IMPORTANT INVERTEBRATE AREA PROFILE

Malham Tarn

Left: Malham Tarn © Jamie Robins. Right: Malham Sedge (*Agrypnetes crassicornis*) © Sharon Flint

The Malham Tarn Important Invertebrate Area (IIA) is centred on Malham Tarn in the Yorkshire Dales. It encompasses the open water of the tarn, the outflow, and the adjacent land, particularly Tarn Moss, an area of raised bog and fen at the mouth of the streams entering the tarn on its western shore.

Malham Tarn is a 60 hectare glacial marl lake which lies at an altitude of 377 metres above sea level. It is one of only eight upland alkaline lakes in Europe. The lake has a relatively small catchment and the outflow stream at the south of the lake goes underground, through the underlying limestone, approximately 500 metres after leaving the lake. It re-emerges at Aire Head Springs, where the River Aire rises.

The catchment of Malham Tarn extends for around 600 hectares to the north west of the lake. The inflowing stream in the north west corner of the lake flows through an area of wet woodland, fen and Tarn Moss, a raised bog.

Malham Tarn and Tarn Moss are a National Nature Reserve (NNR) and are designated as a Ramsar Site. The IIA is also within the Craven Limestone Complex Special Area of Conservation (SAC) and Malham - Arncliffe Site of Special Scientific Interest (SSSI).

The IIA supports a population of the Critically Endangered and Nationally Rare Malham Sedge (*Agrypnetes crassicornis*), a caddisfly found only at this site in the UK. The larvae of this species live in offshore beds of *Chara*, while the adult is flightless and shelters under stones on the north shore.

The IIA also supports a population of the globally Endangered White-clawed Crayfish (*Austropotamobius pallipes*).

The White-clawed Crayfish has declined rapidly across its range over the last 30 years, due to habitat loss, pollution and crayfish plague. Competition from invasive crayfish species such as the North American Signal Crayfish (*Pacifastacus leniusculus*) has also contributed to population fragmentation and decline. As a result many populations of White-clawed Crayfish have been lost in England and Wales. As our only native crayfish and our largest freshwater invertebrate, the White-clawed Crayfish spends much of its time in clean, calcium-rich, well oxygenated shallow waters and are known to benefit from overhanging vegetation, keeping them cool and hidden from predators.

However, White-clawed Crayfish populations in Malham Tarn remain low. It has been suggested that this may be a result of the population's isolation, coupled with historic poor water quality, leading to a previous dramatic decline in numbers and reduced genetic diversity, which has prevented the population from recovering.

Reasons for Selection

The Malham Tarn IIA supports a nationally and internationally important population of the Critically Endangered Malham Sedge, one of Britain's most endangered caddisfly species. Associated exclusively with marl lakes, this species is rare throughout Europe making the UK population particularly important in a global context. The IIA also supports a population of the globally Endangered White-clawed Crayfish. One of Britain's largest freshwater invertebrates, reliant on clean small streams of less than one metre in depth, this species has declined by more than 70% over the last 50 years, leaving its population small and highly fragmented.

White-clawed Crayfish (*Austropotamobius pallipes*) © John Mason

Threats and Opportunities

Lakes

Threats

- Water pollution and nutrient enrichment from agricultural run-off, sewage discharges and other sources can directly kill invertebrates and change the vegetation and structural composition of lakes. Historically septic tank discharges impacted water quality in Malham Tarn, but this has now been resolved and the water quality has improved.
- Excessive water abstraction in the catchment can change hydrological regimes and water tables, removing and modifying available habitat.
- Changes to the hydrology, either lowering or raising the water level can lead to changes in the invertebrate community. Repeated drawdown of the water level is particularly damaging as it causes compaction and drying of the substrate.
- Activities such as ploughing and peat cutting can increase soil erosion within the catchment and increase water-borne sediments in lakes. Excessive sediment loading can contribute to invertebrate decline in various ways.
- Fish introduced for angling can have an adverse effect on lake ecosystems by eating the invertebrates that graze algae and keep it in check, encouraging algal blooms.
- Water-borne traffic can damage aquatic plants at the point of launch, or through bankside wave erosion, passage through strands of vegetation, or the cutting action of propellers.
- Dogs and horses entering the water disturb the substrate, creating cloudy water and potentially polluting the water with veterinary medicines such as flea treatment.
- Invasive non-native species (such as the North American Signal Crayfish) can disrupt the ecological balance of water bodies, eliminating native species.
- Dosing of livestock with broad-spectrum de-wormers is damaging to aquatic invertebrate development and alternative treatments should be used wherever possible.

Opportunities

- Discharges of effluent from septic tanks and other point sources of pollution should be strictly controlled.

- Work with neighbouring landowners to reduce nutrient inputs and maintain the quality of water entering lakes. Additionally, local water companies should be made aware of the sensitivity of lakes to changes in water abstraction patterns or groundwater quality.
- Introduce more sympathetic management practices for invertebrates when reviewing catchment management plans, such as buffer strips to capture run off from fields and riparian planting to shade and cool watercourses.
- Keep livestock and vehicles from entering the waterbody as this compacts the bed and can also increases bank erosion and nutrient concentrations, as livestock enter the lake and defecate directly into the water.
- Establish buffers around lakes to maintain or improve water quality by trapping and removing various non-point source pollutants.
- Avoid over-stocking lakes with fish.
- Minimise disturbance from recreational use.
- Control or remove invasive species.
- Where alternatives to broad-spectrum de-wormers cannot be taken, dosing livestock off-site and keeping them out of the catchment for at least 10 days after treatment will reduce the impact of worming treatments on aquatic invertebrates.
- Cleaning and disinfecting waterproof clothing, fishing tackle and water-sports equipment, to prevent the spread of non-native aquatic species and diseases they may carry. Guidance can be found on the Check-Clean-Dry Website.

Running water

Threats

- Water pollution and nutrient enrichment from agricultural run-off (e.g. artificial or natural fertilisers, worm treatments), sewage discharges or chemical water treatment can alter the community composition and disrupt the lives of aquatic and semi-aquatic invertebrates.
- Engineering activities such as flood alleviation schemes, straightening of watercourses, dredging and water storage have modified flows in some rivers and streams, lowered water tables and removed available habitat. This is particularly exacerbated when there and incidents of sediment flushing down the water course.
- The introduction and spread of invasive non-native crayfish species, such as the North American Signal Crayfish has led to White-clawed Crayfish being aggressively out-competed for food and habitat.
- Disease, such as crayfish plague, spread on clothing, equipment and vehicles is one of the causes of the White-clawed Crayfish decline.
- Exploitation of populations as a result of illegal White-clawed Crayfish fishing.
- Barriers such as weirs and dams disrupt natural flow processes and prevent salmonid fish from moving freely. Walls and piling prevent the watercourse from spreading onto its floodplain, replenishing wetlands and creating damp habitats.
- Removal of riparian vegetation, particularly trees can result in increased water temperatures which affect cold-loving species. Conversely, excessive scrub encroachment on the channel through the lack of grazing or woodland management can lead to overshading and impact on the dispersal abilities of flying species to adjacent sites.
- Activities such as ploughing can increase sediment run-off into streams and rivers, which can contribute to invertebrate declines in various ways e.g. clogging of gills, changes in habitat and prey availability, oxygen and light levels.
- Non-native species such as Himalayan Balsam and Japanese Knotweed can be a particular problem to rivers and their associated wetlands, crowding out native plant species and habitats. Similarly, the presence of American Signal Crayfish can result in increased bank erosion and sediment movement.
- Low flows due to drought and abstraction can result in sedimentation and deterioration of river habitats.

Malham Tarn dam © Jamie Robins

Least Minor (*Photedes captiuncula*) © Robert Petley-Jones CC BY-NC via iRecord

- Residues of toxic chemicals from flea treatments can occur in freshwater due to sewer network discharges and dogs entering the water. These chemicals have the potential to affect the reproduction and growth of aquatic invertebrates.
- Light pollution disrupts the lives of nocturnal insects and can contribute to insect decline.

Opportunities

- Monitor water quality and protect running waters from land-borne pollution through negotiations with local farmers and businesses.
- Restore a more natural flow regime by removing barriers (e.g. weirs) and by re-profiling watercourses from fast-flowing, straight and steep channels to meandering shallow channels with varying speed in water flows.
- Establish vegetation buffers and woodland around running waters to improve water quality and habitat for invertebrates – this helps with trapping pollutants in run-off events, stabilises riverbanks, and creates shaded areas, which will help to reduce water temperatures.
- Allow some grazing on riverbanks as this creates marginal habitat with tussocky vegetation for roosting and mating, and varied microhabitats along the water edge such as poached areas.
- Keep livestock and vehicles from entering the waterbody as this compacts the bed and can also increases bank erosion and nutrient concentrations, as livestock enter the lake and defecate directly into the water.
- Aim to reduce or eliminate the use of artificial lighting around watercourses wherever possible.
- Control or remove invasive species.
- To minimise the environmental impact of flea treatments, dog owners should only treat when necessary and choose products carefully considering their environmental impact and mode of application.
- Cleaning and disinfecting waterproof clothing, fishing tackle and water-sports equipment, to prevent the spread of non-native aquatic species and diseases they may carry. Guidance can be found on the Check-Clean-Dry Website.

Other interest

Although the Malham Tarn IIA qualifies as an IIA on the basis of its populations of the Malham Sedge and White-clawed Crayfish, it also supports populations of two other IIA qualifying species of invertebrate. Least Minor (*Photedes captiuncula*) is a small moth that is mostly active during the day between June and August. The caterpillars feed in the stems of Glaucus Sedge. It also supports the Vulnerable Small Heath butterfly (*Coenonympha pamphilus*) which feeds on a range of grasses.

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