water for wildlife

Environment Agency

THE wildlife TRUSTS

otters and stillwater fisheries

Protecting **Wildlife** for the Future

Contents

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Photography © Environment Agency, M J Hamblett (otter, cover) and Mark Hamblin (www.toothandclaw.org.uk) (otter, p4)

otters and stillwater fisheries

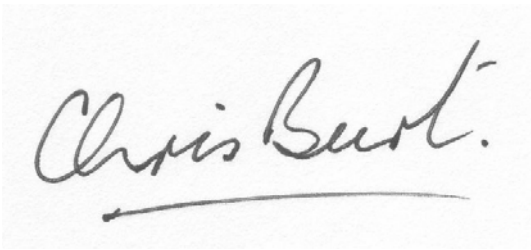
With the recovery of the otter population across most of the UK, and the increasing number of stillwater fisheries, concern about the impacts of otter predation on vulnerable specimen fish and fish farms is growing. Fishery managers need to be aware of the likelihood of predation by otters and whether and how they should protect their fishery. In the majority of cases carefully planned protection measures using otter-proof fencing can be very effective.

This document is designed to provide stillwater fishery owners and managers with the information they need to decide how to deal with the predation of fish by otters. It is underpinned by research carried out by Geoff Liles and Roger Trout (see further reading). Further help and advice is available from Water for Wildlife officers at the Wildlife Trusts, and local fishery and biodiversity officers at the Environment Agency.

"There is an increasing likelihood of otter predation occurring at any fishery, so it is essential to understand the issues and the options available. The otter is welcomed back as an integral part of our environment and is a protected species too; we as anglers have to accept the associated risks posed to specimen fisheries in particular, and manage them where possible.

Fencing is suitable for stillwaters to protect fish stocks and proven designs have been established through detailed research, and I welcome this new guidance which details the options available and explains the thinking behind the measures. It gives a comprehensive and well informed outline of all the relevant issues and how they can be addressed. The background research report can be accessed at www.saauk.org which also provides further details on how to build such fencing.

Funding for such fencing is an ongoing problem as it is expensive and this will prove prohibitive for many fisheries. A contribution towards costs may be available however from the Environment Agency through "Fisheries project bid funding", but for public access waters only. In spite of the high cost involved, I would strongly recommend that plans for full fence specifications be considered for your fishery if any protective measures are to be taken, as this represents the only effective, long term solution."



Chris Burt, Vice President Specialist Anglers Alliance

Decline and recovery

Once common throughout the UK, the otter began to suffer from persecution and increasing river pollution from industrialisation in the early 19th century. By the late 1970s it became clear that there had been a sudden and disastrous decline in the otter population throughout England and Wales since the late 1950s and that this fall was continuing. By 1980 the otter was almost extinct in most of England, parts of Wales and some areas of Scotland. The population crash in the second half of the 20th century was largely the result of pollution from agricultural pesticides, in particular a group of chemicals known as chlorinated hydrocarbons or organochlorines. These same chemicals also caused the sudden crash in populations of other predators, most notably peregrine and sparrowhawk.

European otter, *Lutra lutra*

There have been successive bans on the use of organochlorines from the 1960s, and the otter first received partial legal protection starting in England and Wales in 1978. Otter populations began to recover in the 1980s.

In England, the population has been reinforced through releases of captive bred animals in some localities during the 1980s and 1990s, whilst everywhere enormous efforts have been made to restore waterside and wetland habitats to speed the otter's natural recovery. This has undoubtedly been helped by steady improvements in water quality, particularly following the ban on pesticides such as dieldrin.

Otters and the Law

Otters received full protection under the Wildlife and Countryside Act 1981 (WCA), the Wildlife (Northern Ireland) Order 1985, and also by the EC Habitats Directive. The Habitats Directive is transposed into domestic law through the Conservation (Natural Habitats &c) Regulations 1994 and subsequent amendments covering England and Wales, Scotland and Northern Ireland. The otter is classed as a European Protected Species and therefore has the highest level of protection. This suite of legislation makes it an offence to kill or injure an otter or attempt to do so, to damage or destroy their breeding or resting places or obstruct access to them.

It is also an offence under the WCA to intentionally or recklessly disturb an otter in its place of rest or at a breeding site, and there is also an offence of significant disturbance under the Habitats Regulations. Further advice on legal protection can be gained from the relevant statutory nature conservation body - Natural England, Countryside Council for Wales, Scottish Natural Heritage and the Environment and Heritage Service, Northern Ireland.

Although licences can be issued for what would otherwise be offences under the various legislation, for conservation and development purposes (the latter only under the Habitats Regulations), strict criteria are used in assessing licence applications. As long as suitable alternative methods of resolving the problem exist, it is very unlikely that any licences would be issued to trap and remove otters which are predating a fishery, and such licences would normally be refused.

Otters are territorial animals, and removing an individual will create a vacuum which will be occupied by another otter in due course. This would therefore be only a short-term, ineffective solution, and not acceptable on conservation grounds for a European Protected Species.

otter biology

It is important to know some basic facts about otters in order to understand the impact that they may have on a fishery, how possible solutions may work and what will be ineffective.

Prey and feeding behaviour

The majority of an otter's diet, usually 70-80%, is made up of fish, especially eels and other slow-swimming species. Amphibians are also a key food source, but they will also eat crayfish, waterfowl and small mammals

If the fish taken is small, or a larger fish hauled some distance to a favoured feeding location, then only scattered or a cluster of fish-scales may be present. Larger fish hauled to the shoreline are unlikely to be eaten in their entirety, but may be partially stripped of flesh then discarded in situ. If visits to the fishery are infrequent, then skeletal remains may be all you discover, particularly once other predators have visited and also eaten parts of the dead fish.

Otters hunt by sight where they can, but can fish in turbid water, using their whiskers to sense vibrations in the water caused by fish movements. In fresh water, otters generally feed at night, starting around sunset, since this is when many fish species become torpid and easier to catch. They feed for periods through the night, and in between spend time grooming and resting.

Habitat and home range

A resident otter will occupy a well-defined 'home range', usually including a stretch of river as well as associated habitats including side streams, ditches, ponds, lakes, wetlands, woodlands and the sea.

The size of an otter's home range depends largely on the availability of food and shelter, as well as the presence of neighbouring otters. On rivers a male home range may be up to 40km of watercourse and associated areas. Females have home ranges half the size of the males, and favour quieter locations with little disturbance, particularly on tributary streams rather than the main river.

Transient otters

Otters which do not have an established home range are known as 'transient otters'. These may include young animals dispersing from their mother's home range, individuals seeking a mate in areas where population density is low or any other otter looking to find an unoccupied area to inhabit. Transient otters may make use of an area for a short while like garden ponds, but will move on if conditions are not suitable, or if they are forced to do so by resident animals.

Resting sites

Within an otter's home range there will be a large number of resting sites. These may include above-ground shelter in dense scrub and undergrowth, amongst flood debris in rocks and boulders, and in reed beds; in undisturbed areas an otter may just curl up in tall grass. Underground 'holts' include cavities under tree roots, enlarged rabbit burrows, badger setts, caves and dry drainage pipes. Otters may even rest under sheds or amongst piled timber. Resting sites are often very difficult to identify.

Breeding

Otters may breed at any time of year. The female otter selects an undisturbed holt close to an abundant food source often away from the main watercourse, in which she gives birth to a litter of one to four cubs (normally two or three). The cubs remain in the holt for about three months and stay with the mother for up to a year, by which time they should be independent enough to catch their own food.

Mink

American mink are widespread and will take fish when they can. It is hard to tell whether a mink or an otter has killed or damaged a fish, and the best way to tell is to monitor for scat and footprints. Mink occupy similar habitat to otters and can be difficult to distinguish. If you do have mink, you may trap them without a licence, ensuring you use a trap with an otter guard (intentionally or recklessly trapping an otter is illegal). Your local Wildlife Trust or EA contact should be able to offer further advice and help. For information on best practice, see the mink technical guidance note on the Defra website (hyperlink on back page).

recognising the signs

Tracks

OTTER

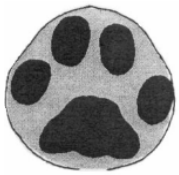
5-7 cm across
(smaller for cubs)

MINK

2-4 cm across

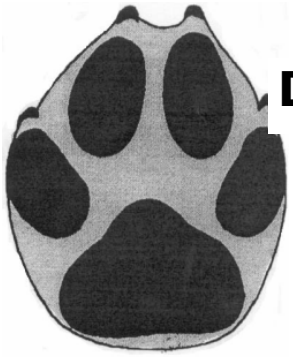
Not to be confused with:

CAT



BADGER

DOG



Droppings

OTTER SPRAINT

Fish bones & scales, frog bones, sometimes crayfish fragments, mammal bones, feathers

Size and shape varies from a tiny blob to a compact cylindrical dropping up to 60mm long

Fresh spraint is black and tarry, slightly sticky

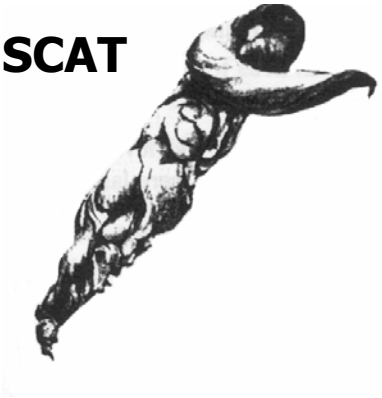
Smells sweet, similar to cut hay or jasmine tea

Recent spraint is drying out, turning oily green in colour and may crumble

Old spraint has dried out, become pale grey and crumbly, like cigar ash

Also look for tar spot and anal jelly, a blob or dribble of black tar-like material or jelly, smells characteristically of otter but without fish bones etc

MINK SCAT



Usually made up of fur and feathers, with some bones and fish scales

Twisted and tapering to a point, more like a small fox dropping

No wider than 10mm

Dark brown to black, shiny when fresh

Smells very unpleasant, similar to rotting meat

Older scats go mouldy rather than crumbly and lose their scent

Not to be confused with

Bird droppings; these vary with species, but most smell muddy or, if fresh, of ammonia. Some may contain fish remains, but lack the distinctive otter smell

Duck droppings are usually greenish and are often gritty

fisheries and otter predation

All managed stillwater fisheries and fish farms provide otters and other predators with an easy and abundant food supply which they are unlikely to ignore.

Even though otter populations have not yet recovered in some areas, the natural recovery of otter populations is continuing and otters will become reestablished in most, if not all, areas over the coming few years.

All stillwater fisheries are at risk of being found by an otter at some time, even if the site is far from major watercourses. Otters follow very small streams and ditches, even if they are dry, and will even cross open country in search of feeding and resting sites.

It is therefore important to assess the implications of predation by otters seriously, wherever a stillwater fishery is. Your local Wildlife Trust or Environment Agency fisheries and biodiversity officers should be able to offer help and advice on how best to protect your fishery.

All types of unprotected stillwater fishery are vulnerable to predation by otters. The degree and cost of the damage will vary, depending on the type of stillwater fishery. However, there may be occasions where a stillwater fishery provides a particularly easy supply of food, and in these circumstances an otter may spend a disproportionate amount of time on the site.

Stillwater fisheries at greatest risk

Several situations encourage locally high predation:

- Large fish such as carp, stocked in enclosed waters *without* other fish species; the fish may be particularly vulnerable in winter when they are torpid.
- Heavily-stocked commercial or club fisheries, where fish are kept at high densities in confined spaces, making them easy for an otter to catch or damage.
- Fish farms with similarly high densities of prey in small, enclosed ponds.
- Garden or ornamental ponds can provide valuable alternative food resources, particularly in urban situations.

Is my fishery at risk all the time?

Stillwater fisheries may suffer predation from otters in the area at any time. However predation levels will vary according to location, vulnerability and time of year.

If predation is by a transient otter, this may be for a short period only, and may not re-occur for months or perhaps even years, if there are no resident otters in the area.

However, a stillwater fishery may provide an ideal site for a female to teach her young how to catch prey, so it will suffer higher losses if a female with cubs is resident in the area. Otters in the UK do not have a particular breeding season so this can be at any time of year.

Stillwater fisheries may also be more vulnerable to predation by otters in winter or times of flood since they provide a valuable food supply when alternative sources of prey are limited or unavailable.

Planning for new stillwater fisheries

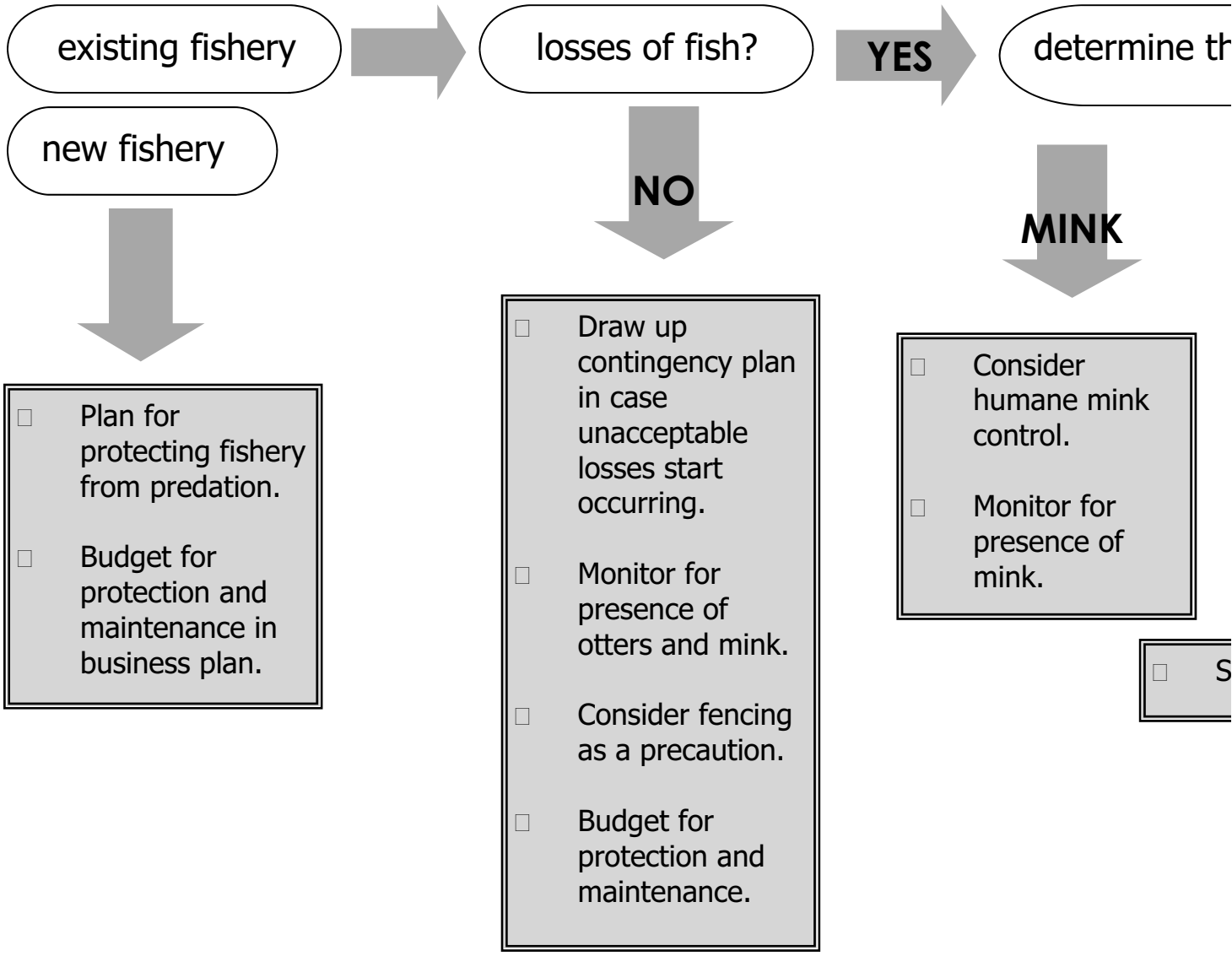
When setting up a new stillwater fishery, it is important to plan for risk of predation by otters, since this will happen sooner or later.

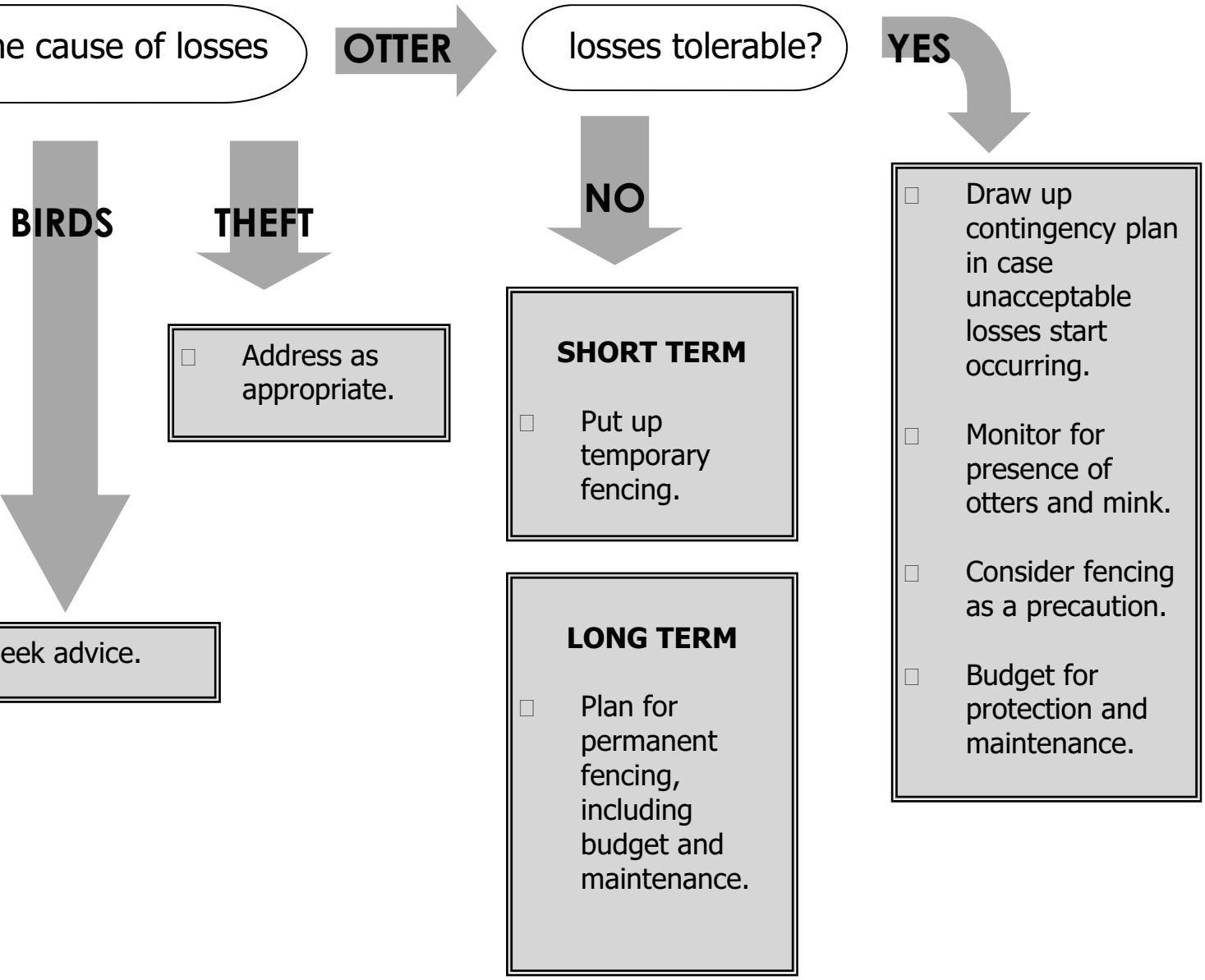
Consider protecting your fishery from otters at the earliest stage of planning, since this can save on cost and problems at a later date. Include the costs of fencing and its maintenance in your business plan. Take into account the time needed to maintain the fencing.

You may wish to install otter-proof fencing as part of setting up the stillwater fishery. Alternatively, if when you design the fishery, you take the future need for fencing into account, it will be easier and probably cheaper to install when the need arises or funding allows. You will not need a Defra licence to install this type of fencing.

If you already have robust fencing in place, you may be able to upgrade it by the addition of a ground level apron of mesh (see page 20). Please talk to an Environment Agency or Wildlife Trusts officer for further advice to see whether your fencing can be modified effectively.

deciding what to do




ne cause of losses
OTTER
losses tolerable?
YES
BIRDS
THEFT
NO
Address as appropriate.
SHORT TERM
Put up temporary fencing.
LONG TERM
Plan for permanent fencing, including budget and maintenance.
Draw up contingency plan in case unacceptable losses start occurring.
Monitor for presence of otters and mink.
Consider fencing as a precaution.
Budget for protection and maintenance.
eek advice.

mitigation options

A number of methods for protecting fisheries from predation by otters have been tried, including noise deterrents and spotlights. However, none of them are fully effective and fencing remains the best protection to your fishery from otters.

Deterrents

Deterring an otter by disturbance can work for a while, but is unlikely to be effective in the long term. An otter is likely to become quickly accustomed to mechanical noise such as a gas gun. Since otters are mostly nocturnal it is not practical to have a human patrol to deter an otter. Moreover, an otter may not be put off by human presence unless it is close by.

Dogs quite often lose interest in the presence of an otter, and they will not necessarily be able to patrol all parts of your site. Otters are large and powerful with very sharp teeth, and a female will not hesitate to defend her cubs, so there is a risk of a dog suffering injury if it confronts an otter. Different otters react differently to dogs, and some may not see a dog as a threat.

Removal of habitat

It is an offence under the Wildlife and Countryside Act 1981 (as amended) to knowingly or recklessly damage, destroy or obstruct an otter's resting place.

If you wish, you could design and manage the site to avoid creating new habitat that would provide attractive cover for otters. However, if there is other suitable habitat within reach of your stillwater fishery, avoiding creating attractive habitat for otters will not make much difference to the likelihood of an otter visiting. This approach would also reduce the amenity and wildlife value of your site.

Fish refuges

Fish refuges can provide effective protection for smaller fish, not only from otters but from avian predators - herons and cormorants. However, a mesh size of 85mm maximum is recommended since there is a risk of otters becoming trapped under water in the refuge and drowning. Fish refuges are ineffective in protecting larger specimen fish.

Removal of the otter

Trapping and removing an otter or shooting it is against the law. This should not even be considered. In any case this would only have a short-term effect, since the removal of a resident otter would simply create a vacant home range, which will soon be colonised by another individual.

Decoy/sacrificial ponds

The use of decoy or sacrificial ponds may distract an otter from attempting to enter a fenced fishery nearby, especially in a situation where a previously utilised resource is fenced off, and they can also be of value for other wetland wildlife.

However, there is no guarantee that this will be successful, and it will also be necessary to regularly replace the stock taken by the otter and other predators.

otter-proof fencing

Post and rail, strand wire fencing and standard stock netting will not exclude an otter from a fishery. Otters are able to dig, to climb and to find their way through surprisingly small gaps. Therefore, in order to be otter-proof, any fencing must:

Prevent an otter climbing through the fence

An otter can squeeze through a gap that is as small as 100mm wide. The maximum hole size for fencing to exclude otters is therefore 75mm. The most commonly used otter-proof fencing is wire mesh with this size hole or smaller. There must not be any gaps in the fencing larger than 75mm, including joins in the fencing, at outflows or at the bottom of the fence.

The use of high tensile mesh will ensure that the fence is strong enough. Mesh fencing must be of a type that a wire cannot be pushed aside to make the hole larger.

Electric fencing used in conjunction with mesh fencing will provide an additional deterrent to an otter attempting to climb through a fence.

Prevent an otter digging under the fence

An otter can dig under the base of a fence, especially into soft ground and where it has been disturbed. Other animals may also dig under a fence, creating a hole which an otter can use. An apron of mesh fencing at the bottom of the fence must therefore be buried vertically or turned horizontally along the ground and securely pegged down.

Alternatively the fence could sit on a solid base in such a way that it cannot be pushed up, although this is only likely to be practical along short sections.

A low electric scare wire placed in front of the fence will provide an additional deterrent to an otter attempting to dig under a fence.

Prevent an otter climbing over the fence

Otters are surprisingly good climbers. An adult male can stretch to the top of a 1 metre fence without needing to use its front feet to climb, and could easily scale a 1.5 metre fence that has footholds, if determined to do so. Mesh fencing therefore needs either an overhang or an electric scare wire (both can be used in conjunction).

Alternatively, a high and sheer fence type without any footholds can be used, although this is likely to be particularly expensive and intrusive, or if made of wood, less durable.

The struts of straining posts must be on the inside of the fence to prevent an otter using them to climb. It is also important to ensure that there are no features nearby which an otter could use to help it reach the top of the fence, such as a leaning tree or overhanging branch.

Prevent an otter pushing the fence over

An otter is heavy and strong enough to push poor quality fencing over by standing on its hind legs and leaning on and stretching the fence. Wire mesh gauge must be at least 1.1mm diameter; good quality rabbit net is strong enough.

The line wire used to support a mesh fence should be high tensile line wire not mild steel.

For maximum strength, mesh fencing should be attached to the outside of the fence posts. The fence posts need to be strong enough and spaced at a distance which will keep the fence taut.

Other weak points

Any fencing is only as good as its weakest point; particular attention should be paid to areas such as gates, inflows and outflows and where different types of fencing are joined. Gates should also be located at the furthest point from the water course.

positioning the fence line

The position of a fence can influence both capital and maintenance costs and its effectiveness. A number of factors need to be considered when deciding the line of the fence.

Visual impact

Consider the visual impact that the fence will have. For example, positioning the fence in a natural dip rather than on a ridge will reduce its impact. Nearby vegetation may screen the fence, or such a screen can be planted if desired. On the other hand, surrounding vegetation may need to be managed so that the fence does not get pushed over by falling branches or to avoid electric fences being short circuited.

Watercourse crossing points

The fence may need to cross watercourses; these points will need otter-proofing which may be complicated and costly. Crossing points are also prone to damage from flooding and will require regular maintenance.

In England and Wales, if the fence is to be sited across a watercourse or within a flood plain, Environment Agency consent may be required. In Scotland, similar consent may be required from Scottish Environment Protection Agency. Contact your local office for advice.

Ground conditions

Avoid waterlogged soils, shallow soil over rocks or other areas where it will be difficult to put the fence posts in firmly. Take account of areas which flood as this may damage a fence or put an electric fence out of action.

In areas prone to drifting snow, position the fence to minimise problems through weight or depth of snow against the fence.

Avoid positioning the fence near to raised features that could be used by an otter to jump from.

choice of fencing type

Site conditions

If the ground is hard or stony, it will be difficult and expensive to put in posts suitable for supporting strained wires. It will also be difficult to dig trenches to bury the bottom apron of a wire fence. If there is woodland or individual trees in the vicinity of the proposed fence, there is a risk that even small branches will fall and damage the fence. Here choose a fence design that will best withstand this risk.

Disturbed and made-up ground will usually be softer than the soil in other areas of the fence line. If a mesh fence is used, these lengths will need to have a wider turned horizontal apron (600-1000mm rather than 200-300mm).

Stock-proofing

If the fence needs to enclose or exclude livestock, it will need to be stockproof and not be damaged by stock. Fencing which relies on an overhang to be effective is easily damaged by cattle and horses and should not be used without it being protected from these animals by an electric wire.

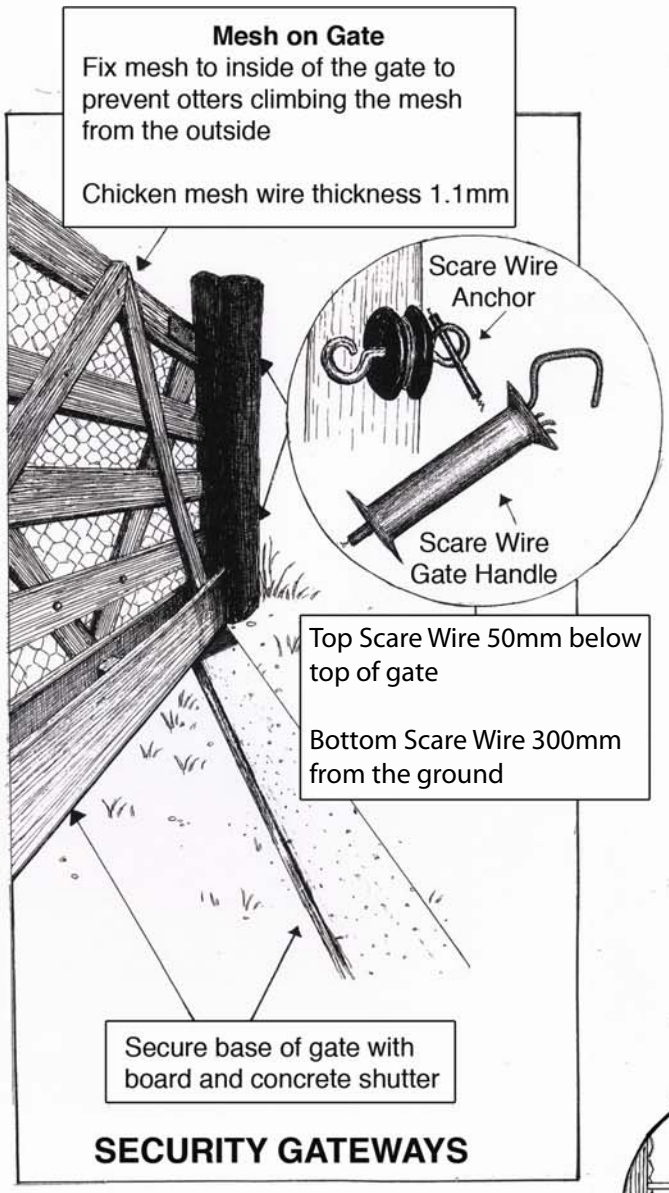
Visual impact

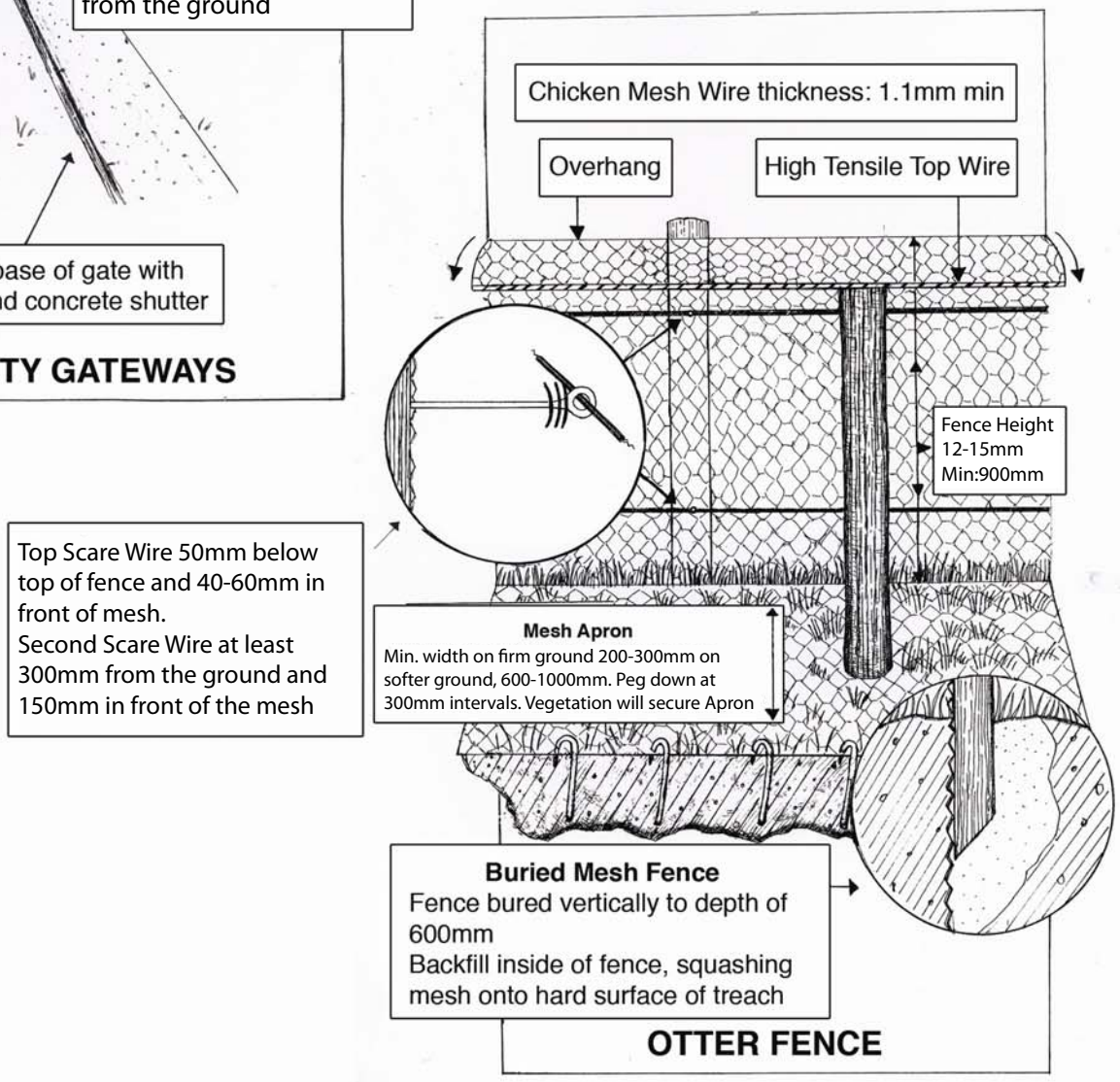
You may want to choose a design that is least obtrusive. If the fencing is to form the boundary of a garden, for example, chestnut paling or close lap fencing may be more acceptable than wire mesh.

Cost

Costs per metre, for labour as well as materials, will depend on the fence type. Chain link, 75mm lock-knot rectangular mesh and welded mesh are more expensive than rabbit or chicken wire or electric netting. However, they will last longer and may save money in the long term. High tensile line wires allow fewer stakes to be used but are more difficult and therefore more expensive to install. There will also be the need to factor in the ongoing cost of electricity. If your fishery has public access, you may be able to obtain financial support from you local EA offices under the fisheries project bid funding, or from other funding streams such as the Heritage Lottery Fund.

fence and gate detail





electric fencing considerations

The most effective proven designs involve an electric deterrent. These include wire mesh netting, electric scare wires, electric netting or multiple strand wire.

Electrified mesh fencing is relatively cheap and is only useful as a temporary measure which will give time to decide what to do in the longer term or as a solution to seasonal predation incidents. It can also be used in the longer term but may not be effective and has a high maintenance burden.

Effectiveness

Where there is no physical barrier to otters, electric fencing will only work if the otter is deterred by the fear of getting a shock. A single shock may be enough to put an otter off. However, an otter may continue through or over a fence despite receiving a shock, especially if it has been visiting the fishery for food before the fencing was put up or if it is particularly hungry. It may also do so if it has been through the fencing once it has been installed but not switched on. If an otter breaks through electrified fencing successfully once, despite receiving a shock, it may do so again. It is therefore vital that it is always working.

Risk of otter being trapped inside

If the electric fence is not live for some reason, an otter may get into the fishery. Before turning the current back on, ensure that the otter has left the fishery, or it may become trapped inside.

Distance from mains electricity

Electric fences can be operated by mains electricity units and the current carried about 500 metres to the fence. The cost of cable and the ease of installing it needs to be considered. Battery-operated fencing relies on the batteries always being charged and is not recommended unless the site has a site manager in daily attendance responsible for management and maintenance.

Electric netting has a higher electrical resistance than strained-wire electric fences, which means that longer stretches of strained-wire fences can be run off a single energiser.

Inspection and maintenance burden

All types of electric fencing will require more regular checking and maintenance than other fencing types, to ensure that it is working and has not been short-circuited by touching vegetation, fallen branches, snow etc. These significantly reduce its effectiveness - the more vegetation in contact the less powerful the shock. Even in winter, electric netting is liable to fail if too many leaves or twigs build up against it. Automatic telephone/pager alarm systems to warn of circuit failure are under development, but are not yet available.

Safety

Electric fencing should not be used close to areas that members of the public visit, particularly alongside narrow paths and at the height of a child.

In addition, by law electric fencing must not lie within two metres of telephone lines or within 15 metres of power cables, and fence earthing systems should be positioned at least 10 metres from any electricity supply earth trip.

Impact on wildlife

Electric fencing can be detrimental to other wildlife, including amphibians and hedgehogs which can become entangled within mesh or receive a shock from a 'live' strand and be killed. Avoid electric mesh or low electric wires where these species are present. To protect other species, strands are less likely to ensnare them than electrified netting.

wire-mesh fencing

Wire mesh fencing provides a good barrier against otters, if modified to prevent an animal climbing over it through the use of an overhang or an appropriately placed electric wire. Similar modifications can be made to prevent animals digging under the fence, either with a physical barrier or an electric scare wire.

Electric scare wires in conjunction with mesh fencing are very effective. If the basic fencing is constructed to a high standard with all weak points properly safe-guarded, and with an overhang to stop otters climbing over, further electric deterrent is generally unnecessary.

Suitable mesh

For any mesh used the wire must be at least 1.1mm gauge unless electric scare wires are used, in which case a lower gauge may be used.

- Galvanised hexagonal chicken net - 50mm mesh.
- High tensile 'locked joint' net, maximum 75mm mesh.
- 31mm Galvanised hexagonal rabbit net.

Welded mesh and chain link mesh are stronger than required and usually have a mesh size which is smaller than necessary. They are also hard to work with and very expensive.

Fence specifications

- Minimum height of 900mm.
- Support mesh with at least two line wires of high tensile wire, one each at the top and the base. Mild steel is NOT suitable.
- Fence posts at 10-12 metre spacing on flat ground.
- Corner and straining posts must be properly dug in and braced.
- All posts including straining post struts should be inside the fence to prevent otters climbing up them.

wire-mesh fencing

General

- hold electric wire at fence posts using screw-in or nailed insulators.
- at joins, use insulated tensioners to preserve tension.
- elsewhere, tensioned electric wire can be held at the correct distance from the fence with 150-200mm plastic cable ties inside 50mm lengths of water pipe.
- to be effective, scare wire must always be 'live' at times when an otter may be present.

Securing fence base

This can be done by installing a horizontal mesh 'apron' at the base of the fence, by burying the bottom section of the fence vertically or by having a solid base on which the fence sits.

Mesh apron

- Minimum width: 200-300mm on firm ground, 600-1000mm on softer or disturbed ground.
- Peg down at 300mm in tervals.
- Vegetation growth will also help secure apron: place turfs on top of the apron and/or cut vegetation before construction.

Buried mesh fence base

- Fence buried vertically, to depth of 600mm.
- Backfill inside of fence, squashing mesh on to the hard face of the trench.
- More difficult/expensive than the apron method.

Solid base

- E.g. concrete or railway sleepers.
- Fence must reach down to the base and be very taut or secured to the base.
- Only suitable for short sections where other methods are inappropriate.

Overhang

Overhangs can be damaged by livestock and should not be used where livestock may be kept on either side of the fence, unless an electric scare wire is used to keep the livestock at bay.

- Overhang must face outwards.
- Angled or horizontal.
- Use in place of electric scare wires or in combination for extra protection.
- Minimum height 1 metre from the ground.
- Minimum width 300mm wide with electric scare wire, 450mm wide without.
- Outer edge fixed to a separate line wire, held out from fence either by separate stakes 400mm out from mainfence line, or supported by rods attached to fence posts.
- Secondary posts can also be used to attach electric scare wires.

Electric scare wire

An electric wire running along the outside of the fence, usually attached to the fence posts, positioned so that the otter will touch it and receive a shock if it tries climbing the fence.

Top Scare Wire

- Positioned 50mm below the top of the fence.
- Offset no more than 50mm out from the fence line.

Second Wire

- Useful additional deterrent.
- Recommended in absence of an overhang.
- Positioned at least 300mm from the ground and if possible 150mm in front of the fencing mesh.

electric fencing

It is important to discuss your requirements with your supplier to ensure that you get a high enough specification for your needs.

Energiser

- Minimum requirement is 1.5 Joule energiser.
- Fast pulse rate.
- More powerful energiser needed for longer fence or electric netting.
- Locate fence energisers inside the fence.
- House the energiser within a vandal proof box.

Power supply

- Mains supply is most reliable and requires least maintenance.
- Batteries need regular checking and recharging. Flat batteries leave the fishery unprotected and reduce the effectiveness of the deterrent.
- Wind or solar power generators can be used. Solar power is less effective in winter, when the fishery may be at greatest risk.

Earth return system

A good earth return system is essential to ensure that the electric pulse can complete its circuit and give the otter an effective electric shock.

- Ideally, use a copper earth stake penetrating at least 1 metre into the ground.
- Place the earth stake close to the energiser for ease of connecting the two.
- Ground must be relatively damp for current to pass through.
- In dry or frozen conditions, run an earth return wire in parallel to fence line, connected to earth stakes at regular intervals.
- Mains energiser needs to be connected to a separate earth point, NOT to the earth of the mains supply.

Leakage/shorting

- If possible, electrified line or net should only touch insulators or insulated posts.
- Manage surrounding vegetation to avoid contact with electrified wire, particularly with electrified netting.
- Join wires with connectors to minimise 'leaks' and prevent arcing and voltage loss.
- Use pinlock insulators on fence posts. A wooden post or gate can act as a superb earth when wet, especially on high output systems.

Inspection and maintenance

Since an electric fence will only work when live, it is essential that it is inspected and maintained regularly. Inspections should ideally be conducted daily during the first two weeks of use, to ensure that any otter receives an electric shock when it first encounters the fence. The fence voltage should then be checked at least once a fortnight. Your supplier should be able to give details on how to do this and general fence maintenance.

To maintain effective otter deterrence, batteries should be replaced when the fence voltage falls below 4kV. Some energisers have indicators to show when the voltage is low.

It is important to check that the fence is not 'leaking' due to long grass, branch overhang, blown leaves or litter touching it . Vegetation will need to be cleared regularly during the growing season. Fence lines and particularly netting can easily sag, putting them into contact with adjacent wires, vegetation or the ground.

Safety

All electric fence systems must comply with British and European Standards.

electric netting

Electric netting is the best temporary or seasonal fencing for excluding otters, being simple and quick to erect and dismantle.

Netting fences vary in specification but generally consist of a heavy-duty, polythene twine mesh in which the horizontal strands are interwoven with electrically conductive stainless steel wire. Less obtrusive green electrified rabbit net is available as an alternative to the standard orange netting.

The fencing must be at least 700mm high; super rabbit netting is ideal. Electric sheep netting is not suitable since the holes are too large.

Installation

Prior to installation, mow or spray off a 500mm wide strip along the fence line, to ensure that the conducting wires are kept clear of vegetation that would otherwise short circuit the system and reduce efficiency.

Electric netting must be live as soon as it is erected to prevent passage by otters: if an individual learns to cross when the fence is not electrified, the fence will be ineffective as a deterrent.

Inspection and maintenance

Electric netting requires similar inspection and maintenance to electric fencing. Netting is electrified closer to the ground and is therefore more susceptible to problems caused by vegetation, litter or heavy snowfall.

It is also flexible and therefore more likely to lean and touch objects including vegetation that will cause it to short.

The posts may become loose in wet and windy weather and need checking and re-positioning every day. It may be necessary to add extra posts to prevent sagging.

A powerful energiser will help overcome some shorting.

multiple strand electric fencing

Some fishery sites have used stand-alone single or multiple parallel strand electric fences. However this has not been tested on captive otters, and no recommended specification with an endorsement of its efficacy is available.

The conducting wires of strained-wire fences are made from either polythene twine interwoven with steel strands (polywire) or stranded galvanised steel. Polywire is cheaper, but is a poorer conductor: galvanised steel is a better conductor and generally more effective.

One fencing supplier suggests a three-wire fence for otter and mink, with the wires 70mm, 140mm and 210mm from the ground.

The fencing advised to exclude badgers and foxes may be appropriate. For example a strained-wire fence with four electrified parallel wires at heights of 100, 150, 200 and 300mm above the ground. The wires are held by adjustable plastic insulators supported on metal stakes. The stakes can be placed up to 10 metres apart, although ground undulations may dictate closer spacing. Where the fence line bends, anchor posts should replace the normal metal stakes.

The whole system is tensioned at a reel post placed at the end of the fence. This is important to keep the live wires parallel. This can be difficult, especially on a contoured site. As an extra precaution the wires can be held apart using sticky tape or cable ties.

Wires at a low level need regular inspections to ensure that they are not earthed by growing vegetation etc.

other types of fencing

There are three options, all of which are very expensive, with the wooden options likely to have a shorter life expectancy. However some, especially the chestnut paling, may be more visually acceptable in some circumstances. All will need to be on a solid base to prevent animals from digging underneath, or with a well attached mesh apron buried into the ground.

All these options need to be at least 1.2m high.

Featherboard/closeboard fencing

The difficulty with this type of fencing is making the base fully otter-proof, unless it is on a solid base. It is possible to staple a mesh apron to the base of the fence. It is most likely to start rotting first at the base, creating entry points.

This type of fencing must be installed with the horizontals on the inside of the enclosure.

Metal security fencing

This type of fencing is particularly unsightly and costly, so it is only likely to be chosen at sites where unauthorised entry by people is also to be prevented. It is, however, strong and long-lasting.

The vertical bars are usually too widely spaced to offer otter-proofing.

As with the other vertical bar types of fencing, the main issue is ensuring the base is secure from digging.

Chestnut paling

Chestnut paling comprises vertical lathes of chestnut joined with wire. The distance between lathes must be no more than 75mm. Sweet chestnut is naturally durable and low maintenance long lasting fencing that does not require the use of any harmful chemicals to stop it rotting. The wood is generally sourced from sustainable woodland management in the South East of England - this is where it is most easily available.

The difficulty with this type of fencing is making the base fully otter-proof. It is most likely to start rotting first at the base, creating entry points. It also needs enough posts to ensure that it cannot be pushed over since it has no inherent strength. An otter may also be able to climb over using the wires.

protecting weak points

Gates

- The gate must be of a type that an otter cannot get through or over. Attach netting to an existing wooden gate. If no electric fencing is being used this must include an overhang.
- A heavy timber or concrete block placed under the gate will prevent an otter or other animal from digging under it. Alternatively, wire mesh can be laid along the ground up to the gate, and buried 75mm below the surface.
- The join between the fence and the gate must be secure. It is advisable to ensure that the gate posts are very securely installed to prevent them shifting and creating a space large enough for an otter to get through. Gates should not be hung on posts that are strainers for the fence.
- If electric fencing is being used the gate can be protected with an electrified spring gate - a strand of electrified wire that can be stretched across the top of the gate.
- There needs to be a protocol to ensure that the gate is securely closed, especially at night, but also during the day when the site is quiet. Make everyone using the site aware of the issue and the importance of keeping the gate closed.

Outflows and inflows, water course crossing

- If possible, run the inflow/outflow through a pipe of no more than 75mm diameter. If a greater capacity is needed, use multiple pipes of this diameter.
- If piping is not possible, use welded mesh panels with a 75mm spacing across the stream. Create a separate mesh dam or balloon within the lake to keep most flotsam away from the mesh.
- Regular checking and maintenance will be necessary to prevent blockages.

In England and Wales, consent may be required from the Environment Agency to fence across or pipe inflows or outflows. In Scotland, consent may be required from SEPA.

fencing options: summary

OPTION	ADVANTAGES	DISADVANTAGES
Permanent fencing (electrified)	□ Very effective. □ Less visually obtrusive. □ Flexible.	□ High initial costs. □ Needs power supply and ongoing maintenance. □ Can cause obstruction to other wildlife and users.
Permanent fencing (not electrified) Post and rail with chicken mesh, with an overhang and dug in	□ Very effective. □ Less visually obtrusive. □ Flexible. □ Cheaper to maintain.	□ Relatively high initial costs. □ Needs ongoing maintenance. □ Can cause obstruction to other wildlife and users. □ Less effective than electrified fence.
Super rabbit netting	□ Quick/easy to erect. □ Effective in short term. □ Relatively cheap.	□ Temporary. □ Visually unattractive. □ Needs power supply and ongoing maintenance. □ Can be dangerous to other wildlife
Multiple strand lines	□ Effective. □ Cheap. □ Easy to negotiate. □ Less visually obtrusive.	□ Awkward to erect/ maintain. □ Less effective than other options.

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further reading

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Biggs J et al (2000) *Ponds, pools and lochans: guidance on good practice in the management and creation of small waterbodies in Scotland.* SEPA, Stirling.

William P et al (1999) *The Pond Book: a guide to the management and creation of ponds.* The Ponds Conservation Trust, Oxford.

FISHERIES AND PREDATION

Trout R C & Liles G (2005) *The use of fencing to prevent access by otters to fisheries: a report to the Environment Agency and SAA.* Available to download from www.saauk.org

The following useful factsheets are available to download from Defra's website at ww.defra.gov.uk/rds/publications

Rural Development Service Technical Advice Note 02 (2005) *Mink.* http://www.defra.gov.uk/rds/publications/technical/TAN_02.pdf

Rural Development Service Technical Advice Note 50 (2005) *Protecting fisheries from cormorants: the use of fish refuges.*

For more information and advice, please contact your local Water for Wildlife Officers based at the Wildlife Trusts, or a Conservation or Fisheries Officer at the Environment Agency. Water for Wildlife is a partnership between the Wildlife Trusts, the water industry and the Environment Agency, taking forward wetland conservation through a network of officers across the UK.

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