

Eradicating *Crassula helmsii* from Norfolk's ponds

What is *Crassula helmsii*?

Crassula helmsii, also known as New Zealand Pygmyweed or Australian Swamp Stonecrop, is an alien invasive aquatic plant that quickly colonises ponds, lakes, ditches and reed beds. It is a creeping succulent that forms dense mats, covering damp pond margins, extending to 3 m depth.

Crassula helmsii outcompetes native aquatic vegetation and is a potential threat to wider freshwater biodiversity. It spreads rapidly both within and between freshwater habitats and is now widespread in the UK.

Crassula helmsii was banned from sale in the UK in 2014, and it is illegal to cause it to grow in the wild.

Who is this leaflet for?

This leaflet is aimed at anyone who owns or can influence the management of a pond, including garden ponds, village ponds, ponds in the agricultural landscape and ponds on nature reserves.

Crassula helmsii is notoriously difficult to manage or eradicate, but recent experiences of the Norfolk Ponds Project show that it can be dealt with effectively and removed from ponds if the right approach is taken. This leaflet offers guidance on how to tackle small and large infestations in ponds.

Above: A village pond infested by *Crassula helmsii*

The Norfolk Ponds Project is a multi-partner organisation and we thank all partners for their contributions to this leaflet.

Identifying *Crassula helmsii*

Crassula helmsii is a small, bright-green, fleshy aquatic plant. It can grow on exposed pond margins or under water and can form dense mats. Its fragile stems can sometimes be pinkish and can stand erect or trail. Its leaves are narrow and cylindrical, from 3-15 mm long. These end in a point and are arranged in opposite pairs.

In summer, *Crassula helmsii* may sometimes produce tiny, pale-pink or white four-petalled flowers. The plant is perennial, evergreen and in winter it releases fragments that float on the water surface and which readily root wherever they settle.

An emergent mat of *Crassula helmsii*



Terrestrial *Crassula helmsii* growing amongst other vegetation at the edge of a pond



A dense, tangled mat that had been floating on the water surface with each stem around 30cm long.



Close up of of *Crassula helmsii* showing pairs of pointed leaves clasping cylindrical stems.



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Crassula helmsii lookalikes

Marsh bedstraw has whirls of leaves, not pairs.



Crassula helmsii is often confused with the native Water-starworts (*Callitriche* spp.), which can form similar low mats in shallow water. *Crassula helmsii* has thicker, cylindrical, distinctly succulent leaves that can create a tight, bright-green mat that can emerge above the water surface. By contrast, Water-starwort has softer, flat leaves that are paler on the underside, which broaden slightly towards the tip and usually show a tiny notch/indentation at the leaf tip. When compared side by side, *Crassula helmsii* appears more rigid and glossy, while Water-starwort looks finer, floppier and more translucent.

Crassula helmsii can also superficially resemble Marsh Bedstraw (*Galium palustre*), however if you feel the stem of Marsh bedstraw, it has four-angles. By contrast, *Crassula helmsii* has a round stem. Marsh bedstraw also has leaves in whorls of 3-6, rather than opposite pairs.

Noticing these subtle differences prevents accidental removal of native species.

TOP TIP: If you are unsure whether you have *Crassula helmsii* or another species then please email a photo to **admin@norfolkponds.org** or message us via social media.

Water-starwort has a flat or notched leaf tip rather than coming to a point.





Single strands of *Callitriche* sp. (left) and *Crassula helmsii* (right) demonstrating how similar they can appear.

Why is it difficult to eradicate *Crassula helmsii*?

A dense mat of Crassula helmsii



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Removing mud from around and beneath *Crassula helmsii*



A single node of *Crassula helmsii* is all it takes to start a new infestation

Crassula helmsii spreads to new areas by releasing stem fragments which float on the water surface. These fragments can be transferred to and carried on machinery, equipment, clothing or animals to quickly initiate a new infestation and facilitate spread.

Crassula helmsii grows best in sunny situations but will persist in shade and will even survive underground for years in the shade of trees. If shade is removed, it will typically reappear. It can tolerate significant drying out so a drought year does not kill it.

Crassula helmsii is often not completely killed by herbicides and will not usually be eradicated solely by this method, although there are examples where this has worked. If use of herbicides creates bare ground and the *Crassula helmsii* is not completely killed off, it will take advantage of the newly created bare mud and quickly re-colonise, so herbicide use can sometimes make matters worse.

When *Crassula helmsii* is being physically removed from a pond it is essential that the mud under the plant is also removed otherwise the plant will readily grow back. It is not deep rooted and removing 10 cm mud depth is usually adequate.

Preventing the spread of *Crassula helmsii*

Eradication of *Crassula helmsii* is extremely difficult, and strict biosecurity is needed to avoid spreading the plant to new locations, as a single stem node can start a new infestation. People, tools and machinery are the most likely mechanisms for moving *Crassula helmsii* from one site to another.

- Wear different footwear when working near *Crassula helmsii* and change before moving into an uncontaminated area.

- Use separate equipment designated for removing *Crassula helmsii*. This can be a pair of wellies or waders and a pair of waterproof gloves (drain or pond cleaning gloves are ideal). Use this equipment whenever you are near *Crassula helmsii* and a separate pair of wellies and gloves for other work. Always be conscious about the possibility of spreading fragments.

- Keep gloves, wellies and tools used for tackling *Crassula helmsii* away from any other items. Carry them in a bag to avoid dropping contaminated mud across other areas.

- Follow the Check-Clean-Dry code for cleaning tools:

  - **CHECK** your equipment and footwear, removing any mud and plant material at the site.

  - **CLEAN** kit thoroughly, ensuring water does not go to a land drain.

  - **DRY** equipment and PPE thoroughly before its next use.

- Machinery carries a high risk of spreading *Crassula helmsii* to other sites. Diggers must not be used at ponds with *Crassula helmsii* and then go straight to an uncontaminated wetland. After power washing, a digger could be used on a dry site or a building site to reduce the chance of a *Crassula helmsii* spread.



Volunteers demonstrating suitable clothing for tackling a *Crassula helmsii* infestation. Waders or wellies and waterproof gloves are ideal.



© Chloe Gordon

How to manage an infestation in a pond

SEARCH EVERYWHERE

1) **Search** to understand the locations and extent of the *Crassula helmsii* infestation. Work in a methodical and bio-secure way, in clean footwear. Do not stand on it. Use additional footwear when moving away from the *Crassula helmsii* infestation, to avoid walking it around the site.

2) **Label** – Mark any patches of *Crassula helmsii* with flags or canes tipped with white tape as you will need to return to the same spot to re-pick, often several times. Labelling points with a number is useful to communicate plans and progress between volunteer pickers. Note that vegetation changes over the growing season and can make the same area unrecognisable in a few weeks so marker flags are essential.

3) **Contain** the infestation. *Crassula helmsii* is transferred between water bodies by animals and people, so restrict access to the infested site using fencing and signage. Prevent within-site spread of viable *Crassula helmsii* fragments (which can occur during picking) using barriers made from brash bundles, or fine mesh (<1 mm) reaching the height of the high-water level, or made to float with pipe insulation at the top and weights at the bottom.

4) **Plan** to manage or ideally eradicate. It is easier and more effective to eradicate *Crassula helmsii* when a pond is dry, so establish if the pond/area you want to focus on is likely to dry by late summer-autumn. If you drain the area, it is vital that pumped water does not lead to a new infestation somewhere else. Drought years are ideal opportunities to tackle *Crassula helmsii* infestations. For planning support do contact Norfolk Ponds Project.

5) **Time** the main removal for the autumn to avoid amphibian and bird breeding season. Regular checks are most effective if they take place throughout the year to avoid disturbing protected species.



Searching for *Crassula helmsii* in ponds. If your site has sedges, use bamboo canes to move leaves aside when searching to avoid cuts.



Clear, durable, labelled markers help ensure that exactly the same area is rechecked over time. You may find it useful to record a GPS grid reference point or what3words location if possible and maintain a field notebook or digital log with photos after each visit.



Removing a large patch of *Crassula helmsii* while there is water in the pond will inevitably cause fragments to disperse. Floating booms and netting barriers can prevent fragments from spreading around the pond. Brash bundles (as in above photo) can be effective and much more wildlife friendly than netting but watch for changes in water level overtopping them and for wildlife making paths through them.

Removal methods

Remove by hand

Crassula helmsii can be eradicated from ponds by methodically digging it out by hand using a trowel or spade, with a pruning saw to cut through roots where needed. Removal by hand is selective and an excellent method of eradicating *Crassula helmsii* without damaging the biodiversity of a pond.

Physical removal by hand must be done meticulously and systematically over a time scale of years with many repeat visits. This method is time consuming but perfect for all small infestations and an essential step for all sites after any attempt at removal. Volunteer "pickers" need to be in for the long haul.

To successfully remove *Crassula helmsii*, start at the very edge of the infestation and don't move forward until every piece that you can reach has been dug out. Remove every single strand including the mud beneath the plant to make sure you remove the root. Check that no fragments are left behind before moving on. When water is still present, a fine mesh hand net or sieve can be used to catch any floating fragments detached during picking. Place the material into trugs or rubble sacks (depending on disposal method). Use barriers to partition your working area to avoid re-infestation of a cleared area. Visit a pond every 2-3 weeks to check for re-growth. Even after what looks like eradication (completely clear for 2 years) a pond should be visited at least once a year for 5 years to ensure full success.

Volunteers demonstrating how to find and remove every piece of *Crassula helmsii* by hand from a Great Crested Newt reserve. The search needs to be methodical and meticulously thorough, followed up by more searches every month with the aim of eradicating the infestation.





Small plants on soft mud and leaf litter are easily removed with a trowel.



Volunteers working methodically across a pond while it is dry.

To eradicate:

- Deep clean (initial removal);
- Hoover (look for regrowth every two or three weeks or at least monthly);
- Polish (when you think you've eradicated it, look again at least every spring and autumn, for at least the next 5 years to be sure you have achieved eradication).





Where the substrate is clay or solid mud and the *Crassula helmsii* is in a turf amongst grass or rushes, a spade or pruning saw are appropriate tools.



When the *Crassula helmsii* is growing in the middle of the pond, removal involves waders, a buoyancy aid, safety buddies, a pruning saw (to cut through roots and stems of infested vegetation), a hand net (for fragments) and a trug.



Try to reduce the amount of heavy lifting involved. Use wheels whenever possible to manoeuvre the contaminated mud/plant mix. Don't over-fill containers. Talk to volunteers and staff about manual handling to avoid injury.

Reducing seasonal fragment dispersal

Between November and March, *Crassula helmsii* sheds short sections to disperse. These float around on the surface all winter and can even raft in ice. They land at the pond edge and will start to grow around May. If you can clear your pond of plants before November, you will reduce the chance of spread by spring. If you are unable to clear an entire area, consider separating cleared areas using bunds, as mentioned above.



A fragment of crassula trapped in floating ice.

Disposing of removed material

Plant material and any soil contaminated with *Crassula helmsii* is classed as controlled waste and can only be transported offsite to facilitate eradication. It is ideal to move the material as little as possible, but some sites will be too wet to be able to manage it on site. In those cases, the material can be accumulated by placing it in biosecure containers such as rubble sacks with eventual removal to a dry location where it can be composted, buried or possibly burnt.

Composting

This requires a dry preferably shady location with little disturbance at least 5 metres away from the high-water level of the pond to avoid it re-entering. Composting is ideal for garden ponds or for minor infestations associated with farm ponds where there is no chance of the material being moved to a nearby wetland site. Avoid deer paths as their hooves can transfer plant fragments.



A small amount of contaminated material has been carefully placed within this dry, shady hedge. There are no apparent mechanisms for it being moved (such as deer paths) and no waterbodies nearby.

Burial

Accumulate material in a biosecure way by using rubble sacks or lidded buckets and bury at least a metre deep.



Volunteers transporting rubble sacks of contaminated material from a wetland site to a dry location to be buried.

Other removal methods

A combination of eradication methods and searches over multiple seasons are usually necessary.

Whatever eradication methods are attempted we recommend they are followed up by searches and hand removal to keep on top of any re-growth to prevent the plant recolonising.

Digger removal of large infestations

For heavily infested sites, removal by hand is unrealistic. Dredging with a digger can be effective but this method is only likely to work when used on a dry pond and can only be carried out in autumn and winter. Avoid damage to habitats of protected species. When digging, the digger driver needs to carefully scrape off the top 10 cm of mud containing the *Crassula helmsii* and its roots in a systematic way starting at one part of the pond and moving backwards.

Diggers are a major method of *Crassula helmsii* dispersal, as even if cleaned with a pressure washer before leaving site, it is extremely hard to ensure every node has been removed. Hence thorough subsequent digger cleaning followed by working on dry sites is essential following *Crassula helmsii* removal work.

Subsequent hand removal with follow up checks are essential with this method, and must be planned in to avoid wasted effort and expense.

Burial under soil or sand

For low biodiversity value sites or to protect a highly biodiverse landscape, the quickest, cheapest and most effective method to eradicate *Crassula helmsii* and prevent spread to nearby habitats is to bury the infestation under at least a metre of soil or sand. This could mean digging another pond (in a bio-secure manner) to replace the infested pond, with the new pond providing the infill material.



This mat of *Crassula helmsii* was completely filling a small artificial pond in an urban environment. There was no problem with making the decision to fill it in and turn it into a raised flower bed to avoid any risk of the plant spreading to a nearby marsh.

Burial under black plastic

For terrestrial or shallow water infestations where immediate control is desirable, but time or funding are lacking, *Crassula helmsii* can be covered with a suitable material such as black plastic. This must be left in place for as long as possible (at least two years) and checked regularly for growth beyond it. Use of black plastic needs to be followed up by hand picking.

This *Crassula helmsii* infestation was located on the shallow edge of a large lake. There was no time or money to remove the infestation so to avoid spread the area was contained with netting and covered in black plastic. The plastic was in place for a number of years and prevented spread.



Herbicide

This method can be time efficient and does not involve relocating the plant material. However, it can only be used on dry ponds, it kills all plant-life in the treated area (creating bare mud), and applications are likely to be needed over multiple years. Treated plants fragment more than untreated plants which can cause many new infestations, especially if bare mud has been created during the work. The treated area must be contained e.g. using mesh to restrict the movement of fragments. Checks and hand picking are essential follow up to herbicide use.



This mat of *Crassula helmsii* had been treated with herbicide on five occasions the previous summer. The following spring new shoots appeared all over the treated area.

How to report an infestation

It is useful to map the distribution and spread of non-native invasives. If you think you have *Crassula helmsii* in your pond, you should record it through iRecord **https://irecord.org.uk/enter-non-native-records**.

Urgent records of non-native invasives should be emailed to **alertnonnative@ceh.ac.uk.**



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Further information

This leaflet provides guidance to landowners on the identification and eradication of *Crassula helmsii*, however we encourage anyone who has further questions to contact us, or refer to further information on the following websites:

Norfolk Ponds Project: **https://norfolkponds.org/**

Norfolk Non-Native Species Initiative:
New Zealand pygmyweed / New Zealand Pygmyweed | Norfolk Non-native Species Initiative

GB Non-native Species Secretariat:
Information Portal » NNSS

iRecord:
https://irecord.org.uk/enter-non-native-records

RAPID 'Good Practice Management Guidance' document for New Zealand Pygmyweed by NNSS:
www.nonnativespecies.org/rapid



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