

# Science for Environment Policy

## Identifying valid surrogates for amphibians and reptiles in pesticide toxicity assessment

**Environmental pollution is putting amphibians and reptiles at risk, yet these animals are not included in regulations regarding the environmental risk assessment (ERA) of pesticides.** The extent to which other species already used in pesticide toxicity assessment (including fish, birds and mammals) can serve as effective surrogates is currently under debate. This study conducts a systematic review of the available literature. The results reveal a positive correlation between toxicity recorded on fish and aquatic amphibians, but indicate that birds and mammals are generally not good surrogates for reptiles and terrestrial amphibians. Moreover, some chemical-dependent trends were detected, with a number of insecticides found to be more toxic to amphibians or reptiles than to potential surrogates. These findings highlight an urgent need for further research to reduce uncertainties and contribute to future policymaking regarding the protection of amphibians and reptiles from potentially harmful pesticides.

**Amphibians and reptiles are the two most endangered groups of vertebrates in the world.** According to [current estimates](#), 32% of amphibians and 21% of reptiles can be classified as endangered or vulnerable to extinction. Pollution (often pesticide-related) has been recognised as a major factor, prompting an increase in studies aimed at assessing the effects of [chemicals](#) on these vertebrate groups. However, research has been limited by the fact that most current legislation has not included amphibians or reptiles within the ERA required for regulatory approval of pesticide products (e.g. [Commission regulation \(EU\) No 284/2013](#)<sup>1</sup>), meaning data is lacking.

Whenever possible, gaps in ecotoxicity data must be filled using existing data sources, rather than by conducting additional vertebrate testing (e.g. [EU Directive 63/2010/EC Legislation for the protection of animals used for scientific purposes](#)<sup>2</sup>). It is, therefore, necessary to explore the extent to which information derived from current ERA protocols for pesticides can be used to estimate — and, ultimately, reduce — the risks that pesticides pose to amphibians and reptiles. ERA schemes often assume that fish are valid surrogates for the aquatic life stages of amphibians and that birds and mammals can serve as surrogates for reptiles and the terrestrial life stages of amphibians. In recent decades, research on the validity of surrogate taxa for amphibians and reptiles in toxicity assessment have produced mixed results. As such, many uncertainties remain.

To meet this need for further scientifically sound and robust information on the extent to which fish, birds and mammals constitute valid surrogates for amphibians and reptiles in pesticide toxicity assessment, a systematic review of relevant literature was conducted<sup>3</sup>. The meta-analysis had two aims:

1. To compare acute toxicities (which result from single or multiple exposures to a stressor within a short period of time) and chronic toxicities (which result from long-term exposure to a stressor) on amphibians and reptiles with available information on fish, birds and mammals.
2. To attempt to identify a candidate amphibian model species to be used in risk assessment.

*Continued on next page.*

**27 September 2018  
Issue 514**

**[Subscribe](#) to free  
weekly News Alert**

**Source:** Ortiz-Santaliestra, M. E., Maia, J. P., Egea-Serrano, A. *et al.* (2018). Validity of fish, birds and mammals as surrogates for amphibians and reptiles in pesticide toxicity assessment. *Ecotoxicology*. DOI: <https://doi.org/10.1007/s10646-018-1911-y>.

**Contact:**  
[manuele.ortiz@uclm.es](mailto:manuele.ortiz@uclm.es)

**Read more about:**  
[Biodiversity](#),  
[Chemicals](#), [Risk  
assessment](#)

1. [Regulation EU 284/2013 – setting data requirements for PPPs](#)

2. [Directive 2010/63/EU on the protection of animals used for scientific purposes](#)

3. Part of the data used in the study were accessible from the procurement OC/EFSA/PRAS/2015/01 awarded by the European Food and Safety Authority. The results of that procurement are publicly available and have been retrieved from <https://www.efsa.europa.eu/en/supporting/pub/1251e>.

# Science for Environment Policy

## Identifying valid surrogates for amphibians and reptiles in pesticide toxicity assessment (continued)

27 September 2018  
Issue 514

[Subscribe](#) to free  
weekly News Alert

**Source:** Ortiz-Santaliestra, M. E., Maia, J. P., Egea-Serrano, A. *et al.* (2018).

Validity of fish, birds and mammals as surrogates for amphibians and reptiles in pesticide toxicity assessment. *Ecotoxicology*.

DOI:  
<https://doi.org/10.1007/s10646-018-1911-y>.

**Contact:**  
[manuele.ortiz@uclm.es](mailto:manuele.ortiz@uclm.es)

**Read more about:**  
[Biodiversity](#),  
[Chemicals](#), [Risk assessment](#)

The researchers found a positive correlation between *acute* toxicity recorded on fish and aquatic amphibians, which indicates that fish may serve as a valid surrogate for the assessment of this type of toxicity. There were not enough data, however, to compare *chronic* toxicity in an aquatic environment, meaning there is insufficient evidence to suggest that fish are a legitimate surrogate for this type of toxicity. Moreover, in a terrestrial environment, only a few weak significant correlations were observed, which suggests that warm-blooded vertebrates (i.e. birds and mammals) typically do not function as valid surrogates for reptiles and terrestrial amphibians in pesticide risk assessment. No suitable candidate amphibian model species could be identified.

Moreover, the research revealed a number of chemical-dependent trends, including the fact that pyrethroids (found in most commercial household insecticides) and organochlorine insecticides are more toxic to amphibians and reptiles than to birds and mammals. The identification of such trends could potentially guide the future assessment and protection strategies associated with specific pesticide groups.

The results of this meta-analysis highlight a clear need for further research in order to reduce uncertainties and support future decision-making regarding the use of surrogate taxa for amphibians and reptiles in pesticide toxicity assessment. This is particularly true for the assessment of chronic toxicity in aquatic environments and the assessment of acute and chronic toxicity in terrestrial environments.



The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission. Please note that this article is a summary of only one study. Other studies may come to other conclusions.

To cite this article/service: "[Science for Environment Policy](#)": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

