Updating EPA's Guidelines for Deriving National Recommended Water Quality Criteria

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Presentation Layout

Lars Wilcut *Standards Health Protection Division*

- Regulatory basis of aquatic life criteria

Wade Lehmann *Health and Ecological Criteria Division*

- History and technical approach to criteria derivation

Mike Elias *Health and Ecological Criteria Division*

- Ongoing work and future focus

Regulatory basis of aquatic life criteria

Lars Wilcut
Standards Health Protection Division

Federal 304(a) Criteria Recommendations

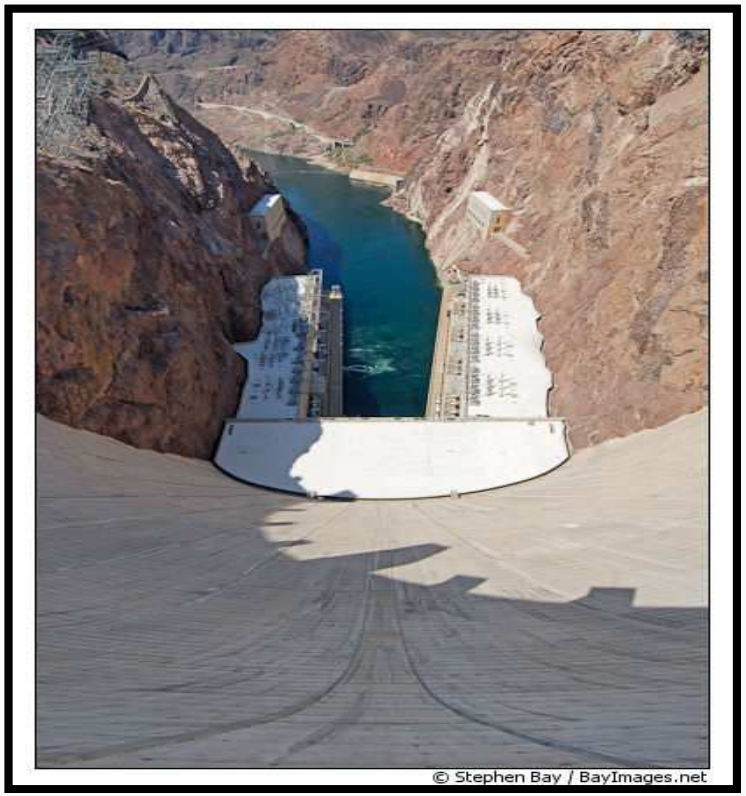
- *CWA Section 304(a) Criteria*: Recommendations developed by EPA based on the latest scientific knowledge, issued periodically as guidance to states/tribes for use in developing their own criteria.

- Basis for Federal promulgation if necessary (i.e., if a state/tribe fails to adopt adequately protective criteria on their own).

Pyramid Lake

What else does the CWA say about Criteria?

- *CWA 303(c)(1):* States/Tribes shall adopt criteria to protect designated uses into their WQS.
- *CWA 303 (c)(2)(b):* States/Tribes shall adopt criteria for "priority pollutants" (a list of 'toxic pollutants' from a Congressional committee report referenced in *CWA 307(a)*).

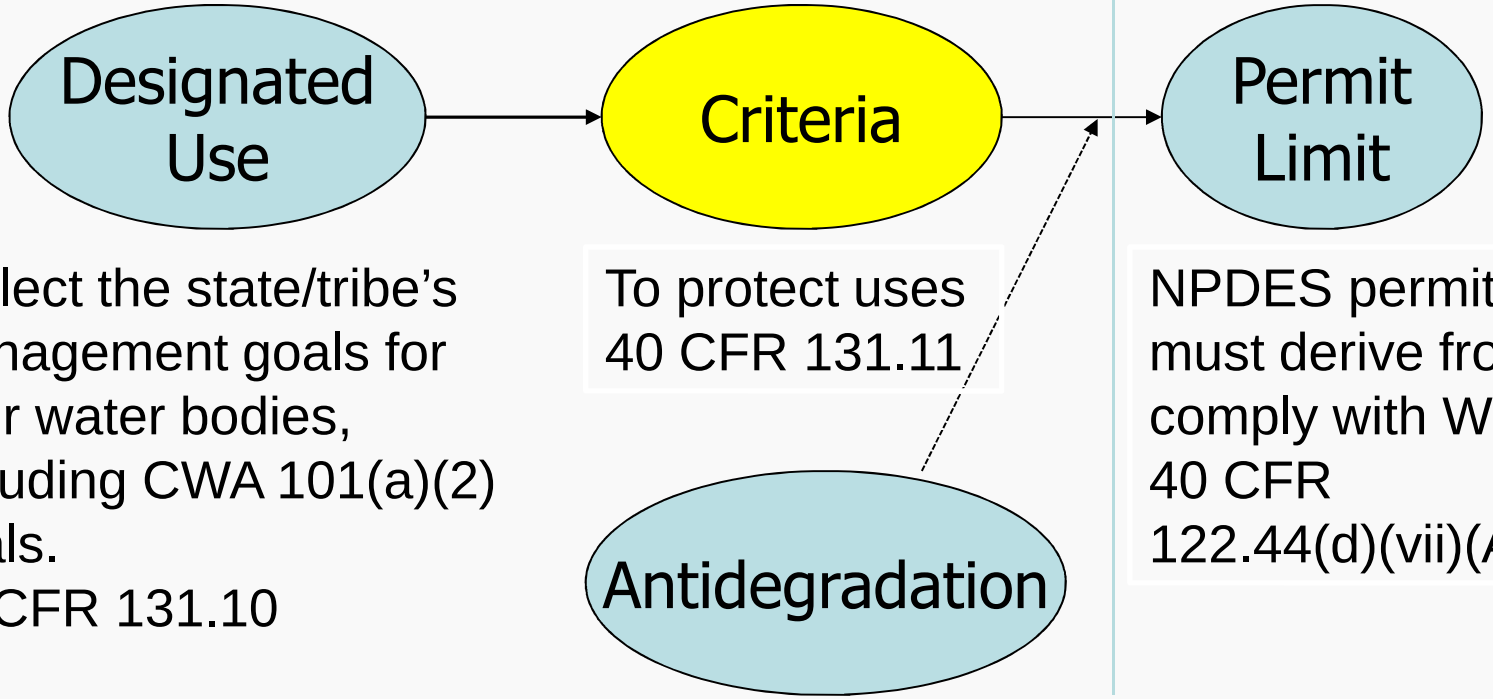


Hoover Dam

State Water Quality Criteria

- The term '*criteria'* is defined in regulations at 40 CFR 131.3(b) as:
  - Elements of state/tribe WQS, expressed as constituent concentration, levels, or narrative statements, representing a quality of water that supports a particular use. When criteria are met, water quality will generally protect the designated use.

Purpose of Criteria



** NPDES is just one example of implementation*

What do the WQS Regulations require for Criteria? (40 CFR 131.11)

- States/Tribes must adopt those water quality criteria that protect the designated use.
  - Such criteria must be based on sound scientific rationale.
  - Such criteria must contain sufficient parameters or constituents to protect the designated use.
  - For waters with multiple use designations, the criteria shall support the *most sensitive use.*

What do the WQS Regulations require for Criteria? (40 CFR 131.11)

- 40 CFR 131.11(b) states that in establishing criteria states/tribes should establish numerical values based on:

  1) 304(a) guidance

  2) 304(a) guidance modified to reflect site-specific conditions

  3) Other scientifically defensible methods

History and technical approach to criteria derivation

Wade Lehmann, PhD
Health and Ecological Criteria Division

What are the Current Guidelines?

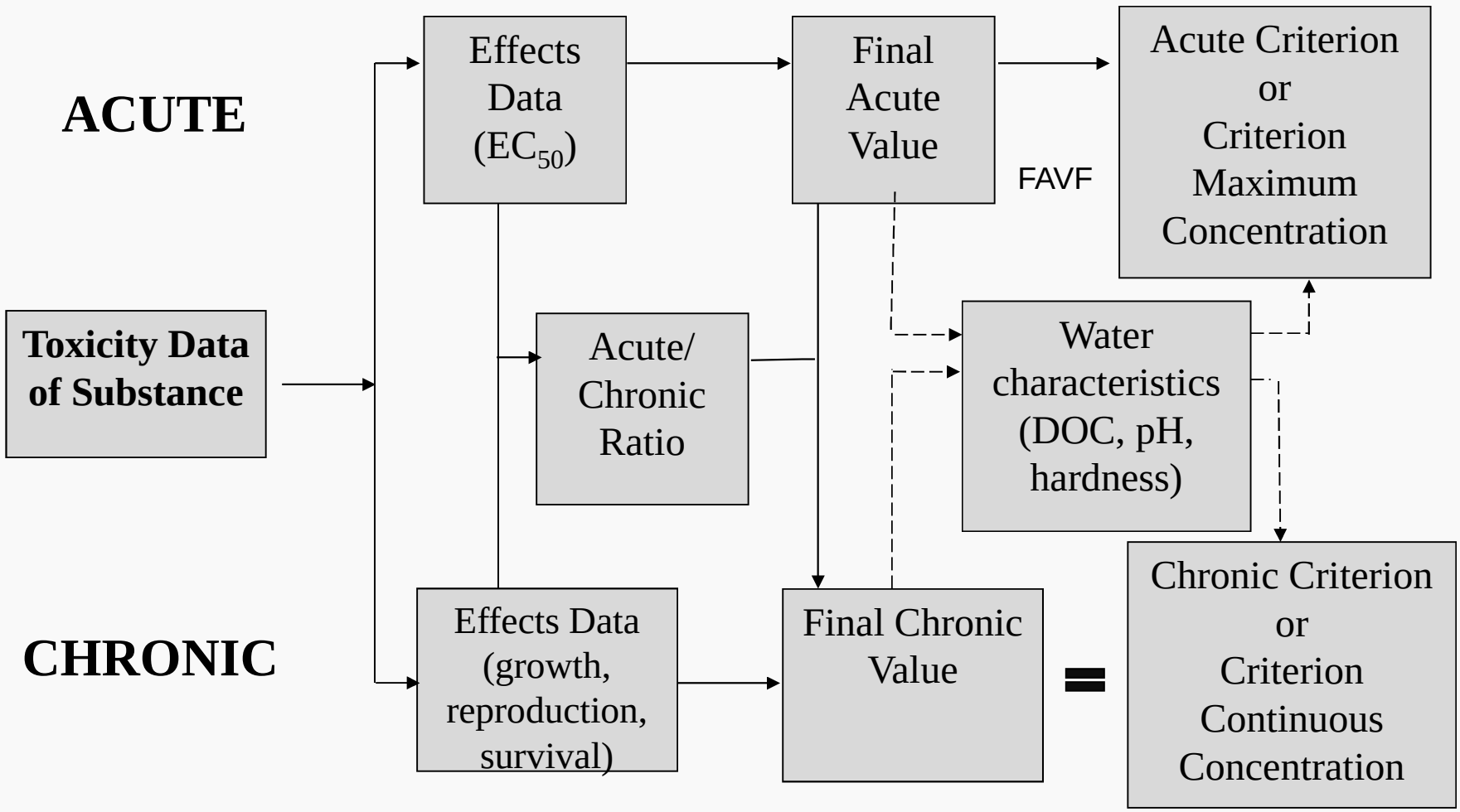
- Applicable to aquatic life (not human health) designated uses
- Generated as outlined in *Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses*, Stephen et al. 1985

"Aquatic organisms and their uses should not be affected unacceptably if the four-day average concentration of the pollutant does not exceed [CCC] and if the one-hour average concentration does not exceed [CMC] more than once every three years on average."

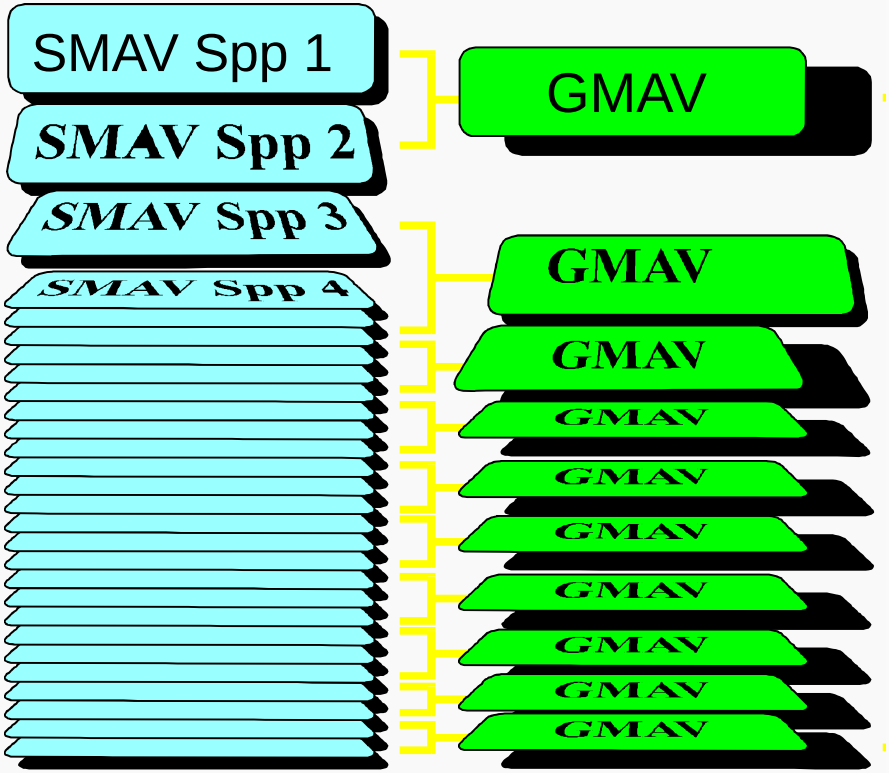
Need for Re-evaluation

- Reviews, workshops and recommendations in 1990, 1995, 1998, 2001, 2003, 2005
- A need to address the state of the science and guidance put forth by EPA and NRC
- Need to consider current areas of focus that cut across Agency offices such as MOA/AOP, weight of evidence, uncertainty

Current Process Summary



Data Compilation Summary



Have the minimum data requirements been met? (8 taxonomic groupings)

Eight Taxa (MDRs)

SALMONID

SECOND FISH FAMILY

CHORDATA

PLANKTONIC CRUSTACEAN

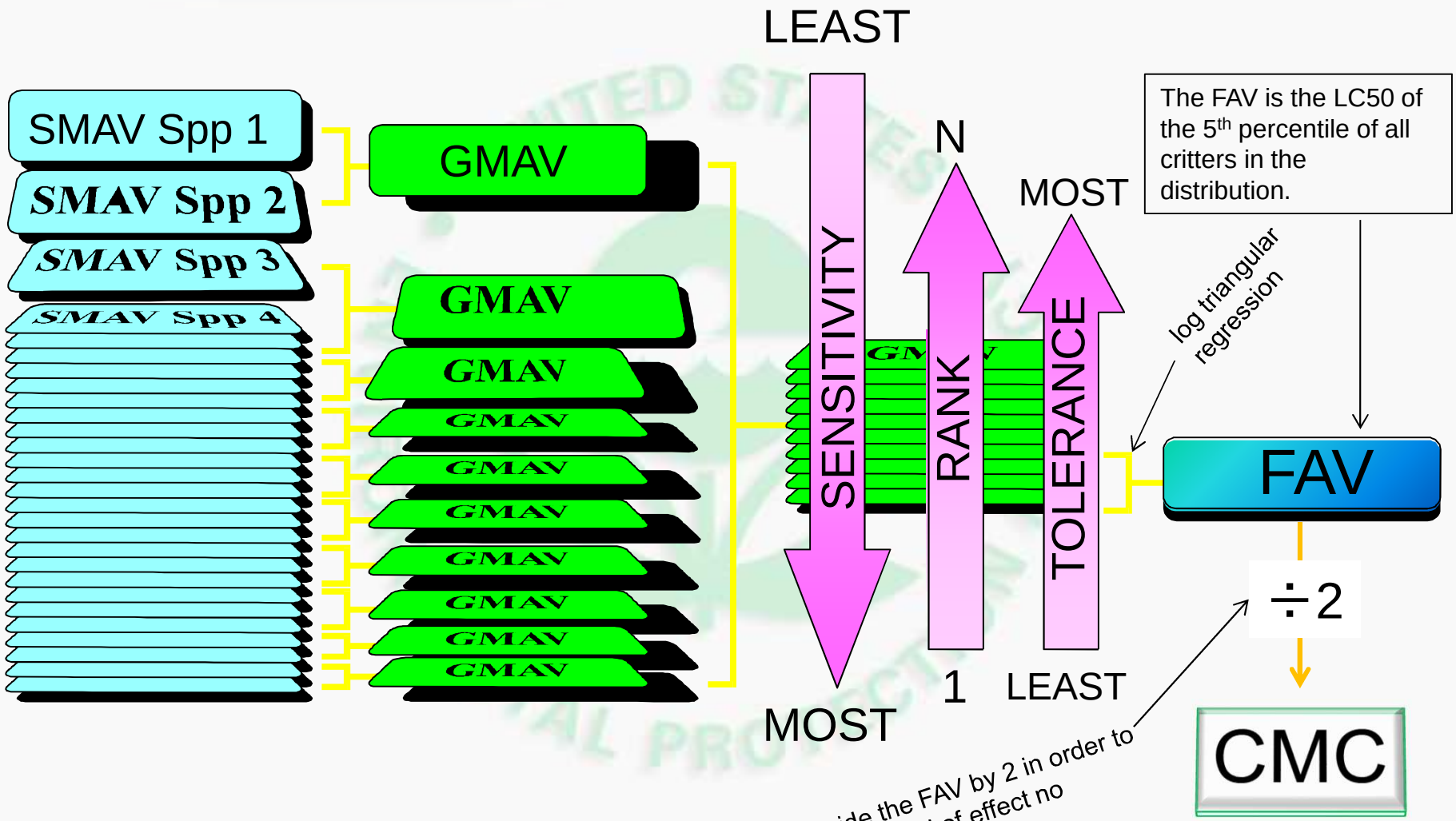
BENTHIC CRUSTACEAN

INSECT

ROTIFERA, ANNELIDA, MOLLUSCA

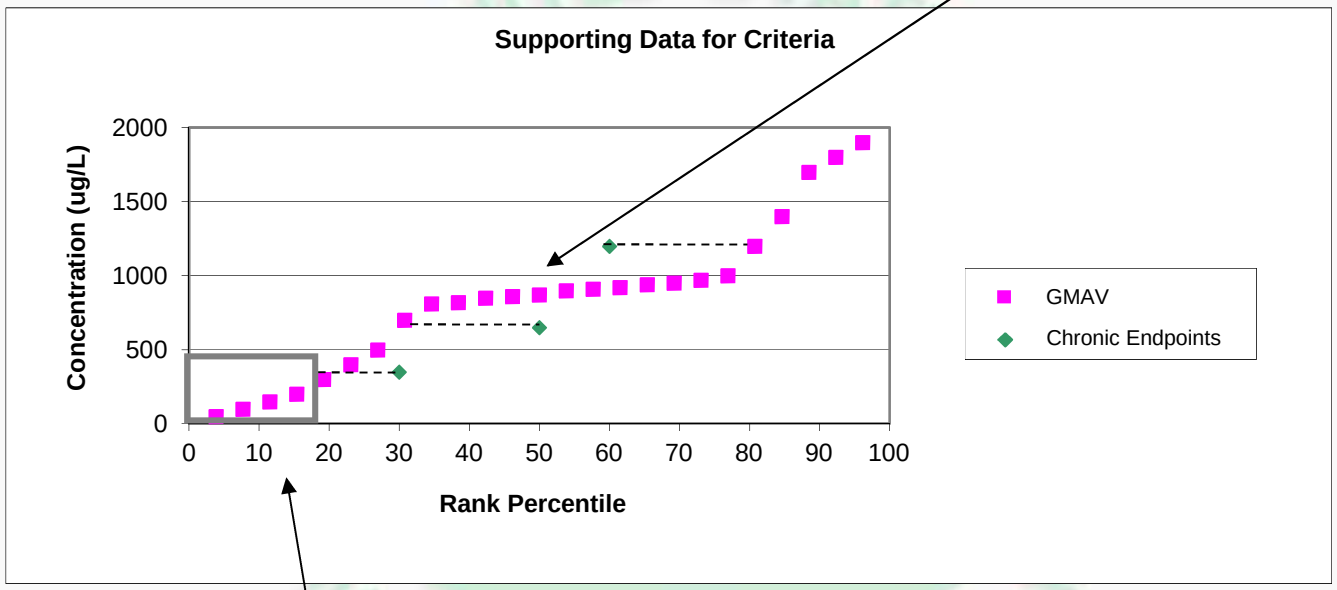
OTHER INSECT OR MOLLUSC

FAV Calculation Overview



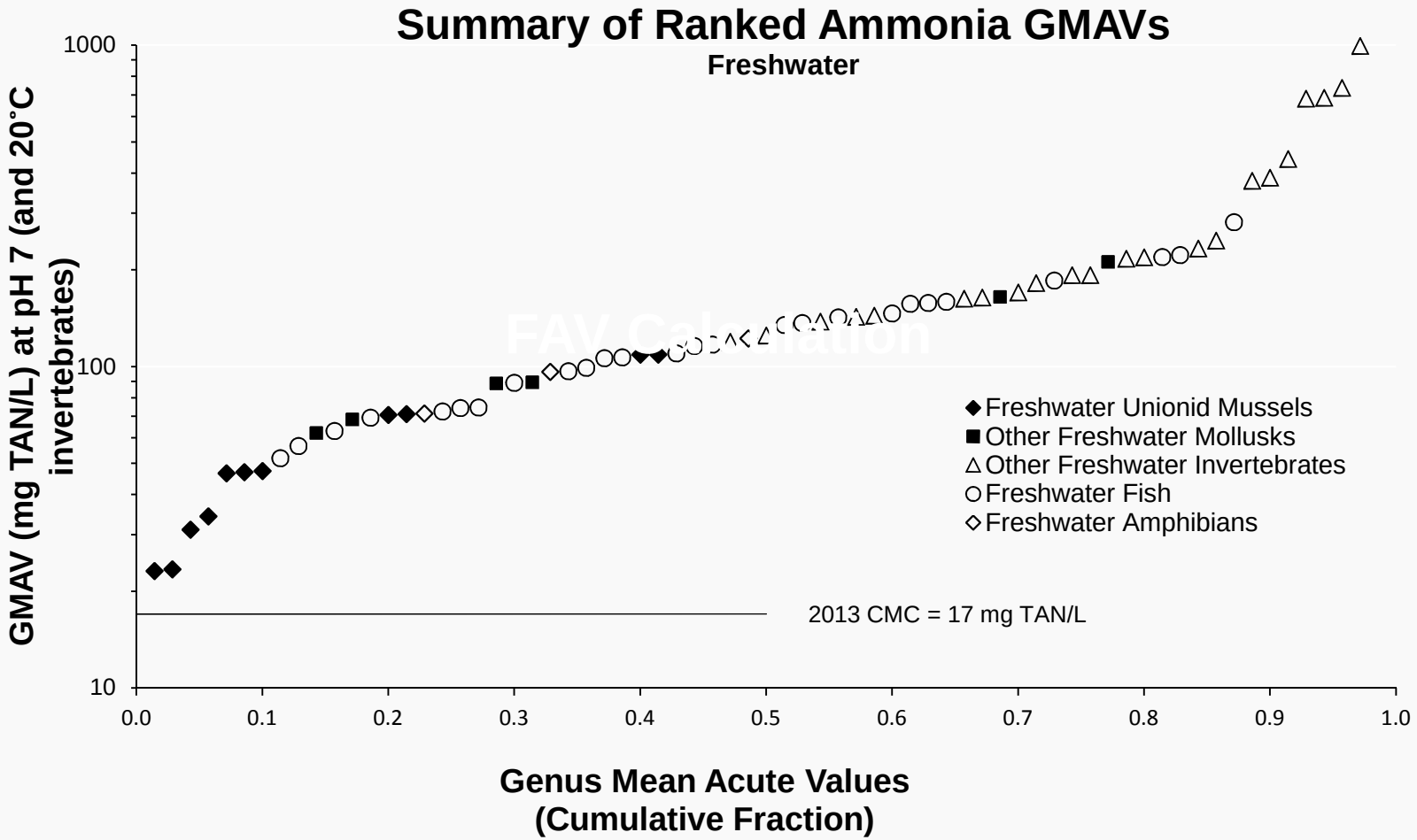
FAV Calculation

GMAV and Calculate the Percentile of each rank (100 R/(N+1))



Using the 4 Most Sensitive Genera, Perform a Least Squares Regression of the GMAV (log values) on the Percentile Ranks (square roots) to generate an HC_5 = FAV

Ranked GMAVs for Ammonia



Acute to Chronic Ratio – Chronic Criterion

Calculating and Applying the ACR

1. Acute & chronic tests using same species in same dilution water
   (guidance on test matching and requirements in 1985 Guidelines)

↓

2. Use results of tests to calculate Acute-Chronic Ratios (ACR):

$$ACR = \frac{\text{Acute Value}}{\text{Chronic Value}}$$

↓

3. Develop a Final Acute-Chronic Ratio (FACR) by taking a geometric mean of the appropriate ACRs *(3 minimum)*

↓

4. Calculate the Final Chronic Value (FCV) using the FACR:

$$FCV = \frac{\text{Final Acute Value}}{\text{FACR}}$$

Ongoing work and future focus

Mike Elias
Health and Ecological Criteria Division

Recent Evaluations by EPA

- MOA/AOP based MDR reduction
- FAV divided by 2 (FAVF) re-evaluation, *Host et al*
- MATC / ECx / NOEC evaluations
- ACR derivation considerations
- SSD utilization

Functional Considerations

- Scientific validity and latest scientific knowledge
- Applicability to national context with ability to derive site specific values as appropriate
- Incorporation of uncertainty, both qualitative and quantitative
- Ease of understanding and use

Criterion Process Advancement

- HECD is actively utilizing complete problem formulation in criteria derivation to better relate the assessment process to the protective outcomes.
  - including pollutant sources and uncertainties
  - recent examples include ammonia, carbaryl, & selenium (draft)

Associated Projects

- Contaminants of Emerging Concern, 2008
- Common Effects, 2010
- EPA Plant Methodology, 2015-2016

Next Steps

- EPA will share EPA presentation, and other presentations for authors that agree, on the EPA website for this meeting

- EPA will create an analysis plan to assess the utility of the presented methods for inclusion in revision of the Guidelines.

- OST's Ecological Risk Assessment Branch will lead a small Guidelines workgroup in this effort; the workgroup will include other OW offices, ORD, Regions, and interested EPA Program Offices.

Next Steps

- The EPA Guidelines workgroup will move forward with developing a draft updated Guidelines document
- Updated Guidelines approach will be submitted for rigorous, independent external peer review and public comment
- Guidelines will be revised considering peer review and public comment and subsequently published as final.
- EPA expects this to be a several year effort.

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