

Kemerton Conservation Trust

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Kemerton Lake Nature Reserve Aquatic Habitat Restoration and Creation Project Report 18th May 2023

Project Background

Kemerton Lake Nature Reserve (KLNLR) is Kemerton Conservation Trust's flagship reserve. It is a 46.5 acre (18.8 ha) wetland complex created out of a former gravel working, situated between the villages of Bredon, Westmancote, Kemerton and Kinsham. The reserve is a designated Local Wildlife Site, and has a diverse range of habitats including a 16 acre (6.5 ha) lake, pools, seasonal wet scrapes, reed beds, grassland, and land specially cultivated for arable plants. The reserve is surrounded by 111 acres (45 ha) of native woodland and arboretum which are not part of the reserve, but which make an important contribution to the habitat mosaic.

KCT manages the reserve under a long lease and the majority of habitat management on site is carried out by the Trust's volunteer Warden John Threadingham, and the Trust's volunteer work party group, with contractors brought in for specific tasks as needed and when funds allow.

The waterbody is a key habitat on the reserve. Many species rely on the water for all or part of their lifecycle. These include:

- invertebrates and mollusc such as Mayflies, Caddis Flies, Dragonflies and Damselflies (many of which form a key part of the diet of animals higher up the food chain); KLNLR is home to thousands of Swan Mussels and is an 'Ark' site for the endangered native White-clawed Crayfish;
- birds such as Great Crested Grebe, Teal, Kingfisher, Cuckoo, Reed Bunting and Lapwing;
- mammals including Otter, Noctule Bat and Daubenton's Bat;
- fish including Roach and Rudd (fish form a key part of the diet of animals further up the food chain);
- amphibians and reptiles such as Common Frog, Common Toad, Palmate Newt and Grass Snake;
- aquatic plants including Amphibious bistort, Fennel Pondweed and Nuttall's Waterweed (a non-native invasive).

The catalyst for this project has been the increasing encroachment of an invasive non-native pondweed Nuttall's Waterweed (*Elodea nuttallii*), which was first recorded at the lake in 2002 and which has subsequently spread rapidly through the lake. Invasive waterweeds are known to have negative impacts on water bodies: they outcompete most native plant species and so reduce biodiversity; and they cause large fluctuations in the amount of oxygen available in the water which is harmful to invertebrates and fish.

In 2021 the Trust identified the waterweed as a serious concern to the biodiversity of the lake and commissioned professional surveys for 2022 to gather data on fish species and population, aquatic plant species and location, and a drone survey to better map the spread of the waterweed. The surveys showed our fish population was much lower than expected, only 158 fish of 2 species was found despite a full HIPASE survey of the lake, with the surveyors highlighting the lack of suitable fish refuges and spawning areas as one of the likely reasons for this (the lake attracts a high number of fish predators including Cormorant, Grey Heron, Otter). In addition, the aquatic plant survey confirmed the loss of most of the native water plants that were at the lake prior to the spread of Nuttall's Waterweed, having been outcompeted. The drone survey also showed the waterweed coverage to be almost 100% in all but a few shallow and exceptionally deep areas. It was clear the waterweed is having a detrimental effect on the biodiversity of the lake, but the literature is contradictory on management advice (it is possible to make the situation worse by attempting to remove the waterweed) so trials were needed to work out the best action. In addition, our bird ringing experts suggested the addition of tern rafts to the lake as Common Tern are seen fishing at the lake every year and have bred in the local area in recent years, but there is no suitable breeding area at the lake. Action was needed to improve the habitat and tackle the highlighted issues.

The Trust therefore applied to the England European Regional Development Fund through the Natural Networks programme delivered in partnership between Worcestershire County Council and Worcestershire Wildlife Trust for a grant to pay for a significant programme of habitat restoration and habitat creation at KLNLR to be carried out by contractors, supported by our warden and volunteers. We successfully bid for ££2307.03, which represented 45% of the total project cost (the maximum the programme could fund). The project began in December 2022 and was completed in April 2023. The Trust also secured additional funding of £2500 from Highfields Trust CIO for this project. The balance of funds came from KCT's own reserves.

Project Aims

The main aim of the project was to improve the habitats within the main lake, by trialling small scale waterweed removal and monitoring its effectiveness, restoring some of the degraded aquatic plant habitat, creating new fish refuges and installing tern rafts for breeding Common Tern. Advice was taken from the Environment Agency, Fishtrack, Worcestershire Wildlife Trust and our aquatic plant experts while designing the project.

The project focussed on the following.

1. Trialling manual removal of Nuttall's Waterweed from small areas of the lake and monitoring the speed of regrowth to assist in future management decisions (waterweed to be removed manually using weed rakes from areas before adding trees, pipes, planted gabions and tern rafts, weed to be removed by contractors & stacked on bank by water to allow inverts to escape, volunteers to move the piles to use as green compost on nearby arable field).
2. Improving aquatic plant diversity by adding native plants into areas cleared of waterweed (9 gabion baskets part-filled with stone & planted with 3 x Watercress, 3 x Water

Plantain & 3 x Arrowhead plants, one to each basket using hessian material & aquatic compost, filling & planting work to be done by volunteers, moving the gabions into position to be done by contractors).

3. Creating diverse fish habitat through the addition of various natural refuges and spawning areas, to allow fish fry to hide from predators and adults to successfully spawn, increasing our fish stocks (29 gabion baskets 30x30cm part-filled with local stone, 20 for deeper areas, 9 for shallower areas with plants included as per below, filling work to be done by volunteers, moving the gabions into position to be done by contractors, 15 terracotta pipe sections to be added to lakebed by contractors, 1 large tree to be felled from southern bank into water by contractors, if successful 2-3 further trees to be felled in 2024 outside of the project, 5 Christmas trees sourced from our local community, volunteers to arrange collection and add stone anchors, contractors to move into position).

4. Installing tern rafts to provide nesting locations for Common Terns (2 tern rafts installed in centre of lake, warden to create concrete anchors, contractors to install & position rafts & add gravel etc.).

Finally, as part of the project a poster highlighting the works was planned for the bird hides so visitors could find out more about what had been done and why.

Overview of Works

Project works commenced in December 2022 and the final works were completed in April 2023 (see Appendix A – Photo Montage).

In December Project Manager Kate Aubury ordered the tern rafts, gabion baskets and other items needed for the project and contacted members to ask for Christmas tree donations in the new year.

In January Project Manager Kate Aubury arranged collection of six Christmas trees from local members, and on 7th January KCT work party volunteers helped prep the trees by adding a large stone anchor into the centre of each tree. The trees were then left ready for later adding to the lake.

In February the aquatic plant order was placed, but the nursery confirmed some of the plants would not be ready for dispatch until early April, after the planned project finish date of 31st March. Project Manager Kate Aubury confirmed this change with the Natural Networks Programme team and received approval to extend the project works into April.

After a request was posted on Facebook, a local resident donated 12 ridge tiles to the project and delivered them in February.

There was an unexpected delay with the tern rafts, which had been expected to arrive in late February, but the manufacturer worked hard to rectify the situation and tern raft delivery was booked for the end of the first week of March. The delay meant our contractors had to be rescheduled for the week after tern raft delivery but as some of the planned works needed to be completed before then to avoid bird nesting season and to tie in with our work party schedule, KCT's Warden John Threadingham stepped in to complete them. He felled a tree on the South bank of the lake at the end of February, dropping it directly into the lake to create natural fish refuges. John also cleared two areas of waterweed and dropped the Christmas trees into their cleared spot on the lakebed (see Appendix B – map of works). The cleared waterweed was stacked on the lake bank by the boat launch area to allow any aquatic invertebrates to crawl back to the water and to dry out pending removal. He also made the concrete anchors for the tern rafts.

The first aquatic plants (Water Plantain) arrived at the end of February.

The tern rafts were delivered to site on Friday 3rd March.

On 4th March Project Manager Kate Aubury, Warden John Threadingham and KCT work party volunteers spent a morning building and filling gabion baskets. 29 baskets were put together and partially filled with recycled stone rubble and cut up branches from the nearby woodland. The baskets were deliberately left with lots of gaps, as this will create more hiding places for fish. 20 of the baskets were left stacked ready for the contractors, 6 were stored until later and 3 had Water Plantain plants added and were left in the shallow water at the boat launch area. Finally, Project Manager Kate Aubury and one volunteer waded out to drop the 15 terracotta pipes into the cleared area chosen for them (see Appendix B – map of works).

Our contractors started work on the tern rafts on 6th March, a team of 2 was onsite for 2 days putting the rafts together, adding the gravel and ridge tiles, attaching the anchors, towing them into position on the lake and covering them with a tarp. The contractors also cleared waterweed from the aquatic plant locations and put the 3 planted gabions into place, adding a ball float to each to enable us to find them later. Finally, they dropped the rubble-filled gabions into their locations (see Appendix B – map of works). The cleared waterweed was stacked on the lake bank by the boat launch area to allow any aquatic invertebrates to crawl back to the water and to dry out pending removal.

Stormy weather in mid-March resulted in the tarp becoming loose and creating a hazard, so Project Manager Kate Aubury and her husband rowed out to the rafts and reattached it more securely by drilling holes in the tern raft posts to tie the tarp ropes to.

Project Manager Kate Aubury worked on the poster design and print and ordered the trail camera for the rafts in late March.

The trail camera arrived in early April, and the first Common Tern were sighted on the south coast on 29th March, so Project Manager Kate Aubury and her husband rowed out to the rafts on 2nd April to remove the tarp and install the camera. The camera was checked using the Wi-Fi connection whilst near the raft, and was working well, but it was confirmed the signal did not stretch to the bank of the lake or the hide. The posters were put up in all 3 hides.

On 8th April Project Manager Kate Aubury and KCT work party volunteers collected the dried waterweed from the lake bank and spread it in nearby woodland (the farm had confirmed there was no suitable site nearby for spreading as compost).

One of the contractors returned for the final day of works in early April, clearing waterweed from 3 trial areas on the eastern margins, which will be monitored throughout 2023 and 2024 to gauge effectiveness of the technique and speed of recolonisation. The cleared waterweed was stacked on the lake bank to allow any aquatic invertebrates to crawl back to the water and to dry out pending removal.

The remaining aquatic plants arrived in the second week of April and Project Manager Kate Aubury added them to the final 6 gabions and left them in the shallow water at the boat launch area. On 20th April Governor Matthew Darby and his daughter used the boat to move them to their final locations (see Appendix B – map of works).

Project Results

Our project was completed 2 weeks after the original deadline (due to the aquatic plant delay) but within the approved extension period. The project budget was increased partway through the project, with approval from the Natural Networks Programme, to include a trail camera and associated costs so came in slightly over the original budget.

The fish refuges are all in place and will hopefully be a valuable habitat for fish and help stocks increase over time.

The aquatic plants have been placed in 3 locations in the lake as planned. Hopefully they will flourish and spread over time.

Waterweed was removed from all areas that refuges were added, as well as 3 trial areas by the bank. There were some issues with the water rakes; it was found that using them from a boat was unrealistic, they worked best when the thrower was stood on solid ground. In addition, the large number of swan mussels in the lake caught on the rakes and made pulling out the weed harder, but our contractors feel this will be less of a problem later in the growing season when the weed is higher in the water. It was also noted that using the rakes resulted in a few sticklebacks being killed, as well as large numbers of invertebrates getting trapped in the weed, so removing the weed does have an impact on other wildlife within the waterbody and that impact will need to be considered when making future decisions.

The tern rafts are looking great out on the lake but have not as yet attracted any Common Tern. Common Tern have only returned to the area in the last two weeks so we will monitor the raft and hopefully they will find and use it. The trail camera is in position recording anything that occurs on the raft this season.

The project poster is up in all 3 hides and is helping educate visitors on the project and its benefits.

The Future

As part of the project, we updated our existing management plan for the site to include management of the new rafts, continuing the water weed removal and adding additional fish refuges in the future. This will ensure the project benefits continue into the future.

The fish refuges will remain in the lake and provide invaluable habitat for our fish species for years to come. We will consider felling additional trees into the lake in the future to add more natural refuges. We will also consider adding new fish stocks to replenish the low numbers now that the habitat has been improved for them and will take advice from the Environment Agency about this.

Our newly planted aquatic plants will be monitored later in the year. If they do well and are not overwhelmed by the waterweed, we will consider adding more of the same species in other locations next year.

Our waterweed trials will continue throughout 2023 and 2024 as we aim to gather data on the pace of regrowth and the effectiveness of manual water weed removal using water rakes. Once the data has been gathered, the Trust will be able to decide on how to manage the waterweed in the future.

The tern raft trail camera footage will be reviewed later in the season and will hopefully capture interesting and informative videos that will help us understand how the rafts are used and if we need to make any changes to the rafts.

Acknowledgements

Kemerton Conservation Trust would like to thank the European Regional Development Fund through the Natural Networks programme delivered in partnership between Worcestershire County Council and Worcestershire Wildlife Trust for generously supporting this project and making it possible. We would also like to thank Highfields Trust CIO for additional funding to support the project.

We would also like to thank all those who assisted in the delivery of the project, including our Warden John Threadingham and our hardworking work party volunteers. Finally, we would like to thank our contractors CRC Ecology who delivered most of the habitat management works, and to a high standard.



Appendix A - Natural Networks Project 169 Photo Montage

All photos copyright Kate Aubury except where noted otherwise



Fish refuge creation: donated Christmas trees, January 2023



© John Threadingham

Fish refuge creation; Christmas trees added to the lake, March 2023



Fish refuge creation; volunteer adding terracotta pipes to the lake, March 2022



Fish refuge creation: volunteers making steel gabion baskets, January 2023



Fish refuge creation; volunteers with filled gabion baskets, March 2023



© CRC Ecology

Fish refuge creation; canoe loaded up with gabion baskets to take out into lake, March 2023



Aquatic plant reintroduction; Watercress, Water Plantain and Water Crowfoot ready for planting out, April 2023



Aquatic plant reintroduction; Support Coordinator Kate Aubury with aquatic plants in gabions, April 2023



© CRC Ecology

Aquatic plant reintroduction; contractors towing planted baskets out to the islands, March 2023



© Matthew Darby

Aquatic plant reintroduction; planted baskets in situ by West Island, April 2023



Waterweed removal trial; contractors using a water rake at the lake, March 2023



Waterweed removal trial; waterweed piles by the lake, April 2023



Waterweed removal trial; a young volunteer helping to return swan mussels and inverts to the water, March 2023



Waterweed removal trial; one of the cleared trial areas, April 2023



Tern raft installation; donated ridge tiles, February 2023



© Fergus Henderson

Tern raft installation; first raft ready to float out into position, March 2023



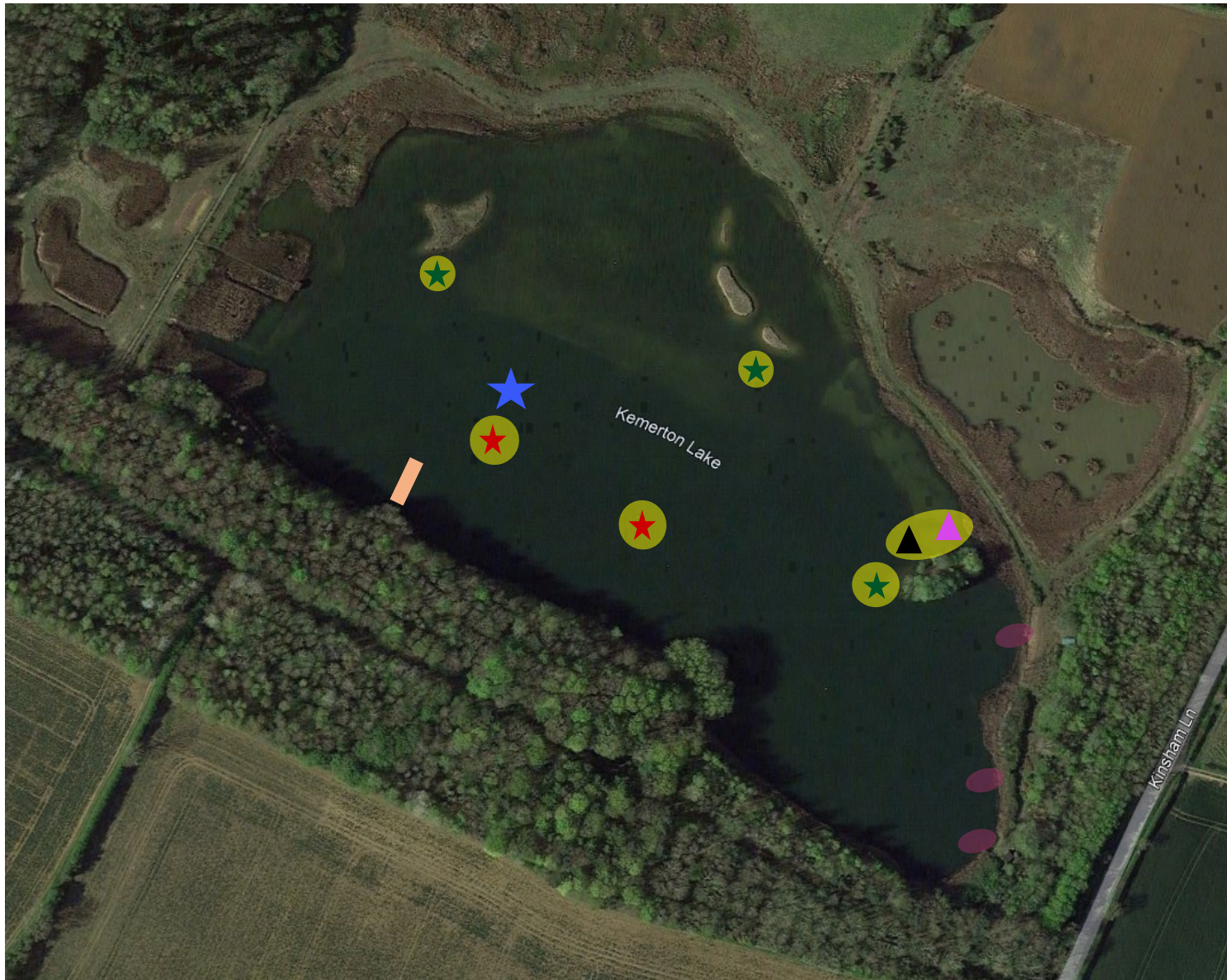
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Tern raft installation; tern raft covered & in position on the water, March 2023





Tern raft installation; tern raft uncovered & in position on the water with trail camera April 2023


Appendix B - Map showing location of new refuges, aquatic plants, tern rafts and waterweed removal areas




Map Key (symbols not to scale)


 Waterweed removal area (no future monitoring planned)


 Waterweed removal area (future monitoring planned)

 Fish refuge gabion basket (10 @ each)

 Aquatic plant gabions (3 @ each)

 Tern rafts

 Fish refuge felled tree

 Fish refuge terracotta pipes (15)

 Fish refuge Christmas trees (6)