

The GCT Mink Raft

The Game & Wildlife Conservation Trust Mink Raft was developed both as a means of detecting mink, and as a favourable trap site. In pilot work in 2002, we found that it was a far more sensitive way to detect the presence of mink than speculative trapping, local knowledge or systematic searches for field signs.

The raft was conceived primarily as a research tool and we continue to use it to develop strategies for managing mink in a UK conservation context. But the raft is also a key feature of those improved strategies. The advantages of a raft-based control policy have been quickly recognised by conservation bodies throughout the UK, and it now forms the basis of many conservation projects, both local and large-scale.

In 2005, the GCT Mink Raft won the first ever Wild Animal Welfare Award offered by the Universities Federation for Animal Welfare, in recognition that it led to a more focused form of control with greatly reduced animal welfare costs.

This leaflet explains how mink rafts are constructed and used, and the range of associated services offered by the Trust. There is much more to the use of mink rafts than can be covered in this brief leaflet. All the topics covered here (and more) are covered in depth at our mink raft training workshops, which can be arranged at a venue and date of your choice.

The GCT Mink Raft is supported by a considerable body of research done by the Trust, which is ongoing. During this research, we have seen no reason to change the original design except in a couple of minor details. Inevitably though, a number of variant rafts have sprung up in other projects. To what extent our research findings also apply to such variants is unknown. You deviate from the well-researched design described here at your own risk.

What is the GCT Mink Raft?

The GCT Mink Raft is a simple, cheap, low-tech device that improves on previous mink control practices in almost every respect.

The raft has two modes of action: monitoring and trapping. In use, it spends most of its time in monitoring mode, and reverts to monitoring after each brief

spell of trapping. In monitoring mode, the raft records the footprints of any visitors (from water shrews to otters), and can be left to accumulate such evidence over a period of one to two weeks. The idea is to set traps only on rafts that have recorded evidence of mink within the last check period. The mink will then usually

be caught within a few days. After running the trap for a maximum of seven to 10 days, the raft is returned to monitoring mode, to establish whether there is still a mink to be caught. In this way, the mink control effort becomes self-assessing, and it is easy to see whether trapping is effectively controlling mink numbers.

Why use rafts?

1 Focus

Fundamentally, rafts give your mink control a clear focus and direction. Imagine you are setting mink traps without rafts. How many traps do you need? What is the best kind of site? For how long should you run each trap? If you catch nothing, should you stop trapping for a while, or should you move the trap?

These are difficult questions but with rafts, they are almost irrelevant. Thanks to the research that underpins the mink

raft approach, you can start with a near-optimal raft density, use the minimum number of traps and will rarely be in doubt about what to do next.

2 Scaled-down trapping

Whereas conventional trapping requires one trap per site, the use of rafts requires a lower number of traps to be available for use and for a far shorter time. The use of traps is therefore vastly scaled down, and so are all the attendant costs: the

need to check traps daily, the capital cost of traps, the ecological and animal welfare cost to non-target species.

3 Reduced manpower/effort

Traps must be inspected daily while set, so using traps speculatively (ie. running them in likely-looking spots) can be very time-consuming. Rafts can be inspected at a much longer time interval while they are simply collecting evidence of mink. Only where a raft collects evidence of recent

mink visits is it necessary to set a trap and check it daily. So rafts save on manpower chiefly because they focus where and when to invest your trapping effort. Manpower is also saved by increased trap efficiency (see below).

Of course, the rafts themselves are an additional cost over and above the cost of traps. Against this, you don't need so many traps. For home construction, the rafts themselves cost approximately £20 each in materials (£40 if you cost in your time), at 2007 prices. A ready-made raft supplied in kit-form costs about £39. For comparison, the cost of spring traps is about £8, and cage traps £22. Hence a cost comparison of conventional trapping versus the raft system will depend on which type of trap is used, and at what density. Nevertheless, because manpower is the greatest expense in mink trapping, there is a net financial saving in most UK situations.

4 Increased trap efficiency

Because traps are set only on rafts shown to be in current use by mink, captures happen quickly (usually within

a few days of trap placement), and thus traps are deployed for a shorter time. Field experience also suggests that rafts are typically much better trap sites than conventional land sets.

5 Reduced non-target captures

Because fewer traps are used, and because they are set for shorter periods, the risk of non-target captures is greatly reduced. Strictly terrestrial non-targets are avoided. Additionally, locations in frequent use by non-target species can be avoided after a short period of monitoring. Movement of a raft by as little as 50m can avoid a water vole colony without affecting the chance of mink captures.

6 Feedback and motivation

There is nothing like a mink footprint to excite fieldworkers and if your mink control is working, the number of rafts with evidence of mink should be falling rapidly. The evidence that this is the case is hugely motivating to fieldworkers, managers and funders alike.

7 Detecting remaining or replacement animals after successful removal by trapping

All culling will have some impact on mink population size, but ecological consequences may perhaps be trivial if some mink are still present after trapping, or if removed animals are quickly replaced through reproduction or immigration. As yet, we don't know what level of mink abundance - if any - is low enough to allow persistence of different prey species. In the absence of such knowledge, the aim of most control efforts is currently to ensure complete absence of mink on a local or wider scale. The GCT Mink Raft provides a method of monitoring presence or absence of mink at specific sites that is independent of the trap itself. In pre-existing trapping strategies, the continued presence of mink at removal sites (or elsewhere) could be monitored only by field signs, direct sightings or further trapping. All of these are less sensitive than the raft method.



The GCT Mink Raft

Raft construction

The GCT Mink Raft is now available commercially (see list of suppliers on page 10), so you may want to skip this section. However, it was intended for home construction and is easy to construct. You will need three power tools: a hand-held circular saw, jigsaw and drill (you could use manual tools if you are making only a few rafts and don't mind work). You will also need trestles (or similar supports), two G clamps or speed cramps, hammer, screwdriver, spanner and knife. A staple gun is handy but not essential. One person can make four to five rafts per day.

The GCT Mink Raft has three elements (see figure 1): a buoyant raft base, a removable tracking cartridge and a wooden tunnel.

The raft base

The raft base is a sandwich roughly 4ft x 2ft, with two 1220 x 610 x 6mm sheets of exterior plywood protecting a central 1200 x 600 x 50mm sheet of expanded polystyrene. These dimensions allow

economical cutting of standard 2440 x 1220 x 6mm plywood sheets and 2400 x 1200 x 50mm polystyrene insulation sheets. A 237 x 152mm rectangular hole with rounded corners is cut in the centre of the plywood sheets using a jigsaw, to accommodate the tracking cartridge. It is best to clamp the two 4ft x 2ft pieces of plywood together with G clamps or speed cramps, to ensure the rectangular holes and bolt holes in the upper and lower sections of plywood are aligned. The sandwich is then fastened together using two 80mm M6 eyebolts (one either end of the raft on the same side) and four 80mm M6 roofing bolts with nuts. After this a sharp, thin-bladed knife is used to complete the aperture through the polystyrene foam. Wire mesh netting (500 x 250mm, 15mm mesh) is stapled over both ends of the raft to assist animals climbing out of the water onto the raft. This wire mesh may not be essential, but it is part of the original successful design, so you leave it off at your own risk.

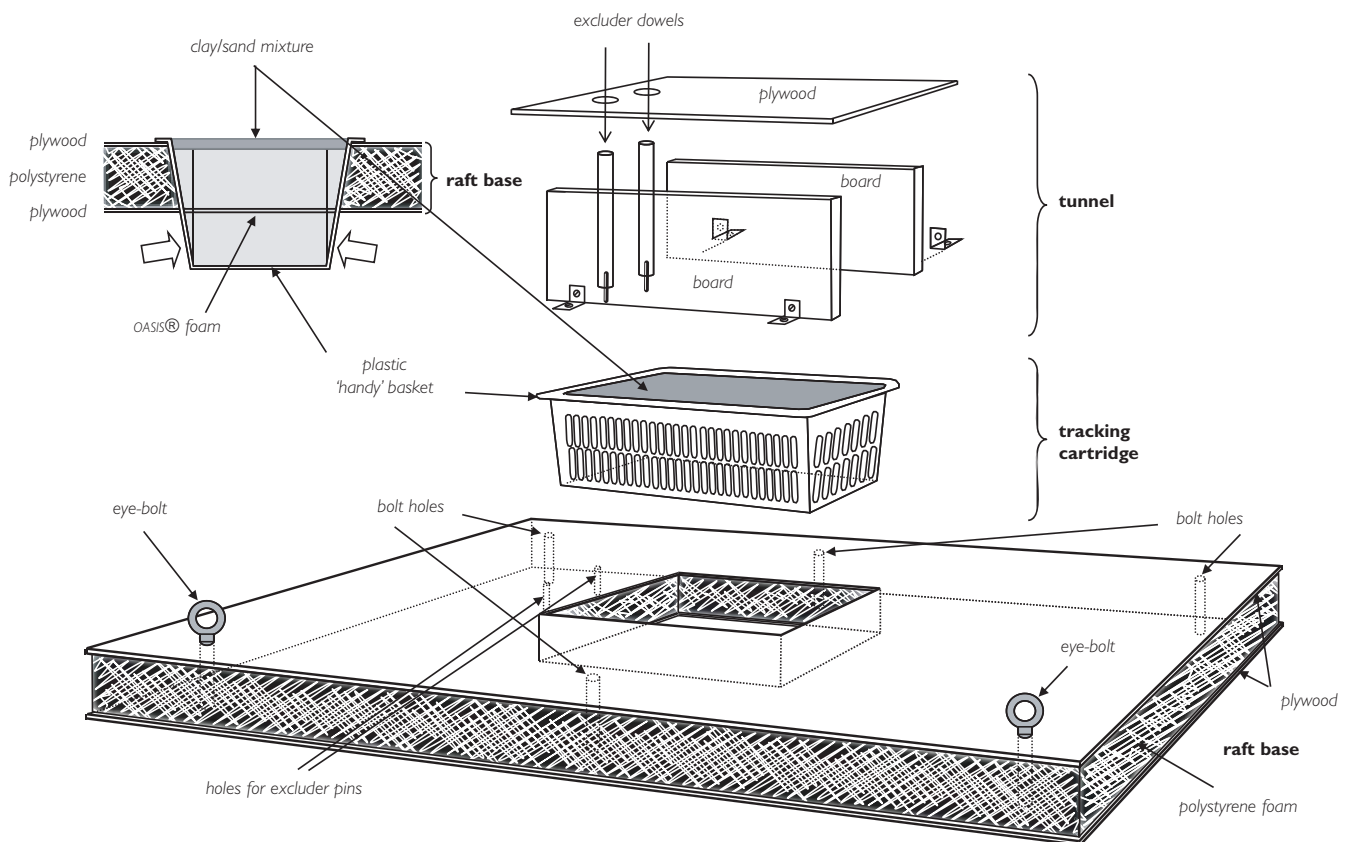
The tracking cartridge and clay mixture

The tracking cartridge consists of a soft plastic basket (25cm 'Handy basket': Whitefurze, Coventry, UK; available from the GCT) having a solid bottom, vented sides and an out-turned rim by which it can be suspended in the raft aperture. The tray is packed to 10mm below the rim with a highly absorbent foam (OASIS® floral foam: from florists, craft shops or Smithers-Oasis UK Ltd). Because the basket has tapered sides, the 230 x 110 x 78mm rectangular block of OASIS® must be cut and the pieces rearranged so that the outer wedges secure a central block in place (see figure 2).

A single block of OASIS® cut in this way fills the basket precisely and holds four pints of water. After the foam is saturated with water, a 10mm-thick layer of tracking substrate is smeared over

continued on page four

Figure 1. Construction of a GCT Mink Raft



March 2007

the top surface with a broad spatula. The tracking substrate is a mixture of fine buff earthenware/stoneware clay (Briar Wheels and Supplies Ltd, Fordingbridge, UK) and kiln-dried block-paving sand (builders' merchants).

**Tracking medium: 1 kg clay
(moist, as supplied)
to 0.5 kg dry sand.**

The point of using kiln dried sand is to be able to control how much water is in the mix. The ingredients are worked together by hand in a bucket, gradually incorporating enough water (approximately 100ml for the above quantities) to make a stiff but workable paste. By smoothing with a wetted spatula, and finally with a grouting squeegee, the surface is left perfectly smooth and level with the rim of the tray. The OASIS® foam acts as a wick, drawing water from the river to maintain a permanently-moist tracking surface.

The tunnel

The tunnel has four intended functions: to provide a dark cavity which mink might find attractive to investigate; to protect the clay surface from rain and debris; to house a trap when required; and to provide a closed-off area whose entrances can be regulated using physical barriers to exclude non-target species larger than mink.

The tunnel dimensions must take account of the traps you intend to use

(see traps, page five). For live catch (cage) traps, this is simply a matter of measuring the dimensions of the trap. For example, using a single-entry Rhemo live-capture mink trap (Rhemo Products Ltd), the tunnel measures 660 x 190 x 175mm internally, allowing 60mm at the entrance for an otter excluder. The tunnel consists of two 660 x 175 x 25mm tanalised boards and a 660 x 250 x 10mm plywood roof screwed together.

If you intend to use spring traps (see switching to trapping mode, page seven), you must dimension the tunnel to suit both set and sprung positions of the trap. It's important that there is no excessive clearance around the trap, otherwise a mis-catch can result, causing suffering to the captured animal. Fenn Mk VI and Springer No 6 traps require internal tunnel dimensions of 190mm wide x 150mm high. The more powerful BMI Magnum 116 spring trap requires internal tunnel dimensions of 180 x 150mm, and an L-shaped slot must be cut in one side-wall of the tunnel to accommodate the projecting trap spring. If you use a single tunnel size to suit both live catch and spring traps, you will need to devise removable blocks to reduce dimensions when a spring trap is used. Otherwise, build the tunnel to suit the trap. Secure the trap chain to a suitable tethering point on the raft, eg. a large staple knocked into the outside of the tunnel.

The tunnel is placed over the aperture in the raft and secured using small right-angle metal brackets and

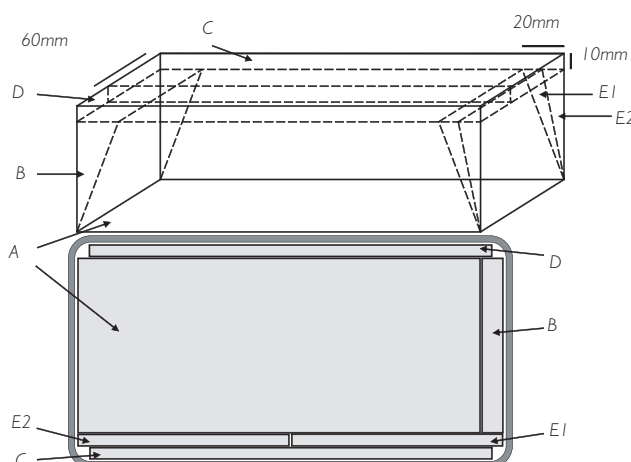
screws. The brackets are simply and cheaply made by bending 100mm lengths of 20 x 1mm galvanised steel fixing band (Expamet, London, UK; available from builders' suppliers).

One end of the tunnel should have an otter guard, removable so that you can detect otter visits when in monitoring mode. Two dowels are inserted through holes pre-drilled in the tunnel roof. Headless nails tapped into the lower ends of the dowels (may require pilot holes) locate into holes in the top plywood sheet of the raft. The easiest way to make these match with the tunnel roof is to clamp the tunnel roof and raft top together and drill the smaller (nail-sized) holes through both. Then enlarge those in the tunnel roof to a size large enough to allow for swelling of the dowels when wet.

Anchoring the raft

The raft is tethered to riverside shrubs or trees, or to a post, by a rope passing through the eyebolts in the raft corners. You must choose whether to fasten the rope to one ring on the raft or to two. Two provides more security, but one attachment allows the raft to find a position where it catches less current and may make it less vulnerable to swamping in spate conditions. We haven't found any satisfactory solution that allows the tethering point to rise and fall with the water level.

Figure 2. Fitting an Oasis block in a basket



Traps suitable for use with rafts

Mink control involves trapping and killing mink. Orders made under the Destructive Imported Animals Act 1932 make it illegal to keep mink without a licence, and stipulate precautions that must be taken to prevent escape. This legislation, therefore, also prohibits you from keeping, transporting or releasing a mink once you have caught it. So besides rafts, you will need traps and equipment for humane dispatch.

Two kinds of trap are allowed by law: live-capture traps (cage traps) and spring traps (killing traps). On balance, we recommend the use of live-capture traps in most circumstances. Live-capture traps seem intuitively humane to most people, though actually their relative humaneness compared with good spring traps is not beyond argument. The humaneness of confinement in a wire cage for up to 24 hours is one issue, and the competence of the operator to dispatch the mink humanely when discovered is another (see section below). A more clear-cut advantage is that live capture traps usually allow any non-target captures to be released alive and unharmed. Because non-target captures are so drastically reduced through the use of GCT Mink Rafts, this is a minor issue in ecological terms, but there are legal complications (unclear aspects of the Wildlife & Countryside Act that have not been resolved through case law), and most

operators prefer not to take the risk. With live-capture traps, you will also need a weapon to dispatch the mink (see below).

There are two basic types of live-capture trap: single entry and double entry. The double entry type allows the mink to enter from either direction and presents no visible mesh barrier across the tunnel end when the trap is set. While that may seem advantageous, double entry types have more mechanism to go wrong, tend to be skimpy in length between treadle plate and door, and would require a larger raft than we use. So on balance we prefer the single entry type. Field experience shows that mink have no trouble finding the entrance. Some traps have otter guards built in (see page eight).

Some operators choose to pack hay or similar material around live-capture traps to provide captive animals with both insulative bedding material and a diversionary activity. Two problems can arise. Firstly, vegetation dragged into the trap may hinder the use of trap combs which are crucial to the humane dispatch of mink with an air pistol (see section below). Secondly, an oversized tunnel is necessary. Once bedding material is drawn into the trap, the trap becomes a loose fit in the tunnel. Unless the trap is fastened to the raft, it is then possible for a captive mink to shuffle the trap out of the tunnel and off the raft, resulting in an

inhumane death by drowning.

Spring traps are cheaper and easier to transport than live-capture traps. They may be appropriate for an operator running only one or two rafts, for whom the expense and responsibility of owning a weapon and carrying out humane dispatch seems disproportionate. Spring traps may also have a role in catching 'trap-shy' mink. Mink show considerable variation in shyness/boldness, so where trapping is intensive we might expect trap-shyness to be an emergent problem, because trapping creates a selection pressure favouring shy animals. Live-capture traps present a big profile to target animals and, in captivity at least, genetically shy mink are wary of exploring them. By contrast, a spring trap in a tunnel is very discrete and the trigger can be very light. Spring traps kill at the moment of capture, and approved models have been tested by Defra (or MAFF, historically) and judged to be humane. The spring traps currently approved for mink are the Fenn Mk VI, Springer No 6, Magnum 116 and Kania 2000.

Note that the Fenn Mk IV, Springer No 4, and Magnum 110 are much too weak to ensure humane dispatch of mink, and for this reason are NOT approved for catching mink.

How to dispatch a live-caught mink

We recommend you use an air-weapon rather than a firearm. It doesn't require you to have a Firearms Certificate, is much easier to carry about discretely, doesn't make you conspicuous and sinister, is quiet in use, safe for the operator, trap and bystander, and is perfectly adequate for the job provided you follow the procedure described below.

With air weapons, more power costs more money. We have researched the cheaper end of the market and can vouch for the ability of an air-pistol producing a muzzle energy of 3.1 ft lbs (such as the Webley Hurricane .177) or more to kill even the largest mink (1.7kg) humanely. For such a relatively low power weapon

(air pistols generating up to 6ft lbs muzzle energy may be used without a Firearms Certificate) it is also critical to use 'Prometheus' steel-tipped conical pellets (lead alloy pellets will not penetrate), and to follow the procedure described below. An air rifle (legal limit 12ft lbs) can also be used, but is considerably more awkward to manipulate, more conspicuous as you travel between traps and the extra power is unnecessary.

To use an air-weapon humanely the mink must be held still in the trap. This is easily done using two plywood 'combs' to form the equivalent of a livestock handling crush. The combs are made by cutting slots with a saw in 10mm plywood

boards, so that the remaining 'tines' fit through the mesh of the cage trap from above, forming a divider within the trap.

Once exposed in a trap a mink may scream loudly and incessantly until it is dispatched. So prepare the air-pistol, pellets and trap combs before removing the wooden tunnel or pulling out the trap. Check that the pistol barrel is clear before loading it. If the mink has been caught on a raft, it is convenient to dispatch it on the raft in the water (the raft can be floated away from public view). Remove the wooden tunnel (or pull out the trap) and by inserting the combs alternately, gently

continued on page six

push the mink to the end of the trap farthest from the door; until it is confined to a space only one or two meshes long. By easing or increasing pressure, you can allow the animal to squirm around or hold it in position.

Using the comb as a lever, push the mink up towards the roof of the trap, letting it squirm around until its head is immediately below the roof mesh. With the gun barrel perpendicular to the cranium, push the muzzle of the barrel down firmly and shoot the mink. Avoid the very strong centre line of the skull. Do not fire unless you have achieved the muzzle/cranium contact described (if the muzzle is not perpendicular to the cranium, or if there is insufficient downward pressure, the pellet may glance off or fail to penetrate). Note that when using Prometheus pellets, the plastic skirt of the pellet typically lodges at the surface,

while the steel pellet itself separates and penetrates deep into the brain.

One shot properly placed like this will cause instant and irreversible loss of consciousness, but be prepared for convulsions and kicks as the animal dies. Although the single shot may be all it takes, we recommend that you immediately fire a second shot into the skull from the junction between the neck and the back of the skull which destroys the brain stem. To confirm that the animal is dead, lightly touch one of its eyes with a piece of vegetation. If there is no blink reflex the animal is dead. Any regular breathing action also indicates that it is not dead. The carcass should be disposed of responsibly by incineration or burial.

To maintain the muzzle energy of an air weapon, the barrel must be kept clean and pellets should ideally be lightly lubricated with a specialist airgun oil

(eg. Napier Power). Do not use shotgun oil or any other kind which will leave a residue when dry.

We do not recommend the use of firearms to dispatch cage-trapped mink. A .22 rim-fire pistol or rifle should never be used. If you are close enough to dependably hit the mink in the trap, you are at severe risk of being wounded by ricochet, and furthermore you will damage the trap. A shotgun can be used with a normal game or clay-shooting cartridge, though you must realise that its use at close quarters is risky. Place the trap in front of a safe background, retreat to a distance of about 10m (pace it out), and take careful aim. Do not allow any bystanders closer to the trap than this, and be aware that shot and fragments can ricochet high above the trap. Please also remember that shot can ricochet off a water surface.

Deployment and maintenance

We find it easiest to carry the raft base, tunnel, clay/sand mix, tracking basket (with OASIS® foam in place), rope and tethering pole as separate items. At the chosen site, the foam is saturated with water (which takes a few minutes). The clay-sand mixture is then smeared on top and smoothed off. Finally the tunnel is screwed down onto the raft and the raft is tethered. You will need to carry a broad spatula and a flat-bladed squeegee (for the clay mix), screwdriver, screws, knife (for the rope) and lump hammer or mallet (for the pole). You should also have personal safety gear (eg. waders, life-jacket, mobile phone).

We favour locations where the raft can be pushed into the emergent vegetation at the water's edge, because we assume mink will hunt carefully through that habitat. However, where there is no vegetation (for instance on canalised and overgrazed sections of river) the rafts seem to work just as well. One advantage of vegetative cover is to hide rafts from passers-by, who may vandalise the raft, trap or release a captive mink. We try to moor rafts where the only access is by wading or swimming. Children are often the worst culprits and

some sites are simply unworkable during school holidays because of easy access. We always 'dress' the tunnel with local vegetation to camouflage it, and renew this at intervals to avoid it looking 'tired' and unconvincing, but be careful not to obscure the ends of the tunnel. The glaring white edge of the polystyrene foam quickly becomes covered with an algal film which tones it down. Incidentally, publicity explaining the rationale of your work, and a raft and explanatory material left at a visitor's centre, are also important steps to reduce interference.

The tracking cartridge can be lifted out without removing the tunnel from the raft. It is important to keep the clay/sand mix in good working condition, otherwise you are wasting your time. At every check, remove debris and smooth over the surface with a wet rubber squeegee (best), spatula or wetted hand. At intervals (eg. every two to four checks) it will be necessary to resurface, flip over or replace the clay-sand layer, because the clay particles gradually wash away with repeated smoothing, leaving a depressed surface and a hard gritty mix. Strong drying winds or sub-zero temperatures can also require the clay to be resurfaced.

We carry the clay/sand medium already mixed in plastic bags when checking rafts. It is a false economy to skimp on the above.

Check rafts at one or two week intervals, depending on circumstances. More frequent checks are obviously desirable where you have recently returned a raft from trapping to monitoring mode, in case further mink remain to be trapped. At certain times of year (eg. during autumn dispersal) a fast response may be important. In these circumstances, try a one-week check interval and run traps for a maximum of seven days.

Longevity of rafts is probably about three to four years. We have had rafts in almost constant use for this long, after which most show signs of the plywood delaminating. These rafts also become less buoyant resulting in the tracking cartridge becoming easily flooded.

Identifying mink tracks

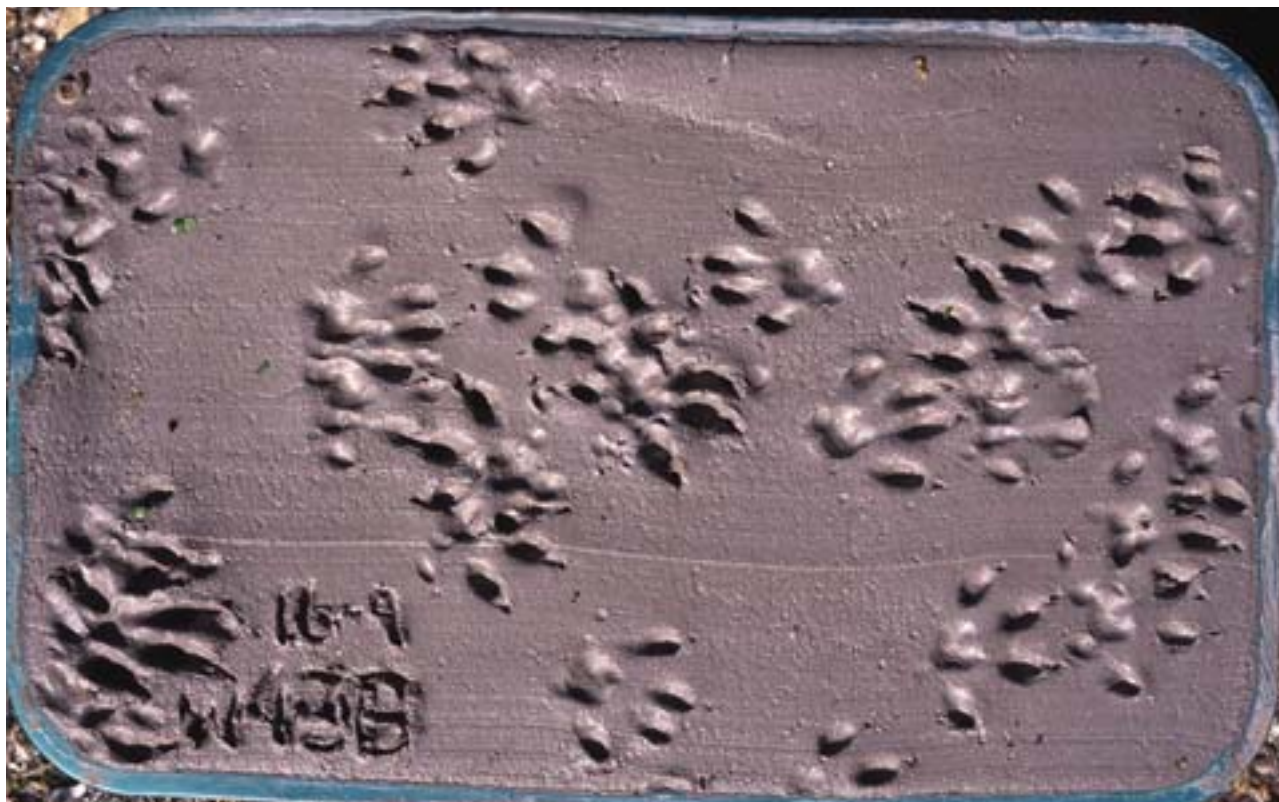
Tracks are captured in perfect detail on rafts and mink tracks are easily recognised (see below). A field guide on animal tracks will help you distinguish other species if you are in doubt, but we plan to publish a separate photographic guide for raft users shortly. The tracks most similar to mink are those of polecats, and

at present we can offer no reliable rule to distinguish the two species from their tracks. Polecats do visit rafts, but not frequently.

Tracks of other species, for instance water voles and water shrews, may also be of interest. Note that water vole tracks are often impossible to distinguish from those of

brown rats. Only where droppings are also present can you be completely sure which of the two species was involved. Water voles often use the rafts as latrines, leaving droppings on the raft base, tunnel and tracking cartridge.

1 cm



Switching to trapping mode

When adding traps to the raft the tracking cartridge is removed. For live-capture traps it is simply a matter of sliding the trap into the tunnel. If the tunnel is closely dimensioned to suit your live-capture trap, you may need to remove or loosen it to slide the trap in. When tightened down, it will clamp the trap to the raft, which helps to prevent theft. Short lengths of galvanised steel builders' band can also be used to secure the trap to the raft with screws.

To set a spring trap, the tunnel must be lifted off. Fenn Mk VI and Springer No

6 traps can be bedded down into the foam of the tracking cartridge (take the clay out). For Magnum 116 traps, you will need to remove the tracking cartridge and fit a solid base for the trap in its place. Cut a rectangular board of plywood (we use 6mm ply) measuring 300 x 165mm, and use PVA wood glue to fix to its centre a further block of 12mm plywood measuring 75 x 40mm. This stepped base gives a firm wedge fit for the jaws of a BMI Magnum 116 trap set at its most sensitive setting. You may need to round off the top edges of the smaller block

slightly, but a tight fit is better than a loose one. The plywood board is screwed to the top surface of the raft before the tunnel is replaced. Also secure the trap anchor chain to the raft or to the outside of the tunnel, using a fencing staple. Set the trap, flip the safety clip into position and push the trap into place on the board. Then carefully slide the tunnel over the spring and fasten it down to the raft base. With any spring trap, remember to slip off the safety catch before you leave!

Record keeping

Your ability to assess how your mink trapping impacts on mink numbers and how that translates into conservation benefits, will be enhanced if you keep

detailed records of your rafts, especially of tracks found during monitoring mode. It's not the number of mink you remove that matters, but how much of the time the

river is free of mink. This is the evidence that will motivate your funders to support the project, and convince the public that this is the right course of action.

Responsibilities

For operational and river maintenance purposes, the Environment Agency (EA) needs to know where mink rafts are being used. If you are planning to use mink rafts, please contact the EA's local offices. There is a small theoretical risk of a raft causing obstruction to a sluice or other drainage control structures, resulting in flooding and extra maintenance work. In practice, we are not aware of any instance where this has occurred, as the raft is a small structure compared with trees and other common flotsam. Nevertheless, the legal situation is that the

raft operator could be open to prosecution by the drainage board if these circumstances arose. Similarly, environmental pollution by raft materials is not really an issue, as rafts which break loose in flood conditions are generally easy to retrieve in large pieces. However, morally as well as legally, the operator should assume full responsibility for the raft while it remains on the water. It is advisable to 'retire' rafts after three years, rather than risking them breaking up at the next spate.

You should also be conscious of the risk of carrying disease (eg. fungal

fish diseases, crayfish plague) from one river to another on any wet equipment. This includes rafts and waders. The best form of disinfection is to thoroughly dry equipment for a minimum of 48 hours. Drying in sunlight is the most effective option. A raft will take a long time to dry unless it is completely dismantled. Iodine-based preparations (eg. Iodophor, from veterinary suppliers or online services) are also recommended for disinfecting equipment. Iodophor contains iodine and phosphoric acid, so read the safety data.

Raft FAQs

Please remember that this information sheet reflects research in progress. We don't have all the answers yet, and our advice on how to use rafts may well develop as time goes on. But here are our current answers to some frequently-asked questions.

- **How many rafts should I use?**

We currently recommend one raft per km of river. Our research shows that this allows each mink access to at least one raft, and usually two to three rafts. In open water, our best guess would be to follow the same spacing along the water's edge, including islands. For land intersected by many ditches and channels, we would suggest one raft per square km as a starting point (not including rafts on the main river channel), but more may be necessary depending on the density of ditches.

- **How long should the raft stay in trapping mode?**

It's tempting to leave traps 'just a little longer', in the hope of catching the mink that left its footprints. However, experience tells us that a mink will usually be caught within a few days, if at all. If it isn't caught in that time frame, don't jump to the conclusion that you have a 'trap-shy' individual. It is much more likely that it has been caught elsewhere, died through some other means or that it was a 'transient' individual simply passing through. If you keep the trap set you will probably only increase the number of non-targets you catch. Return the rafts to monitoring mode after each capture, or after a maximum of 10 days without a capture.

- **Is there a way to keep non-target species out of traps?**

In trapping mode we use a physical excluder modified after Short & Reynolds

(2001), to ensure that otters cannot force their way into the trap. This has a central space of 60mm between two upright dowel bars, leaving smaller spaces to the sides (see raft description and diagram on page three).

In a field experiment using paired rafts, with and without excluders (autumn 2002), visits by mink to rafts were shown to be unaffected by this excluder. Otters do visit mink rafts, leaving spraints on the ends and on the tunnel roof to prove it. When excluders are not present (we remove them when the raft is in monitoring mode) some otters do enter the tunnel - which is a tight squeeze, to judge by the deep footprints! But after four years of research, in all seasons, in places with otters present, we haven't had any otters pass through tunnels that were protected by this excluder.

Other designs of otter excluder are offered by trap manufacturers, for

instance by restricting the trap entrance to a three-inch square aperture. Users have expressed satisfaction with this arrangement, but currently our two-dowel design remains the only one shown by experiment not to reduce mink visits. So as in other details of the raft, you deviate from it at your own risk.

Polecats (a species with Schedule 6 protection under the Wildlife & Countryside Act, 1981) are similar in size to mink, so clearly they can enter tunnels even with excluders fitted, as do other non-target species such as moorhens and water voles.

It is illegal to return either mink or grey squirrels to the wild after capture, so these species must be dispatched.

- ***What is the best trapping strategy?***

There is no statutory restriction on when to trap mink. Arguably the most important time to monitor and trap is in the spring. The idea is to prevent on-site production of young mink and to safeguard prey species, which are breeding themselves and are therefore vulnerable. In spring mated female mink will be choosing den sites in which to pup, and until their pups are weaned the family will be relatively sedentary. Female mink we have trapped in spring time were carrying up to 10 foetuses. A family of this size develops a huge need for food as the summer progresses and the implications for prey species are obvious. If trapping commences as early as mid-February or early March, you are also likely to catch adult males as they roam around searching for females to mate.

As summer progresses you start to run into a welfare dilemma. If you kill adult females that have dependent young, those young will die of starvation and cold (mink dens are difficult to locate). If you want to avoid this scenario, you must suspend trapping until the young are free-ranging, have already eaten a lot of prey and have to be trapped one at a time. There is no easy solution to this dilemma. It arises in most other vertebrate pest control issues, eg. mice, rat, rabbit, woodpigeon, fox etc. Clearly the ideal is to trap adult females before their young are born. Rafts help to achieve this quickly, but they will also show if any mink are present during the summer, bringing the

dilemma to uncomfortable prominence. You need to decide whether you are prepared to compromise effectiveness in the interests of welfare. If you are using rafts on a fairly wide scale, a ruthless campaign in year one that quickly reduces the population to low levels is arguably more humane than a campaign that is drawn-out because it has a close season.

Having stressed spring-time control because it has the greatest impact on the mink population, we don't actually know when mink have their greatest impact on prey species like water vole, crayfish or amphibians. It may be that autumn or winter predation by mink is critical for some of these species and the advice above may need to be revised in due course.

However, because it is not a nationwide eradication campaign, the mink you remove will eventually be replaced through immigration. If you are addressing only a small section of river, and/or you are in a region with a high mink density, this may happen very quickly. The peak time for dispersal is August/September and this is the second key period of the year after spring. Only experience in your location will tell you how much immigration typically takes place, but using the raft system you can clear the river again quickly.

- ***Can rafts be used on spate rivers?***

The GCT Mink Raft was developed on southern England chalk-streams, but it has been used successfully on rain-fed rivers in Cumbria, Aberdeenshire and the Welsh borders. Of course you must be aware of the dangers of rafts being swept away by sudden spates or flood water, and it may be that in rainy seasons you simply cannot use them. But we have made the system work despite these practical difficulties. It is advisable to rope only to one corner of the raft, allowing it to find quieter water, but also to fix a second 'back-up' rope in case the first one fails.

Knowledge of how your river behaves in spate is vital. Experience will show you where the slack water areas are. Try to position the raft so that it is protected by a large tree or other feature, so when the river floods there will often be slack water directly behind (downstream of) the tree and the raft will float quite safely. This will also protect it from heavy debris (tree trunks etc) floating down stream.

The rope should be anchored quite high up allowing maximum rise and fall - too low and the raft may be dragged under water and lost or damaged. When water levels recede it will be necessary to re-float any rafts that have become beached. Experimentation is the key!

- ***What bait should I use?***

We use no bait or scent lure on our rafts. In general, we have no problem in catching a mink within a few days, once we have detected it using a raft (see below for exceptions). Both bait and scent lures introduce complications which we feel are unnecessary. Bait needs to be replaced regularly to ensure it is fresh, and it may increase the interest from non-target species. Scent lures may have different effects on different mink depending on their sex and age class. Please don't use bait and then ask us why you aren't catching.

- ***Why am I not catching mink despite finding tracks on rafts?***

Don't jump to the conclusion that the mink is 'trap-shy'. There are several more likely reasons for this situation. Mink tracks found during late winter-early spring and in autumn, may have been left by 'transient' animals moving through the catchment, either to find mates or to disperse. Setting traps in response to these will waste time if the animal responsible for leaving the track has already moved away from the vicinity. The only options here are to shorten the raft checking interval to give a faster response time and to set traps, not only on the raft where you have found tracks, but also on adjacent ones. Obviously in taking these steps you sacrifice some of the labour-saving benefits of mink rafts.

Alternatively, the mink you have detected may live predominantly in terrestrial habitats, making only rare visits to the river. This applies particularly to male mink, which are more inclined to live on terrestrial resources such as rabbits. The problem may be increased in the presence of otters, which are thought to displace mink aggressively from the main river channels. Catching such individuals becomes more of a lottery. It may be necessary to set some traps on land nearby, in order to catch mink known to be present. But think: if the aim is to

protect the river channel, then a mink that visits the river only occasionally is not such a big problem. If it's a male, then it is largely irrelevant either to water vole conservation, or to mink population control. Also the tracks you recorded could be one of the occasional visits to a raft by a polecat.

If the tracks were large, it's possible that the animal entered your trap but failed to trigger it. A very large male mink standing in front of the treadle plate will have its nose up against the end mesh, and may not take that final step before turning round and leaving the trap. In these circumstances the use of a spring trap may be justifiable.

If you are using an otter excluder different from the one described here, it may have the effect of reducing mink captures. Intuitively one would expect any such effect to be on the larger (male) mink.

One thing that isn't a problem is the use of single entry traps as mink have no trouble finding the way in.

- ***There are too many tracks and I can't identify any - what can I do?***

Where there is a lot of 'traffic', mink tracks may become overlaid by those of other species, which can make identification difficult. Ironically, water voles have proved to be the main culprit. Territory-holding voles scent-mark in raft tunnels, then

drum their feet over the latrine, which can quickly obliterate any other tracks present on the clay mix. The problem can be overcome by more frequent raft checks. Moving the rafts a short distance (50-100m) along the river may avoid the middle of a water vole colony. Trapping can still proceed if mink tracks are identified, but it should be remembered that water voles will not be excluded from traps and will enter them, rendering them unavailable to mink. Arguably if this is an issue, then water vole populations are healthy suggesting that mink presence is minimal.

Suppliers

Ready made GCT Mink Rafts (flat-pack) and accessories

Forsham Cottage Arks
Goreside Farm
Great Chart,
Ashford,
Kent,
TN26 1JU, UK
Tel: (01233) 820229
Fax: (01233) 820157
www.forshamcottagearks.com

Clay

Briar Wheels & Supplies Ltd
Whitsbury Road,
Fordingbridge
Hampshire,
SP6 1NQ, UK
Tel. 01425 652991
Fax. 01425 656188

Plastic handy baskets

Whitefurze Ltd,
Burnsall Rd,
Canley,
Coventry,
CV5 6BT, UK
Tel. 024 7671 7755
Fax. 024 7671 7474

Because many raft users have run into minimum order problems, we now stock these baskets at the Game & Wildlife

Conservation Trust and sell them in any quantity required. Please contact:
Tel: 01425 651003
Fax: 01425 655848
Email: sales@gct.org.uk

Floral foam

Smithers-Oasis UK Ltd
Crowther Road,
Crowther Industrial Estate
Washington,
Tyne & Wear
NE38 0AQ, UK
Tel. 0191 417 5595
Fax. 0191 419 2638

Spring traps

Magnum Trap Co Ltd
PO Box 372,
Southampton,
Hampshire,
SO14 0TA, UK
Tel. 023 8058 5421
Fax. 023 8055 0476

Cage traps

Rhemo Products Ltd
Unit 26, Wick 2 Industrial Estate
Gore Road,
New Milton
Hampshire,
BH25 6TJ, UK
Tel. 01425 621283
Fax. 01425 619860

Bethel Rhodes and Sons Ltd
Lawkholme Mills,
Alice Street
Keighley,
West Yorkshire
BD21 3JD, UK
Tel. 01535 602532
Fax. 01535 610067

Albion Manufacturing
The Granary,
Silfield Road
Wymondham,
Norfolk
NR18 9AU, UK
Tel. 01953 605983
Fax. 01953 606764

Other literature

- Jeffries D J (2003). The water vole and mink survey of Britain 1996-1998 with a history of the long term changes in the status of both species and their causes. *The Vincent Wildlife Trust*. 234 pp
- Macdonald D W & Strachan R (1999). The mink and the water vole. *Analyses for conservation*. Wildlife Conservation Research Unit, Oxford University. 161 pp
- Reynolds J C (2003). Mink control in conservation. *The Game Conservancy Trust Review* 34, 42-46
- Reynolds J C (2004). Sophisticated mink control. *The Game Conservancy Trust Review* 35: 87-90
- Reynolds J C, Short M J & Leigh R J. Development of population control strategies for mink (*Mustela vison*), using floating rafts as monitors and trap sites. *Biological Conservation* 120, 533-543
- Short M J & Reynolds J C (2001). Physical exclusion of non-target species in tunnel-trapping of mammalian pests. *Biological Conservation* 98, 139-147

Training workshops

We offer one day workshops or refresher courses for conservation bodies engaging in mink control. The workshops can be tailored to your requirements from the topics listed below, and are suited to everyone including decision-makers and practitioners, professionals and volunteers. You choose the location and the emphasis you require.

Topics available include:

- The history of mink and mink control in Britain.
- Is mink control necessary? The evidence linking water voles to mink.
- The GCT Mink Raft. A logical approach that leads to focused, incisive mink control.
- Mink traps – recognising good and bad traps.
- Mink trapping on land.
- Planning and budgeting for mink control.
- Ethics.
- Humane dispatch and related safety and legal issues.
- Health and safety, risk assessments.
- Water vole reintroductions.
- Hands-on practical outdoor session:

How to deploy and maintain the mink raft. Handling the mink in the cage. Humane dispatch. Gun safety.

Our workshops offer you the very best instruction from the experts, based on a long history of involvement in predator management, richly supported by research data and fully up-to-date.

To book a workshop please contact our advisory department on 01425 651013 or email advisory@gct.org.uk

Please keep in touch

If you are planning to use the GCT Mink Raft, please get in touch with us. Mink are a difficult issue for everyone and we are keen to see management methods developed that are both effective and appropriate. Until we have a clear evaluation of what it takes to achieve particular conservation goals, none of us can decide what is feasible and reasonable. Intensive research of the kind done by the Game & Wildlife Conservation Trust, or WildCru (Oxford University), has a crucial role here to gain unequivocal answers to specific questions. But ultimately the real test of any approach is in actual use. By coordinating practical trials across the country, we can turn locally applied effort into a collective learning experience.

Jonathan Reynolds, July 2003, revised with Mike Short, Tom Porteus, Ben Rodgers and Mike Swan, March 2007

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