

Clean Rivers Trust

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An Investigation into the Mortality and Deformation of Heron Chicks at a Heronry in the East Midlands.

The Lessons That Should Be Learnt.

Briefing Note.

June 2010.

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Introduction.

Heron is a magical family of birds with their height and wing span, their cries when mating or alarmed can make the hairs stand up on the back of the neck as this is a primeval sound not pretty or pleasant but familiar. These are the largest birds that the majority of Britons see: they hunt rivers, ponds, streams, and ditches; they also regularly empty town garden ponds of peoples' prize specimen carp or goldfish. They are elegant and gaunt, the super models of the British avian catwalk. They watch anglers from a distance and at the time the angler packs up rods and the paraphernalia that goes with the sport, after another near blank day the heron will show off and prove that no rod is needed and a beak is sufficient to bring in a fish that the human could only have dreamed of during the day. They appear afraid of little and as they take to the air when they are approached their little hop as they unfurl their wings to catch the air on the first down beat gives the impression that it is really the last thing they want or need to do but are only moving on for form's sake. All these and their many other traits makes this i one of the most admired and wonderous of birds, if not the most popular.

So when such a bird appears to develop a vulnerability out of the blue it is both concerning and it also creates an energy to find answers and find solutions, sometimes too quickly and without looking at the local area for the unnoted, especially when there are many locations that cry out to be vilified, unjustly as it transpired.

Hopefully environmental investigation has learnt much from this adventure into a real 'who dun it'. Next time, as surely, it will not look at the 'likely' culprits, major companies that are begging to have the finger pointed at them, when in reality the culprit works behind a not very high hedge and has been complained about for years for being a nuisance and no one organisation was in a statutory position to act against the offender due to geography and the boundaries of county and district councils, which are also the edge of two regions of the environment regulator. This sounds like conspiracy and could have taken years to find such a location, instead the polluter had inherited the site and did not profit vastly, or realise fully what they might be causing it could be asserted that this individual was ignorant with regard to regulation or the law.

The Grey Heron (*Ardea cinerea*).

A large grey, white and black-bodied bird with a long neck surmounted with a plumed head that sports a dagger like bill. The body is supported with a pair of long, spindly legs nobly knees and remarkably large feet; these are noticeable even in flight.

Usually seen standing still or moving slowly, watchful for any movement on or below the water it is wading in, a heron will seldom land in even shallow water, but will land on the bank and slowly take up its position in the water margins. It stands its neck erect or else round-shoulded with its neck folded, as it were, into its shoulders. When it takes to the air it is apt to make a sharp harsh 'frainc', flapping easily and surprisingly swiftly away. They stand, looking about, in trees a safe sanctuary from foxes which are, apart from man, their only major predator, though a mink has been observed attacking a heron.

They are semi-social birds, nesting in groups or colonies known as heronries. These can be a few pairs or larger groups; colonies of thirty pairs or more are known. Nest sites are usually in trees, though it is not uncommon, if trees are scarce for nests to be located in large bushes. The nests are large, collections of twigs and branches usually collected from their feeding areas along rivers and ditches; they will also rob abandoned or ill-guarded nests of their own colony.

Heron normally produce one brood of 3 to 5 eggs between February and May. They do not normally have a second brood but where chick mortality is high a second clutch of eggs have been observed. The young are fed regurgitated and whole food, though usually dead. The main mortality is caused by high winds or gales sending nests and their occupants to the ground.

The heron is a varied feeder, noted to eat fish and eels, some of prodigious size, one fish which was abandoned for a short while weighed over 3 kilograms. It will also eat rats, voles, ducklings, young water hen, frogs, or any other living thing that it feels it can swallow. They like to swallow their prey whole head first down the gullet, but butchering of large fish has been observed.

Its feeding habitat is any slow moving river or still water, ponds and ditches particularly in lowland areas. It appears not to like faster rivers or rocky bolder strewn foreshores and many upland birds winter on lowland or estuarine stretches of water during the colder months. Normally the birds are lone feeders, not welcoming others in close proximity. At times of flood herons appear to congregate in fields inundated by water and feed on worms, as well as fish that have escaped the confines of the river channels and have become trapped as the waters recede.

The Grey Heron (*Ardea cinerea*). Stained Glass, Selborne Church, Hampshire.

The Problem and Possible Recovery.

The problem was first recognised in 1996, though there were unusual instances of its initial manifestation in spring the year previous.

Young chicks were hatching as usual, all was apparently normal, that is until the annual ringing of young fledglings was about to get into full swing. One of the ringers discovered a deformed chick another ringer found a further two in a nest close by; this was unusual, but from time to time odd mutations are not unexpected in nature. The next year, though the same ringers found a larger proportion of young were displaying signs of skeletal distortion, malformation and broken bones. This now was recognised as something out of the ordinary; bodies were collected. Initially six dead chicks, not half-way to fledging were collected, there followed shortly afterwards a collection of five deformed young that, judged to be non-viable were removed from three nests: three from one and one each from the other two. All were sent for post mortem analysis and subjected to rigorous examination.

There was at the time a concern, not made public, that these manifestations were early signs of some sort of epidemic or other contagion that needed to be isolated and identified: The ringers and others who had been involved in the collection of the specimens were also partially isolated and observed for any sign of malady. Blood tests and metabolic tests were carried out, and thankfully for those involved, all the tests carried out proved to be negative. The herons could not be treated to house-arrest and monitoring their movements was not considered a feasible action. The sterilisation of the colony was put forward as an option in need of consideration. Fortunately this was not their fate as initial laboratory findings became available, which dismissed the theory of contagion and showed poisoning was the root of the problem.

The poison was noted in the body and organ tissues also in the bone as was a noticeable alteration to the skeletal structure of the chicks. It was also noted that the young birds were obviously having problems feeding from the parent birds as all intestines showed lack of nutritional material so even if the poison did not actually kill the birds starvation did.

The compound that appeared to be in excess in all cases was Selenium. The bone ash sample clarified the fact. All the young birds were suffering from severe rickets.

One chick, which had a broken femur, weighed 810 grams. All its bones were evidently fragile and levels of Selenium were of a high nature. Liver level was 104.5 and kidney level was 97.8 umol/kg dry matter. All the samples tested showed similar or higher findings.

In 1997 the following figures demonstrate the situation within the colony. Out of 56 nests occupied, 202 eggs counted, 103 hatched young counted, young dead, unaccounted for and definitely not fledged 76, fledged 27. this is a figure that has been repeated year on year till 2009 when a count showed 42 nests occupied, 120 eggs counted, 98 hatched young counted, 28 young dead, unaccounted for and definitely not fledged, 70 fledged.

The 2010 breeding season is only half way through at present but the following data show some optimistic indicators. 55 nests occupied, 198 eggs counted, 159 hatched young counted. One dead juvenile has been recovered this year and analysis showed Liver selenium content was 8.4 umol/kg dry tissue and bone ash content was 60.1 % where in the past it had been in the region of 40.5 % accounting for the severe calcium deficiency in the bones of the affected young in previous years.

The Heronry in its Landscape.

The Heronry is located on a wooded island, a vestige of the original landscape of the area now a quarried area of large lakes and marsh landscape where restoration has taken place, the rest of the site is a working site dedicated to mineral extraction. For thirty miles and more the landscape is an altered environment with worked out open workings and others of a landscape that is restored to its original agricultural uses. This has mainly been possible as the coal-fired power stations that still proliferate in the area (and once had been more numerous) supplied the fly ash, the waste from burning the fuel coal, to be used as infill after mineral extraction had taken place. This had been an arrangement agreed with the planning authorities both locally and at a national level. To transport this ash from the power generating stations to the mineral voids was the ash was turned into a slurry and pumped in huge volumes to the 'ponds'. This liquid over time drained off into the large and small water courses of the region. The residue was then

almost solid and was able with the addition of the top soils that had been stored or 'banked', to reprofile the surface ready for the 'farmer' to take control of again.

This heronry has been on this site from time immemorial and was not taken notice of until mineral workings appeared on the horizon. The Wildlife Trusts and other ornithological organisations realised belatedly what a resource they had up till this point overlooked, but that had ended for good. The site is now in their management and car parking charges help pay for the wardens and explanation boards that are there to aid the visitors.

The area is low-lying and apart from one major river the area is criss-crossed by streams, dykes and ditches. The top soils are predominantly clay and the plethora of watercourses allow for the rain and surface waters to be carried away expeditiously. The heronry is situated close to the edge of another water catchment area which drains part of the area away from the major water course; this, as will be explained, was the major problem with regard identifying the source of the poisoning pollution.

This landscape is criss-crossed not just by waterways but by county and local authority boundaries. Furthermore, environmental regulation was almost equally split along near county boundary lines into two regions. The drainage of the agricultural land is even split by the boundaries of three separate district drainage boards. This human geography has more complex functions than a lot of the natural world.

As well as the invisible cat's cradle of boundaries, humans have also dominated the landscape with, on most horizons, the power stations of the East Midlands taking centre stage with their cooling towers belching 'smoke' in truth, inert steam. These coal-burning leviathans were the natural source of this heron 'plague'; their waste has high selenium concentration and it is close to water and when it is slurry its water of composition drained into the local environment. Surely this polluted the fish in the river, and herons are everywhere fishing: easy! No.

Research.

Research into Selenium and its links to coal, farming and agrochemicals, traffic and road run-off, all had their advocates, others blamed anglers for

poisoning fish as bait for the herons that were eating their fish, much of these accusations and assertions became farcical and was certainly bad science.

The power generation / Selenium link was shown to have substance with several proven instances of aquatic avian malformation and morbidity in the United States, and elsewhere. The proof of this pudding was not the eating.

The research was showing links and sources, there were pathways but there were questions that appeared not to be being answered. The most notable conundrum being provided by another group of birds, roosting and nesting on a next-door island.

The Neighbours.

The heronry has a neighbouring roost and breeding colony of cormorants located on a separate but, at times of low rainfall, linked island with more mature trees. This breeding colony is very successful producing good fledging of young who since the colony established itself in the early 1980s has had its young become founder-members of new colonies in other parts of the country, more specifically in the North West (2004). Dead young have been found, but with no symptoms of the sorts found within the heron cadres. Usual reasons of death being attacks by magpies. The adult bird deaths that have been noted have in many instances shown gun shot wounds as the most common causes.

Other Species.

Other species of birds that were living and feeding close by the heronry (and where herons were seen to be) and notably not suffering similar setbacks include Swan, Moorhen, Coot, Great Crested Grebe, Mallard and Goose.

None of the above appeared to have any symptoms of a similar sort, in fact the populations of all were growing. One specimen of a deformed Dabchick or Little Grebe (*Tachybaptus ruficollis*) was found in 1999 several miles from the heronry, it also sported signs of rickets and was found to have an elevated Selenium level in its liver tissue and a reduced calcium level, this was though only one example.

The similarities of all these species are that they feed on and by water; the majority consume fish, insects, small mammals, molluscs, amphibians and vegetation. All, including the Heron and Cormorant, hunt by eye.

The Investigation.

What are the main differences in all these birds' feeding habits, all but the Heron and Mallard will only feed on open water and will not try (or find it impossible) to feed in, or on, confined waters such as ditches and marshy ground. This is because all the other birds need a reasonable amount of space to gain ground or surface speed before their takeoff can be achieved.

This understanding took longer to gain credence than any of those involved would now like to admit.

The likely source of the problem then could be taken to exclude major water courses or lagoons or lakes. Now the options had declined in number and that the area that needed identification was likely to be a ditch or wet ground somewhere in the area.

Considering the area of interest was many square miles, as herons will travel some considerable distances to favoured feeding areas, some put forward other options and hypotheses. These again included deliberate poisoning, a natural source of selenium, a genetic disorder that made some of the herons bio-accumulate, a point source that was unknown. This last was the most likely, but with several hundred miles of water course, streams dykes and ditches, some not even on maps due to the changing nature of this mineral rich landscape, where would the search begin?

Discussions were held with the Drainage Boards of the area. They cover their respective areas with a large amount of local knowledge, also some private aircraft flights were taken to try to spot some obvious anomaly: a barren area or a noticeable cancer on the vegetation, (archaeologists use such methods) but nothing was apparent. The Drainage Boards were more instructive and suggested that there was, to all intents and purposes, an unregulated zone of inactivity on the borders where their responsibilities met. The Boards went on to say that the two regions of environmental regulation followed a similar pattern and the same was true regarding local and county council responsibility. Their main reasons being that properties in this small area received two waste collections a week one from each

district council, and planning permissions appeared not to be necessary off the main trunk roads. The area was still large, but reduced to tens of square miles.

In 2008 a request for advice came in regarding a pond that had been created by a company in a nearby village. The pond was planted up (1993) and had hard landscaping so that staff could use it in their lunch times and other breaks. This small water body had been healthy for years but had become rundown over time and only in the last year or two had staff reclaimed it for use. The water was now foul, scummy and noxious. Not an attractive staff facility as it stood. The received water from a ditch was indeed unpleasant.

Water samples were taken and sent for analysis, at the same time the ditch was walked and an audit of its flora and fauna was undertaken. Half a mile from the pond the state of the ditch was overgrown with briar reed and rush also blackthorn; at this point it entered an isolated holding with a small bungalow surrounded in waste materials and obvious fire sites. Signs of burnt tyres and vast piles of charred wire were everywhere. Along the stream edge was a large (20 metres across) scrape full of foul smelling ooze and piles of 'ash' that was at the edge - as it turned out - waiting to be deposited into the ditch when the water was flowing freely so it would take the waste away.

The environment regulator was telephoned that same day, details were taken and the response when the map reference was given was that it was the other region that should be informed; when they were informed the same response was offered. The local council environmental health departments both said the same thing. The county councils both said that the environment regulators should be informed.

After days of this circular inaction the water samples analysis was received. The findings included Dioxins, PCBs and Selenium.

Further examination, with the owner's rather surprised compliance showed a site of about ten acres of waste and wasteland with several ditches and small dykes obviously discharging on the watershed of two river catchments. The fact that there were springs as well as rain fed water flowing from the site was interesting and the water courses were choked with reed and rush, in clogged areas was standing water and signs of heron activity. On one visit

two herons were observed hunting two of these choked and polluted watercourses.

The rest of the investigation is at this point sub judice as, due to the cat's cradle of authorities yet to get their various legal cases together. There is much that needs to be reported in due time.

Those Involved.

Royal Society For The Protection of Birds, Environment Agency, European Environment Agency, British Trust For Ornithology, Lincolnshire Wildlife Trust, Nottingham Wildlife Trust, Leicestershire Wildlife Trust, Lafarge Aggregates, Tarmac Quarry Products, Veterinary Investigation Centre, Severn Trent Laboratories, National Power, RJB Mining plc, Department of Mines (US), British Geological Survey,

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