e.g. leather boots, neoprene waders, gaiters, nets, ropes) in 0.8% F10 SC solution for at least 5 minutes and ideally up to 30 minutes.
- Dry equipment completely between sites. If drying is not possible, ensure all equipment is soaked in disinfectant solution for at least 5 minutes and ideally up to 30 minutes.
- Avoid capture and handling of amphibians where possible.
- Limit the duration of amphibian handling to minimise stress. Amphibians should be released quickly where possible and at the same site from which they were captured.
- When handling frogs, wear disposable gloves and use *new* non-powdered gloves for each animal.
- When handling tadpoles, wear well-rinsed vinyl gloves and use *new* gloves for each animal.
- In situations where gloves are not available or suitable, hand washing with 70% ethanol between animals is an alternative (maintaining contact for 60 seconds) or use F10 SC hand gel. Rinse hands in distilled or sterile water after hand washing to avoid transferring disinfectant to other amphibians.
- Use clean, dry disposable containers for holding frogs temporarily and house each frog individually in a separate container. Do not reuse containers.
- If necessary group together tadpoles from the same pond or stream section in one container for short times, but avoid overcrowding.
- Never mix amphibians from different sites.
- Collect and preserve any sick or freshly dead amphibian in 70% ethanol and store for later investigation.
- Wash your hands in F10 SC hand gel between sites.
- Any amphibians that have been held in captivity (laboratory, zoo or breeding facility) should not be returned to their natural environment.

Disinfecting net between sites.
Photo courtesy of DPIPWE Water Assessment.

EXAMPLES OF AMPHIBIAN FIELDWORK EQUIPMENT THAT REQUIRE CLEANING PROTOCOLS

Amphibian fieldwork.
Photo courtesy of Jamie Voyles, DPIPWE.





Amphibian fieldwork.
Photo courtesy of Annie Philips, DPIPWE.

HYGIENE PROTOCOLS
FOR PLATYPUS FIELDWORK

BACKGROUND

Platypuses are affected by Mucormycosis (Mucor) disease only in Tasmania. It has spread widely in northern Tasmania since 1982 and it is the most significant disease threat to Tasmanian platypuses. It has also been found to kill frogs in captivity and may affect wild frog populations. Although its transmission mechanisms are poorly understood, the pathogen may be contracted through infected water or soil. Refer to Appendix E for information on the pathogen.

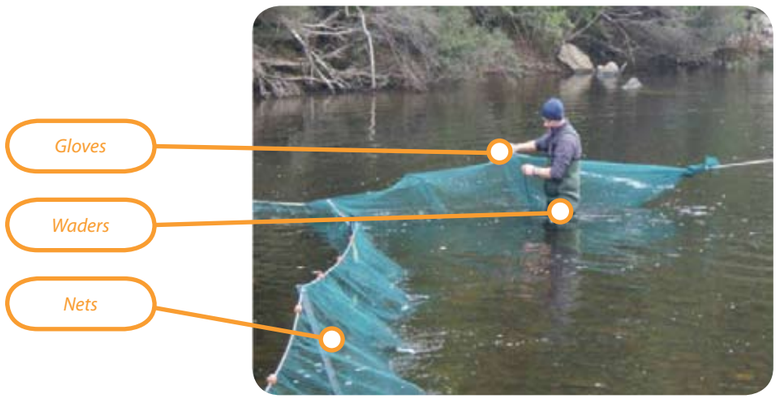
These protocols are particularly important when working in catchments where cases of Mucor disease have been confirmed or implicated (refer to Appendix E). These protocols may need to be updated as further information on Mucor becomes available.

GENERAL HYGIENE PROCEDURE

In addition to applying the standard **Check Clean Disinfect Dry** protocols to regular clothing, footwear and equipment, specific hygiene protocols for platypus fieldwork apply.

- Only use platypus capture bags once during each field trip, and soak with F10 SC between fieldtrips.
- Wash hands in F10 SC hand gel after handling each apparently healthy animal.
- Use a new pair of disposable gloves when handling any ulcerated individual.
- Clean and disinfect all sampling equipment used when handling clinically affected individuals with F10 SC. This involves soaking all equipment in 0.8% F10 SC solution for 30 minutes. The equipment is then ideally left to dry thoroughly before the next use because the fungus is vulnerable to desiccation and the drying provides additional safety.
- Alternatively if moving between affected and unaffected catchments (refer to Appendix E) use 10% Phytoclean solution for 5 minutes. The equipment is then ideally left to dry thoroughly before the next use.
- Clean and disinfect all netting equipment after use, particularly before moving to another catchment. Soak in 0.8% F10 SC solution for 5 minutes and ideally up to 30 minutes.
- Carefully dispose of items not sterilised (e.g. syringes and biopsy punches).
- See Appendix E for the 11 catchments known to have been affected by Mucor since 1982 and the 11 other catchments that are also potentially affected.

EXAMPLES OF PLATYPUS FIELDWORK EQUIPMENT THAT REQUIRE CLEANING PROTOCOLS



Platypus fieldwork. Photo courtesy of Nick Gust.

Platypus fieldwork. Ensure to clean and disinfect or dispose of all sampling equipment appropriately. Photo courtesy of Nick Gust.

HYGIENE PROTOCOLS
FOR FIREFIGHTING

BACKGROUND

Firefighting is often unplanned, requiring rapid response times and movement between several locations at short notice. It can also involve co-ordination across multiple agencies and contractors and the construction of fire breaks. Because of the movement of people, vehicles, heavy machinery and water, firefighting is a high risk activity for the spread of freshwater pests and pathogens and weeds. Particular risks include:

- movement of water from one catchment to another.

Water is commonly moved between locations and catchments during firefighting. Photos courtesy of Paul Black, PWS.

Earthmoving equipment is used during firefighting for construction of access roads and fire breaks. Photo courtesy of Paul Black, PWS.

- movement of earthmoving equipment at short notice without washdown.
- movement of soil and mud from one catchment to another.
- movement of Phytophthora from contaminated areas to a Phytophthora Management Area (refer to Appendix B).
- movement of Chytrid frog disease from contaminated areas to areas with endemic and threatened frog species (refer to Appendix D).

Where feasible, undertake pre-planning (e.g. identify local water points) and fuel and track management activities to minimise the need for unplanned high risk activity and entry to high risk areas. For example fire management **outside** Phytophthora Management Areas will reduce the need to enter these areas.

The following procedures should be adhered to as much as possible in as many situations as possible (e.g. when undertaking prescribed/planned burning operations).

BEFORE GOING INTO THE FIELD

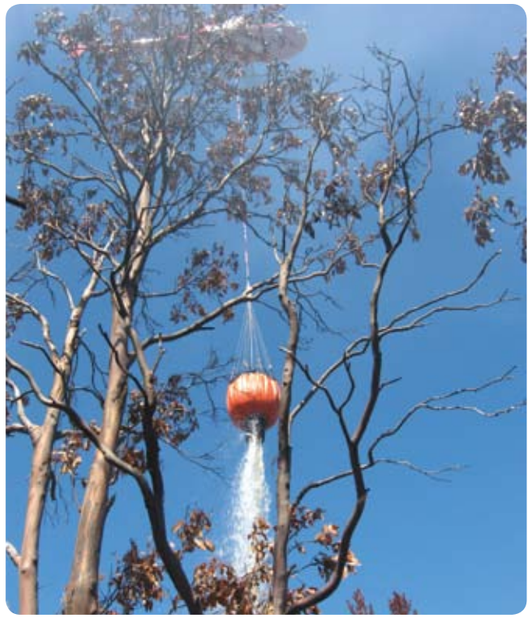
- Consult with the relevant land manager to identify specific protocols and procedures that apply.
- All equipment should be **Checked Cleaned Disinfected** and **Dry** ready for deployment.
- Wherever possible, assess the level of risk. High risk areas include:
    - o Phytophthora Management Areas and known locations of Phytophthora (refer to Appendix B). The latter is also important when sourcing local water for firefighting.
    - o Locations where Chytrid fungus is present and areas where there are endemic and threatened frog species (refer to Appendices C and D).
    - o Remote areas - large areas with no vehicle access (on private or public land), TWWHA or off-shore islands.

GENERAL HYGIENE PROCEDURE

- Apply rigorous planning and hygiene protocols (including *disinfection* of vehicles and equipment) when working in high risk areas. **Check Clean and Disinfect before you arrive** and **between sites.**
- For complex and emergency response situations follow the protocols prescribed by Parks and Wildlife Service, Forestry Tasmania or the Tasmanian Fire Service to assess the level of risk and identify the management response.
- Refer to *Hygiene protocols for vehicles and heavy machinery* and include all equipment (e.g. pumps, hoses, bladders, buckets, earth moving equipment, helicopter skids) in hygiene procedures.
- Refer to *Hygiene protocols for movement of gravel and soil between sites, and road construction and maintenance.*
- Minimise the transfer of mud and water between locations.

(continued over page)

- Use treated town water for firefighting. Otherwise use water from a local source/waterway.
- Fire tankers can be used to clean down vehicles. If disinfecting, use plain tank water first to thoroughly clean vehicles and machinery and finish with a disinfection rinse. Only mix disinfectant into the water tank when a very small quantity of water is present so as to minimise use, cost and environmental risk.
- Induction of disinfectant may be possible for fire units fitted with inductors however agency advice is essential (as it will depend on the induction rate).
- Fire fighting foam is NOT effective in disinfecting water.
- Avoid dumping surplus water into waterways and wet/boggy areas.
- When releasing surplus water from a vehicle or tanker release it slowly to reduce the chance that it will filter back into a waterway or enter roadside or stormwater drains.
- Refer to Appendix J for the prototype and specifications required for using a mobile washdown unit



Firefighting from helicopter. Photo courtesy Paul Black, PWS.

EXAMPLES OF FIREFIGHTING EQUIPMENT THAT REQUIRE CLEANING PROTOCOLS

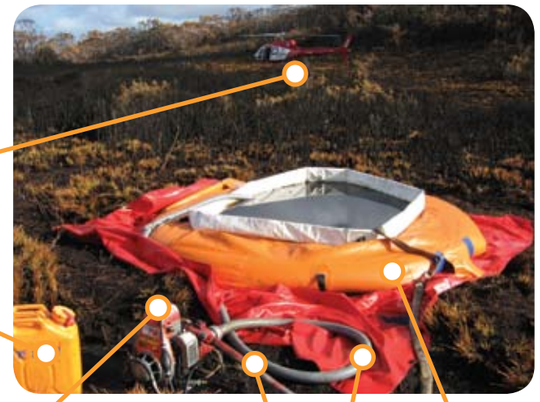


Photo courtesy of Paul Black , PWS.

Helicopter skids

Ancillary equipment

Boots

Overalls

Pump

Hoses

Bladder

Photo courtesy of Paul Black , PWS.

Vehicle

Ancillary equipment

Hoses

HYGIENE PROTOCOLS

FOR MOVEMENT OF GRAVEL AND SOIL BETWEEN SITES AND ROAD CONSTRUCTION AND MAINTENANCE

BACKGROUND

Movement of infected gravel, sand, soil or water during road construction and maintenance is a key way that *Phytophthora cinnamomi* (root rot) is introduced to new areas. The presence of Chytrid frog disease is also strongly associated with the presence of gravel roads. Quarries and landscaping nurseries are major dispersal points for soil borne pathogens such as Phytophthora.

High risk activities for the spread of pest and diseases include moving and distributing soil and road construction and maintenance. Photos courtesy of Forestry Tasmania.

GENERAL HYGIENE PROCEDURE

- Follow *Hygiene protocols for vehicles and heavy machinery.*
- Apply rigorous planning and hygiene protocols (including **Disinfection**) when working in Phytophthora Management Areas (refer to Appendix B), areas with endemic or threatened frog species (refer to Appendix D) or remote areas and where it is not possible to *thoroughly* clean and dry vehicles, heavy machinery and equipment between sites. Ensure you **Check Clean** and **Disinfect** **before you arrive** and **between sites.**
- When taking gravel, fill, soil or similar material to a Phytophthora-free site that has vegetation sensitive to Phytophthora (see next point), ensure that it is from a quarry that is certified as free of Phytophthora.

  This can be done by either sourcing the material from a quarry that has been certified within the last 12 months as Phytophthora-free or by arranging a weed and disease survey to provide current certification. As it is not compulsory for quarries to undertake weed and disease surveys, payment for the survey will need to be negotiated between the quarry manager and the person purchasing the quarry material.

  The weed and disease survey required for certification can be undertaken by some environmental consultants and Forestry Tasmania. Contact DPIPWE Biodiversity Monitoring Section within Wildlife and Conservation (ph (03) 6233 6556) or Forestry Tasmania, Biology and Conservation section for information on this process.

  While there is currently no register of Tasmanian quarries that have been inspected and certified as Phytophthora-free this may be possible in the future if there is sufficient demand.
- For species and forest communities sensitive to Phytopthora refer to pages 5 – 8 of *Flora Technical Note No. 8: Management of Phytophthora cinnamomi in production forests* (FPA 2006) on the Forest Practices Authority website - www.fpa.tas.gov.au (then search for Flora Technical Notes)
- For information on maintaining quarries free of Phytophthora refer to pages 12 – 14 of *Flora Technical Note No. 8: Management of Phytophthora cinnamomi in production forests* (FPA 2006) on the Forest Practices Authority website - www.fpa.tas.gov.au (then search for Flora Technical Notes)
- For more detailed information on hygiene actions during road construction and maintenance refer to pages 10 - 11 *Flora Technical Note No. 8: Management of Phytophthora cinnamomi in production forests* (FPA 2006) on the Forest Practices Authority website - www.fpa.tas.gov.au (then search for Flora Technical Notes)
- Wherever possible take water for road construction/maintenance from a treated town water supply or from a waterway within the sub-catchment where the road is being constructed and avoid dumping this water into waterways or wet or boggy areas.

- Try to minimise run-off when watering gravel roads during construction and maintenance.
- Undertake road maintenance wherever possible in dry weather.
- Roads should be kept free of potholes to prevent puddles forming and potentially harbouring freshwater diseases.
- Where earth, stones, boulders, shingle, metal, minerals, gravel, silt or sand are being extracted from a waterway, they should be piled on high ground near to where they were extracted and be left to drain back into the waterway. Prevent drainage into a new waterway.

Rutting of roads, particularly in winter, may create potholes that can harbour freshwater diseases. Photo courtesy of Forestry Tasmania.

Constructing and maintaining dirt roads are a high risk for the spread of freshwater pests and diseases. Photo courtesy of Forestry Tasmania.

APPENDIX A:
HOW TO DISINFECT – PREPARE, APPLY AND DISPOSE OF DISINFECTANTS AND CLEANING WASTE

RECOMMENDED DISINFECTANTS

Based on the current safety profile information available (i.e. toxicity to organisms, biodegradability and irritation to humans) *Phytoclean* and *F10 Super Concentrate* (F10 SC) are the two disinfectants recommended for use in these protocols. They have both been tested against each of the 4 pests and pathogens outlined in this manual and have been found to be effective using the following protocols. Their active ingredient, Benzalkonium chloride, has been found to be **less** toxic than other traditional quaternary ammonium disinfectant compounds. However Benzalkonium chloride and these disinfectants (like all disinfectants) still cause harm to the environment, organisms and humans. **Therefore they should be used with care, only in the concentrations prescribed and with the minimal volume of water required to adequately wash equipment.**

Phytoclean and F10 SC are currently being used by key Tasmanian organisations involved in natural resource management. Refer to Appendix H for information and comparison on their availability, human health effects, toxicity and biodegradability.

WHERE TO DISINFECT

On-site disinfecting is best done on dry, stony or gravel sites (and close to the vehicle) to minimise re-contamination with water, soil and other debris and to minimise the risk of disinfectant leaching into the waterway.

Cleaning can be undertaken in portable wash baths/ plastic bins to reduce risk of re-contamination.

PREPARING DISINFECTANT SOLUTION

To ensure effective disinfection, it is important that the water used to prepare disinfectant solution is clear or free of large amounts of silt or organic material. Therefore when preparing disinfectant solution wherever practical use water from a treated town water supply. This is particularly important when local water is limited or has large amounts of silt or organic material. Otherwise a simple filter system using fine gauze or muslin cloth inserted into a funnel can be used to remove silt. In-line filters that are inserted into pipes or hoses can also be purchased from irrigation equipment suppliers. Where silt is not able to be removed change any wash bath water frequently to allow optimal penetration of disinfectant.

Use the minimum amount of water needed to adequately disinfect all equipment and only add the amount of disinfectant required. This is important to reduce the amount of disinfectant released into the environment.

- Phytoclean:
  - use a 2% solution (1:50 dilution or 20 ml of disinfectant in 980 ml of water) for *washdown*
  - use a 10% solution (1:10 dilution or 100 ml of disinfectant in 900 ml of water) for *wash baths* (e.g. used for boots, waders and nets).
- F10 SC:
  - use a 0.8% solution (1:125 dilution or approximately 8 ml F10 in 1 litre of water) for *washdown* and *wash baths*. Allow longer soaking times for wash baths (at least 5 minutes and ideally up to 30 minutes) and ensure disinfection water is clear.

DISINFECTING PROCEDURE

- All items must be thoroughly cleaned before they are disinfected to remove as much visible mud and debris as possible. This is essential to ensure that disinfection is effective.
- Spray and scrub or soak and scrub all items. **Spraying** equipment (particularly non-absorbent equipment or equipment that has had minimal contact time with water and soil) requires less disinfectant and can help to minimise the risk of disinfectant leaching into waterways and the environment.
- Ensure **non-absorbent** equipment maintains contact with disinfectant solution for at least 1 minute.
- Allow at least 5 minute soaking/contact time (and up to 30 minutes) when cleaning **absorbent material** (e.g. leather boots, neoprene waders, gaiters, nets, ropes).
- Where possible allow the disinfectant to dry on the equipment to increase contact time (and effectiveness) and to reduce disinfectant leaching into the environment.

Scrubbing and disinfecting soles of wader boots. Photo courtesy of DPIPWE Water Assessment.

Disinfecting wader gortex boots. Small spray bottles are good for remote locations and to help minimise the amount of disinfectant that leaches to the environment. Photo courtesy of Hydro Tasmania.

Disposal of Weeds

***Where* and *how* best to dispose of terrestrial weeds will depend on the weed species (e.g. a permit is required to transport declared weeds) and whether they have viable seeds. As a general rule it is best to leave weeds on site unless they are remotely located (which will make them difficult to return to for follow-up weed control) or if they are likely to re-sprout from fragments (e.g. elisha's tears, willows).**

Please refer to Hydro Tasmania's Working with Weeds Manual (www.hydro.com.au) or contact the DPIPWE Weed Management Officer phone 1300 368 550 for advice.

DISPOSING OF DISINFECTANT WATER/WASTE AND SOLID DEBRIS

- Dispose of cleaning water/ waste that **does not contain disinfectant** directly at the site of origin.
- Dispose of all **disinfectant** cleaning water/waste in an area where there is no or limited chance of it filtering back into the waterway/wet area, entering stormwater or other drains or trenches, or reaching an area of environmental significance. If at base, flush all cleaning water or waste down the sewerage system.
- When disposing in the field, try to ensure there is a buffer of at least 30 meters from a waterway (e.g. in the middle of a paddock) and dispose well away from storm water or other drains and trenches. Choose a dry disposal site rather than a site that is permanently or seasonally moist or muddy. Where relevant, always check with property owners before disposing of any waste.
- Remove from the site all disinfectant cleaning water/waste where the above approach is not practical or in areas of high conservation value and flush down the sewerage system.
- Solid debris (such as mud, algae, leaf litter) can also be placed in the rubbish, however, first ensure that it has been soaked in disinfectant or completely dry. The treatment of **weeds** is species specific (see box adjacent).

Collecting water sample from Lagoon of Islands, Central Highlands of Tasmania. Photo courtesy of Hydro Tasmania.

APPENDIX B:
PHYTOPHTHORA ROOT ROT

Phytophthora cinnamomi causes plant disease and death in native Tasmanian vegetation. The photo shows a roadside table-drain in western Tasmania with dead swamp heath and white waratah in the foreground. Photo courtesy of Tim Rudman, DPIPWE.

Phytophthora cinnamomi (root rot/dieback)

Phytophthora is an introduced water mould that can cause plant disease and death in native Tasmanian vegetation.

It poses a serious threat to susceptible plant species found in open vegetation in lowland environments (below 700m) such as moorlands, heathlands and dry eucalypt forests where rainfall is greater than 600mm. Phytophthora has the potential to significantly change the ecology of these vegetation types and some threatened plant species are declining as a result of Phytophthora. It does not threaten grasslands, agricultural crops or pasture.

In Tasmania 181 plant species have so far been recorded as hosts for Phytophthora. Some hosts can be resistant, or show no signs of disease, such as *Gymnoschoenus sphaerocephalus* (buttongrass). Other species such as *Agastachys odorata* (white waratah) are rapidly killed and may not regenerate in infected areas.

Phytophthora is spread to new areas by the movement of contaminated gravel, soil or plant material on vehicles, equipment, people or animals and is transported by water percolating through the soil or in creeks. Local spread is strongly determined by the direction of water movement - Phytophthora moves rapidly downhill and along roadside drains.

Contact DPIPWE for advice, or see the DPIPWE website - www.dpipwe.tas.gov.au (then follow links to Weeds Pests and Diseases, then Plant Diseases) for more information. Information on the distribution of Phytophthora is updated regularly on the Natural Values Atlas and can be downloaded at www.naturalvaluesatlas.tas.gov.au.

Refer to *Flora Technical Note No. 8: Management of Phytophthora cinnamomi in production forests* (FPA 2006) for information on recognising field symptoms of Phytophthora and the plant species and forest communities susceptible to Phytophthora on the Forest Practices Authority website - www.fpa.tas.gov.au (then search for Flora Technical Notes).

PHYTOPHTHORA MANAGEMENT AREAS

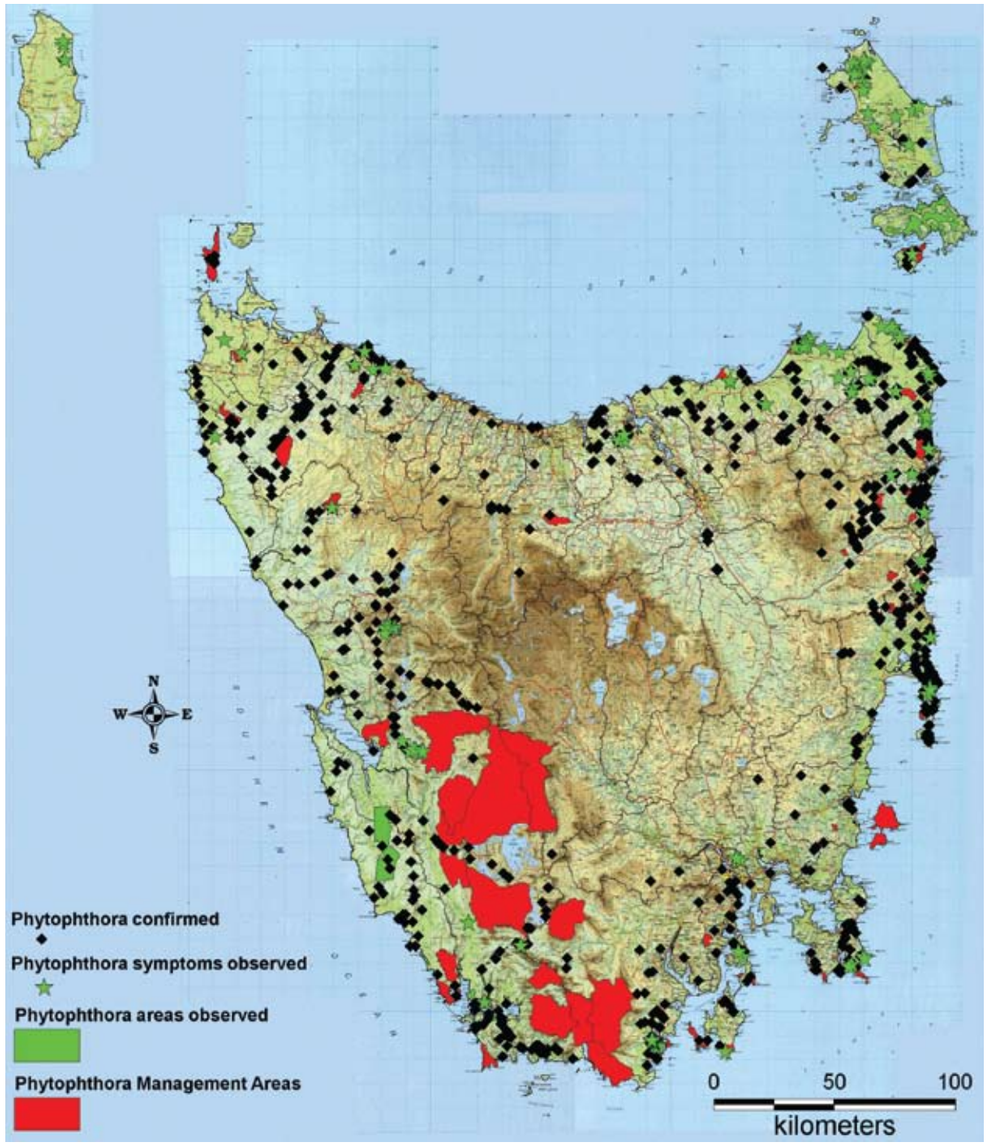
Phytophthora Management Areas are regions that are susceptible to *Phytophthora cinnamomi* and are a priority for protection. They represent the forest and non-forest vegetation communities and plant species (including rare, endemic and threatened species) that are likely to suffer significant impact from Phytophthora if it were introduced. However, due to their location and landscape attributes they currently have a lower risk of introduction and thus have the greatest long term chance of survival. When working in these areas rigorous planning (refer to page 10) and hygiene protocols must be applied i.e. **Clean** and **Disinfect** all footwear and equipment **before you arrive** and **between sites.**

Phytophthora Management Areas are mapped for state forest and all lands managed by DPIPWE (including national parks, nature reserves, conservation areas, State reserves, game reserves and Crown reserves) and can be found on the Natural Values Atlas - www.naturalvaluesatlas.tas.gov.au

For further detailed mapping and information of management areas refer to the Technical Report 03/03, Nature Conservation Branch, DPIPWE: *Conservation of Tasmanian Plant Species & Communities Threatened by* Phytophthora cinnamomi. *Strategic Regional Plan for Tasmania* (see Phytophthora publications on the DPIPWE website).

Contact DPIPWE for advice, or see the DPIPWE website - www.dpipwe.tas.gov.au (then follow links to Weeds Pests and Diseases, then Plant Diseases) for more information.

PHYTOPHTHORA MANAGEMENT AREAS AND PHYTOPHTHORA LOCATIONS



The map shows Phytophthora Management Areas (identified by the Nature Conservation Branch of DPIPWE in 2003 as a priority for protection against Phytophthora).

Also shown are locations (as at February 2009) where the presence of Phytophthora cinnamomi has been confirmed by laboratory analysis. These points do not indicate current extent, severity or boundaries of infestations (which will vary significantly from site to site) and do not include records from Diagnostic Services Branch of DPIPWE which primarily relate to the agricultural and urban environment. There will be many other infested areas which have not been sampled and field observations suggest a much wider distribution in local areas with favourable vegetation and conditions.

The map also shows the location points and areas where Phytophthora cinnamomi symptoms have been observed (as at December 2009) but not verified by sampling.

This map file is available for download with better resolution from the NRM South website - www.nrmsouth.org.au (then follow links to Information, Publications, Technical Sheets Manual & Reports, Freshwater & Rivers).

P. cinnamomi infection on Schouten Island. Photo courtesy of DPIPWE.

Walker using washdown station at Frenchmans Cap track. Photo courtesy of DPIPWE.

APPENDIX C:
CHYTRID FROG DISEASE

A healthy striped marsh frog (Limnodynastes peroni). Photo courtesy of Hans Wapstra.

Batrachochytrium dendrobatidis (Chytrid) infects the skin of frogs causing death. The photo shows a striped marsh frog (Limnodynastes peroni) displaying clinical signs of Chytrid including fatigue, reddish and peeling skin, splayed hind legs and loss of righting reflex. Photo courtesy of Jamie Voyles.

Batrachochytrium dendrobatidis (Chytrid frog disease)

The disease known as Chytridiomycosis or Chytrid fungus currently threatens Tasmania's native amphibians.

This fungus infects the skin of frogs, destroying its structure and function, and can ultimately cause death. Sporadic deaths occur in some frog populations and 100 per cent mortality occurs in other populations. Chytrid has the potential to devastate Tasmania's important frog populations (3 of our 11 Tasmanian frog species are found nowhere else in the world and 2 other species are already threatened).

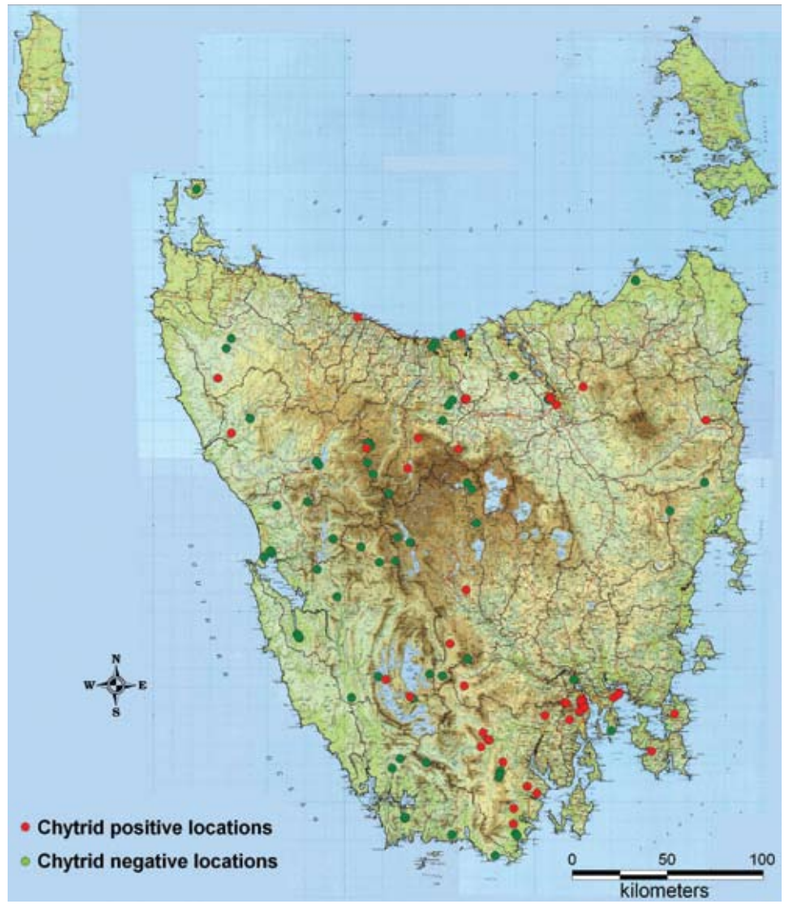
In Tasmania, Chytrid infection has spread widely in habitats associated with human disturbance and the presence of gravel roads. It will continue to spread unless we act quickly. Once established, Chytrid fungus is extremely difficult to eradicate from the natural environment. Remote areas in Tasmania, particularly the Tasmanian Wilderness World Heritage Area, are still largely free of the disease; it remains a big challenge to keep it out and we need your help.

The movement of infected frogs, tadpoles, soil and water are the known key agents of spread. The fungus (or infected frogs or tadpoles) can be spread by people in water and mud/soil on boots, camping equipment, vehicles and heavy machinery, soil relocated for road construction/maintenance and in water used for drinking or spraying on gravel roads or fighting fires.

Contact DPIPWE for additional information and advice. Information on Chytrid in Tasmania is available on the DPIPWE website - www.dpipwe.tas.gov.au (then follow the links to Weeds Pests and Diseases, then Animal Diseases). Information on the distribution of Chytrid is updated regularly on the Natural Values Atlas and can be downloaded at www.naturalvaluesatlas.tas.gov.au

It is important to note that Chytrid distribution will change over time and that hygiene protocols need to be adopted at all sites whether they are Chytrid positive, negative or unknown.

KNOWN LOCATIONS OF CHYTRID FUNGUS



Distribution map of Batrachochytrium dendrobatidis (Chytrid frog disease) as of 2008 from data provided by the Central North Field Naturalists and DPIPWE. This map does not include data from recent surveys (including that undertaken by DPIPWE in November/December 2009).

This map file is available for download with better resolution from the NRM South website - www.nrmsouth.org.au (then follow links to Information, Publications, Technical Sheets Manual & Reports, Freshwater & Rivers). Data from the 2009 surveys will be updated on this map.

APPENDIX D:
ENDEMIC AND THREATENED FROG SPECIES

Of the 11 frog species present in Tasmania, 5 are either endemic (*Litoria burrowsae* – Tasmanian tree frog, *Bryobactrachus nimbus* – moss froglet, *Crinia tasmaniensis* – Tasmanian froglet) or listed under threatened species legislation (*Limondynastes peronii* – striped marsh frog, *Litoria raniformis* – green and gold frog).

These are considered priority species to protect against Chytrid frog disease and other pathogens. When working in areas where these frog species are present rigorous planning (refer to page 10) and hygiene protocols must be applied i.e. **Clean** and **Disinfect** all footwear and equipment **before you arrive** and **between sites**.

Littoria burrowsae – Tasmanian Tree Frog. Found in western and southern Tasmania confined to open or moorland habitats.

Bryobactrachus nimbus – Moss Froglet. Found in south-west Tasmania in the World Heritage Area.

Crinia tasmaniensis – Tasmanian Froglet. Widespread in wet areas at all altitudes.

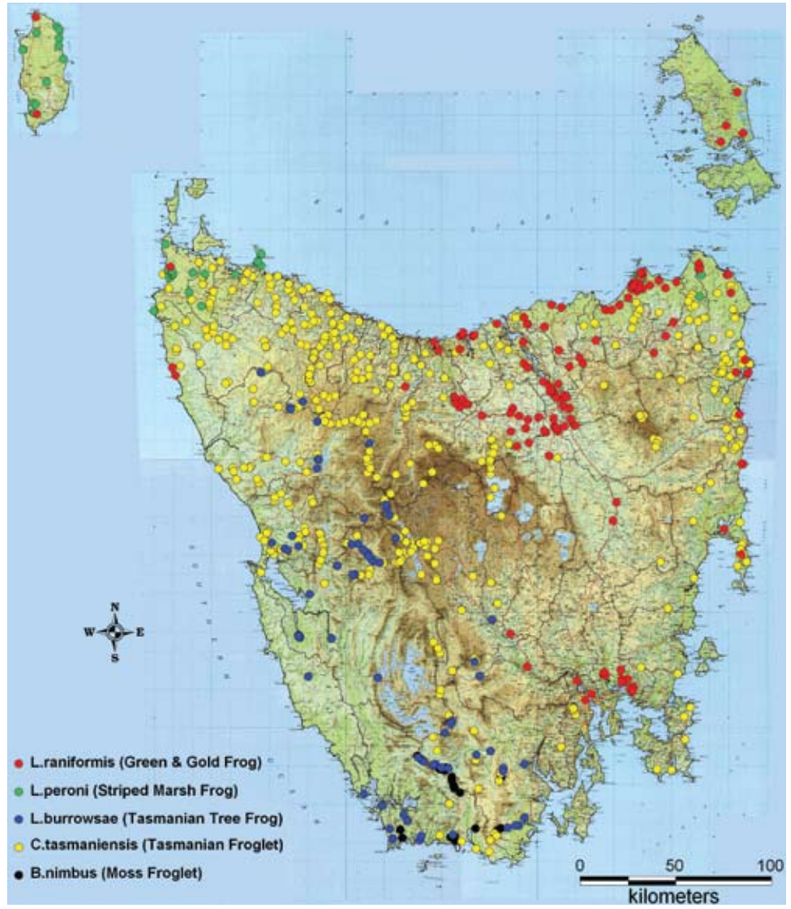
Limondynastes peronii – Striped Marsh Frog. Found in northern Tasmania, particularly in the north west.

Litoria raniformis – Green and Gold Frog. Found in north-eastern Tasmania, along the east coast and in Hobart and surrounding areas.

All photos courtesy of Hans and Annie Wapstra.

Information on the distribution of frogs is updated regularly on the Natural Values Atlas and can be downloaded at www.naturalvaluesatlas.tas.gov.au

KNOWN LOCATIONS OF PRIORITY FROG SPECIES



Distribution map of Tasmania's 5 endemic and threatened frog species as of October 2009 (data from the Natural Values Atlas). This map does not include data from a survey undertaken by DPIPWE in November/ December 2009. Check the Natural Values Atlas and DPIPWE website for this information.

This map file is available for download with better resolution from the NRM South website - www.nrmsouth.org.au (then follow links to Information, Publications, Technical Sheets Manual & Reports, Freshwater & Rivers). Data from the 2009 surveys will be updated on this map.

APPENDIX E:
PLATYPUS MUCOR DISEASE

Mucor amphibiorum (Mucor) causes a deadly ulcerative infection in Tasmanian platypuses. The photo shows a Tasmanian platypus with Mucor disease. Photo courtesy of Nick Gust, DPIPWE.

Mucor amphibiorum (platypus Mucor disease)

Mucor amphibiorum has also been shown to kill frogs in captivity and may affect wild frog populations.

Mucor amphibiorum is a native Australian fungus previously restricted to mainland Australia but which has spread widely in northern Tasmania since 1982. It causes a deadly ulcerative infection in Tasmanian platypuses (Mucormycosis or Mucor disease) and is their most significant disease threat.

It seems likely that the fungus was introduced to Tasmania via infected frogs transported from mainland Australia. Affected platypuses develop single or multiple ulcers on various parts of their body. The fungal ulcers are visible on the skin, though lungs can also be infected. Disease is thought to increase the probability of secondary infections and the un-furred ulcers may cause heat loss problems since the animals forage in cold waters. Mobility can also be severely affected, potentially resulting in slow starvation.

The disease is known to have infected platypuses in a variety of catchments through the north central part of the state. The catchments where infected animals have been confirmed are: Black-Detention, Emu, Mersey, Meander, Tamar, Brumby's-Lake, Pipers, North Esk, Great Forester-Brid, Macquarie and South Esk catchments (see figure next page).The potentially infected catchments that have had unconfirmed public sightings of ulcerated animals are: Montagu, Pieman, Inglis, Forth-Wilmot, Upper Derwent, Ouse, Huon, Lower Derwent, Clyde, Derwent Estuary-Bruny and Musselroe-Ansons.

The impact of Mucormycosis on the abundance of platypuses in Tasmania is not known, however a 2008–09 survey indicates that the prevalence of the disease has declined since the mid to late 1990s, although it has continued to affect Tasmanian platypuses for over 25 years. In 8 of the historical catchments where the disease has been recorded, platypus still survive, which suggests the disease does not cause rapid local extinction (though it may reduce their abundance).

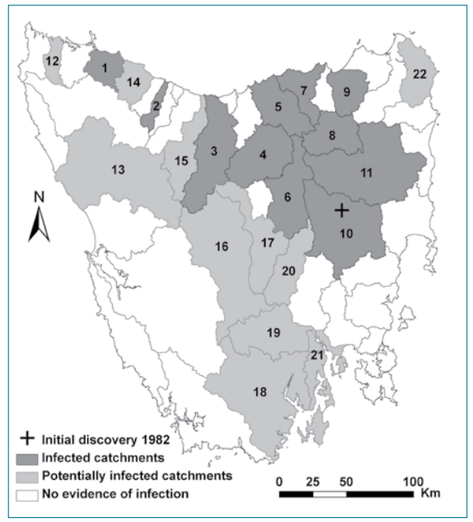
For more information on distribution of Mucormycosis refer to research article by Gust et al: *Distribution, prevalence and persistence of Mucormycosis in Tasmanian platypuses* (Ornithorhynchus anatinus) on the CSIRO website - www.publish.csiro.au/nid/90.htm

It is not currently known how Mucor is spread. While movement of contaminated water or soil are possibilities, results from the 2008–09 survey suggest that human activity may not be a key method of transfer. *The risk of spread of Mucor when undertaking general activities/fieldwork in wetlands and waterways is unclear but potentially low, and the generic concentrations of disinfectants recommended in these protocols is considered adequate with existing knowledge. However when handling platypus in the field it is recommended that the specific Hygiene protocols for platypus fieldwork are applied (page 32)*

Contact DPIPWE for advice or see the DPIPWE website - www.dpipwe.tas.gov.au (then follow links to Weeds Pests and Diseases, Animal Diseases) for more information on the disease and the Tasmanian Platypus Management Plan.

These protocols may need to be updated as further information on Mucormycosis becomes available.

LOCATIONS WHERE PLATYPUS MUCOR DISEASE HAS BEEN RECORDED



Cumulative evidence for ulcerated platypuses in Tasmanian river catchments from 1982 to 2007 (reproduced from Gust and Griffiths 2009).

*The cross indicates where the first ulcerated platypuses were discovered in 1982 on the Elizabeth River near Campbell Town. "**Infected catchments**" have had one or more ulcerated platypuses confirmed since 1982, and include (from west to east): 1. Black-Detention, 2. Emu, 3. Mersey, 4. Meander, 5 Tamar, 6. Brumbys-Lake, 7. Pipers, 8. North Esk, 9. Great Forester-Brid, 10. Macquarie and 11. South Esk. "**Potentially infected catchments**" contain unconfirmed public sightings of ulcerated animals and include: 12. Montagu, 13. Pieman, 14. Inglis, 15. Forth-Wilmot, 16. Upper Derwent, 17. Ouse, 18. Huon, 19. Lower Derwent, 20. Clyde, 21. Derwent Estuary-Bruny and 22. Musselroe-Ansons. "**No evidence of infection**" indicates catchments where public observations have only reported healthy platypuses, and there are no records of ulceration in either captured or dead animals.*

APPENDIX F:
DIDYMO ALGAL PEST

Didymosphenia geminata (Didymo) colonies at an early stage in the Mararoa River, New Zealand. Photo by Maurice Rodway, courtesy of NIWA, New Zealand.

Didymo on cobbles in the lower Waiau River, New Zealand. Photo by Environment Southland, courtesy of NIWA, New Zealand.

Didymo blooms can completely smother a stream or lake bed, adversely affecting water quality and fauna (including invertebrates and fish). The photo shows thick Didymo colonies in the lower Waiau River, New Zealand. Photo by Shirley Hayward, courtesy of NIWA, New Zealand.

Didymosphenia geminata (Didymo)

Didymo, also called rock snot, is a freshwater algae that is widespread in the northern hemisphere. It is highly invasive and is a declared List A pest under the *Plant Quarantine Act 1997*.

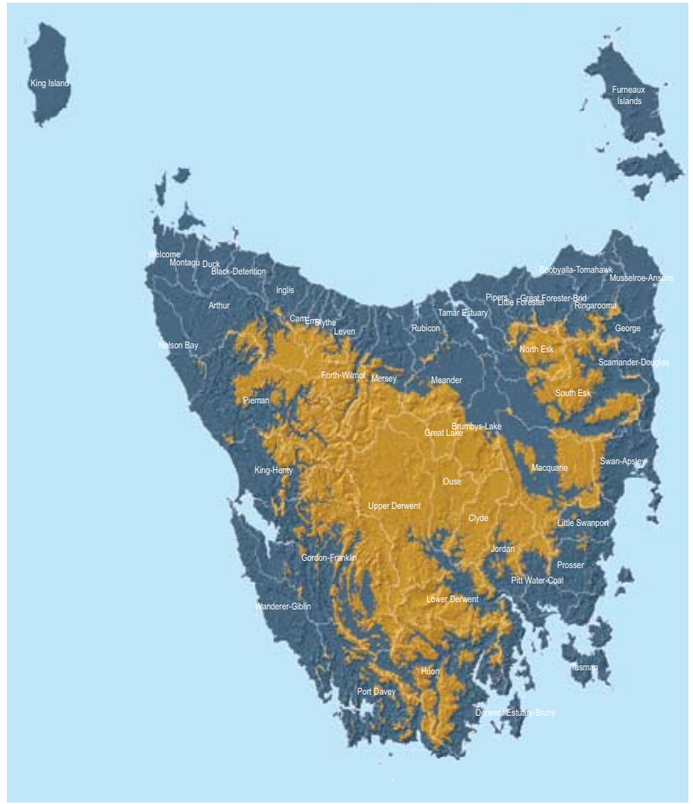
Intentionally bringing Didymo into Tasmania is prohibited. Its primary spread pathway is via contaminated aquatic and fishing equipment and other freshwater recreational equipment. Although no confirmed sightings have occurred in Tasmania, the threat is serious. It has recently invaded New Zealand's south island where it has had significant detrimental effects.

Didymo attaches to rocks and submerged plants and rapidly multiplies and spreads to form thick brown blooms that completely smother the stream or lake bed. Once established it is impossible to eradicate. Didymo blooms can adversely affect water quality, aquatic invertebrates and fish stocks and it is a hazard for hydroelectric generation, agricultural irrigations and recreational pursuits. It is also potentially devastating for platypus populations if it smothers their benthic feeding habitats.

Currently there is no 'cure' for Didymo; it takes only one cell in a single drop of water for the algae to spread between waterways. Preventing spread relies on freshwater users thoroughly cleaning and drying aquatic equipment between waterways.

Contact DPIPWE for advice, or see DPIPWE website - www.dpipwe.tas.gov.au (then follow the links to Weeds Pests and Diseases, Aquatic Pests and Diseases) for further information.

RISK MAP OF POTENTIAL DISTRIBUTION OF DIDYMO IN TASMANIA



Legend: Yellow = likely extent of Didymo; blue = very low risk of Didymo establishing.

The map shows the maximum likely extent of Didymo should it become established in Tasmania. The map is based on data from New Zealand where it has been determined that Didymo does not grow in waterways where the mean winter air temperature is above 5 °C. This modelling will be further refined in future to incorporate other environmental factors such as substrate characteristics and waterways with tannin rich waters.

This map file is available for download from the NRM South website - www.nrmsouth.org.au (then follow links to Information, Publications, Technical Sheets Manual & Reports, Freshwater & Rivers)

APPENDIX G:
HYGIENE ACTIONS REQUIRED FOR OTHER HIGH RISK ACTIVITIES

The following activities are high risk for the spread of aquatic pests and diseases.

While they are not addressed in this manual, basic information and contacts are provided.

ACTIVITY

Entering Tasmania with equipment (e.g. fishing gear, kayak, canoe, waders, boots, technical and diving equipment) that has been used in waterways interstate or overseas.

These are potential vectors for pests and diseases.

ACTION

Strict state quarantine regulations apply.

Refer to information on the DPIPWE website www.dpipwe.tas.gov.au (then follow the links to Quarantine, What You Can and Can't Bring into Tasmania and Check Clean Drain and Dry Checklist)

Contact: Quarantine Tasmania ph (03) 6233 3352 or freecall 1800 020 504

ACTIVITY

Bringing aquatic plants and animals into Tasmania from interstate or overseas.

Aquatic plants and animals are potential vectors for pests and diseases.

ACTION

This can only be done with a permit and strict state quarantine regulations apply.

Refer to information on the DPIPWE website www.dpipwe.tas.gov.au (then follow the links to Quarantine)

Contact: Quarantine Tasmania ph (03) 6233 3352 or freecall 1800 020 504

ACTIVITY

Moving aquatic organisms between waterways and waterbodies including macro-invertebrates (e.g. mudeyes/dragonfly larvae, frogs, platypus, fish, eels, aquatic plants).

Aquatic plants and animals are potential vectors for pests and diseases.

ACTION

As a general rule **avoid** transferring aquatic organisms between waterways and waterbodies. In certain circumstances it is illegal to do so without a permit.

Where aquatic animals are captured they should be returned to the place of capture.

Where translocation of aquatic plants or animals (e.g. fish, platypus or eels) is necessary for authorised research, production or management purposes, specialist advice must be sought and strict protocols applied. Translocation activities also involve the transfer/release of water, which will also need to be managed.

A permit is required to take and possess aquatic animals protected under the *Nature Conservation Act 2002, Inland Fisheries Act 1995* and the *Threatened Species Protection Act 1995*. This includes most vertebrate animals (e.g. frogs, fish, eels).

A permit is required to take any plant or animal into or out of land reserved under the *Nature Conservation Act 2002* (e.g. national parks, nature reserves, conservation areas, State reserves, game reserves) or crown reserves under the *Crown Lands Act 1976*.

Contact the Inland Fisheries Service on 1300 INFISH (1300 463 474) for advice on fish and eels.

Contact DPIPWE for advice on all other animals, threatened species and plants on reserved land (03) 6233 6556.

APPENDIX H:
CHARACTERISTICS OF PHYTOCLEAN AND F10 SC DISINFECTANTS

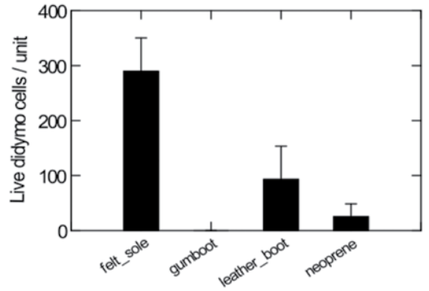
DISINFECTANT	Active ingredient	Indicative Price/litre (2010)	Availability	Irritation to skin/ throat/lungs
Phytoclean Australian Pesticides and Veterinary Medicines Authority (No 64562).	Benzalkonium chloride (BC) proprietary blend < 30% w/w (MSDS).	$193/20L or $1330/200L = $10/L or $7/L. @ 2% 1:50 dilution approx 17c/L. @ 10% 1:10 dilution approx 85c/L .	Serve-Ag 6181 Frankford Rd Bellfield via East Devonport ph (03) 6498 6800 . Manufacturer: Bold Scape Pty Ltd PO Box 499 Belgrave Vic 3160 ph 0412 885 556.	High risk. Wear rubber gloves and eye protection (MSDS).
F10 SC or **F10 Super Veterinary Disinfectant** Australian Pesticides and Veterinary Medicines Authority (No 54149).	Benzalkonium chloride (BC) (5.4% w/w or 54 g/L) and polyhexamethylene biguanide hydrochloride** (4gm/L or 0.4% w/w) (MSDS).	$1553/25L or $318/5L = $62/L or $64/L. @ 0.8% (8ml/L) 1:125 dilution approx 50c/L.	Chemical Solutions 13 Abelia St Doncaster East Vic 3109 ph (03) 8821 0025. Manufacturer: Health and Hygiene Pty Ltd South Africa.	Low risk (MSDS).

MSDS – Material Safety Data Sheet; LD50 – lethal dose required to kill 50% of a study population (does not account for any sub-lethal effects); VPC – Victorian Plantations Corporation (Australia); ETL – ETL Technology Ltd (England); MPS – Medical and Pharmaceutical Services (England)
** polyhexamethylene biguanide hydrochloride is currently under investigation for potential harm to human health
Refer to the Material Safety Data Sheets for more information on Phytoclean and F10 SC.

DISINFECTANT	Toxicity to organisms	Biodegradability (MSDS)	Physical properties	Dilution recommended in these protocols
Phytoclean Australian Pesticides and Veterinary Medicines Authority (No 64562).	Oral LD_{50} (rat) = 366 mg/kg (@ 80% active ingredient) (MSDS). Keep un-diluted disinfectant away from waterways. (MSDS). Concentrations of >5% BC can be harmful to the environment (Work Standards Australia).	Information not available. Phytoclean can be bound in some types of clay (anecdotal information from CSIRO).	Information on corrosiveness to metals, rubber is not available. Phytoclean foams when mixed with water and rinse off is often required.	Prior to disinfection, thoroughly clean surfaces of mud & disinfect in clear water. 2% (1:50 dilution) for **washdown**. 10% (1:10 dilution) for **wash baths** (e.g. boots, waders, nets). Maintain contact for 1 minute for non-absorbent materials. Maintain contact for 5 minutes and ideally up to 30 minutes for absorbent materials (leather boots, neoprene waders, gaiters, nets, ropes).
F10 SC or **F10 Super Veterinary Disinfectant** Australian Pesticides and Veterinary Medicines Authority (No 54149).	LD_{50} (mice) = 3000mg/kg (@ 1:20 dilution) & classified as not hazardous (ETL).	Biodegradable at 1:20 dilution (MPS).	Non corrosive to metals and rubber at 1:25 dilution (MPS). F10 does not foam when mixed with water and does not require rinse off. Can leave to air dry.	Prior to disinfection, thoroughly clean surfaces of mud & disinfect in clear water. 0.8% (1:125 dilution) for **washdown and wash baths**. Maintain contact for 1 minute for non-absorbent materials. When using wash baths or when disinfecting absorbent materials (e.g. leather boots, neoprene waders, gaiters, nets, ropes) soak for at least 5 minutes and ideally up to 30 minutes.

APPENDIX I:
FELT-SOLED BOOTS AND WADERS

In 2006 the National Institute for Water and Atmospheric Science (NIWA) in New Zealand conducted laboratory trials to compare the survival of Didymo cells on felt-soled waders, neoprene waders, gumboots and leather boot uppers. All were exposed to Didymo in an infested river for 5 minutes, returned to the lab 5 hours later, scrubbed, checked and left to dry for 36 hours at 5 – 17°C. After cell retrieval tests many live cells were found in all items except for gumboots. Felt-soled waders had significantly more cells than all other treatments. Further research would need to be undertaken to determine whether felt-soled waders can harness live cells of Phytophthora or Chytrid in the same way as for Didymo.



Laboratory trials comparing the survival of Didymo cells on felt-soled waders, gumboots, leather boot uppers and neoprene waders.

Avoid using felt-soled boots/waders wherever possible. This dense material holds moisture and live cells longer than other materials, which increases the risk of spread between waterways. It requires rigorous cleaning and long soaking times to completely disinfect. Spraying with, or immersing in disinfectant solution is not effective as it takes considerable time for disinfectant solution to saturate. It can also take several weeks to completely dry out.

CLEANING AND DRYING FELT-SOLED BOOTS AND WADERS

Where using felt-soled boots and waders is **absolutely** unavoidable:

- Ensure the entire item is soaked in disinfectant solution (spraying with disinfectant is inadequate) for at least 45 minutes. For greater effectiveness use hot water (maintained at 45°C or higher) in conjunction with disinfectant and soak for 45 minutes. This provides the best precautionary treatment.
- Do not rely on drying as a stand-alone treatment for decontamination. **After disinfecting**, complete dryness must be confirmed by feeling the felt pile at the base of the fibres. Once completely dry, the felt sole must remain dry for **at least another 48 hours** before use in a waterway.

APPENDIX J:
MOBILE WASHDOWN TRAILER SPECIFICATIONS

MOBILE WASHDOWN TRAILER

- Heavy-duty trailer with off road suspension and 15 or 16 inch wheels
- 600 litre poly water tank
- Storage box for accessories – see lists below
- 5 Hp (Honda Davey or similar) firefighting pump preferably with twin impeller
- Plumbing to enable filling from external water sources such as dams or rivers
- Suction hose complete with foot valve
- Diaphragm primer pump
- 25 metres of 25mm black anti-kink PVC fire hose fitted to a reel
- 25 mm adjustable fire nozzle
- 25 metres of lay flat fire hose
- 5.5 Hp – 15 CFM (cubic foot per minute) portable compressor air unit
- 30 metre retractable air hose line fitted with blow gun

CLEANING EQUIPMENT

- Long handle shovel
- Long handle scraper
- Crowbar
- Firm brush and shovel
- Detergent applicator
- Disinfectant – Phytoclean or F10 SC. Note: other disinfectants often used in vehicle wash down have not been tested against the pests and pathogens outlined in this manual.

PERSONAL PROTECTIVE EQUIPMENT

- Safety goggles or glasses
- Earmuffs or disposable ear plugs
- Gloves
- Overalls

ACCESSORIES

- Copy of the *Tasmanian Washdown Guidelines for Weed and Disease Control: Machinery, Vehicles and Equipment* (DPIPWE, Edition 1, 2004), available at DPIPWE website - www.dpipwe.tas.gov.au (then follow links to Weeds Pests and Diseases, Plant Diseases, Phytophthora, Phytophthora Publications, Washdown Procedures)
- Operating Instructions

Mobile washdown unit with high pressure pump, hose and compressed air unit. Photo courtesy of NRM South/Southern Tasmanian Councils Authority.

APPENDIX K:
PRE-FIELDWORK CHECKLIST

Consider the following questions before working in or adjacent to a waterway/wetland/ muddy/ swampy site. If you answer NO to any of these questions then your field trip has not been sufficiently well planned to consider hygiene issues and you are at risk of spreading pests and diseases.

	YES	NO
A. Have you planned your fieldwork and sites you will visit?	☐	☐
B. Have you planned the field equipment you will be using?	☐	☐
C. Do you have alternatives to felt-soled boots/waders? (gumboots and PVC waders are the best choice, followed by neoprene and then leather see Appendix I)	☐	☐
D. Have you determined if you will be undertaking high risk activities? (page 8).	☐	☐
E. Have you checked the hygiene requirements for your task? (vehicles and heavy machinery, boats and trailers, amphibian or platypus fieldwork, firefighting, road construction or maintenance, or moving gravel or soil between sites)	☐	☐
F. Have you consulted with your workplace and/or the relevant land manager to identify hygiene protocols that apply?	☐	☐
G. Have you planned your field schedule (e.g. pest-free, upstream sites first)?	☐	☐
H. Have you planned the field cleaning program, equipment, water requirements and where necessary potential field washdown sites?	☐	☐
I. If visiting multiple sites have you planned to disinfect all equipment between sites or do you have enough field equipment and clothing to have clean and dry sets for each new site?	☐	☐
J. Have you planned how you will dispose of any disinfectant cleaning water/waste?	☐	☐
K. Have you checked that all field equipment, footwear, clothing, vehicles, heavy machinery, boats and trailers are thoroughly clean and dry before leaving base?	☐	☐

APPENDIX L:
POST-FIELDWORK CHECKLIST

Consider the following questions when returning from the field. If you answer NO to any of these questions then sites visited on the next field trip may be at risk of contamination.

	YES	NO
A. Have all equipment and vehicles been thoroughly checked and cleaned (including with a disinfectant rinse – which is critical before going into high risk areas)?	☐	☐
B. Have all equipment and vehicles been placed in a protected area that allows thorough drying with adequate ventilation?	☐	☐
C. Have all equipment and vehicles been allowed to dry completely with an additional 48 hours of drying time before the commencement of the next field trip? (Equipment can be labelled to show time when drying commenced.)	☐	☐

ORGANISATIONS INVOLVED IN DEVELOPMENT OF THIS MANUAL

These hygiene protocols have been developed for the key organisations involved in water quality monitoring and/or related activities – including DPIPWE, Hydro Tasmania, Inland Fisheries Service, NRM regions, Forestry Tasmania, water authorities, councils, Irrigation Development Board – who are in the front line of the prevention, detection and management of aquatic pests and pathogens.

The manual was funded collaboratively by NRM South, Hydro Tasmania, NRM North and Cradle Coast NRM. Kaylene Allan (NRM South) was the principal author of this document with assistance from Simon Gartenstein (Hydro Tasmania). Many specialists provided valuable input and assistance to enable the production of this manual. In particular, the efforts of the following people who either provided support, reviewed and/or trialled the manual are greatly appreciated.

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Tim Farrell
Sarah Graham
Kevin McFarlane

James Cook University
Rebecca Webb
Lee Berger

NIWA (National Institute of Water & Atmospheric Research) – New Zealand
Cathy Kilroy
Karen Robinson

NRM South
Patrick Taylor
Graham Flower

NRM South/Southern Tasmanian Councils Authority
Sandy Leighton

Quarantine Tasmania
Sabatino Cesile

The following organisations have also provided information used in the development of this manual.

Australasian Fire Authorities Council - Victoria

Biosecurity New Zealand

Department of Environment and Conservation – Western Australia

Department of Sustainability and Environment - Victoria

Environment Protection Agency - Queensland

Melbourne Water

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NOTES

Check Clean Disinfect Dry