ESA Stakeholder Workshop: Weight of Evidence Breakout Groups

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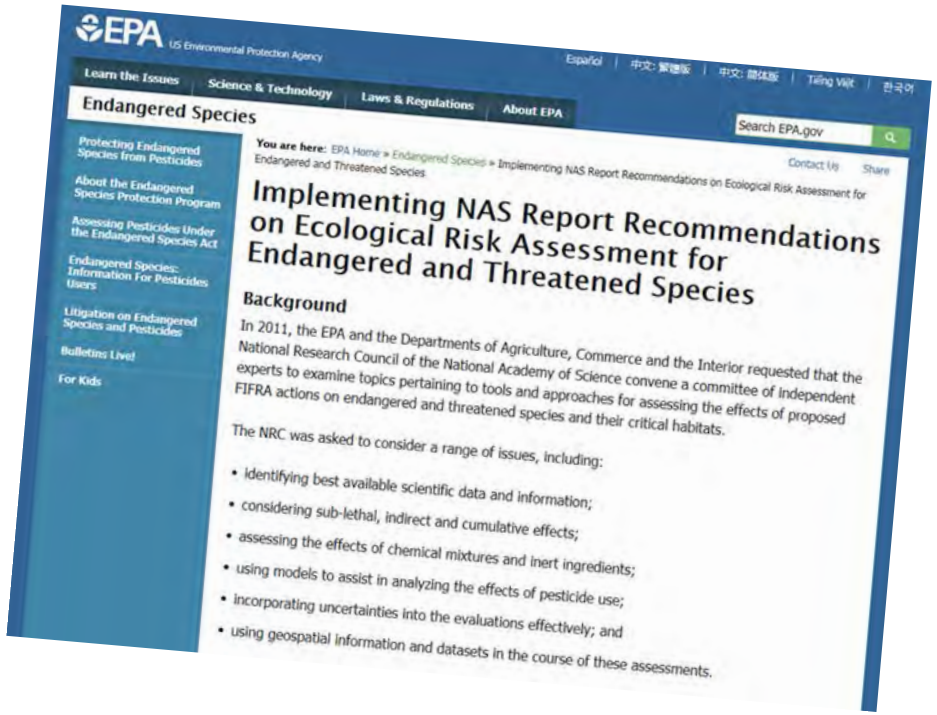
Overview

- Overview
- Weighting Exposure
  - Current BE process
  - Charge Questions
- Weighting Effects
  - Current BE process
  - Charge Questions
- Weighting Risk
  - Current BE process
  - Charge Questions
- Questions



Overview

- Uses various lines of evidence to evaluate the totality of the direct and indirect impacts of the action on the species and/or critical habitat. Lines of evidence include:
  - Mortality
  - Growth
  - Reproduction
  - Behavior
  - Sensory effects
  - Indirect effects (*e.g.,* prey items, habitat)
  - Chemical stressors
  - Non-chemical stressors
- Evaluate both the exposure and effects data to determine the weight of the 'risk' and 'confidence' associated with the data available for each line of evidence

Overview

- Exposure
  - Relevance of environmental models for generating EECs for receiving habitats (terrestrial and aquatic)
  - Robustness of EECs derived from environmental models
- Effects
  - Biological relevance of effects data
    - Is there a relationship between the effects data and line of evidence?
  - Surrogate relevance of effects data
    - Is the effects data measured with the listed species or an appropriate surrogate?
  - Robustness of information
    - Do we have multiple, independent studies that show the same effect?

Weight-of-evidence Matrix

	Weight of evidence (confidence in exposure and effects data)					Risk: Overlap of exposure and effect (High, Medium, Low)	Confidence (Weight: high, medium, low)
Lines of Evidence	Things to consider for confidence in data						
	EXPOSURE		EFFECTS				
	Relevance	Robustness	Biological Relevance	Species Surrogacy	Robustness		
Mortality							
Growth							
Reproduction							
Behavioral							
Sensory effects							
Indirect effects (prey items, habitat)							
Chemical Stressors							
Non-chemical stressors							

Overview

- Breakout Groups:
  - WOE 1: Animals
  - WOE 2: Plants

Overview: Charge Questions

- EPA and the Services are interested in suggestions that improve the WoE method. When addressing the questions, answers will be grouped into “short term” or “long term” solutions, considering the magnitude of work associated with developing and applying the methods to all listed species (n ≈ 1800).

- In general, the same set of questions will be considered by the WoE groups focused on plants and on animals; however, the discussions are expected to differ.

Current BEs: Weighting Exposure

- Criteria used to assess exposure estimates ultimately answer the question, “how confident are we that exposure estimates represent environmental concentrations that could occur based on allowable labeled use?” The current approach for characterizing exposure considers
  - the relevance of predicted EECs for species’ habitats and
  - the robustness of EECs derived from environmental fate models

Current BEs: Weighting Exposure

- **HIGH**: conceptual model is consistent with species habitat and chemical specific fate data are available to derive input parameters.
  - The life history of the species may be considered.
- **MED**:
  - conceptual model is consistent with species habitat but important fate data are missing such that chemical specific input parameters cannot be derived; **OR**
  - conceptual model is not consistent with the species habitat; sufficient fate data are available to derive chemical specific input parameters
- **LOW**: Important chemical-specific fate data are missing or inability to estimate exposures in habitat (*e.g.*, open ocean, caves)

Exposure: Charge Questions

- **CHARGE QUESTION 1:** Comment on/suggest alternative methods for presenting exposure information (e.g., probability distributions, consideration of a range of exposure estimates, consideration of duration of exposure) and how the information can be weighed for each line of evidence's risk conclusion.

- **CHARGE QUESTION 2**: Comment on the criteria used to weight Confidence in the estimation of exposure as described in Supplemental Information to Attachment 1-9.

Current BEs: Weighting Effects

- Similar to the exposure characterization, the effects data are evaluated to answer the question, “how confident are we that available toxicity data will accurately predict an effect to the listed species?” The current approach considers
  - 1) biological relevance- whether there is an established relationship between the measure of effect and the assessment endpoint,
  - 2) relevance of surrogate- how representative the tested organisms used in the toxicity studies are at informing the potential for adverse effects to listed species or critical habitat, and
  - 3) robustness- whether there is consistency within the line of evidence for the taxonomic grouping of interest

Current BEs: Weighting Effects (Animals)

Poweshiek Skipperling

https://wisconsinbutterflies.org/butterfly/species/131-poweshiek-skipperling

- **HIGH**: toxicity data are available for test species within the same order (*i.e.*, confidence due to surrogacy); if not, a robust data set is available (*e.g.*, SSD, many studies for different orders); there is an established AOP and the effects seen are consistent with the AOP
- **MED**: toxicity data are not available for the same order; data set is not particularly robust (*e.g.*, no SSD; few studies)
- **LOW**: data are not available for species within the same taxon, limited data are available for the line of evidence

Current BEs: Weighting Effects (Plants)

- **HIGH**: Toxicity data are available for the same group (*i.e.*, herbaceous dicot, woody dicot, monocot, other) for the species and data are available for more than six dicots/four monocots

- **MED**: data are available for the same group (*i.e.*, herbaceous dicot, woody dicot, monocot, other) for the species and data are only available for six dicots/four monocots

- **LOW**: data are not available for the same group or data are available for less than six dicots/four monocots

Asclepias meadii

Photo by Mike Redmer (http://www.fws.gov/Midwest/endangered/plants/meads/index.html

Current BEs: Weighting Effects

- Additional Factors that may be considered:
  - percent of terrestrial species range that overlaps with potential areas where pesticide may occur (defined by use sites and off site transport buffers)
  - temporal use of different habitats by species (with consideration of migration and different life stages) and,
  - elevation restrictions.

For **CONFIDENCE** determination (based on exposure and effects data)

Confidence Conclusion	Exposure	Effects
HIGH	HIGH	HIGH
	HIGH	MED
	MED	HIGH
MED	MED	MED
	HIGH	LOW
	LOW	HIGH
	MED	LOW
	LOW	MED
LOW	LOW	LOW
LOW	Unknown and/or Unknown	
NA	NA	NA

Effects: Charge Questions

- **CHARGE QUESTION 3**: Comment on approaches for incorporating data quality into the weight assigned to a line of evidence. The current approach to data quality is described in Attachment 1-8.

- **CHARGE QUESTION 4a**: For animals, to what extent can taxa with robust data sets be used as surrogates for other taxonomic groupings where lines of evidence have little or no data (*e.g.,* mammals for reptiles)?

- **CHARGE QUESTION 4b**: For plants, comment on the approach to surrogacy. Is there a better or more representative way to group species?

- **CHARGE QUESTION 5**: How can we more effectively incorporate the breadth of the available toxicity information (*i.e.*, not just the most sensitive endpoints), including magnitude of effect, into the characterization of effects and weight of evidence?

Effects: Charge Questions

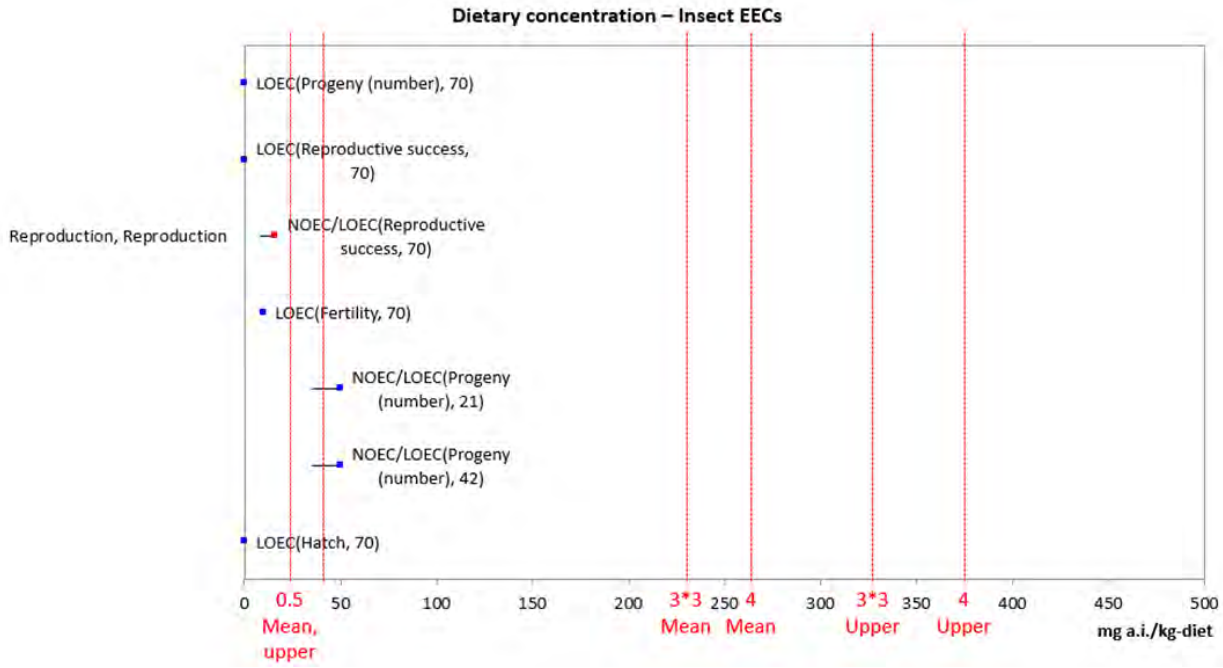
- **CHARGE QUESTION 6**: How can we effectively weigh the impacts of other stressors (*e.g.*, temperature) on the LAA/NLAA call, especially in the event of little or no data?

- **CHARGE QUESTION 7**: Are there additional sublethal effects that have an established relationship with an assessment endpoint that should be considered as lines of evidence?

- **CHARGE QUESTION 8**: Comment on the criteria used to weight Confidence in the estimation of effects as described in Supplemental Information to Attachment 1-9.

Current BEs: Weighting Risk

- Risk is established by comparing the overlap of exposure with effect levels from available toxicity studies for each line of evidence. Consideration is given to the degree of overlap between exposure and effects data.



Current BEs: Weighting Risk for Direct Effects

- **LOW**: If exposure does not exceed the lowest threshold or endpoint
- **MED**: If exposure exceeds the threshold or lowest endpoint but not an endpoint where effects were observed; *e.g.,* EC25, LC50, LOAEC
- **HIGH**: If exposure exceeds one or more endpoints where effects were observed *e.g.,* EC25, LC50, LOAEC.

Current BEs: Weighting Risk for Indirect Effects (Animals)

- **LOW**: If exposure is below both the mortality and sublethal indirect threshold for all animals considered in the indirect line (*e.g.*, dietary items, pollinator)
- **MED**: If exposure is below both the mortality and sublethal indirect threshold for some animal taxa but above for other animal taxa.
  - Specific species information may be considered.
- **HIGH**: If exposure is above either the mortality or sublethal indirect thresholds for all taxa upon which species relies or for multiple animal taxa upon which species relies.

Current BEs: Weighting Risk for Indirect Effects (Plants)

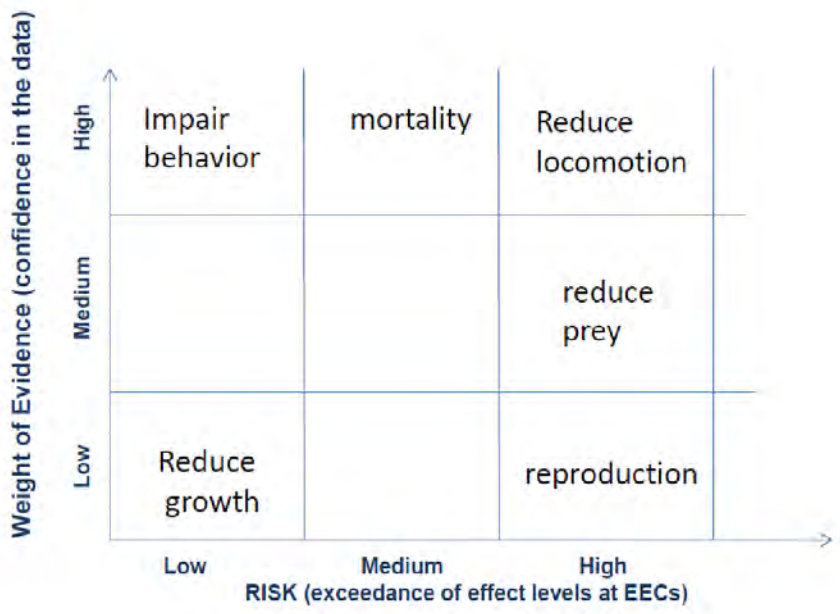
- **LOW**: If exposure is below the lowest EC25 (terrestrial) or EC50 (aquatic) for all plant types assessed in the indirect line

- **MED**: If exposure is below the lowest EC25 (terrestrial) or EC50 (aquatic) for some plant types but above for other plant types.
  - Specific species information may be considered.

- **HIGH**: If exposure is above the lowest EC25 (terrestrial) or EC50 (aquatic) values for all plant types assessed.

Current BEs: Integrating Lines of Evidence

- Risk hypotheses are assessed based on the weighting of the data and risk for each line of evidence (LOE).
  - Equal weight is given to the direct and indirect LOEs
  - Chemical and non-chemical stressor LOEs are evaluated for their potential to increase potential effects



Current BEs: Making an Effects Determination

Risk Estimate (for any line of evidence)	Confidence	Effect Determination
High	High	LAA
High	Med	LAA
High	Low	LAA
Medium	High	LAA
Medium	Medium	LAA
Medium	Low	NLAA or LAA*
Low	High	NLAA
Low	Medium	NLAA or LAA*
Low	Low	NLAA or LAA*

* The selection of the appropriate effects determination associated with this 'risk' and 'confidence' pairing may require additional discussion with FWS and NMFS.

Risk Estimation: Charge Questions

- **CHARGE QUESTION 9**: Comment on the criteria used to weight Risk as described in Supplemental Information to Attachment 1-9.

Questions?