

CENTRE FOR EVIDENCE BASED CONSERVATION

Review No. 7

Working Title: Control of American Mink (*Mustela vison*) in Europe

Review Protocol

1. Background

Introduced American Mink (*Mustela vison*) are a cause for concern to many UK conservation organisations, game keepers and farmers, as an invasive species. *M. vison* were first introduced into the U.K in 1929 on fur farms for the fur trade. Escapes led to breeding in the wild, first known to occur in 1956 (Usher, 1986). Further releases both accidental and deliberate have led to feral populations of *Mustela vison* becoming widespread across Britain and they are also present in Ireland, Finland, Iceland and France (Chanin, 1981).

M. vison are generalist predators, hunting both on land and in water, preying on rabbits, birds, eggs, and fish. They have no natural predators in the UK, and are associated with a wide range of aquatic and semi-aquatic habitats (Halliwell & Macdonald, 1995). In the 1960s occurrences in the UK were rare, but by 1980 there had been a ten-fold increase in numbers, showing their adaptability and dispersal capacity (Tapper, 1980).

Management interventions to control *M. vison* include hunting with dogs, shooting and lethal or non-lethal trapping (Defra, UK, Department for Environment, Food and Rural Affairs). There are no UK approved fumigants or poisons for *M. vison*, but forms of immuno-contraception are being developed (Macdonald, 2003). With each intervention there is the possibility of killing non target species (Short & Reynolds, 2000), and further disturbing the area, therefore non-lethal trapping is the most commonly used intervention, as non-target species can be released if caught.

A systematic review is proposed to determine the effectiveness of control methods to reduce the population numbers of *M. vison*, and any possible deleterious effects of control techniques. Depending on the quality and quantity of studies available on each intervention, the review may focus on one or more of the interventions listed in Table 1.

Table 1. The subjects, interventions and outcomes of relevance to the control of *M. vison*.

Subjects (habitats)	Interventions	Outcomes		
		Primary	Secondary	Tertiary
Areas where <i>Mustela vison</i> are present	Fatal trapping Non-fatal trapping Shooting Hunting with dogs Exclusion (fencing, including electric)	Reduced mink populations or distributions	Increased populations or distribution of native species	Any other effect from the control of <i>Mustela vison</i>

2. Specific Objective of the Review

Primary Question:

Do management interventions effectively reduce or eradicate population numbers of *Mustela vison*?

The aim of this review is to provide an effective synthesis of studies relevant to this question, including meta-analysis if appropriate data exists.

3. Methods

3.1 Search Strategy

The following computerised English language databases will be searched:

- 1.) JSTOR (dependant on the journals)
- 2.) ISI Web of Knowledge (1981 to present)
- 3.) Science Direct (All Sciences, 1823 to present)
- 4.) Scirus (All journal sources, 1920 to present)
- 5.) Index to Thesis Online (1970 to 2003)
- 6.) Copac

7.) Agricola (2 databases for the National Agricultural Library, one Public Access Catalogue, and one Journal Article Citation Index)

An internet search will also be performed using www.google.co.uk and www.allnet.co.uk, 'hand' searches (following links) for the first 50 'hits'.

Searches will include the terms, (* indicates a wildcard)

Mustela vison 'or' mink

Mustela vison 'or' mink 'and' management

Mustela vison 'or' mink 'and' control*

Mustela vison 'or' mink 'and' pest

More specific search terms may be added as the search becomes more specific. For example, specific terms for interventions may be used such as trap* and hunt*.

Foreign language searches will be carried out using the Latin name, *Mustela vison*.

A single reviewer will search the electronic databases, and the number of citations for each search will be recorded.

3.1.2 Other sources

A hand search of English Nature's 'Wildlink' library will be included.

Bibliographies of full text accepted articles and relevant secondary articles will be searched. Authors, recognised experts and current practitioners in the field of mink, and control of the species will be contacted for any unpublished relevant material.

Searches of publications by organisations will be included, such as the Game Conservancy Trust, Scottish Natural Heritage and The Wildlife Conservation Research Unit at Oxford University.

3.2 Study Inclusion and Exclusion Criteria

- **Relevant subjects.** All studies that consider *Mustela vison* and interventions for control will be included. The subject will be considered globally, and the geographical area will be recorded in order to interpret any patterns of variation in the results. The geographical location of papers within the UK will also be recorded as the species is thriving in this country and numbers are rapidly increasing, and there may be differences in effects of the intervention in varying habitats.
- **Types of interventions.** Initially all the interventions listed in Table 1. will be considered valid. The review may also have to be restricted if there is not enough literature available on particular interventions. If this is the case, a scope of the literature will be carried out and the intervention(s) with the most available literature will be the focus of the review.
- **Types of Comparator.** The control method (intervention) will be compared to an unmanaged control (no intervention). Studies may be

included where the comparator is temporal (same area at an earlier time) or spatial (direct comparison with a similar uncontrolled area). In some cases, this may be a computer model of the community without mink control occurring, or it may be the monitoring of the number of mink in surrounding areas, not subject to the intervention. Lower hierarchy evidence may be included using a notable change in base line populations.

- **Types of Outcome.** All outcomes will be recorded although the primary outcome is a change in the abundance of *Mustela vison*.
- **Types of Study.** All studies will be included if they present primary data about a relevant subject, intervention and outcome, along with a valid comparator.

The inclusion and exclusion criteria will be applied to all potential studies at the title and abstract stage by one reviewer. Articles will be assumed to fulfil the relevance criteria where there is insufficient information to make a decision without reference to the full texts. Articles passing on to the full text stage will be assessed independently by two reviewers. Disagreement will be resolved by consensus following assessment by a third reviewer.

3.3 Study Quality Assessment

Study quality will be scored according to a hierarchy of evidence. At least two reviewers will assess each accepted article independently, filling in an assessment form. Disagreement regarding study quality and inclusion will be resolved by reaching a consensus.

3.4 Data Extraction Strategy

Data will be extracted by one reviewer and a subset of data will be checked by another to verify accuracy. Data regarding the study characteristics, study quality and results will be extracted using data extraction forms. It is likely that these forms will be subject to amendment following consultation with statisticians and piloting the process of data extraction.

3.5 Data Synthesis

Summary tables of study characteristics, study quality and results will be presented, accompanied by a narrative synthesis. Quantitative analysis will be undertaken on data that is suitable for more formal statistical treatment. Other statistical treatments may be undertaken, depending on the nature of the extracted data. Meta analysis may be undertaken if appropriate data exist.

4. Potential Conflicts of Interest and Sources of Support

There are no conflicts of interest to be recorded.

5. References

Chanin, F. (1981) The feral mink: natural history, movements and control. *Nature in Devon* **2**, 33 – 54.

Halliwell, E.C. & Macdonald, D.W. (1996) American Mink *Mustela vison* in the upper Thames catchment: Relationship with selected prey species and den availability. *Biological Conservation* **76**, 51 – 56.

Macdonald, D.W. & Harrington, L.A. (2003) The American mink: the triumph and tragedy of adaptation out of context. *New Zealand Journal of Zoology* **30** (4), 421 – 441.

Moore, N.P., Roy, S.S., & Helyar, A. (2003) Mink (*Mustela vison*) eradication to protect ground-nesting birds in the Western Isles, Scotland, United Kingdom. *New Zealand Journal of Zoology* **30**, 443 - 452.

Short, M.J. & Reynolds, J.C. (2001) Physical exclusion of non-target species in tunnel-trapping of mammalian pests. *Biological Conservation* **98**, 139 – 147.

Tapper, S. (1980) Predators in line for protection. *Field* 1 Oct 1980, 864 - 892.

Usher, M.B. (1986) Invasibility and wildlife conservation: Invasive species on nature reserves. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* **314** (No. 1167), 695 – 709.

Department for Environment, Food and Rural Affairs (DEFRA) <http://www.defra.gov.uk>

English Nature <http://www.english-nature.org.uk/>

Scottish Natural Heritage (SNH) <http://www.snh.org.uk/>

Game Conservancy Trust (GCT) <http://www.gct.org.uk/>

Wildlife Conservation Research Unit (Wild CRU) <http://www.wildcru.org/>