Terrestrial Mammal Conservation

Global evidence for the effects of interventions for terrestrial mammals excluding bats and primates

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CONSERVATION EVIDENCE SERIES SYNOPSISES
10. Threat: Pollution

Background

Pollution, of many diverse types, has direct and indirect impacts on mammals. Water-borne pollutants can devastate otherwise productive wetland and coastal habitats. Many pesticides linked to mammal deaths are still in widespread use and especially those targeting rodents may pass up through the food chain to predatory mammals. Oil spills remain a threat to some mammals of aquatic habitats, while solid waste is an increasing problem. Little is known of the long-term effects of many pollutants, including those that persist and accumulate in the environment. Organic farming, with reduced or zero input of pesticides, herbicides or artificial fertilizers, is included in this chapter.

10.1. Reduce pesticide or fertilizer use

https://www.conservationevidence.com/actions/2539

- **Three studies** evaluated the effects on mammals of reducing pesticide, herbicide or fertilizer use. Two studies were in the UK\(^1\), one was in Italy\(^2\) and one was in Argentina\(^3\).

COMMUNITY RESPONSE (1 STUDY)

- **Richness/diversity (1 study)**: A replicated, site comparison study in Argentina\(^3\) found that farming without pesticides or fertilizers did not increase small mammal species richness in field margins.

POPULATION RESPONSE (2 STUDIES)
• **Abundance (2 studies):** One of two site comparison studies, in the UK\(^1\) and Italy\(^2\), found that reducing pesticide or fertilizer use, by farming organically, increased wood mouse abundance\(^1\). The other study found that it did not increase European hare abundance\(^2\).

**BEHAVIOUR (1 STUDY)**

• **Use (1 study):** A replicated, site comparison study in Argentina\(^3\) found that farming without pesticides or fertilizers did not increase small mammal use of field margins.

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**Background**

Pesticides (including insecticides, herbicides and fungicides) and fertilizers, used especially in agriculture, but also in horticulture, amenity grassland, gardens and other situations, may have a negative effect on wildlife. Through reducing plant and insect diversity, or through direct toxicity, they may also natively impact mammals. Organic farming, an agricultural system that excludes the use of synthetic fertilizers and pesticides and relies on techniques such as crop rotation, compost and biological pest control, is included within this intervention.

A site comparison study in 1994–1996 on arable land in Gloucestershire, UK \(^1\) found that reducing pesticide, herbicide or fertilizer use by farming organically was associated with higher numbers of wood mice *Apodemus sylvaticus*. More wood mice were caught on an organic farm (monthly averages of 19–24 individuals) than on a conventional farm (8–17 individuals). This result was not tested for statistical significance, though there were significantly more juvenile mice on the organic farm compared to the conventional farm and female mice on the organic farm were significantly heavier in two out of three years (data not presented). On one organic farm and one conventional farm, wood mice were surveyed using 56 Longworth live traps in each of two fields, at each farm, each year, in 1994–1996.

A replicated, site comparison study in 2011 on 26 mainly arable farms in Tuscany, Italy \(^2\) found that reducing pesticide, herbicide or fertilizer
use, by farming organically, did not increase abundances of European hares *Lepus europæus*. The density of hares on organic farms (14 hares/km²) was lower than on conventional farms (24 hares/km²). Higher hare density appeared, instead, to be more strongly positively related to increased habitat diversity, including crop diversity. Half of the 26 study farms, average size 6.1 km², were organic and half were non-organic farms. Organic farms complied with European Union organic farming requirements. Hare density was estimated using spotlight counts from a car, two or three times at each farm, in early March 2011.

A replicated, site comparison study in 2011–2013 of three arable farms in Córdoba, Argentina (3) found that farming without herbicides, fertilizers, or fungicides did not increase small mammal use of field margins or small mammal species richness in margins. Average annual small mammal capture rates on margins not treated with pesticides or fertilizers (2.5–2.9 individuals/20 traps) did not significantly differ from those on conventionally farmed margins (2.4–3.2 individuals/20 traps). Average annual small mammal species richness without pesticides and fertilizers (1.1–1.2 species/20 traps) did not differ from that with conventional farming (1.1–1.2 species/20 traps). Organic fields were managed without herbicides, fertilizers or fungicides for 10–19 years. A range of these chemicals was used on conventionally farmed fields. Small mammals were live-trapped, using lines of 20 traps in 1.5–2.5-m-wide vegetated field margin strips on three farms. Trapping was carried out over four consecutive nights, once each in spring, summer and autumn, from November 2011 to June 2013. There were 106–116 trap lines/sampling period (proportion in each margin management type not stated).


10.2. Leave headlands in fields unsprayed

https://www.conservationevidence.com/actions/2540

- **Two studies** evaluated the effects on mammals of leaving headlands in fields unsprayed. One study was in the UK\(^1\) and one was in the Netherlands\(^2\).

**COMMUNITY RESPONSE (0 STUDIES)**

**POPULATION RESPONSE (0 STUDIES)**

**BEHAVIOUR (2 STUDIES)**

- **Use (2 studies)**: Two replicated studies (one also controlled) in the UK\(^1\) and the Netherlands\(^2\), found that crop edge headlands that were not sprayed with pesticides were used more by mice than were sprayed crop edges\(^1,2\).

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**Background**

Conservation headland management may involve restricting fertiliser, herbicide and insecticide spraying along a strip through a sown arable crop. Typically, as under agri-environment schemes practiced in Europe, this may be a 6-m-wide strip with selected herbicide applications permitted to control certain weeds or invasive species.

A replicated study in 1986–1987 in an arable field, in Oxfordshire, UK (1) found that not spraying herbicide on headlands of crop at the field edge was associated with higher use of those areas by wood mice *Apodemus sylvaticus*. The proportion of location fixes obtained for mice in unsprayed or sprayed plots indicated greater selection of unsprayed plots relative to their availability within home ranges (data presented as preference indices). Plots extended 10 m into a winter wheat field and were 20 m long. Plots were either sprayed or not sprayed with a range of agricultural herbicides. Application of other chemicals (insecticides, fungicides, growth regulators and fertilizers) were the same across all plots. Wood mouse movements were monitored by radio-tracking 15 mice, between June and August in each of 1986 and 1987.
A replicated, controlled study in 1990–1993 of six arable farms in the Netherlands (2) found that unsprayed crop edge headlands were used more by field mice *Apodemus* spp. than were crop edges sprayed with herbicides and insecticides. Results were not tested for statistical significance. More field mice were caught in unsprayed crop edges (38 mice caught) than in sprayed edges (27 mice caught). Strips 3–6 m wide, 100–450 m long, along the edges of crops, were left unsprayed by herbicides and insecticides and were compared to sprayed crop edges in the same field. Small mammals were surveyed using pitfall traps during 13 weeks in 1990 and 12 weeks in 1991 (all in May–July). The number of strips on which small mammals were surveyed is unclear.


10.3. Establish riparian buffers

https://www.conservationevidence.com/actions/2541

- We found no studies that evaluated the effects on mammals of establishing riparian buffers.

‘We found no studies’ means that we have not yet found any studies that have directly evaluated this intervention during our systematic journal and report searches. Therefore, we have no evidence to indicate whether or not the intervention has any desirable or harmful effects.

**Background**

Uncultivated strips of vegetation at the edge of waterways are often used to help reduce pollution entering the water within agricultural and forestry systems. These buffer strips may, therefore, help to enhance environmental quality for aquatic and semi-aquatic mammal species.

See also: *Biological resource use — Retain riparian buffer strips during timber harvest.*
10.4. Translocate mammals away from site contaminated by oil spill

https://www.conservationevidence.com/actions/2542

- **One study** evaluated the effects of translocating mammals away from a site contaminated by oil spill. This study was in the USA\(^1\).

COMMUNITY RESPONSE (0 STUDIES)

POPULATION RESPONSE (1 STUDY)

- **Survival** (1 study): A study in the USA\(^1\) found that after being translocated in a trial of responses to a hypothetical pollution incident, most sea-otters survived for the duration of monitoring.

BEHAVIOUR (1 STUDY)

- **Behaviour change** (1 study): A study in the USA\(^1\) found that after being translocated in a trial of responses to a hypothetical pollution incident, most sea-otters did not return to their capture location.

**Background**

Where there is a large pollution event that has potential to affect wild mammals, one intervention option may be to translocate these mammals to another site. In such event, the translocation would be an emergency action, carried out with minimal planning. It would only be likely to be considered where the survival chances of mammals would be very low otherwise.

A study in 1988–1989 in coastal waters of California, USA (1) found that after being translocated in a trial of responses to a hypothetical pollution incident, most sea-otters *Enhydra lutris* survived for the duration of monitoring and did not return to their capture location. Seventeen of 19 translocated sea otters survived for at least 16–87 days after release. Two died at the release site, after 21 and 28 days after release. Five of
19 translocated sea otters were recorded back at their capture location during the monitoring period. Twelve were last recorded at a site 27 km from the release site. Nineteen sea otters were caught between May 1988 and May 1989 and were released 291 km further north. Nine were released immediately on arrival and 10 were held for 48 hours in floating pens before release. Sea otters were radio-tracked from the ground or air for 16–87 days after release.
