Fish Control Methods for Great Crested Newt Conservation
(England and Wales)

Review of fish control methods for the Great Crested Newt SAP, CCW contract science report no. 476.
Version date: September 2010

Introduction

This advice note outlines the fish control methods that have been used in Britain as great crested newt conservation measures, and covers the key issues that need to be examined when considering them. Legislation surrounding this conservation activity is complicated, and in many cases highly restrictive, with special permission needing to be obtained. All forms of control require careful planning, with the Environment Agency consulted early in the process.

Please note this document does not advocate any of the fish control techniques outlined, but provides a summary and review of methods that have been used. Techniques described here may be unacceptable to statutory agency staff and others, or they may be deemed suitable in only limited circumstances. Before undertaking any of the described procedures, further literature research is recommended and advice from the relevant statutory agencies must be sought.

Fish and Great Crested Newts

Great crested newt (Triturus cristatus) larvae are extremely vulnerable to predation by fish; their eggs are also taken opportunistically. Predatory fish such as sticklebacks and perch are known to be particularly harmful. Larger species such as carp can have an additional impact by removing weed used as an egg-laying substrate by newts and stirring up sediment. Great crested newts may avoid breeding in ponds where some fish species are present and rely on the presence of nearby fish-free ponds to maintain the population.

Fish may colonise ponds naturally, as well as being accidentally and deliberately introduced by people for angling or other purposes. Fish introduction has been identified in the UK Great Crested Newt Species Action Plan as a significant factor causing the decline and extinction of populations. To halt the decline and maintain the existing range and viability of great crested newt populations, fish should not be introduced into newt ponds. Furthermore, fish populations in newt ponds sometimes need to be eradicated; partial control is normally pointless, as fish numbers will subsequently increase.
The selection and careful application of control methods is important to minimise the impact of work on other pond wildlife. This advice note summarises current knowledge, including a review carried out under contract to the Countryside Council for Wales (Watson, 2002).

Conservation managers have used a range of different measures to control or eliminate fish in great crested newt ponds, with varying degrees of success. A brief description of these methods is given here. Some methods require special permissions. Concerns have been raised regarding both the welfare of fish stocks and the effects of these methods on non-target species, and there are important legal and health and safety issues that must be considered. These are discussed below.

Legal Issues

Protected Species and Fish Control

Fish removal work on a great crested newt pond may require a conservation licence. A licence would be required if the control methods involve disturbance or capture of newts, or damage to breeding sites or resting places.

The presence of other protected species such as the white-clawed crayfish (Austropotamobius pallipes) or water vole (Arvicola terrestris) is also an important consideration. Advice on whether a conservation licence is needed should be sought from the relevant statutory nature conservation organisation. It should be noted, however, that such licences are not granted automatically. If your actions are likely to result in an offence, you must first review whether there is an alternative approach.

Timing of Fish Control: General Points

If great crested newts are still using the pond, fish control should generally be avoided during the aquatic phase (mid-February to mid-October). The life cycle of the fish species present is also an important consideration.

Fishery Issues

Each country has different laws covering fisheries. Guidance must be sought from the Environment Agency in England and Wales. The killing of fish and movement of fish to/from inland waters (except small garden ponds) is regulated under the Salmon and Freshwater Fisheries Act 1975 in England and Wales. It is therefore essential to contact the appropriate Agency office to discuss your control proposal in detail before applying for written consent to control fish populations.

Water Issues

The discharge of water into a watercourse, draining a pond that may affect the water table or refilling a pond may require consent from the Environment Agency or the local authority. Discharging water into storm drains requires permission from the water company. Dead fish are considered ‘controlled waste’ and the Environment Agency must be contacted regarding their disposal.

Methods of Fish Control

Piscicides

Application

Rotenone, an organic compound derived from the roots of plants in the bean family (Derris spp. and Lonchocarpus spp.), is used as a horticultural insecticide and a piscicide. For centuries, people in the tropics have used rotenone for stunning or killing fish. It has been used in North America in fish management since 1934 to remove or reduce populations of undesired or nuisance fish and has been used on occasion in Britain for this purpose since the late 1940s. Rotenone does not persist in the environment, but is rapidly broken down in soil and water. It inhibits cellular respiration by blocking an enzyme, preventing the mobilisation of oxygen for respiration in the blood stream. We have no information on the breakdown products of rotenone in the environment or their toxicity to humans and wildlife. Specific details and guidance should be sought from the manufacturer.

The effectiveness of rotenone is reduced by low temperature, low light levels, high levels of suspended organic particles or high levels of oxygen in the water. Aquatic plants and debris in the pond may inhibit the dispersal of the rotenone.

Rotenone application is often the most effective and desirable means of eradicating fish for newt conservation purposes. Although requiring
considerable preparation and permissions, we recommend that it is investigated in cases of serious damage to newt populations.

Timing
Control by rotenone is more effective when aquatic plants are dormant, but it should not be used later than early March and periods of frost and prolonged cold weather should be avoided. Using rotenone during the dormant period also reduces the impact on aquatic invertebrates. Tadpoles and newt larvae are also unlikely to be present within the pond at this time.

Regulations and legal requirements
The use of one rotenone-based piscicide (CFT Legumin) is currently permitted under the Biocides Directive (98/8/EC). The position may be subject to change based on the outcome of review. Its use in the UK is subject to consent from the Environment Agency under Section 5 (2) or (from January 2011) Section 27A of the Salmon and Freshwater Fisheries Act 1975 (SAFFA). Consent must be obtained and Environment Agency guidance should be followed. The Agency may charge for such authorisations.

Use in England and Wales is restricted under SAFFA for scientific purposes, protecting, improving or replacing fish stocks. Under current legislation, piscicides cannot be authorised for use for the purposes of removal of fish stocks solely for great crested newt conservation. However, in a particular case, you should discuss with the Agency whether the removal could be justified under scientific or fish management purposes.

Effects on non-target species
Although rotenone is toxic to a wide range of organisms at high doses, most are not expected to be affected when it is applied at the concentrations needed to kill fish (Murphy and Willis, 1996). The concentration of rotenone will be determined by the fish species to be targeted, as well as environmental conditions etc., therefore no specific dosage guidelines can be provided here. Although research is limited, rotenone has been shown to be highly toxic to amphibian tadpoles at concentrations similar to those used for fish control. It is therefore only appropriate to use this method when amphibians are not in the pond. Studies on invertebrates show that most groups rapidly re-colonize and recover following rotenone application.

Important
Environment Agency consent required
Highly restricted use – fishery management and scientific purposes only
Requires detailed risk assessment

Electric Fishing
Application
Electric fishing involves placing electrodes in the water and generating an electrical field to stun the fish (sometimes referred to as electro-fishing). The fish are then removed using nets. It requires specialised equipment and must be performed by a trained, experienced operative, and only with prior consent of the Environment Agency.

The electric field is effective only when applied within a couple of metres of fish and is less effective in water over one metre deep. Electric fishing is more effective on larger fish (over 100 mm in length) and less so for smaller fish such as sticklebacks.

Electric fishing is very unlikely to capture all fish and therefore has limited value. It is recognised only as an additional method or where a very small number of medium or large fish have been recently introduced.
Timing
The optimum time to undertake electric fishing is before fish breeding commences. Fish can be stressed during periods of extreme temperatures so electric fishing should be avoided when the water temperature is below 4°C or in periods of hot weather. Therefore spring and autumn tend to be the best times to use this method.

Regulations and legal requirements
Consent must be obtained from the Environment Agency under Section 5 (2) or, from January 2011, 27A of the Salmon and Freshwater Fisheries Act 1975 (SAFFA), for which the Agency may charge a fee. Environment Agency guidance must be followed. Consent cannot be issued solely for the purpose of protecting great crested newts; the use of this technique is restricted to scientific purposes, or for the purpose of protecting, improving or replacing stocks of fish.

Effects on non-target species
Electric fishing should not take place if newts are known to be present in the pond. Amphibians caught within the electric field will be immobilized due to their muscles contracting. The effects of electric fishing on native amphibian species have not been investigated fully.

Some aquatic invertebrates have shown fatalities, possibly through coming into contact with the electrodes.

Important
- Environment Agency consent required
- Highly restricted use – fishery management and scientific purposes only
- There are strict health and safety guidelines to be followed
- Private contractors and persons working on behalf of the Environment Agency must comply with the Electric Fishing Code of Practice (2001)

Netting and Trapping
Application
Netting and trapping are rarely successful in removing all fish from a pond, but can help to reduce numbers temporarily. For netting, total removal can be achieved only in small ponds with good visibility, few fish and no obstructions to hinder nets. Netting is frequently applied alongside draining down ponds, as this technique allows a manageable water level to be achieved. Generally, netting and trapping are only suitable as additional methods; if used as sole methods they will almost certainly be ineffective.

The most efficient net for capturing the majority of species of fish in medium or larger water bodies is the seine net. This is a long rectangular net with floats along the top edge and weights along the bottom. The net is dragged through the water, catching fish and aquatic biota on contact. Stop nets are similar to seine nets, however they are used for more static operations where fish are isolated and then guided into the net.

The efficiency of nets is also dependent on mesh size and the experience of the operatives. It is advisable to carry out a pre-netting survey of fish to help determine the type of nets or traps required.

Netting may not be suitable for ponds with a lot of aquatic vegetation or other underwater obstacles that may snag the net. Problems also arise in silt-laden ponds, as fish may avoid capture in the silt.
Timing
The best time tends to be in winter or spring, avoiding freezing conditions (when fish tend to stay at the bottom of the pond, making them harder to catch). Although trapping and netting can be done at other times of the year, possible harm to newts (if present) and fish, especially during the breeding season (around March–July), should be considered.

Regulations and legal requirements
The netting and removal of fish are regulated by regional fisheries bylaws, made under the Salmon and Freshwater Fisheries Act 1975. Each Environment Agency region has its own fisheries bylaws hence the requirement to contact your local office prior to considering any operation. In order to net fish by a method which is not covered by the regional bylaws, you must first obtain written consent from the Environment Agency. The use of seine nets and stop nets for fish removal would, for instance, require prior written consent.

Effects on non-target species
It is important to ensure that netting does not have a significant impact on non-target species. If netting is carried out in summer or early autumn it may capture adult and larval great crested newts and possibly white-clawed crayfish if they are present. It is important, therefore, to comply with the relevant wildlife legislation outlined in this document. Captured amphibians and aquatic invertebrates should be placed in a water-filled container and released back into the pond when the work is finished.

Draining/Drying Out Ponds

Application
Draining down of ponds is most often used in conjunction with other control measures, including netting and electric fishing. It may involve reducing the water to a level that allows netting or electric fishing to be applied effectively, or pumping as much water out of the pond as is possible and leaving it to dry out for a period. It is advisable to clear a sump in the base of the pond where fish and other animals can be collected as the water draws down.

Draining down and drying out ponds are often the simplest and most effective methods for fish control in newt ponds.

Timing
Draining ponds in conjunction with electric fishing or netting is generally best undertaken during winter. Amphibians are less likely to be in the pond and fewer invertebrates are present, therefore any damaging effects are minimised. Catchment-fed ponds can be difficult to drain down during periods of heavy rain so their drainage is best attempted early in the winter season. Draining and drying out is more likely to be successful if carried out in the summer months. This method should be used only if there is no evidence of great crested newts.

Regulations and legal requirements
Draining down or complete drying out of ponds for the purpose of controlling fish is covered under SAFFA therefore written consent from the Environment Agency must be obtained.

The process of discharging water from a pond also necessitates consultation with the Environment Agency.
Agency under the Environment Act 1995. This includes one-off, as well as repeated, discharge into controlled waters (all water courses) and may require a ‘discharge consent’.

Re-filling may also require consent from the Environment Agency.

If discharge into a main river (watercourses for which the Environment Agency has a responsibility) is required, the land drainage section of the Environment Agency should be notified. In most other situations with minor streams that do not fall under the management remit of the Agency, the local authority is responsible for drainage and must be consulted.

All riparian landowners should also be consulted before any pond water disposal takes place, which is likely to have a detrimental effect downstream as a consequence of the discharge. Other interested parties may need to be consulted, for example the SNCO in the event of a potential impact upon specially protected species such as white-clawed crayfish or water voles.

Discharging water into storm drains requires permission from the water company.

**Effects on non-target species**

Draining a pond is likely to have minimal effects on invertebrates adapted to fluctuations in water levels, but may harm species adapted to stable conditions or those locally confined to a particular pond. Desilting ponds is likely to eradicate those invertebrates that have sought sanctuary in silt.

More research is needed to determine the effects of draining down of permanent and semi-permanent ponds on aquatic invertebrates.

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### Desilting

**Application**

Removal of silt and other debris from a drained pond may increase the effectiveness of other fish control methods by removing small fish, eggs or fry that cannot be rescued by hand. Prior to desilting it may be helpful to apply lime. The toxic effects ensure that no small fish survive during the management operation. Silt removed by a vacuum wagon or slurry tanker can either be disposed of off-site or on-site. Extra guidance on these matters should be sought from the Environment Agency and the landowner or body responsible for the management of the site prior to commencing work. The Environment Agency has used desilting as a means of rejuvenating small lakes and pools.

**This is an additional method, to be used alongside others.**

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![Important](Image)

| Environment Agency consent required for draining down/complete drying out |
| Consult Environment Agency concerning regional bylaws; draining may be a bylaw offence in some areas |
| Possible implications for water quality |
| Likely to have a significant impact upon aquatic invertebrates |

### Silt Agitation

**Application**

Silt agitation involves stirring up silt in the pond. When anaerobic silt comes into contact with oxygenated water, hydrogen sulphide and sometimes methane are released resulting in de-oxygenation of the water. The release of gases, combined with the increase of suspended particles in the water, reduces the chances of fish survival. The dissolved oxygen levels return to normal when the silt comes out of suspension.

This method can be used only in ponds where there are thick deposits of anaerobic silt. In deeper ponds agitation is best applied after draining down some of the water. In ponds where there is good all round access and few obstructions, a tractor-
operated vacuum tanker could be used with an agitator attached to the suction hose or it can be done manually by wading through the water. It is important to note that silt agitation for fish control has been undertaken on only one occasion in the United Kingdom to our knowledge.

**It is likely to have limited application until further research has been undertaken.**

Before carrying out silt agitation it is important to establish whether there has been a previous pollution incident in the pond because harmful substances could be re-released into the water column. However, it will not always be clear if a pollution incident has occurred.

**Timing**

This method is potentially harmful to amphibians. It is strongly recommended that this procedure be applied during the winter months when there should be less risk of harm. The pond should be checked for the presence of overwintering newts prior to commencing work.

**Regulations and legal requirements**

Because this method involves the release of chemicals into a pond it is subject to guidance under the Salmon and Freshwater Fisheries Act 1975, which strictly prohibits the deliberate killing of fish, except for the purpose of controlling fish stocks. Consent must be obtained from the Environment Agency to undertake this technique.

**Effects on non-target species**

Silt agitation may cause suffocation of non-target species, though no research has been done to investigate this. Further research is required to determine the effectiveness of this fish control method and the potential impacts on non-target species and pond dynamics. There may be cases where animals could be trampled under foot.

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**Prevention is better than cure**

There is a range of measures that can reduce the likelihood of fish introductions, both natural and human-induced:

- Raise awareness of great crested newt conservation issues and legislation regarding release of fish.
- Produce leaflets and display boards to reinforce local bylaws and management strategies.
- Redirect public access routes away from sensitive areas, such as the main breeding pond.
- Screen ponds by planting scrub or hedges.
- Allow public access to some waterbodies to distract attention from more sensitive ponds.
- Locate new ponds away from rivers and other waterbodies that support fish and are susceptible to flooding.
- Avoid connecting ponds to streams or ditches.
- Provide information on the wildlife benefits of not stocking ponds with fish.
- Raise awareness of modes of fish movement, such as with pond plants and equipment.
- Create new ponds that are likely to dry out occasionally.

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**Important**

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<tr>
<th>Environment Agency consent required</th>
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<tbody>
<tr>
<td>Limited application until further research has been undertaken</td>
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<tr>
<td>Likely to have a significant impact upon aquatic invertebrates</td>
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Factors to Consider When Selecting a Fish Control Method

Site Characteristics
It is important that the method is chosen to suit the physical characteristics of the site. Factors to consider include:

- site access
- amount of aquatic vegetation
- previous pollution incidents
- depth of water
- silt levels
- presence of protected species
- site hazards
- public access or prominence
- connections to other water bodies

General Points to Consider
It is important that you:

- Contact the Environment Agency early on in the decision making process to seek advice concerning local bylaws and the fish control methods available to you, etc.
- Identify any protected species present within the pond and contact the Statutory Nature Conservation Organisation for advice, and to determine whether you need to apply for conservation licences.

- Contact other interested parties, such as the local Wildlife Trust and riparian owners etc. (if required).
- It is advised that in all methods of fish control a method statement is commissioned by the applicant and/or site manager which outlines the method of control. The statement should cover the desired outcome, application, timing, regulations, legal requirements, health and safety, effects on non-target species and costs.

Fish Welfare
Fish removed from a pond must be transferred to an appropriate, non-sensitive receptor site. The Environment Agency must conduct health checks before fish can be moved between ‘mandatory sites’ (e.g. ponds on a flood plain, a SSSI or connected to watercourses). Health checks at non-mandatory sites would have to be done independently. In all cases, as many fish as possible should be removed by humane methods.

Biosecurity
The possible spread of both non-native plants and animals and amphibian diseases should be considered when undertaking pond management work. At the start of a project such issues should be assessed, appropriate advice sought, and the necessary biosecurity measures put in place.

With all pond work it is best practice to disinfect equipment to reduce the accidental spread of disease and non-native species. For general guidance refer to ARG-UK Advice Note 4 Amphibian disease precautions: a guide for fieldworkers.

Monitoring
Following any fish control activities survey work will be required to assess the effectiveness of the control method and the response of the newt population to these measures. Amphibian and Reptile Conservation would be grateful to receive the results (positive or negative) of fish control work and subsequent monitoring.
Health and Safety

There are no specific Health and Safety Executive (HSE) or government guidance notes that relate to ponds and other still water bodies within the UK, however organisations such as RoSPA offer detailed guidance on safety at inland water sites. Health and safety issues are also covered in the Herpetofauna Workers’ Manual (Gent and Gibson, 1998) and The Pond Book (Williams et al., 1999).

All works undertaken must comply with the Health and Safety at Work Act 1974 through the Management of Health and Safety Regulations 1999.

A risk assessment should be produced where there is likely to be a risk to health, safety or the integrity of property. A risk assessment would normally be included within a written method statement, describing in detail how the proposed work will be carried out. The risk assessment should include a site-specific assessment of the pond, in addition to basic health and safety procedures (refer to Five steps to risk assessment, [Health and Safety Executive, 2006]). The assessment should also include the site specific conditions and the resulting hazards, with the precautions set out on how to eliminate or control the identified risks.

Rotenone

As highlighted earlier, there are restrictions over the use of rotenone. A written method statement and a thorough risk assessment must be prepared when considering its use.

If approval is granted the contractor must comply at all times with current legal requirements relating to storage, handling, use and disposal of hazardous substances and in particular the Control of Pesticides Regulations 1986 and the Control of Substances Hazardous to Health 2002 (as amended), Regulation 6. Information regarding the precautions for use is contained within The UK Pesticide Guide 2001 published by the British Crop Protection Council.

Rotenone can be applied by backpack sprayers or by a pressurised pump from a boat (Morrison, 1988). Rotenone should be applied only by properly trained operators. The guidance followed is similar to that needed to apply herbicides in water.

Additional advice should be sought to ensure that the current guidelines concerning the use of rotenone and its application are followed.

Electric fishing

Electric fishing is safe if undertaken properly, however, due to the potential risks from electric shocks and the use of small boats in the freshwater environment it is classified as a ‘dangerous’ activity. Any contractor appointed to undertake electric fishing must follow the Environment Agency code of conduct for electric fishing which includes health and safety guidance. It is also expected that the operator has training to use the equipment.

Draining down ponds

It is important that the drainage pump is operated and monitored by a competent person.

Silt agitation

This technique requires walking across a large area of the pond, with a risk of falling over, and/or tripping or standing on sharp objects etc. An assessment of these risks should be made ahead of carrying out this procedure. Appropriate clothing and safety equipment should be worn.

**Important**

- There are health and safety issues specific to each method
- Additional guidance should be sought for each technique
Case Study: Little Wittenham Nature Reserve, Abingdon, Oxon

Site description

- Little Wittenham is a designated SSSI/SAC for its large population of great crested newts. The site consists of two main ponds surrounded primarily by woodland, but with areas of grassland and arable.
- Little Wittenham Nature Reserve is owned and managed by The Northmoor Trust (www.northmoortrust.co.uk).
- Fish have been present in one of the ponds since the 1980s; it is believed that the public deliberately introduces fish.
- The pond is approximately 800 m² in size, with a varied vegetation and shore structure and diverse invertebrate fauna, including an important dragonfly assemblage.

Methods of fish control

- In April 1988, Thames Water Fisheries used electric fishing to remove fish from the pond.
- In 2001, advice was obtained from English Nature (now Natural England) and permission was granted from the Environment Agency to drain the pond for the purposes of fish removal.
- In January 2002, the pond was drained down and landing nets used to remove fish.
- An experienced, local contractor conducted the draining and removal work, and the reserve manager assisted with the netting.
- Draining took 17 hours over two days using a self-priming pump.
- The pond was allowed to re-fill naturally.

Results

- 100 brown carp and 23 goldfish were removed by electric fishing in 1988.
- A survey in September 1988 showed that fish populations appeared to be approximately the same as before the electric fishing.
- Draining and netting in 2002 removed over 8000 fish (including 65 large carp, 700 smaller carp, 7600 goldfish and a tench).
- Contractors estimated that 95% of the fish population was removed; therefore 400–500 fish remain.
- Great crested newts are known to breed in the pond; over 200 adults were recorded in 2000.
- The Trust carried out electric fishing on the same pond in January 2008, resulting in 23 large carp and approximately 25 goldfish being removed. The pond was not drained down on this occasion, resulting in the reduced effectiveness of the fish control method compared with earlier work.

Comments

- It was thought that draining and netting were the most effective methods of fish control in this case.
- Electric fishing was unsuccessful because of the large number of small fish.
- Funding for the work was provided by English Nature.
- It is doubtful that fish will be eradicated from the pond.

Proposed future actions

- Draining of the pond will hopefully occur on a five- to ten-year basis, or more often if required.
- Great crested newts will continue to be monitored annually.

Case Study: Orton Pit SSSI/SAC Peterborough

Site description

- Orton Pit SSSI/SAC, situated to the south of Peterborough, supports the largest known population of great crested newts in Britain (estimated to be around 30,000 adults in 340 ponds).

- The reserve consists of an extensive pond system found within the ridge and furrow landscape created by the extraction of clay in this former brick-pit. The resultant water bodies are at various successional stages.

- The site was designated as a Special Area of Conservation (SAC) in 2005 for the significant great crested newt population and the charophyte community (stonewort), which includes nationally scarce species.

Methods of fish control

- A fish survey was undertaken in 2003/4, which revealed a widespread presence of nine-spined sticklebacks (*Pungitius pungitius*) on the reserve. Additional survey work of both fish and great crested newts in 2005 indicated that the fish were not being contained, but spreading across the reserve.

- As a result of extensive consultation with English Nature and the Environment Agency it was determined that the application of rotenone would be the most effective method to eradicate sticklebacks. Because of the importance of the site and the extent of the fish problem, a scientific licence was issued by the Environment Agency for using rotenone. It was also concluded that the eradication in this complex pond system could be undertaken effectively without draining the ponds.

  - This control method consisted of three phases:
    i) Preparation of the ponds, which involved strimming the bank vegetation (October–December 2005) to expose bank line;
    ii) First application of rotenone (December 2005)
    iii) A second application of rotenone was applied to a sub-set (17) of ponds (January 2006).

- In small ponds, rotenone was applied using backpack sprayers. For larger ponds, it was applied from a small boat using small pumps, hoses and specially designed nozzles. This allowed for precise application deep under the water.

- Although 3 ppm (parts per million) of rotenone was used, the study concluded that 2 ppm was sufficient.

Results

- 34 ponds were treated and 5,812 dead fish removed.

- The majority of the fish removed were nine-spined stickleback; perch were removed from one pond.

- No fish were found during the second application suggesting successful removal during the first application.

- There were 24 amphibians found to be affected by the treatment (including great crested newts); most (19) were from a single pond. Eight of the affected animals from this pond survived the 48-hour observation period in a plastic container with clean water and were released (three smooth and five crested newts, including four larvae).

Comments

- An invertebrate specialist carried out comprehensive pre and post treatment surveys.

- Results from the surveys suggest that the invertebrate mortality had been selective, with the common species most severely affected. However, the majority of the common species were either unaffected, or remain in large enough numbers for the population to recover.
Fish Control Methods for Great Crested Newt Conservation
(England and Wales)

- Further work needs to be undertaken to determine the impact on microscopic and planktonic fauna that might affect the larger invertebrates.
- There is concern that the preparatory work (strimming and raking marginal vegetation) had a negative impact on the invertebrates.

Proposed future actions

- It is unlikely that fish will be entirely eradicated from the reserve – further fish control will be required in the future.
- In complex pond systems it might be more efficient to ‘sacrifice’ some areas, especially those connected to fish ponds and ditches that occasionally flood.

Rotenone as a conservation tool in amphibian conservation. A case study of fish control operation undertaken at Orton Pit SSSI, Peterborough, UK. The Froglife Trust.

Advice and Assistance

Statutory Nature Conservation Organisations
The statutory nature conservation organisations are responsible for providing advice on nature conservation and wildlife legislation and issuing licences for conservation work.

England: Natural England
Northminster House, Peterborough, PE1 1UA
Tel: 0845 600 3078

Wales: Countryside Council for Wales
Maes-y-Ffynnon, Penrhosgarnedd, Bangor, Gwynedd, LL57 2DW
Tel: 01248 385500

Other Government Agencies

Environment Agency (England and Wales)
The Environment Agency has environmental protection responsibilities, which include a conservation and wildlife remit (in particular those relating to rivers and wetlands). These obligations extend to maintaining and improving the quality of surface and ground waters. The Agency also has responsibilities regarding fisheries in England and Wales.

Offices: The Environment Agency has offices across England and Wales. These are divided into eight regions and each region has a number of areas within it. Each area office is responsible for the day-to-day management of its local area.

Enquiries: 08708 506 506
Incident Hotline: 0800 807060
www.environment-agency.gov.uk

Non-Governmental Organisation

Amphibian and Reptile Conservation
655A Christchurch Road,
Boscombe, Bournemouth,
Dorset, BH1 4AP
Tel: 01202 391319
www.arc-trust.org
Further Reading

Cowx, IG and Lamarque, P (1990)
**Fishing with electricity**
Fishing New Books (FNB)

**Great Crested Newt Conservation Handbook**
Froglife, Halesworth

Maitland, PS and Campbell, RN (1992)
**Freshwater Fishes of the British Isles**
Harper Collins, UK

**The use of Rotenone in Fisheries Management.**
Department of Agriculture and Fisheries for Scotland
Scottish Fisheries Pamphlet Number 15 1988
ISSN 0309 9105
www.scotland.gov.uk/Uploads/Documents/No15.pdf

Murphy, BR and Willis, DW (1996)
**Fisheries Techniques Second Edition**
American Fish Society, Maryland, USA

Piec, D (2006)
**Rotenone as a conservation tool in amphibian conservation. A case study of fish control operation undertaken at Orton Pit SSSI, Peterborough, UK**
The Froglife Trust

Watson, W (2002)
**Review of fish control methods for the Great Crested Newt Species Action Plan**
CCW contract science report no. 476. CCW, Bangor

**The Pond Book: a guide to the management and creation of ponds**
Pond Conservation Trust, Oxford

Biosecurity

ARG UK Advice Note 4: **Amphibian disease precautions: a guide for UK fieldworkers**
Available from the publications section of the ARG UK website www.arguk.org

For information concerning non-native species (plant and animal species): www.nonnativespecies.org/

Health and Safety

British Crop Protection Council (2001)

Environment Agency (October 2001)
**Electric Fishing Code of Practice**
Reference No. EAS/6100/4/02

Gent, T and Gibson, S (1998)
**Herpetofauna Workers’ Manual**
Joint Nature Conservation Committee, Peterborough

*Health and Safety Executive*

**Five steps to risk assessment**
Ref. INDG163 (rev 2) 06/06. ISBN 0 7176 6189 X
www.hse.gov.uk/pubns/indg163.pdf

*Health and Safety Executive*

**Leptospirosis**
Ref INDG84. ISBN 978 0 7176 25468
www.hse.gov.uk/pubns/indg84.pdf

*Health and Safety Executive*

**Working Alone. Health and safety guidance on the risks of lone working**
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Nichols, D (ed) (1999)
**Safety in biological fieldwork – Guidance notes for codes of practice (4th edition).**
London: Institute of Biology

National Joint Health and Safety Committee for Water Services (1983)
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