

Wetland Species Risk Assessment - An Industry Perspective

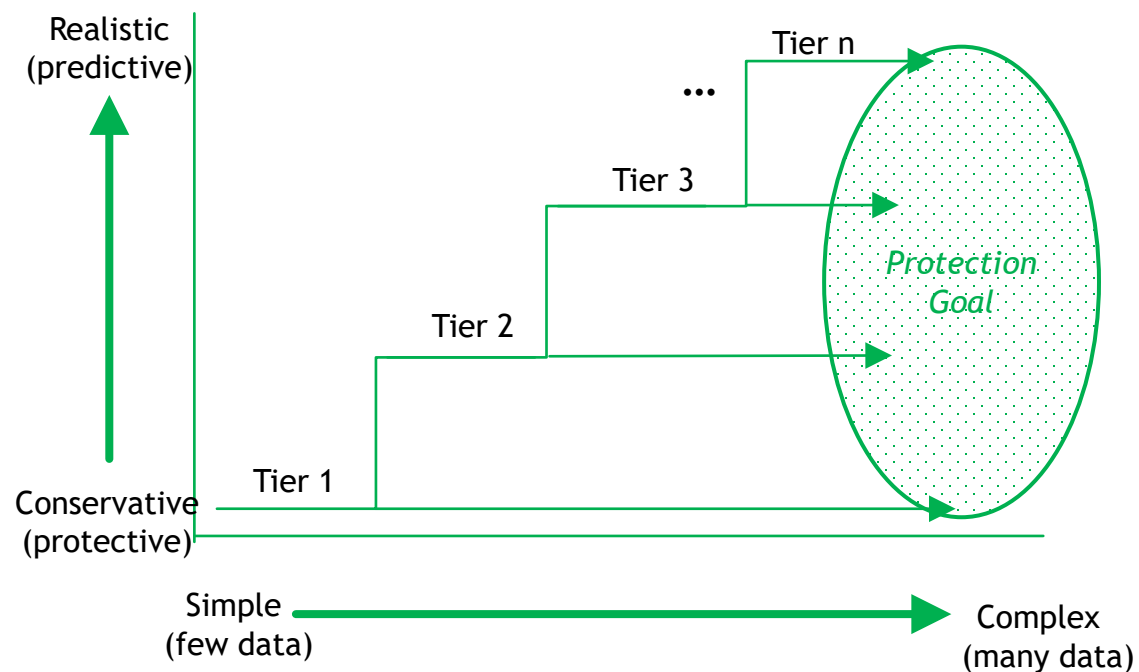
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Disclaimer - views expressed are those of the authors only

Why a tiered process for exposure/hazard and risk?



$$Risk = f \{exposure, hazard\}$$

Adapted from: Solomon, K. R., Brock, T. C. M., De Zwart, D., Dyer, S. D., Posthuma, L., Richards, S. M., ... & Van den Brink, P. J. (2008). Extrapolation in the context of criteria setting and risk assessment. In *Extrapolation Practice for ecotoxicological effect characterization of chemicals* (pp. 1-32). SETAC Press & CRC Press.

Screening-level exposure estimates

▶ Pros -

- ▶ Fast & Easy - low data and resource requirements
 - ▶ Can be a simple calculation/spreadsheet/model shell
- ▶ Conservatively characterize potential exposure and risk
- ▶ Protective by design

▶ Cons -

- ▶ Can represent situations that are highly unlikely
 - ▶ And that likelihood is hard to characterize
- ▶ Conservative elements can compound
- ▶ Difficult to guide mitigation and risk management decisions

Higher-tier models

▶ Pros -

- ▶ More realistic representations of processes
- ▶ Can be more spatially/temporally granular
- ▶ Probabilities of occurrence are better known
 - ▶ Including uncertainties
- ▶ More utility in defining risk management and mitigation decisions

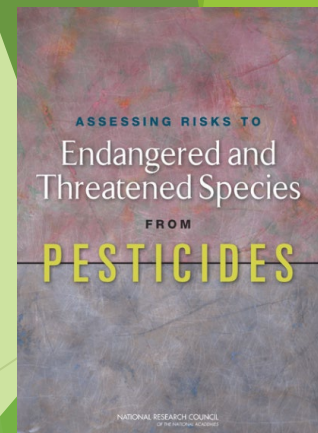
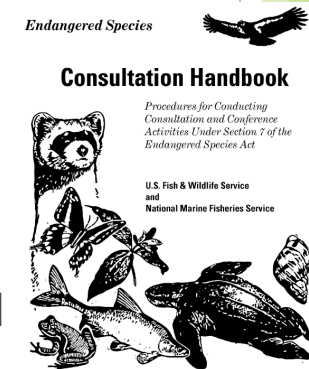
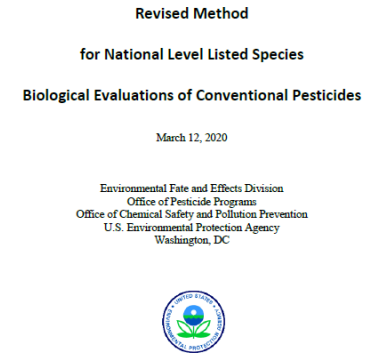
▶ Cons -

- ▶ More data and resource intensive
- ▶ Scientific acceptability/validation/regulatory buy-in can be arduous
- ▶ Interpretation of outcomes can be difficult to communicate and place in a regulatory framework

- ▶ **Keep in mind - all these issues apply in the hazard part of the risk equation as well!**

The ESA conundrum

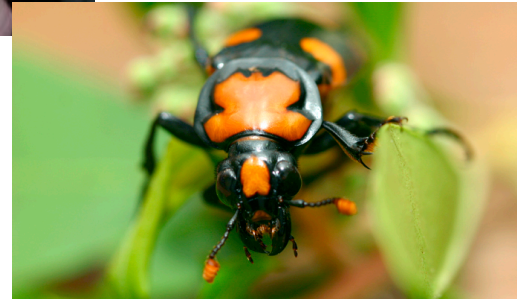
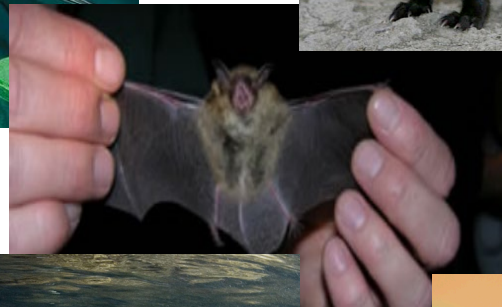
- ▶ FIFRA and ESA have a different “risk standard”
 - ▶ FIFRA - no unreasonable risk
 - ▶ ESA - cannot jeopardize the continued existence of a listed species or destroy or modify its defined critical habitat
- ▶ ESA Section 7 - a *federal action* requires a determination of potential impact on listed species
 - ▶ A FIFRA registration is a federal action
- ▶ If the action agency (EPA) determines a “may effect/likely to adversely effect” to a species or its designated critical habitat, a consultation is required with the responsible agency (FWS or NMFS)
- ▶ The Services make determination of jeopardy/adverse modification or not
 - ▶ Jeopardy results in reasonable and prudent alternatives/measures
- ▶ Current EPA methods employed a multi-step process, but further work is needed
 - ▶ Consumes enormous amounts of resources (for everyone!)
 - ▶ Extremely difficult public policy and legal environment



What about wetlands specifically?

- ▶ There are many listed species that inhabit wetlands or are dependent on them
- ▶ Current modeling methods are difficult to apply to wetland systems
 - ▶ Models of transport into wetlands are relatively simple
 - ▶ Do they represent transport realistically? (and is this important?)
 - ▶ Hydrology and other dynamics of the wetland itself is represented in a relatively simplistic fashion
 - ▶ Is it important to be more first principles-based?
 - ▶ Spatial scale can be important
 - ▶ Single field/water body ⇒ subwatershed ⇒ catchment ⇒ ...
- ▶ How can higher-tier models fit into a regulatory framework?
 - ▶ How high is high enough?

Questions?



Photos: NMFS & USFWS