Radiotracking the critically endangered European mink (*Mustela lutreola*): feedback on the fitting of collars and intraperitoneal transmitters

Christine Fournier-Chambrillon[a*], Fermín Urra-Maya[b], Romain Beaubert[c], Aitor Lekuona Alzugaray[d], Pascal Fournier[a]

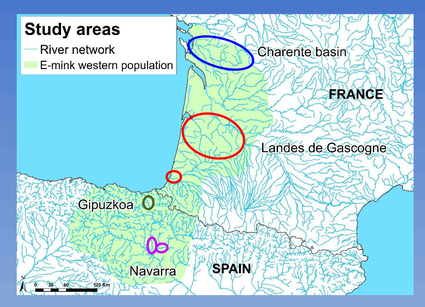
[a] GREGE, Villandraut, France
*cfournier-chambrillon.grege@orange.fr
[b] GAN-NIK, 31015 Pamplona, Spain
[c] LPO, 17305 Rochefort, France
[d] Diputación Foral de Gipuzkoa, 20004 Donostia, Spain

Several VHF radiotracking studies on spatial ecology of native European mink (E-mink) have been carried out in France and Spain over the last 25 years to better target conservation measures [1,2,3,4,5].

Similarly, translocated E-mink in Spain, Germany or Estonia have been radio tracked to monitor their behaviour and adaptation to the environment [6,7,8,9].

However, due to its morphology with similar head and neck circumference, and its semi-aquatic and frequently subterranean behaviour patterns, E-mink is difficult to radio tag. Two types of transmitters have been used during these studies : external collar-mounted transmitters, or surgically implanted intraperitoneal transmitters. In both cases, a general anaesthesia is needed to equip the animals, while implantation requires a simple aseptic veterinary procedure.

We provide here our feedback on these two types of transmitters on 4 study areas, with a view to their impact on individuals and respect for animal welfare.



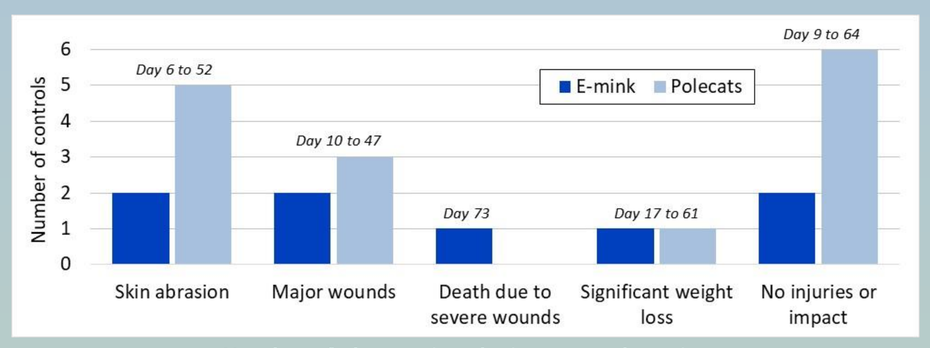
EXTERNAL COLLAR-MOUNTED TRANSMITTERS

Native E-mink and Polecat radiotracking in South-western France (1996-1999)[1,2]

During this study, E-mink and polecats (*Mustela putorius*) were initially fitted with radio collars specially recommended by the manufacturers BIOTRACK®, then AVM® (20 g - ≈ 38 x 21 mm). Collars were not tight but attached so that the ears stopped it from removing.

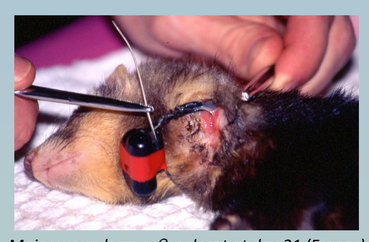
The initial model consisted of a cable in a Teflon sheath, pleated to create an accordion effect. Following first lesions, brass loop collar and around 10 self-made prototypes were tested, including soft leather collars or harnesses. In this context, recaptures had to be carried out regularly to check the individuals, causing major disturbance.

External transmitters were placed 10 times on 7 E-mink and 15 times on 9 polecats.



Number of observations by impact and species

Skin irritation on a ♂ polecat at day 6 (France)



Major wounds on a ♀ polecat at day 21 (France)

Major wounds on a ♂ E-mink at day 39 (France)

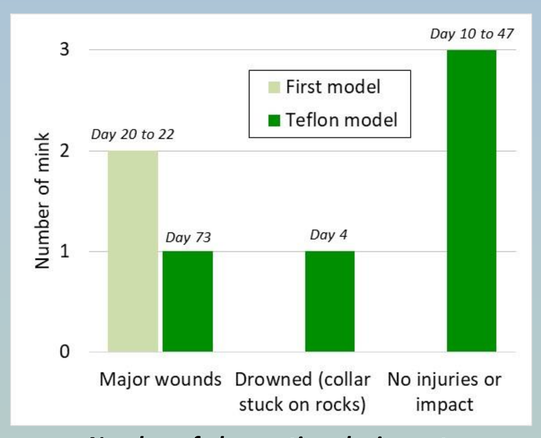
➡ **All models caused injuries in both species, and death in 1 E-mink.**

➡ **83 % of 6 E-mink and 67% of 9 polecats were seriously impacted.**

Translocated E-mink radiotracking in Gipuzkoa, LIFE Lutreola Spain (2007)[6]

During the C4 action, 9 nine translocated E-mink were fitted with VHF radio collars from the manufacturer ATS® (M1730, 11 g).

Two mink received a first model provided by the manufacturer. Following first lesions, 7 mink received an improved model coated with a Teflon sheath, specially recommended.



Number of observations by impact and collar

Major wounds on E-mink at day 20 (Initial collar - Spain)

Major wounds on E-mink at day 73 (Teflon collar - Spain)

➡ **Both models caused injuries, and death in 1 E-mink.**

➡ **57 % of 7 E-mink were seriously impacted.**

IMPLANTED INTRAPERITONEAL TRANSMITTERS

Native E-mink and Polecat radiotracking in South-western France (1996-1999)[1,2]

In this study, radio-collars were definitively abandoned.

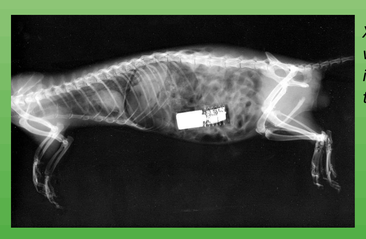
Two TELONICS® 18 g beeswax-coated intraperitoneal transmitters were used, IMP-150-L-HP and IMP-150-L (51 x 22 mm). First sterilised by immersion in a disinfectant solution according to the manufacturer's recommendations, cold sterilisation using Ethylene Oxide (ETO) was then preferred. Transmitters were placed freely in the peritoneal cavity.

16 implantations were successfully performed on 7 E-mink and 12 on 9 polecats. 3 E-mink and 3 polecats were implanted twice and 3 E-mink 3 times. 24 implantations were checked when transmitters were replaced or removed.

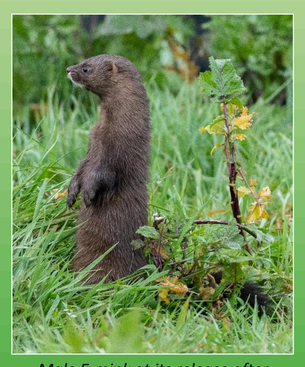
➡ **No mortality or severe impact were observed.**

- Significant inflammatory reaction, with no apparent consequence, was observed in 1 polecat due to sterilisation by immersion.
- Twisted omentum around the transmitter, of no consequence, was observed twice (1 E-mink and 1 polecat).

Intraperitoneal transmitter implantation on a ♀ E-mink under anesthesia with oxygen mask (©LIFE VISON /GREGE)



X-ray of a ♂ E-mink with a TELONICS® intraperitoneal transmitter (©GREGE)



Male E-mink at its release after implantation (©LIFE VISON /LPO)

Native E-mink radiotracking in Navarra, Spain (2007-2009)[3,4]

In this study, 28 E-mink were radio tracked using intraperitoneal transmitters.

Different ETO sterilised transmitters models were used: BIOTRACK® (11 g - 60,5 x 13 mm), ATS® (9,5 g - 58 x 11,7 mm for ♀♀; 19,5 g - 70 x 19 mm for ♂♂) and TELONICS® IMP-150-STP and IMP-130-HP (18 g or 16,5 g - 51 x 22 mm).

34 implantations were successfully performed on 15 males and 13 females. 2 males were implanted twice and 1 male and 1 female were implanted 3 times. 13 implantations were checked.

➡ **No mortality or severe impact were observed.**

- BIOTRACK® models proved to not be waterproof and unreliable. Significant inflammatory reaction was observed twice / 6 controls.
- Twisted omentum around the transmitter, of no consequence, was observed twice with the largest male ATS® model.
- Reproduction was confirmed on 2 monitored females, and 4 times after monitoring on 3 other females.
- 4 females and 1 male were recaptured 1 to 5 times after monitoring, up to 1.4 to 4.6 years after implantation.

Native E-mink radiotracking in Charente basin, LIFE VISON, France (2020-2022)[6]

During the C2 action, 9 E-mink were radio tracked using intraperitoneal transmitters.

Two ETO sterilised beeswax-coated TELONICS® models were used (IMP-3 and IMP-2; 16g - 55 x 18 mm).

12 implantations were successfully performed on 6 males and 3 females. 1 male and 2 females were implanted twice. 6 implantations were checked.

➡ **No mortality or severe impact were observed.**

- No inflammatory reaction was observed.
- Twisted omentum around the transmitter, of no consequence, was observed on 1 male.
- All 3 females monitored during the breeding period were observed with cubs.
- 2 males and 1 female were recontacted after monitoring up to 2 years after implantation.

CONCLUSIONS

- ✓ Collars on E-mink and polecats caused serious to fatal injuries, severe emaciation or drowning.
- ✓ Such ethically unacceptable problems were also reported on American mink (*Mustela vison*) [10] and invasive Northern raccoon (*Procyon lotor)* [11] corroborating that collars should be banned for semi-aquatic species.
- ✓ Intraperitoneal transmitters revealed minor problems. They do not distort the animal's conformation and their volume fairly close to that of faeces, is appropriate.
- ✓ They appear harmless to reproduction and without long-term impact.
- ✓ They were also successfully used on translocated E-mink and invasive American mink in Germany [7,10].
- ✓ With up to 8 months monitoring periods, similar to radio-collars, at present, intraperitoneal transmitters appear to be the best solution for radiotracking E-mink, with reference to animal welfare.
- ✓ For 25 years of reliability, we recommend TELONICS® beeswax-coated models with ETO sterilization.

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