Management: American mink (*Mustela vison*)

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Contents :

1. General Considerations

Amongst the measures to reduce the impact of the American mink on native biodiversity, mink control has been identified as an essential tool by the UK National Species Action Plan (Bonesi 2007). However, in some cases mink populations, after increasing rapidly and steadily, for some reason begin to suddenly decline (as in Sweden in the 1990s) effectively eliminating the need for control measures (Josefsson and Andersson 2001). The desirability of long-term control of mink populations depends on how ecologically effective control would be. Macdonald and colleagues (Undated) summarise the factors likely to influence management decisions as follows: humaneness, safety (to people and to non-target species), control aims, number of people involved, number of animals killed, alternatives, effectiveness, quality of information available and public perceptions.

Some questions managers should ask include: “Can control can be achieved? Will the effects be long term? What will it cost? How will animal welfare be considered?” (Reynolds Short and Leigh 2004). Another pertinent question is “Can eradication be achieved?” The population size of introduced American mink in some countries is so large that eradication is considered impossible (due to re-invasion from neighbouring countries or from fur farms) (CCS Undated). For example, the extent to which mink have now colonised the United Kingdom would mean that it is almost inconceivable that a wholesale eradication programme would be a viable option on the UK mainland as a whole (unless some biological method can be developed) (Mundy 2000). However, successful mink eradication has occurred on some islands where re-invasion is easier to control. For example, a Scottish campaign aims to eradicate American mink from part of a 2800 km2 archipelago off the west coast of Scotland and is planned to last 5 years and cost GB£ 1.65 million (in part funded by EU LIFE) (Moore Roy and Helyar 2003). It is the largest eradication campaign in the United Kingdom since the successful coypu (*Myocastor coypus*) eradication of the 1980s (Gosling and Baker 1989, in Moore Roy and Helyar 2003). The campaign aims to protect ground-nesting birds, which are vulnerable to mink predation, and has been successful to date (with over 220 mink caught and positive responses in native wildlife). Other countries are also addressing the feasibility of carrying out eradication schemes (Moore Roy and Helyar 2003). Where eradication is not feasible, it may be best to concentrate mink control in areas of high ecological value.

2. Monitoring / Tracking

Detailed knowledge of American mink population size and distribution is lacking for most countries in which the mink has established. In the United Kingdom, mink are widespread along waterways and around the coast and the population size has been estimated at 110,000 (JNCC). Monitoring mustelid abundance is a way of determining the need for control in any given area and perhaps preventing incursions in new regions. Conservation managers and researchers at mainland sites throughout New Zealand now commonly use tracking tunnels as a method of indexing rodent and mustelid abundance (Gillies and Williams Unpub.). Data on this elusive species may be gathered through field surveys for signs such as footprints, droppings (Bonesi 2007) and hairs and using DNA based technology (see *8. Research*). Data gathered from field signs can be used to estimate the distribution and abundance of mammals (Bonesi 2007).

The use of rafts has the benefits of a reduced need for manpower, increased trapping efficiency, reduced non-target captures and reduced number of traps (Reynolds Short and Leigh 2004). It should be noted that in areas where polecats are present mink tracks recorded in tracking tunnels or rafts may not be distinguishable from polecat tracks (The Game Conservancy Trust Undated). For more information on mink rafts please see: http://www.defra.gov.uk/wildlife-countryside/vertebrates/reports/minkraftleaflet.pdf.

3. Preventative Measures

Exclusion fencing may be effective in areas of conservation importance. Various types of repellent may also be used (Baker and Macdonald 1999, in Macdonald and Harrington, 2003). Another preventative methodology is used in Denmark, where mink farming is still carried out, and the government places restrictions on farmers to minimise farm escapes.

4. Physical Control

A number of physical methods can be employed in mink control including rifle use (by day), shotgun use, live-trap and shooting, kill-trapping, snares and use of dogs (foot packs or terriers) (Macdonald *et al*. Undated; Kirkwood 2005). Trapping is one of the most effective methods, however, the expense of a large scale operation may be prohibitive, particularly in countries such as the United Kingdom where traps must be checked every day according to the law (Mundy 2000). Where native mustelids live, live trapping and selective killing may be necessary to prevent any harm to native wildlife. Strategies to improve trapping efficiency and limit risk to non-target species include, (i) weeding out irrelevant trap sites, and (ii) limiting deployment time to 10 days (Reynolds *et al*., in prep, in Kirkwood 2005). Mink trapping is a little unusual in that the habitat (riparian corridor) along which most females can be found is easily definable (Kirkwood 2005). However, trapping is not 100% reliable and individual animals may show a marked reluctance to enter traps, particularly females (Mundy 2000).

Mink trapping has been employed successfully in Belarus and in the eradication of mink from Hiiumaa Island in Estonia (Macdonald and Harrington 2003). It is also being used in the mink control project currently underway in the Western Isles in Scotland. Here, trappers use bait containing mink scent glands, as an effective way to lure mink (Hebridean Mink Project 2004). Such methods work because mink, like other mustelids, communicate via scent deposition. Dead rats may also be used as bait.

Other factors to consider when trapping are: the need to target juveniles or sub-adults (it has been found that to significantly impact mink populations 60% of mink caught should be juveniles or sub-adults) and the timing of mink control (culling at the end of summer is usually a waste of effort). In the United Kingdom breeding females should be targeted between January and April (Macdonald and Strachan 1999, in Macdonald *et al*., Undated).

In Finland a mink control programme used dogs to locate and air-blast mink dens. Trained dogs were also utilised in the United Kingdom in annual mink hunts before the use of hunting dogs was made illegal (Mundy 2000). In fact, specially trained dogs under the supervision of the Government, local authorities and the University of Reykjavik carry out mink control in Iceland. Dogs are used to find minks, which are then dug out and dispatched humanely. Live trapping (once used to protect local farms where ducks are farmed for their down) is now considered ineffective in comparison to dog use, which doesn't rely on random methods (Mundy 2000). However, evidence has been found that hunting with hounds in the United Kingdom had no effect on mink population size (based on a population model study by Macdonald *et al*. Undated).

5. Biological Control

Animal welfare is an important factor in the selection process for possible biological control options. For example, native predators may assist in mink control. This could involve encouraging populations of European otter (*Lutra lutra*) and European polecat (*Mustela putorius*) or rabbit (*Oryctolagus cuniculus*). There is evidence to suggest otters are hostile towards mink and facilitation of otter recovery could be an important component of mink control in the United Kingdom and other parts of Europe (Macdonald and Harrington 2003).

6. Educational Awareness

A high level of trapping is required in Harris (Western Isles, Scotland) to remove remnant mink populations and members of the public are asked to report any mink sightings to the Hebridean Mink Project. Similar public education may also be necessary for mink control projects to inform people about the negative impacts of mustelid species on native bird life and encourage support for the project.

7. Integrated Management

A holistic approach to mink management could involve mink removal, habitat restoration and the recovery of native competitors (Macdonald and Harrington 2003). Habitat restoration in conjunction with mink control allows native and threatened species a chance of recovery (Macdonald and Harrington 2003). Monitoring local bird species, such as terns, can be incorporated into a mink control project as a measure of project success. For example, several mink control projects are aimed at reducing mink numbers but also at increasing and protecting native bird species. The Hebridean Mink Project aims to protect ground nesting birds from the negative impacts of mink, including terns (*Sterna paradisaea*, *S. hirundo* and *S. albifrons*), the red and black-throated divers (*Gavia stellata* and *G. arctica*), corncrake (*Crex crex*), dunlin (*Calidris alpina*) and the ringed plover (Moore Roy and Helyar 2003). Monitoring of terns is underway in the area (Hebridean Mink Project 2006). Recently in Ireland a pilot mink control project has been funded to control mink on Lough Mask with the aim of protecting breeding gull colonies (The Heritage Council 2007).

Bonesi (2007) is currently developing a management strategy for the American mink in Italy using an integrated approach that involves modelling the spread of the mink, assessing the economic and biodiversity impacts and assessing the perceptions of the civil society toward the problem. This project is carried out at the University of Trieste in Italy.

8. Research

Research into differentiating mustelid hairs by light microscopy on the basis of cuticular and medullary patterns of guard hairs has been conducted by González-Esteban, Villate and Irizar (2006). This could aid monitoring programmes for both the introduced American mink and the threatened European mink (*Mustela lutreola*). Alternatively, current research is beginning to focus more on noninvasive genetic sampling techniques, which provide great potential wildlife management (Waits and Paetkaud 2005). DNA can be obtained from a variety of sources (including hair, feces and urine) without observing the animals directly and these samples can then be used to identify the presence of species which are elusive, such as the mink (Waits and Paetkaud 2005). Restriction enzyme-based techniques have been developed to differentiate mtDNA of otter (*Lutra lutra*), American mink (*Mustel vison*), and polecat (*Mustela putoris*) in Europe (Hansen and Jacoben 1999, in Waits and Paetkaud 2005).

Bonesi (2007) is working on a model of mink control to be used as the foundation for planning a strategy of mink control in the UK. The kind of model being used is known as a 'spatially explicit population model', which means that the population dynamics of minks in real area can be simulated. This project is carried out as a collaboration between the University of Newcastle (CLSM directed by Steve Rushton) and WildCRU at Oxford University (Bonesi 2007).

9. Ethical Considerations

Mink are cute animals. Many people are horrified at the thought of killing these animals. This poses an ethical dilemma. Sometimes certain values must be compromised in order to preserve other values such as the conservation of the environment. Whatever ones' views on this issue, there is one thing everyone should agree about: if an animal is to be killed it should be done humanely and, if possible, expertly. Some of the trapping methods discussed in the literature are probably far from humane and more research needs to be conducted in this area. For example, kill traps have been assessed against the specifications that target animals must be rendered unconscious within three minutes, and results indicate that most kill traps currently in use fail the test (NAWAC 2000, in Warburton and Connor 2004). Any planned mink control project should endeavour to gain public support through educational means (eg: informing the public about the negative impacts of mink on native bird life). They should also be based around firm humane guidelines and legal methods of disposing of the animals.

Under New Zealand legislation a non-target species must be killed as quickly and humanely as possible. Animals must only be captured and killed in ways that fulfil legal obligations under the Animal Welfare Act 1999 (New Zealand) (Ragg and Clapperton 2004). See www.maf.govt.nz/biosecurity/animal-welfare act to download a guide to the Animal Welfare Act. For further legislation for pest control in New Zealand, Australia, Europe and the United Kingdom please see Littin and Mellor (2005). Tthis document can be downloaded from: https://www.oie.int/eng/publicat/rt/2402/PDF/littin767-782.pdf.

Furthermore, before any animal-research projects can proceed (eg: captive trials to determine the toxicity of poisons, the efficacy of fertility control agents, and welfare impacts of poisons and traps) in New Zealand they must receive approval from institutional Animal Ethics Committees (AECs) (Warburton and Connor 2004). This is usually done by assessing the ethical cost to the experimental animals (ie: pain and suffering) in relation to the end benefits of the study (i.e. biodiversity conservation and control of zoonoses) (Warburton and Connor 2004). However, it must be noted that this process is often only achieved with vague benefits being provided (eg: to develop more cost-effective protection of an endangered species), and weighed against equally vague costs to welfare, as it is a difficult and subjective task to evaluate and quantify the costs and benefits in these situations (Warburton and Connor 2004).

For more discussion on this issue topic please read Littin and Mellor (2005) *Strategic Animal Welfare Issues: Ethical and Animal Welfare Issues Arising From the Killing of Wildlife for Disease Control and Environmental Reasons*, which can be accessed from: https://www.oie.int/eng/publicat/rt/2402/PDF/littin767-782.pdf.

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