

SPECIES HANDBOOK

Tansy Beetle (*Chrysolinia graminis*)

Ecology, conservation, survey
and management



Conservation Status

ENDANGERED

- **Facing a high risk of extinction in the wild**
- **Dependent on Tansy for foraging and breeding**
- **Only three native sites remaining**

Chrysolina graminis, more commonly known as the Tansy beetle, is a chrysomelid leaf-beetle that predominantly feeds on the plant Tansy *Tanacetum vulgare*. The beetle is an iridescent green and around 10 mm long. Its elytra are pitted and have a coppery tinge.

The species' world distribution ranges from south-eastern Europe through to central Asia and China. Currently the only known British populations are along a 45 km stretch of the River Ouse in central Yorkshire, and at Woodwalton and Welney Fen, Cambridgeshire, where it was rediscovered in 2014 and 2019 after a 40 year absence of records.

Through more than 12 years of monitoring, both Tansy and beetle populations are steadily increasing. Awareness of the species has successfully meant new populations have been identified, and the beetle now has not only its own emoji, but also a giant mural in the centre of York!



Description

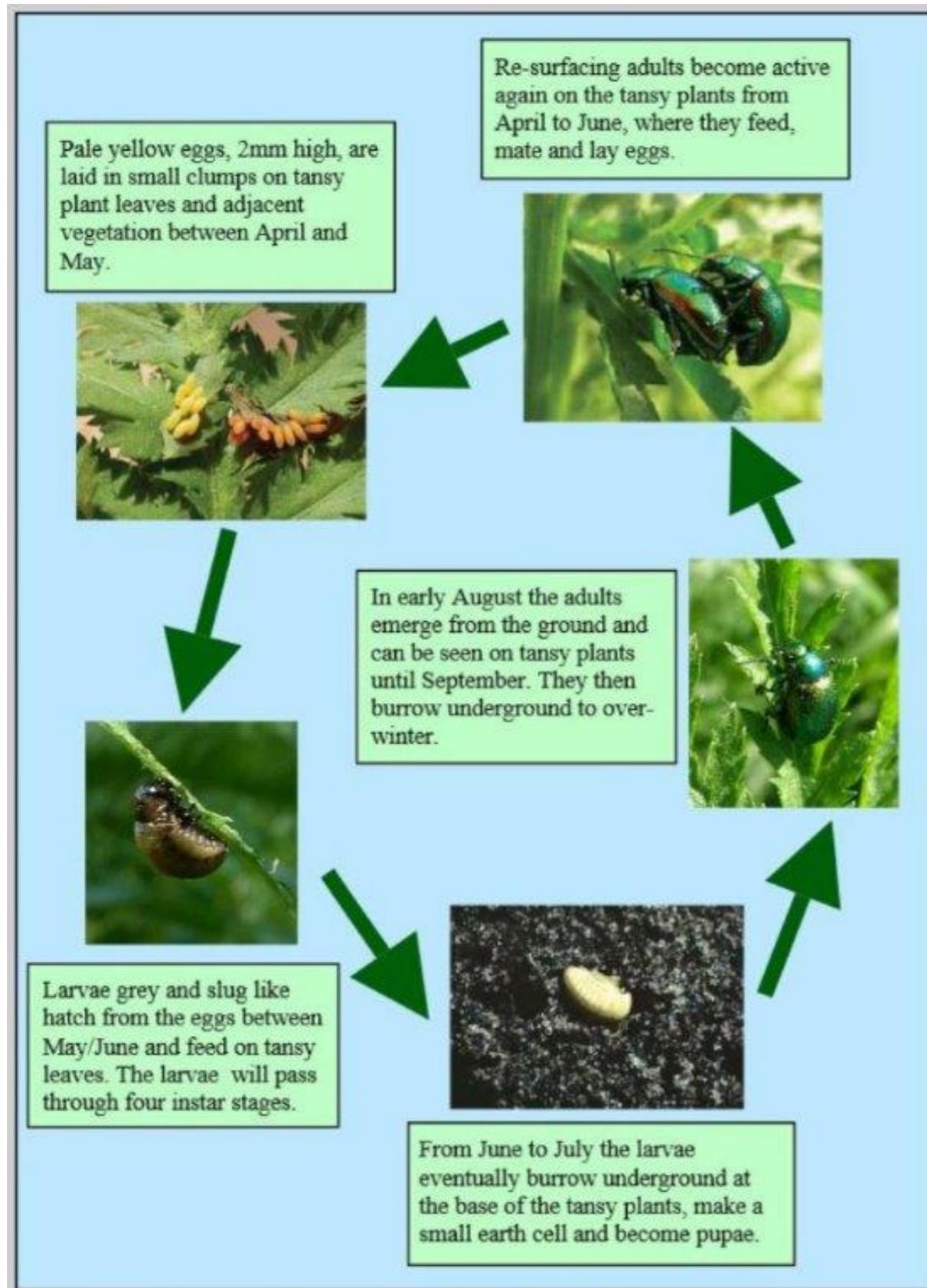
Chrysolina graminis, more commonly known as the Tansy beetle, is an iridescent green and around 10 mm long. Its elytra are pitted and have a coppery tinge.



Lifecycle

The Tansy Beetle has an annual life cycle with a peak mating period during the spring and continuing into early summer. Females lay numerous batches of 3 - 15 eggs on the under surface of Tansy leaves. Each yellow, rice-grain-shaped egg is 2 mm long and stands upright from the leaf's surface. High beetle density on Tansy plants induces some females to seek out other, non-food plants on which to lay their eggs. This strategy acts to decrease the chance of their eggs being cannibalised by other adults but it may lead to an increase in larval mortality, while they locate Tansy to commence feeding (Chapman et al., 2006).

Lifecycle (continued)



After hatching, the newly emerged, grey larvae pass through four instars before burrowing into the soil at the base of the Tansy clump during July. Once underground the larvae metamorphose into pale yellow pupae. The new generation of adults emerges from the soil around a month later and begin feeding. Most of the previous generation's adults die before the new generation emerges (Oxford *et al.*, 2003). By late September and into early October the new adult beetles return to the soil to overwinter. They do not emerge again until spring when, the cycle completed, they begin mating and egg-laying again (Oxford *et al.*, 2003).

Habitat

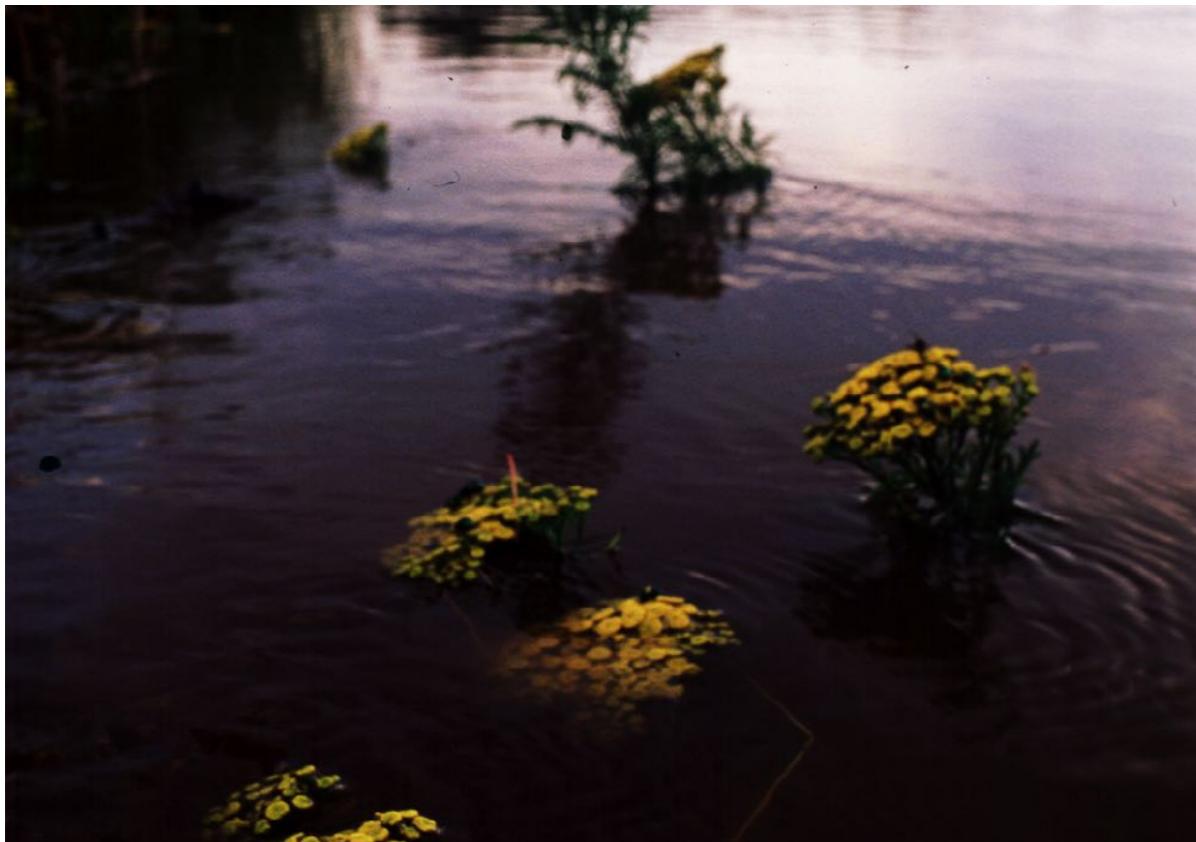
Tansy is an ephemeral plant which grows on disturbed ground, so a particular tansy patch may not be present in a habitat for very long (Oxford et al., 2003). The stronghold population of Tansy beetles along the Ouse is split into smaller sub-populations; a result of the clumped nature of their food plant. As mentioned earlier, these patches of Tansy are made more sporadic by shading from large willow trees and competition from the invasive non-native plant Himalayan balsam *Impatiens glandulifera*. More generally, Tansy occurs in damp environments such as marshland and at the margins of rivers and ponds, but also on roadside verges. It is a widespread plant in the British Isles (BSBI, 2016) but often occurs in small, isolated patches, which are unsuitable for sustaining beetle populations in the long term. The presence of the beetle on the Ouse is likely to be a result of abundant tansy, distributed along many stretches in large and adjacent clumps. It is likely that grazing is an important tool in maintaining the heterogeneous vegetation mosaics favourable to Tansy, and may be a means of controlling Himalayan balsam on some sites. Fine-scale habitat preferences of the Tansy beetle are not currently fully understood (Oxford et al. 2003).

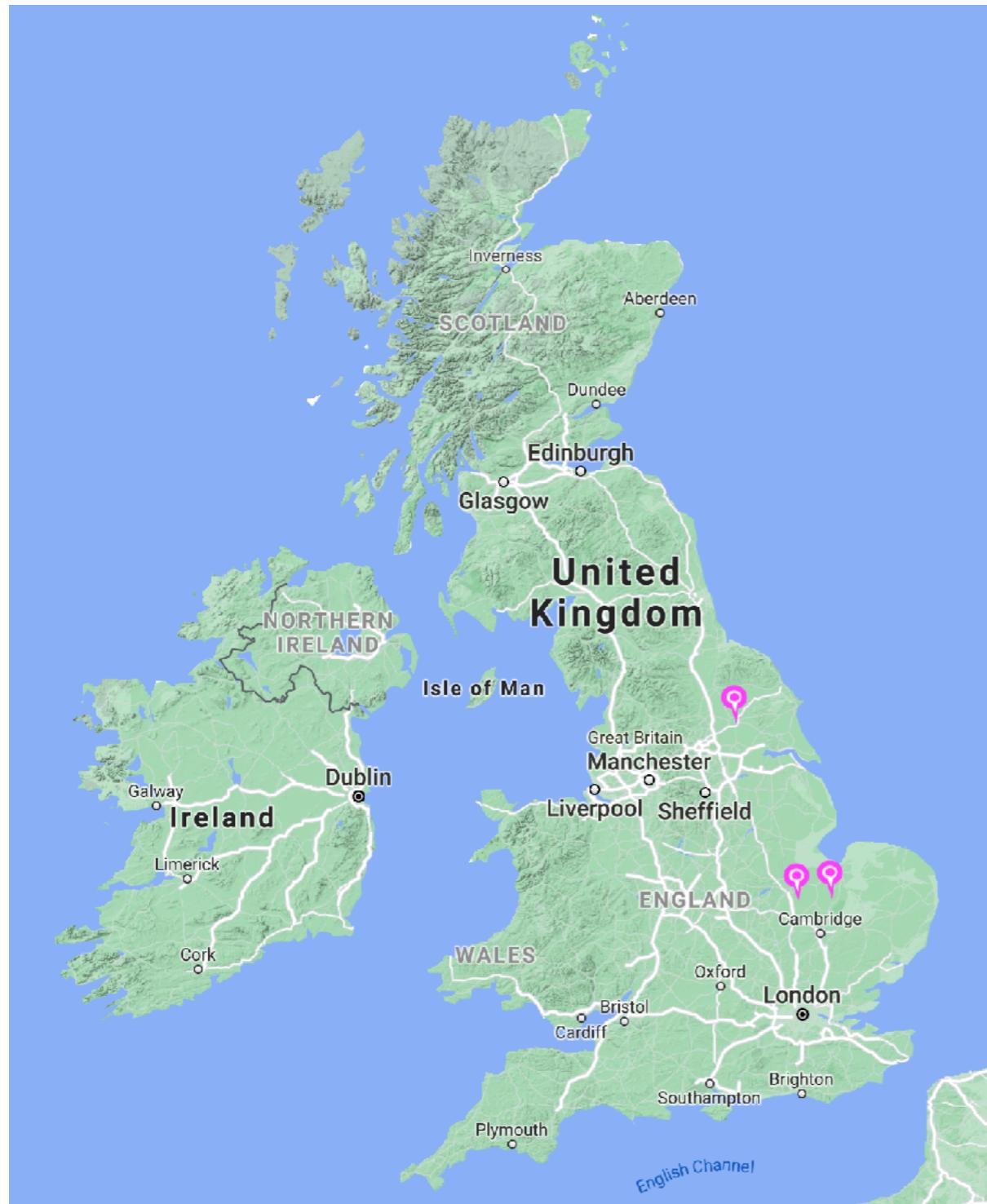
In the Fens the beetles occur on a very different vegetation type compared to the York population and at its only currently known site at, Woodwalton and Welney Fen, it is found along ditch edges. These are dominated by Common Reed *Phragmites australis* but include a mix of, often scattered, food plants - Gypsywort *Lycopus europaeus* and Water Mint *Mentha aquatica*. With rotational management practiced on site, there is a need to maintain appropriate habitat structure and connectivity.



Habitat (continued)

One obvious difference, other than food plants, between the York and Fen habitats is that the River Ouse floods every winter (Oxford et al., 2003). Tansy beetles demonstrate a high winter survival rate (Oxford et al., 2003; Oxford and Millington, 2013). It has been suggested that winter flooding may reduce the impact of predation on the beetle. For example, adults in the soil might suffer reduced mortality from moles, and in the summer larvae and eggs on plants could be exposed to reduced mortality from ants, which are less successful in damp environments (Oxford et al., 2003); however all these hypotheses need further research.





Distribution

Annual surveys along the Ouse, begun in 2009 and continuing to the present day, have provided insights into the current distribution and demography of both the Tansy beetle and its food plant. Surveys completed from 2014 onwards covered a 46.8 km stretch of the river, from Linton Lock in the north to Selby in the south (Oxford, 2015). In 2014 the Linton Lock to Nun Monkton west bank site, which had lost beetles in previous summer flooding, received wild-collected and captive-bred beetles which were successfully re-established.

Overall, there has been a continuing increase in the numbers of beetles, numbers of Tansy plants, and the numbers of Tansy plants occupied by beetles from 2014 to 2016. The geographical range of the beetle doesn't seem to have changed significantly in this time.

In the Fens a monitoring protocol has been established and during 2016 this has been implemented by Tom Bowers (Natural England) approximately weekly within the known beetle 'hot-spot'. A maximum of three individuals was recorded on any one occasion. Previous *ad hoc* surveys at Woodwalton Fen have only recorded a maximum of 8/9 beetles, whereas at Welney this has been as high as 114. A notice to the general public on Woodwalton Fen has resulted in a small number of additional localised records. It is not known how the numbers of beetle sighted relates to the true population size on the Fens.



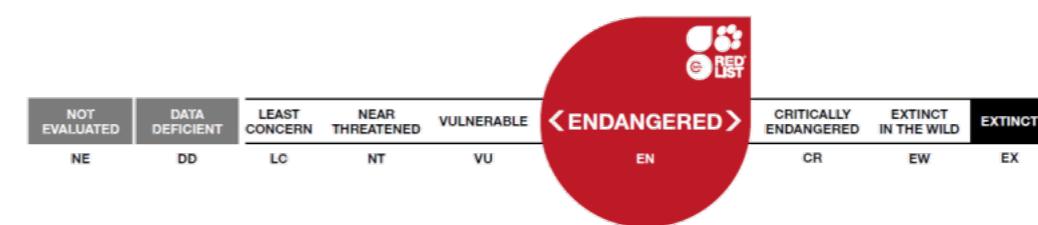
Status

With only two UK populations remaining the Tansy beetle was categorised as Endangered using the IUCN Red List criteria in the recent UK species status review (Hubble, 2014).

Endangered, meaning it is facing a high risk of extinction in the wild.

Protection under the law

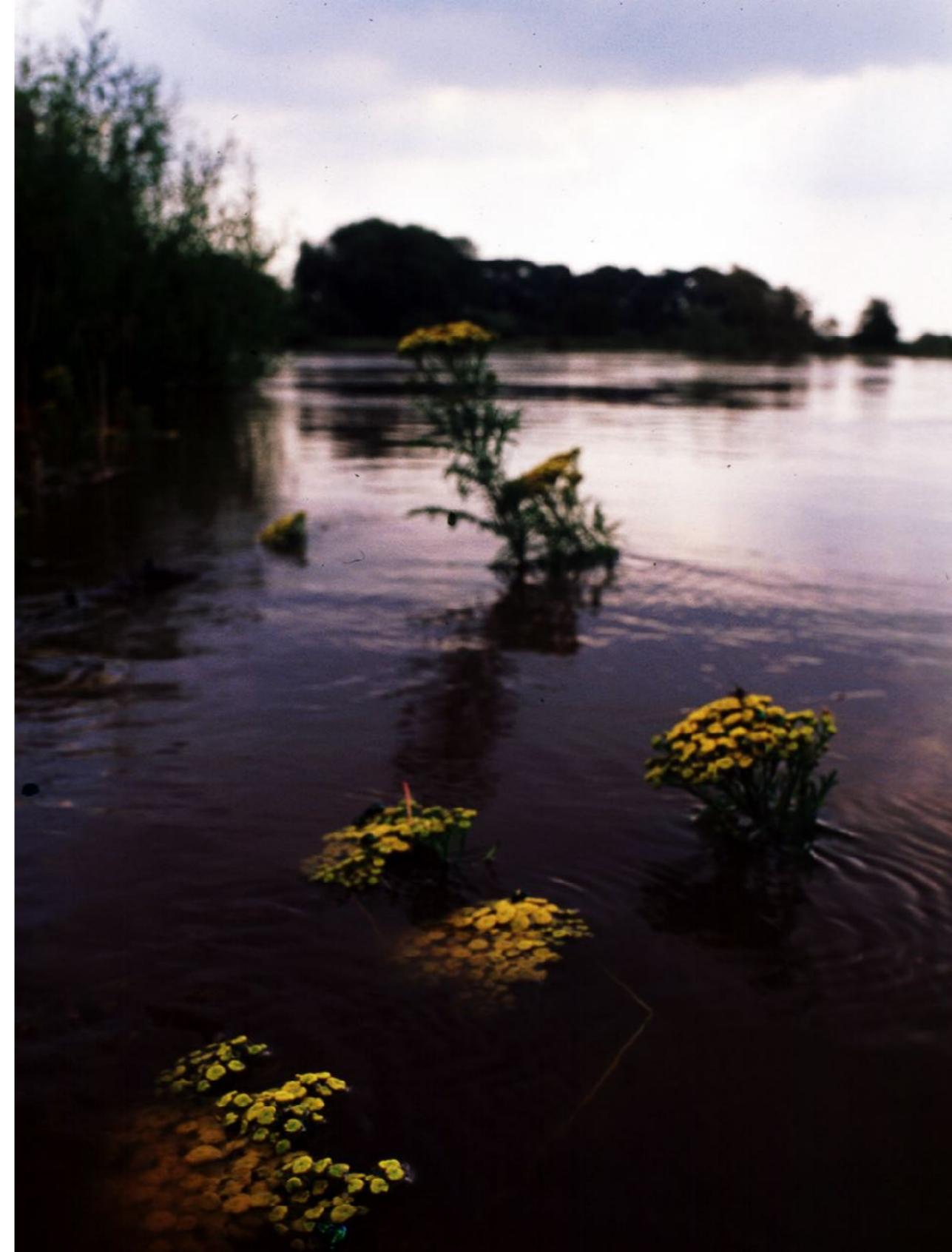
Tansy Beetle is listed as "a Species of Principal Importance" under Section 41 of the NERC Act (2006) and is included on the UK BAP list of Priority Species (2007).



Reasons for decline

Historically the Tansy beetle may have been more widespread in Britain and it is not clear what factors have led to its decline, especially in the East Anglian Fens. The beetle's food plants - Tansy, Water Mint and Gypsywort - are widespread across the British Isles (Oxford et al., 2003) although, as intimated above, local quantity and distribution are both critical for the long-term survival of beetle populations. Flooding can eliminate large sub-populations; evidence suggests that summer flooding has the greatest impact. With only one known stronghold population in Britain, it would take just one year of extreme summer flooding to jeopardise the whole population along the River Ouse. During summer floods, larvae sink and drown when knocked off plants (Oxford et al., 2003; Oxford and Millington, 2013) and eggs also die after a few days inundation. Adults do not seem to suffer as much mortality, as they either float away (buoyed by air trapped under their elytra), climb to higher ground or even enter the soil by climbing down submerged stems (Chapman 2006, as cited in Oxford and Millington, 2013).

On the River Ouse a number of other threats directly impact Tansy and lead to the removal of the food plant on which the beetles rely. These include overgrazing by livestock, particularly cattle, which results in the further isolation of Tansy patches. In addition, the invasive plant species Himalayan balsam outcompetes Tansy and willows shade out clumps. It is also the case that some landowners actively remove Tansy plants, mistaking them for Ragwort.



Reasons for decline (continued)

Eutrophication is likely to be significant as it leads to the decline of Tansy and the replacement of heterogeneous vegetation mosaics with highly competitive nitrophilous plant communities. There is a general increase in nutrient loading in the Ouse floodplain as historic botanical data indicates the loss of many smaller, poorly competitive plants during the past 100 years. There are localised nutrient issues, for example on the Ings Dyke and Blue Beck at Clifton, and deposition of ditch slubbings along the banks has resulted in the loss of a significant Tansy beetle populations as nettle-bed vegetation has encroached. This also reflects the high nutrient inputs into these watercourses from urban surface water run-off.

Another threat is development and some land management by public authorities (Environment Agency, City of York Council, North Yorkshire County Council, district councils, Internal Drainage Boards) when exercising their duties, as well as private development (which is regulated by the City of York Council). Some recent works, such as regrading of the river bank along the Esplanade in York, has had a significant impact on Tansy beetle habitat and the upgrading of the Clifton Washland defences has the potential to affect the Rawcliffe Meadows population. Tansy beetle populations need to be protected during operations and any unavoidable impacts fully mitigated.



Reasons for decline (continued)

Small Tansy patches cannot sustain beetle populations in the long term unless they form part of a landscape-scale mosaic of adjacent clumps. Beetles mainly disperse by walking but clumps more than 150 to 200 m away are not accessible. Therefore, if clumps are reduced in size or further isolated as a result of overgrazing or flooding the metapopulation structure of the beetle breaks down. Longer distance dispersal by flight is a possibility but is thought to be relatively rare. These threats, specifically flooding and overgrazing, put the remaining patches of Tansy and beetle populations at risk. To make long term populations sustainable, there is a need to increase the connectivity between Tansy patches along certain stretches of the Ouse.

Specific site impacts and threats at Woodwalton and Welney Fen are still unclear, it is likely that historical changes in management have influenced beetle numbers and distribution.



SURVEY

Habitat

In York, Tansy occurs in distinct clumps along the River Ouse and riverbank surveys occur yearly along the 45km stretch of river. This is divided into 30 transects that are surveyed by around 30 volunteers each year.

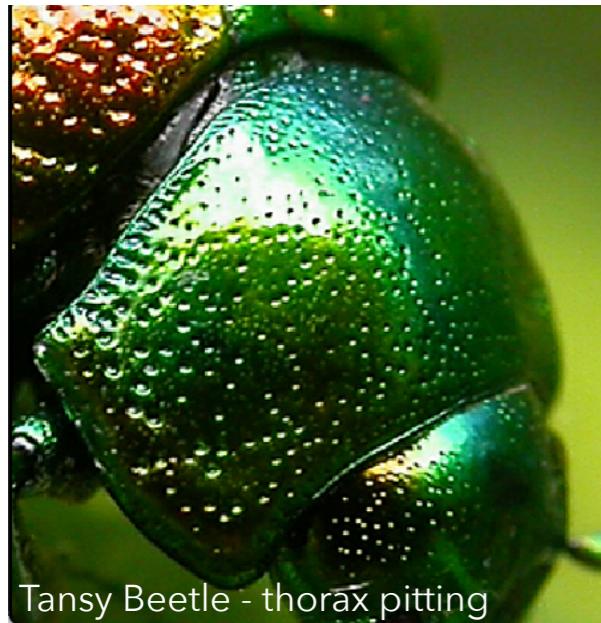
In the Fens annual fixed transects are in operation at both Woodwalton and Welney Fen, providing a proxy for the wider populations present.

What to look for

The beetles are highly distinctive, large bright green leaf beetles with a coppery sheen and in York are found on Tansy in good weather on both leaves and flower-heads. Note that in the Fens they feed on other foodplants including Water Mint and Gypsywort.

When to survey

The best time of year to survey is August to September each year.



Tansy Beetle - thorax pitting



Mint Beetle - thorax pitting

SURVEY

What to record

- Location (grid reference or GPS if possible) of Tansy clump
- Beetle presence or absence
- Number of beetles seen
- Land management method: sheep / cattle grazing, mowing, arable, no management etc

Confusable Species

In York, the only confusable beetle species is the Dock beetle but this species is significantly smaller than the Tansy beetle. In the Fens the mint beetle is present and so it is possible to confuse the two.



MANAGEMENT

Managing around the beetle's life cycle

When planning riverbank management it is important to consider any work in conjunction with the beetle's life cycle. The beetle is particularly vulnerable during the reproductive phase of its life cycle i.e. between March-September. Cutting and other operations that remove Tansy plants should be avoided during this time.

Grazing

For areas of high grazing where clumps of Tansy are being eaten, stock-proof enclosures containing Tansy plants have worked well, and this has been evidenced at both Riccall and Beningbrough Hall. Enclosures are areas protected with normal wooden fencing and about 6 x 5 m in area. They create a non-grazed area either around extensive, existing Tansy clumps (if feasible) or built in an appropriate site where Tansy can be planted within.

- Enclosures are best constructed using post and 2 or 3 rail fencing, which is resistant to cattle but still permeable to floodwater. A barbed wire strand around the top deters cattle reaching over.



Tansy Beetle eggs showing colour variation



Tansy Beetle larva



Tansy Beetle enclosure



Himalayan balsam *Impatiens glandulifera*

Grazing (continued)

- A design that is flooding friendly is best in order to channel the water around the enclosure. In exposed locations, enclosures should run to a point at the upstream end to reduce resistance to flood debris. If they are situated within 7 metres of the bank top, a 'works in rivers' consent may be required from the Environment Agency.
- Enclosures need annual inspection/repair, particularly after flooding, to maintain their integrity.

Cutting

Sections of riverbank containing Tansy may need to be cut to allow access and to generally manage plant growth. It is often used to control problem plants e.g. thistles. For example, topping can stop the seeding of thistles. When plant growth is vigorous and thistles and nettles are prolific, cutting and removal of all plant material once a year (at a time not affecting the beetle's lifecycle) is recommended to reduce nutrients.

Management of riverbanks by mowing should ideally be done during the beetle's overwintering period, October-February. If vital, cutting could be done in late June to mid-July (during the pupation period), but avoiding larger Tansy patches. Marking of Tansy clumps with flags or canes, and avoiding them during cutting, can also allow flexibility around timing and frequency of management.

Management of competitive plants, including Himalayan Balsam and Willow, should be undertaken where possible. Willow, although, not invasive, dominates riverbanks and Tansy plants are unable to grow under heavy shade.



Cutting (continued)

Himalayan Balsam is very prevalent on the Ouse and easily outcompetes Tansy. The use of chemical control should be avoided near to the river but this species can be strimmed or pulled (to prevent encroachment on Tansy), or will be grazed by cattle. When planting Tansy for the beetle, it is best to avoid in areas where Himalayan balsam is highly dominant, unless there are resources available to allow annual control. The Tansy beetle monitoring scheme also provides data to the Environment Agency to help support control of Himalayan balsam and other invasive plant species.

Willow has many benefits for wildlife and helps to prevent bank erosion, but they do spread along the riverbank creating long stretches where Tansy is unable to grow. However, Willows can be cut back and their spread managed. This can be done strategically to increase the size of certain Tansy patches. When considering whether to remove willows entirely, the bank erosion protection created by the trees needs to be considered.

Plant Confusion

Sometimes Tansy can be confused with other plants, particularly Ragwort which is often controlled, and so Tansy can be removed by mistake. Tansy is a perennial with button-like flowers that mature in July to October. It has dissected leaves with finely toothed leaflets and a strong aromatic scent when crushed. In comparison, Ragwort has deeply divided leave with daisy-like flowers. Double-check plant identification before uprooting or cutting them.



Planting & Seeding

Where long stretches of riverbank are devoid of Tansy, and grazing is light or absent, using plug-planting or seeding on prepared areas of bare ground can be used to fill in gaps. In wider bank reseeding schemes, Tansy should be included in the seed mix. This should be done with material of local provenance, as Tansy sourced from different locations can vary in chemotypes and may not be suitable for Tansy beetles. You can collect your own seeds or split Tansy clumps from the riverbank; local sources for York-derived seeds and plants are available at Miresbeck Nursery www.miresbeck.co.uk and Brunswick Organic Nursery www.brunswickyork.org.uk.

The best time to collect seed is in early October, once the beetles are hibernating and the seed heads are ripe. Collect a few flower heads (don't collect all flower heads - leave some for natural re-seeding) and store in paper bags/envelopes (not plastic as the seeds will rot). Keep them somewhere warm and dry overwinter. The seeds will fall out of the flower heads into the bag and will be ready to use early next year. Seeds should be sown densely (germination rates are not high) on raked bare ground, where competition with strong species such as Himalayan Balsam and thistles is unlikely.

The best time to establish plug-plants is also early in the year. Make sure that the Tansy plants have a good root system and plant in clumps of about 10 plants with at least 50cm between each plant. Clumps should be 50 m or less apart. Existing Tansy clumps on the riverbank can be split to yield mature plants. Take only a few plants from large clumps (2 m² or larger) or move single, existing plants to make bigger clumps and fill in gaps. If you do not own the land being managed, make sure you have landowner permission and avoid planting into areas that are prone to summer flooding - which kills larvae and eggs.



OUR WORK

- **Annual monitoring of the York site**
- **Liaise with land managers to improve management for the species**

SUCCESS

- **12 years of data collection in York**
- **Increases in Tansy along the River Ouse**
- **Steady long-term increase in the beetle population**
- **Own Emoji and Giant Mural!!!**

Our Work

The Species Recovery Trust co-lead the annual Tansy beetle survey in the conjunction with the Tansy Beetle Action Group. This survey sees around 30 volunteers surveying approximately 45km of riverbank in and around York every year. SRT are also working with land managers including the Environment Agency, Natural England, the National Trust, City of York Council, Parish Councils and farmers to understand beetle numbers and change; improve their management of the riverbanks for the beetle and wider wildlife, as well reduce threats and increase the occurrence of Tansy.

Successes

This project has allowed over 12 years of data collection in York providing an invaluable research resource and evidence-base for riverbank management. New recording schemes have also been established at the Fen sites.

Over the last 12 years, there has been an increase in Tansy size and distribution along the river Ouse. Despite fluctuations in numbers, the recording scheme has seen a steady long-term increase in beetle numbers, with total beetle numbers no longer dropping below 1000. In 2020, the number of beetles experienced a drop in numbers by half, however over 6000 beetles were still recorded.

Increased awareness of the beetle both nationally and locally has seen new sites identified, where people have thought to check for it. The beetle even has its own emoji, and nearly everyone you meet in York knows what a Tansy beetle is and there is now a giant mural at the heart of the city.

The Species Recovery Trust is a charity set up to tackle the loss of some of the rarest species in the UK.

There are over nine hundred native species in the UK that are classed as under threat, with several hundreds more currently widespread but known to be in significant decline. The countryside is now bereft of many species that were a familiar sight a mere generation ago.

A small number of these species are on the absolute brink of existence, poised to become extinct in our lifetimes; our goal is to stop them vanishing.

Our aim is to remove 50 species from the edge of extinction in the UK by the year 2050. In addition we are reconnecting people with wildlife and the natural world through training programmes and awareness raising.





the species recovery trust

www.speciesrecoverytrust.org.uk
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