

Impact of the New Zealand flatworm on Scotland's Biodiversity.

Brian Boag and Roy Neilson
SCRI, Invergowrie, Dundee DD2 5DA.

The New Zealand flatworm (Fig. 1) is an alien planarian first recorded in Scotland in 1963 and has subsequently spread throughout the mainland and many of the western islands (Fig. 2) (Boag B. et al., 1997)



Fig. 1 New Zealand flatworm.

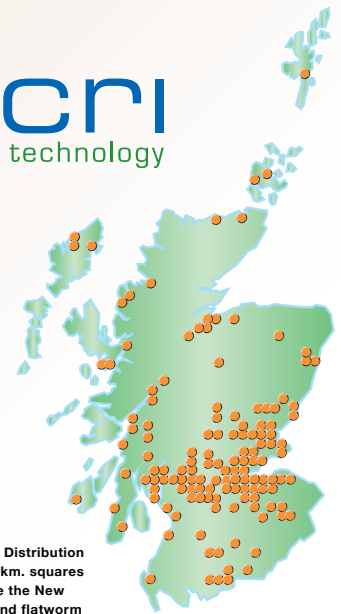


Fig. 2 Distribution of 10 km. squares where the New Zealand flatworm were recorded.

Impact on Earthworms

Initial reports from Northern Ireland implicated the New Zealand flatworm with reductions in earthworm populations to below detectable limits. In Scotland research has shown the presence of the New Zealand flatworm significantly reduces both the numbers and biomass of the anecic earthworms *Lumbricus terrestris* and *Aporrectodea longa* (Table 1, Jones *et al.*, 2001). These are the species which feed on fresh surface litter on the soil surface and therefore probably the main earthworm species eaten by birds and mammals.

Species	New Zealand flatworm infested fields (n=2)	Non infested pasture fields (n=48)
<i>Lumbricus terrestris</i>	2.25	7.17
<i>Aporrectodea longa</i>	0.39	16.73

The impact of the New Zealand flatworm on other earthworm species is probably less but still the numbers of endogeic species from infested fields (6.89 per m²) were significantly less than those from non infested fields (27.68 per m²). The deleterious impact on drainage, soil processes and nutrient cycling is also unknown.

Impact on Wildlife

The impact of the New Zealand flatworm on wildlife is difficult to estimate (except in the case of moles where mole hills can easily be counted). In the west of Scotland moles (Fig. 3) can be detected in approximately 70% of pasture fields but in an area between Loch Eck and Dunoon (where moles had been a problem) none of 55 New Zealand flatworm infested fields now has moles (Fig. 4) (Boag B.; Neilson R., 2006). The eradication of moles due to flatworms has now also been reported from Wester Ross. Earthworms are a major constituent of the diet of many birds and animals (Tables 2 and 3, Alford *et al.*, 1995). Water logging and changes in vegetation e.g. increase in rushes in infested fields has also been reported.



Fig 3

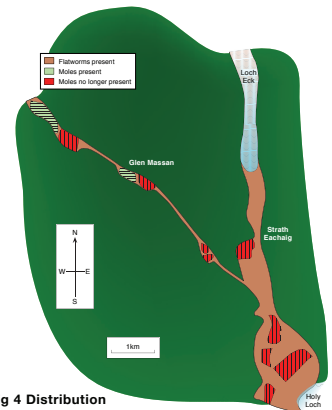


Fig 4 Distribution of moles and flatworms in Strath Eachaig and Glen Massan

Table 2. Possible impact of the New Zealand flatworm on native mammals. (after Alford *et al.*, 1995)

Species of Mammal	Possible effect
Mole	Extinction
Common Shrew	Population suppression, possible local extinction
Badger	Population suppression, possible local extinction
Hedgehog	Population suppression, possible local extinction
Skunk	Possible local extinction in 'lean' years
Fox	Probably unaffected

Table 3. Birds likely to be affected severely by earthworm loss (after Alford *et al.*, 1995)

Moorhen
Oystercatcher
Golden plover
Lapwing
Stone curlew
Snipe
Woodcock
Little Owl
Blackbird
Ring Ouzel
Redwing
Song thrush
Rock

Conclusions

Reports of the spread of the New Zealand flatworm throughout Scotland continues but its deleterious impact on some earthworm species and the resulting affect of the biodiversity of wildlife found in Scotland is still unknown.

Meanwhile the "precautionary principle" should be promoted to control and slow down its further spread to uninfested land in Scotland.

References

- Alford D.V. et al., (1995). MAFF Chief Scientist Group Report. Project OCS9323.
- Boag B. et al., (1997). *Eur. J. Soil. Biol.* 33: 53-56.
- Boag B. & Neilson R. (2006) *Proc. Crop. Protection N. Britain.* 51-56.
- Jones H. D et al., (2001). *Ann. Appl. Biol.* 139: 75-92.