Assessing Taxonomic Accuracy and Precision Through Inter- and Intra-laboratory Quality Assurance

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Outline

- SBU program summary
- Inter-laboratory QA efforts
- Intra-laboratory QA efforts
- Next steps in taxonomic quality assurance

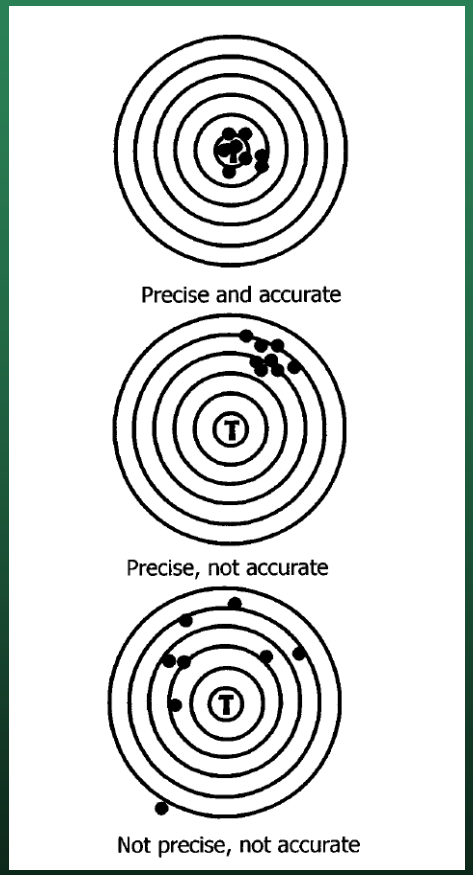
The Biomonitoring Program

- 100 organism subsample
- Collecting and identifying since 1972
- Previous QA manual describes resort 15% of samples/year ??
- SBU was in need of taxonomic quality assurance

Taxonomic QA Program Summary

- 2006 and 2007, contracted samples for re-identification
- 2008, instituted biweekly taxonomic review sessions
- 2009, sent samples to VT for exchange

Accuracy and Precision



Accuracy – nearness to accepted taxonomic literature, reference collection

Precision – repeatability of results

Stribling, J. B., et al. 2003. "Determining the quality of taxonomic data." Journal of the North American Benthological Society **22**(4): 621-631.

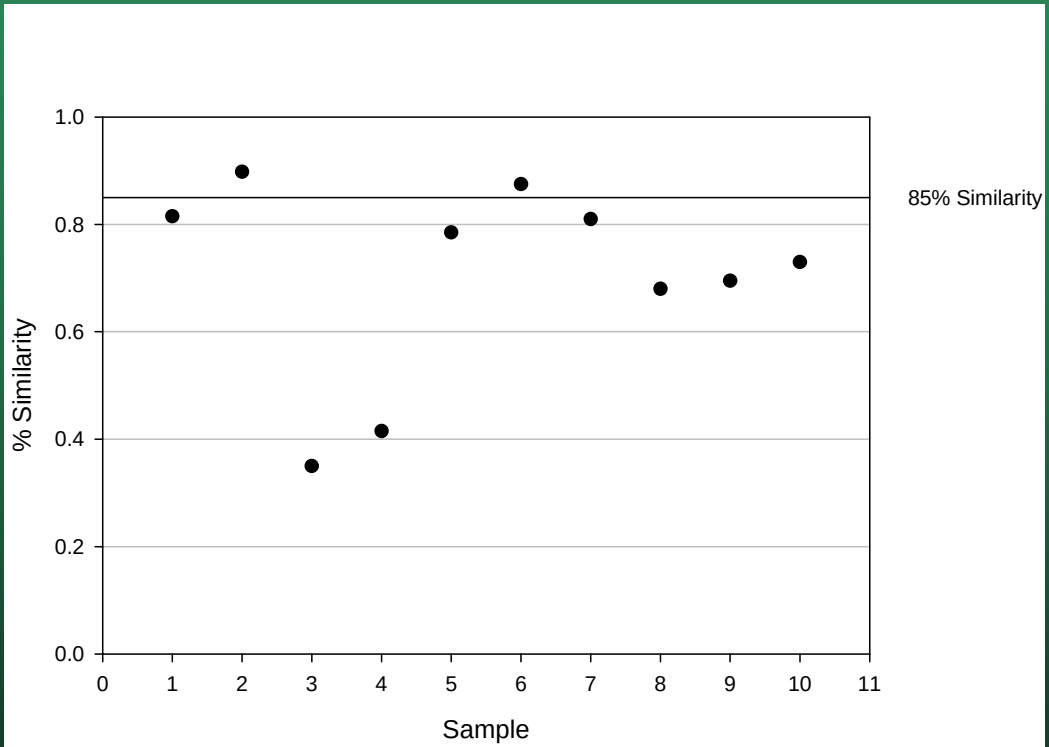
Error Types

Type I - Taxonomic Resolution

Type II - Count Disparity

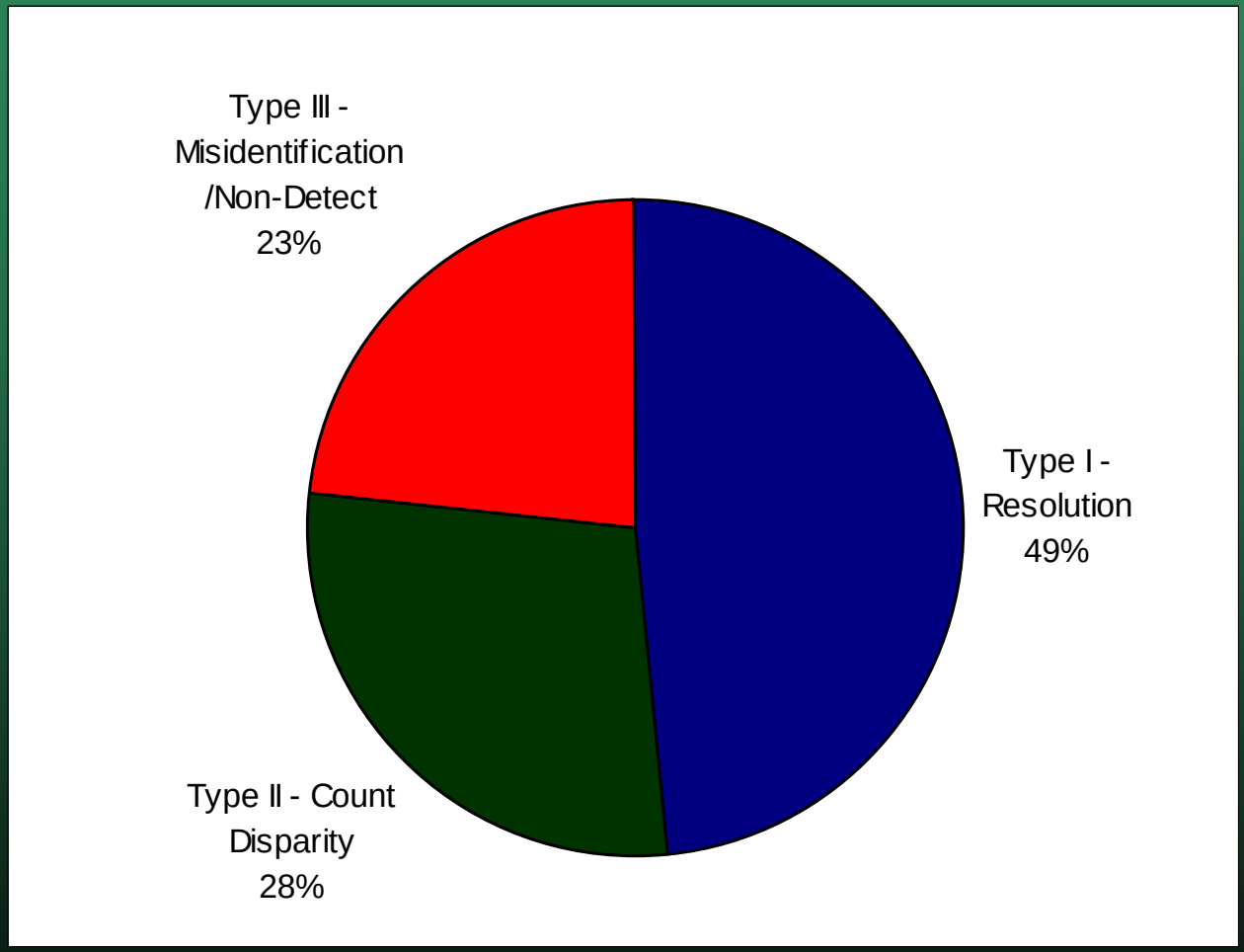
Type III - Mis-identification/Non-Detect

2006 Inter-lab % Similarity

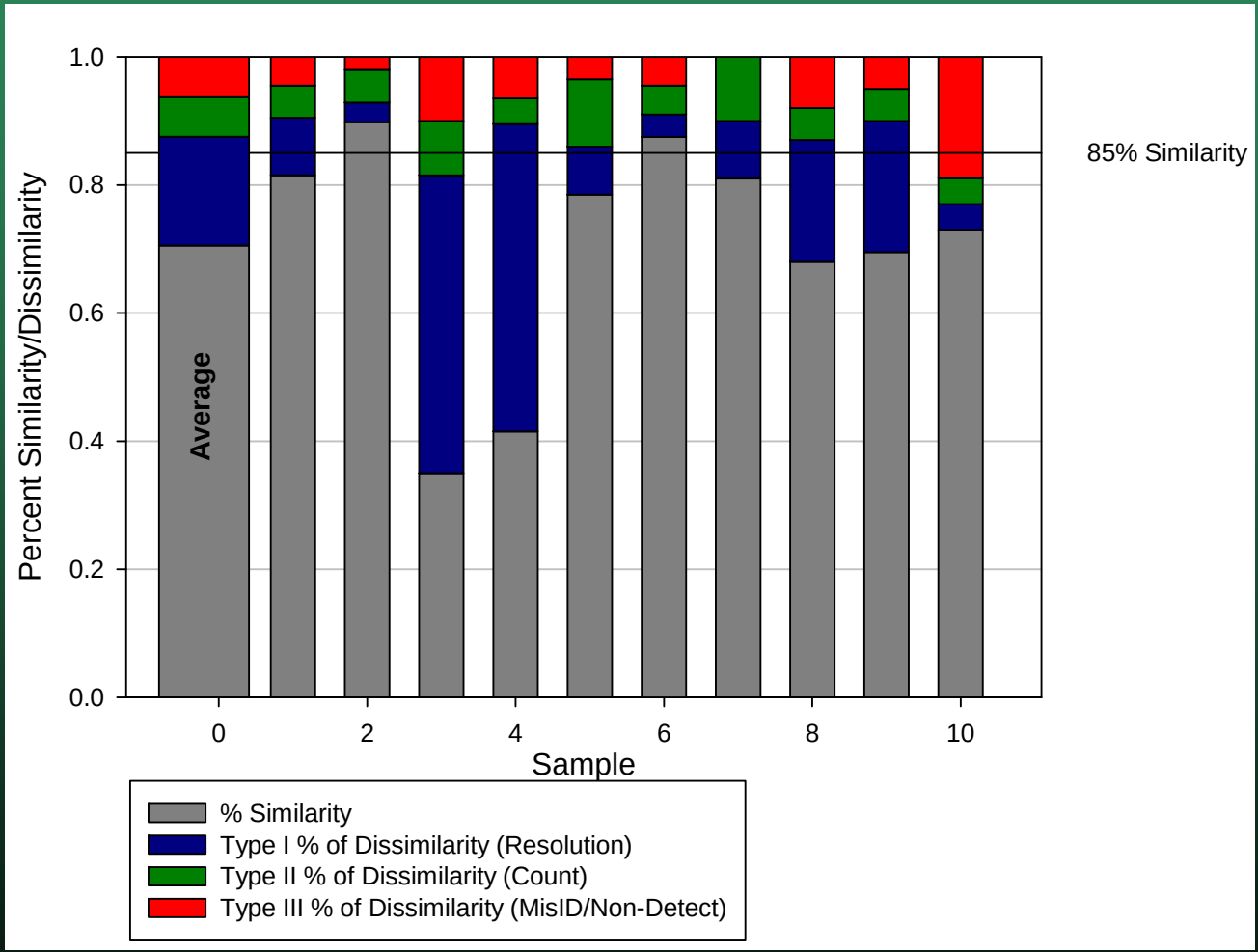


- 2 of 10 samples above 85%
- 4 of 10 samples above 80%

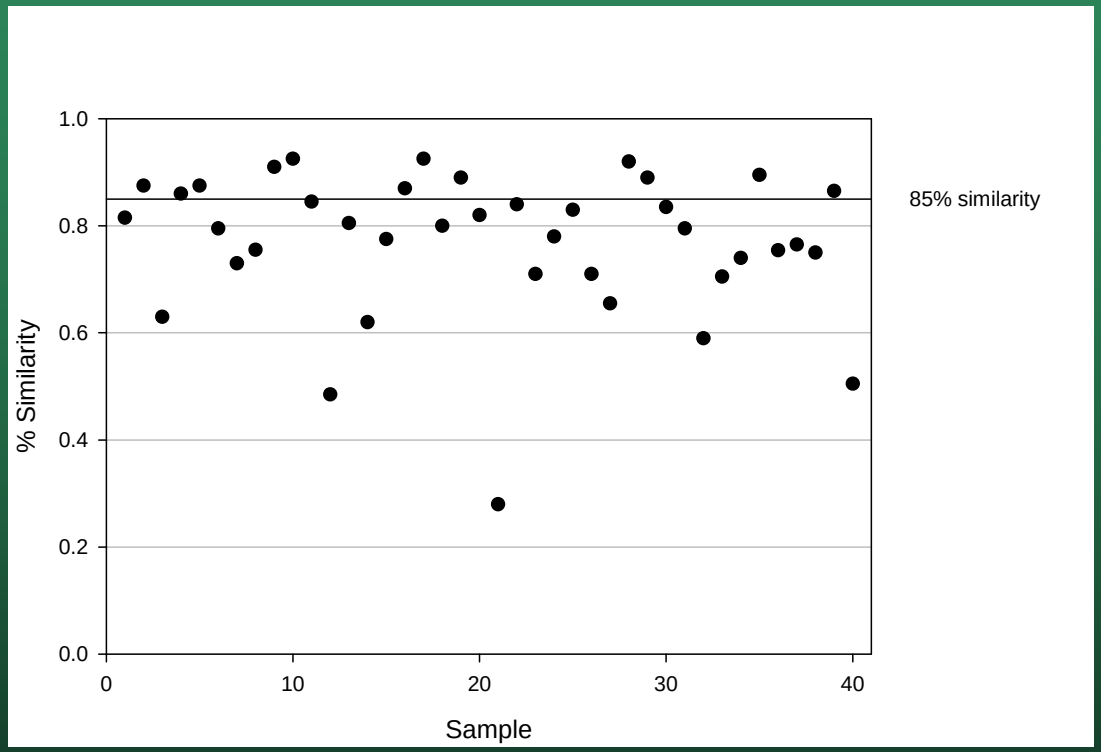
2006 Inter-laboratory Error Breakdown



2006 Inter-lab % Similarity and Error Type

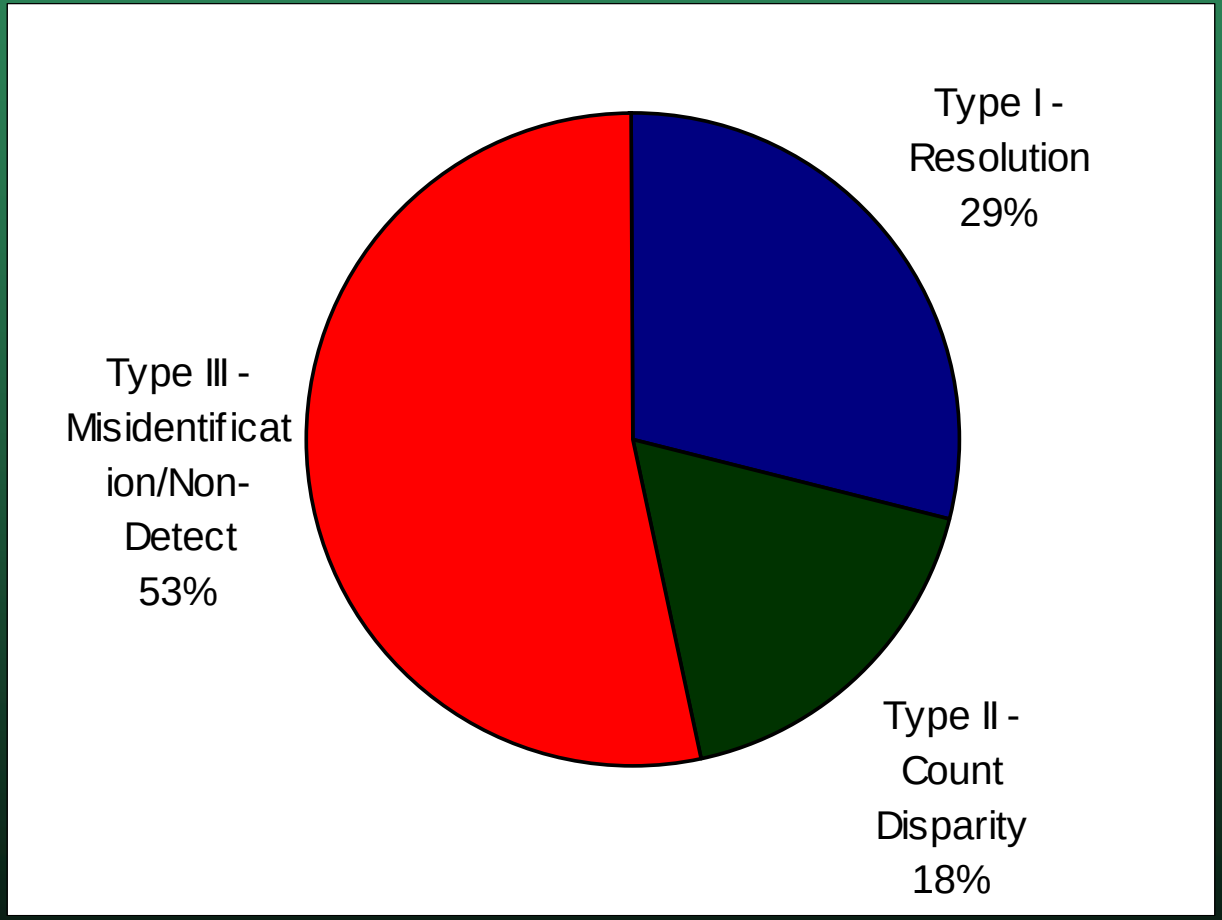


2007 Inter-lab % Similarity

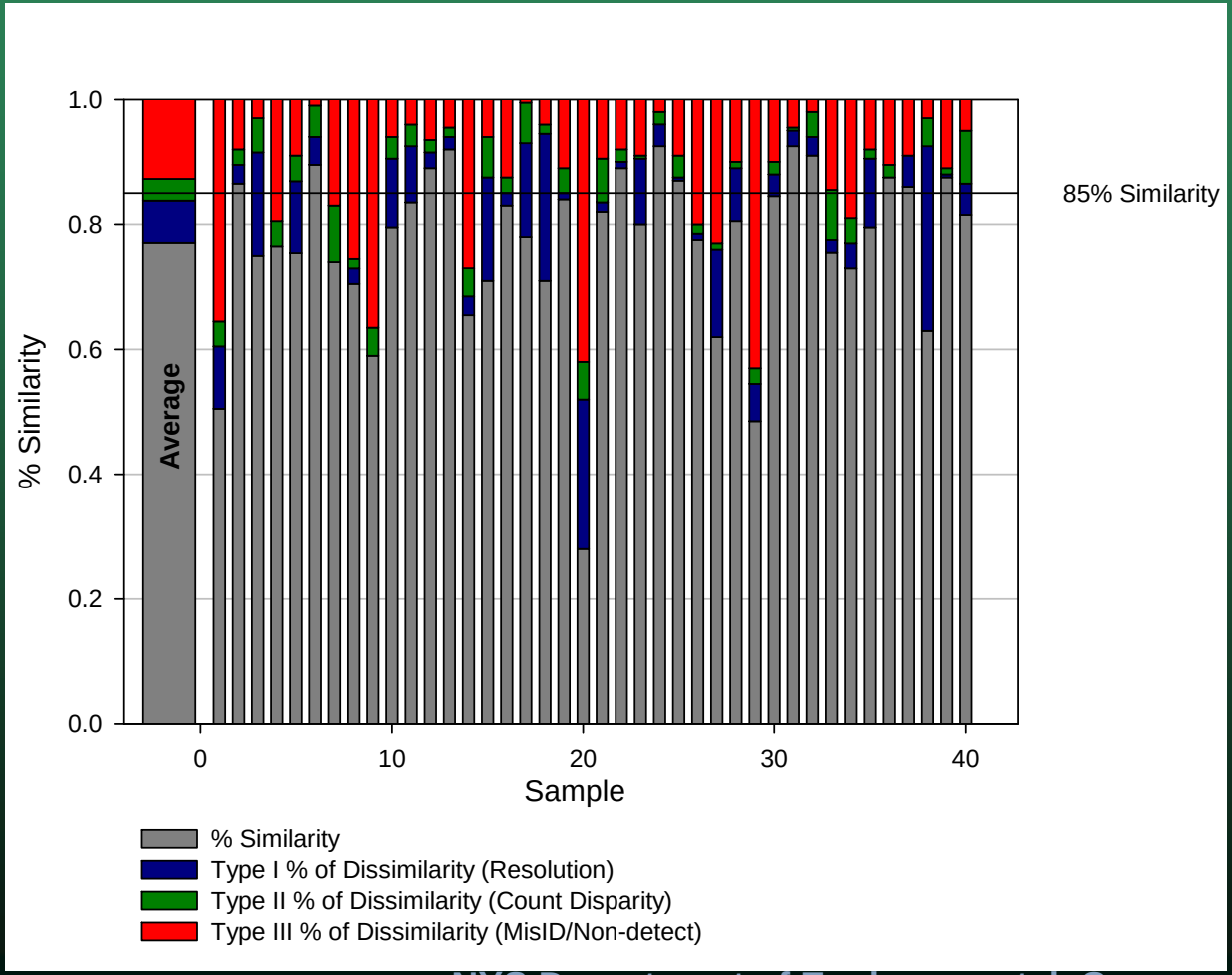


- 11 of 40 samples above the goal of 85% similarity
- 20 of 40 above 80%

2007 Inter-laboratory Error Breakdown



2007 Inter-lab % Similarity and Error Type



Common Problem Groups

- Beetles
  - *Optioservis sp, Dubiraphia sp*., *Stenelmis sp.*
- Chironomidae
  - *Polypedilum sp., Tanytarsus/Micropsectra, Orthocladius/Cricotopus*
- Caddisflies
  - *Hydropsyche sp., Chimarra sp.*

Mayfly troubles

- Over 50% of Type III error came from mayflies
  - Majority due to Baetid misidentification
- “Favorite” Baetids
  - *Acentrella* sp., *Baetis brunneicolor, Baetis intercalaris, Baetis flavistraga*
- “Rare” Baetids
  - *Baetis tricaudatis, Plauditus* sp., *Diphetor hageni*
- *Stenonema* sp.
  - *Stenonema luteum/vicarium*, *Stenonema* sp.

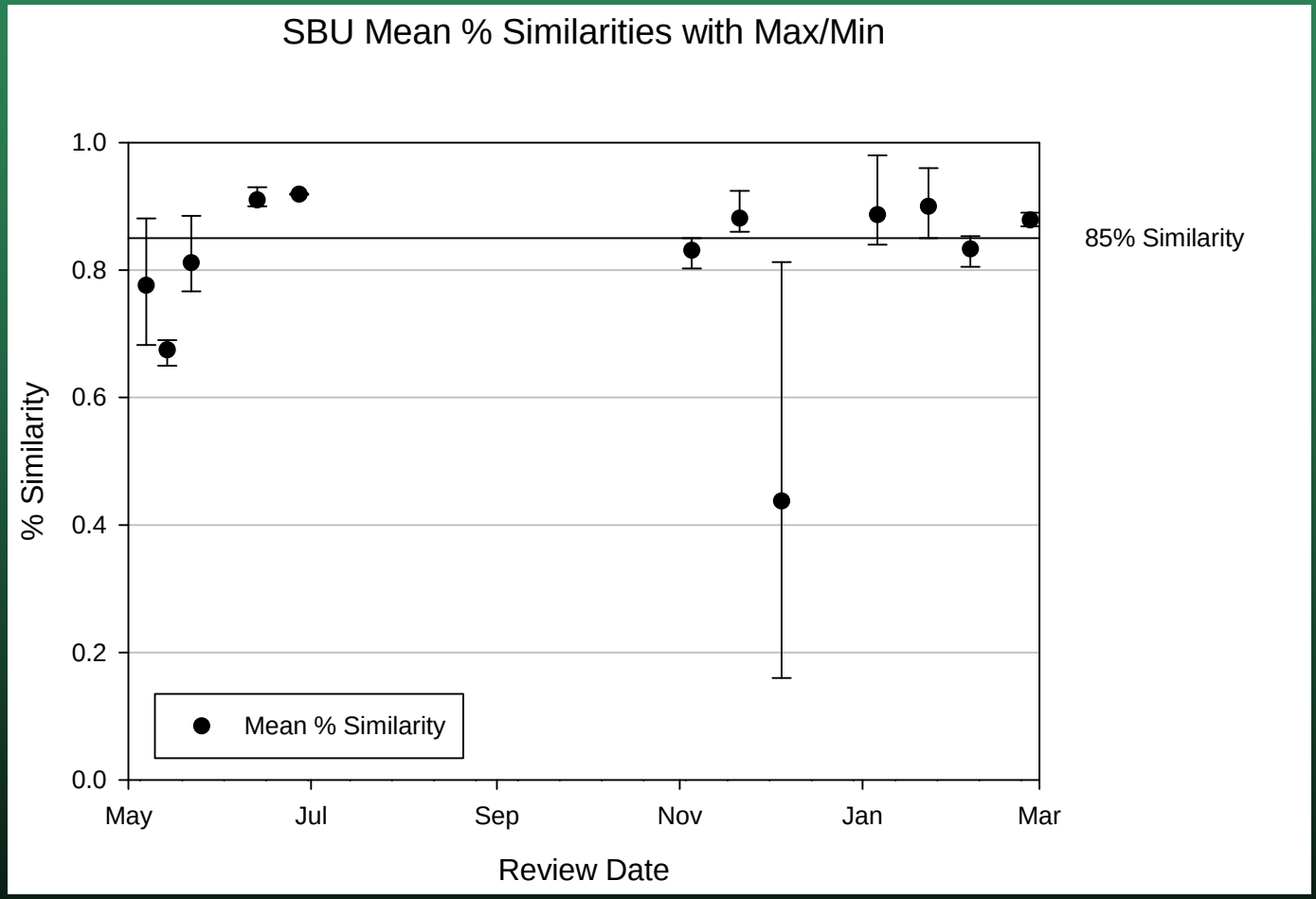
SBU Internal Taxonomic QAQC Sessions

Goal: Increase accuracy and precision of taxonomic data through continuous review sessions, consultation with taxonomic experts, creation of a photo reference collection

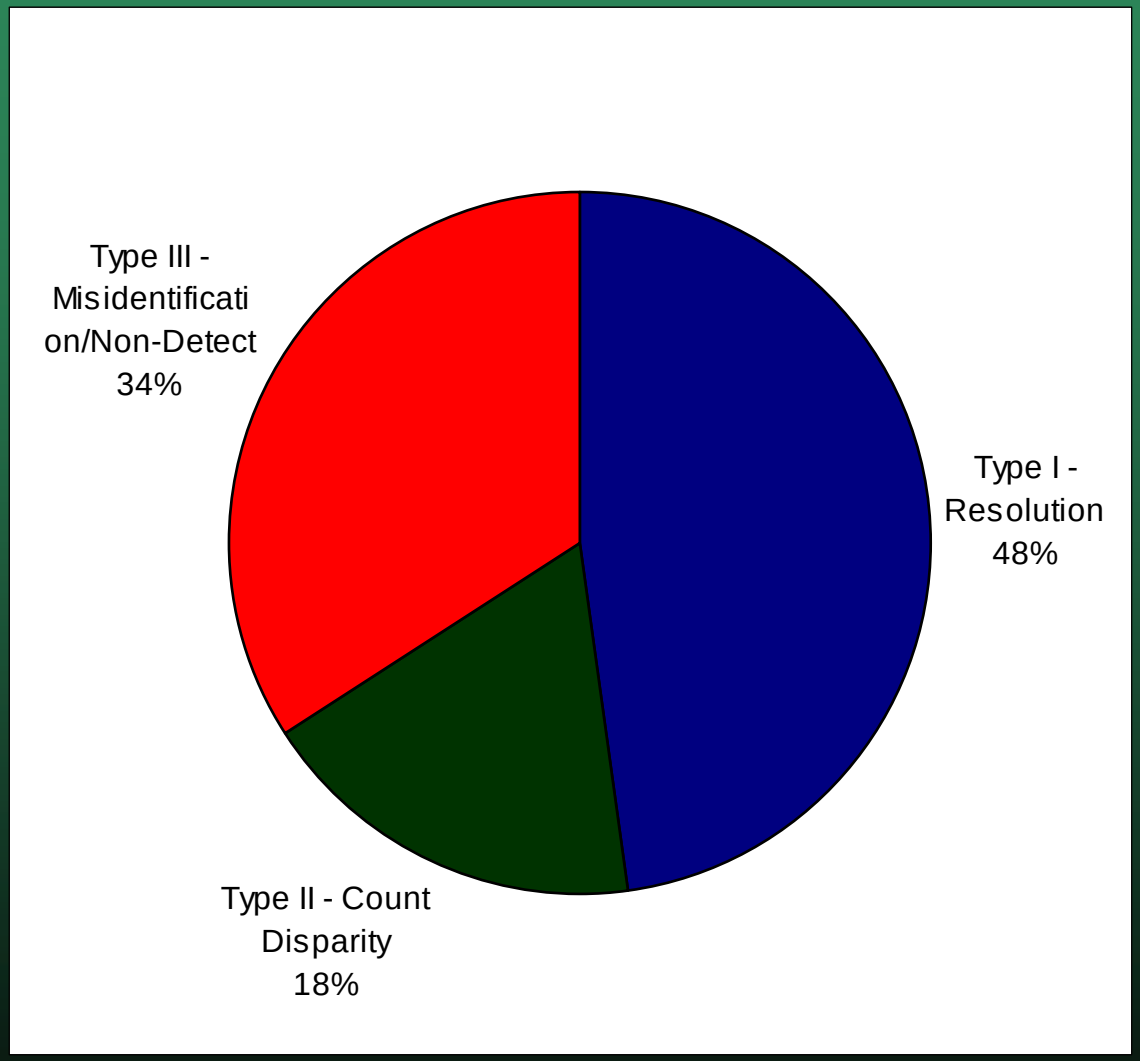
Possible Issues

- Mental taxa lists
- “New” habitats
- Problem taxa (ie Baetidae, *Macaffertium spp.*)
- Shortcuts for certain early instar individuals
- Gestault (the art and the science)
- Levels of resolution
- Loss/Damage
- Taxonomic specialty

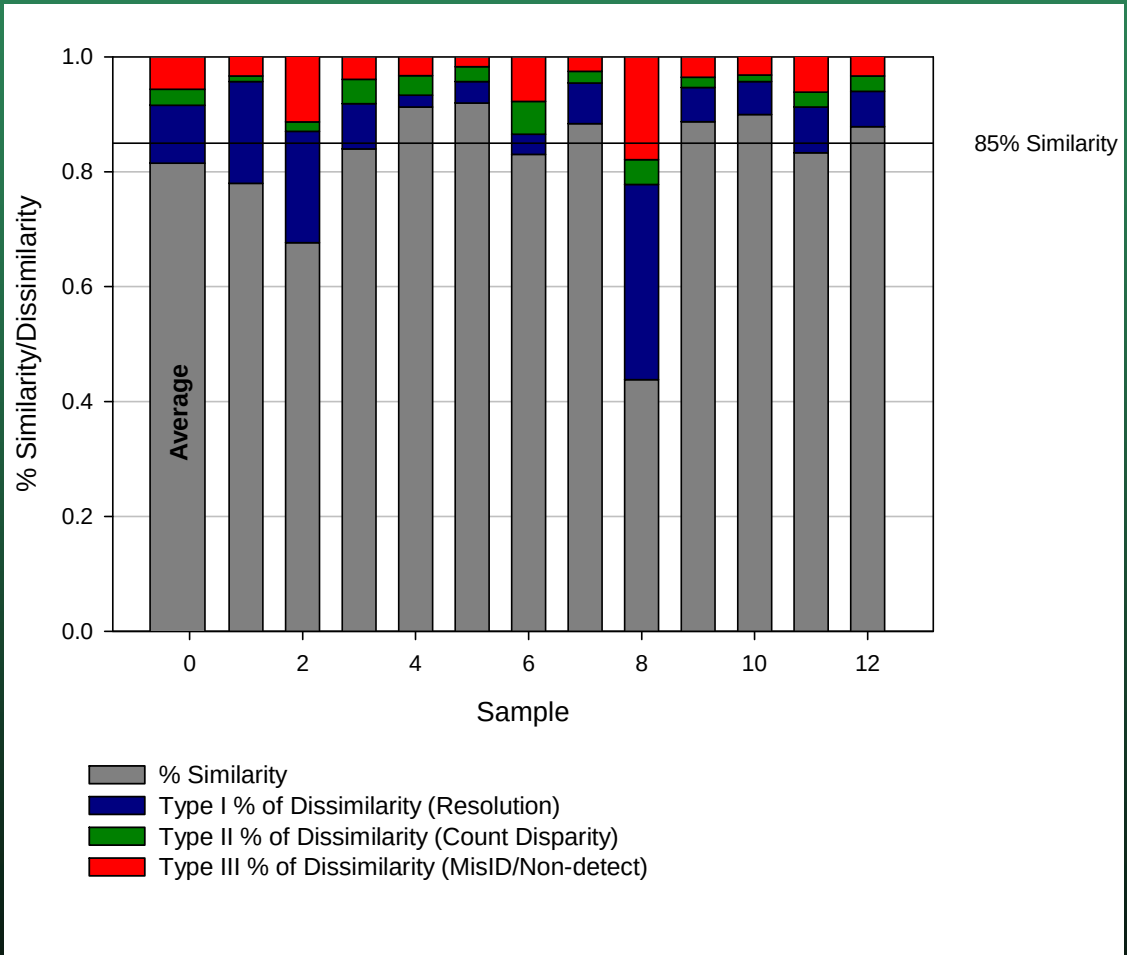
Internal Similarities



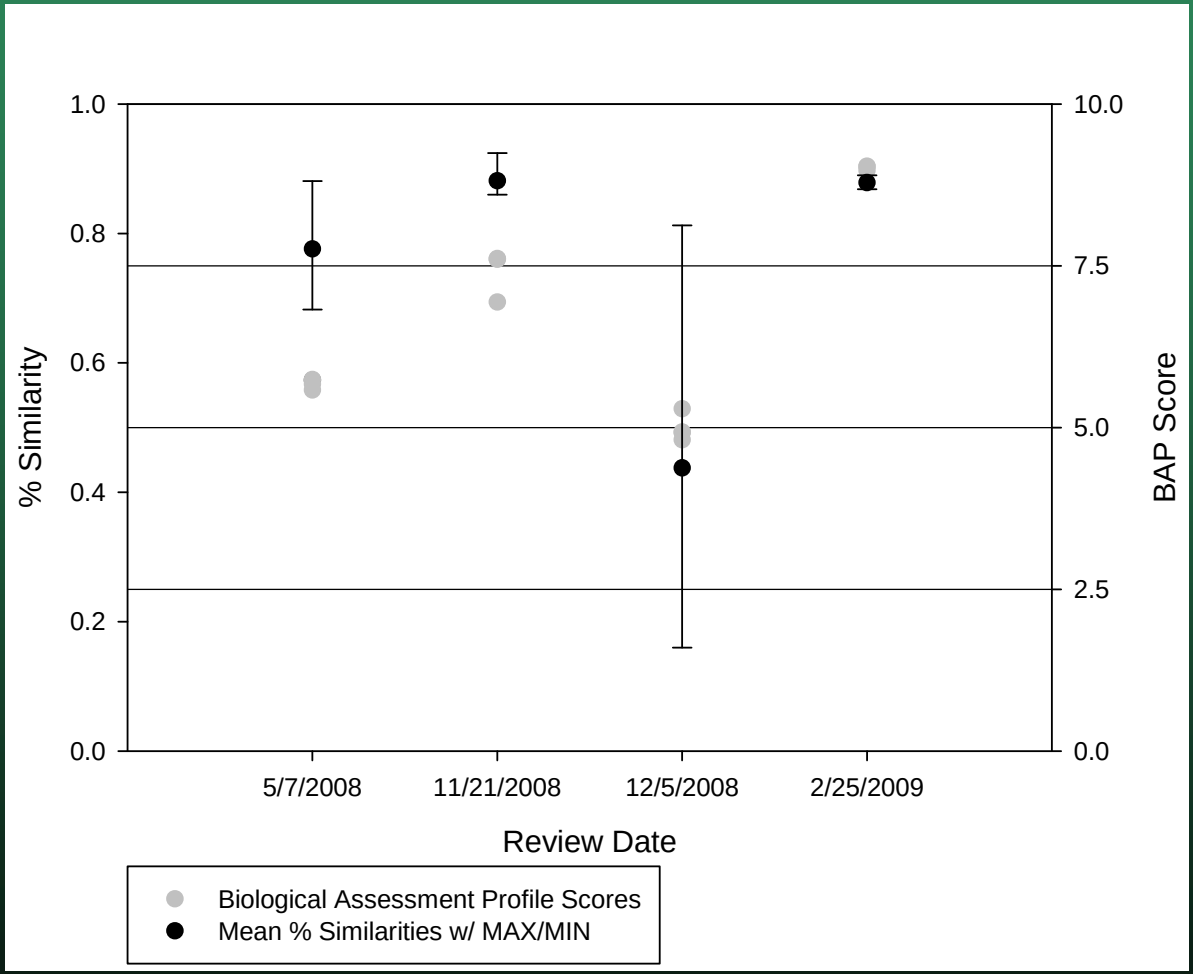
SBU Error Breakdown



SBU % Similarities with Error Type



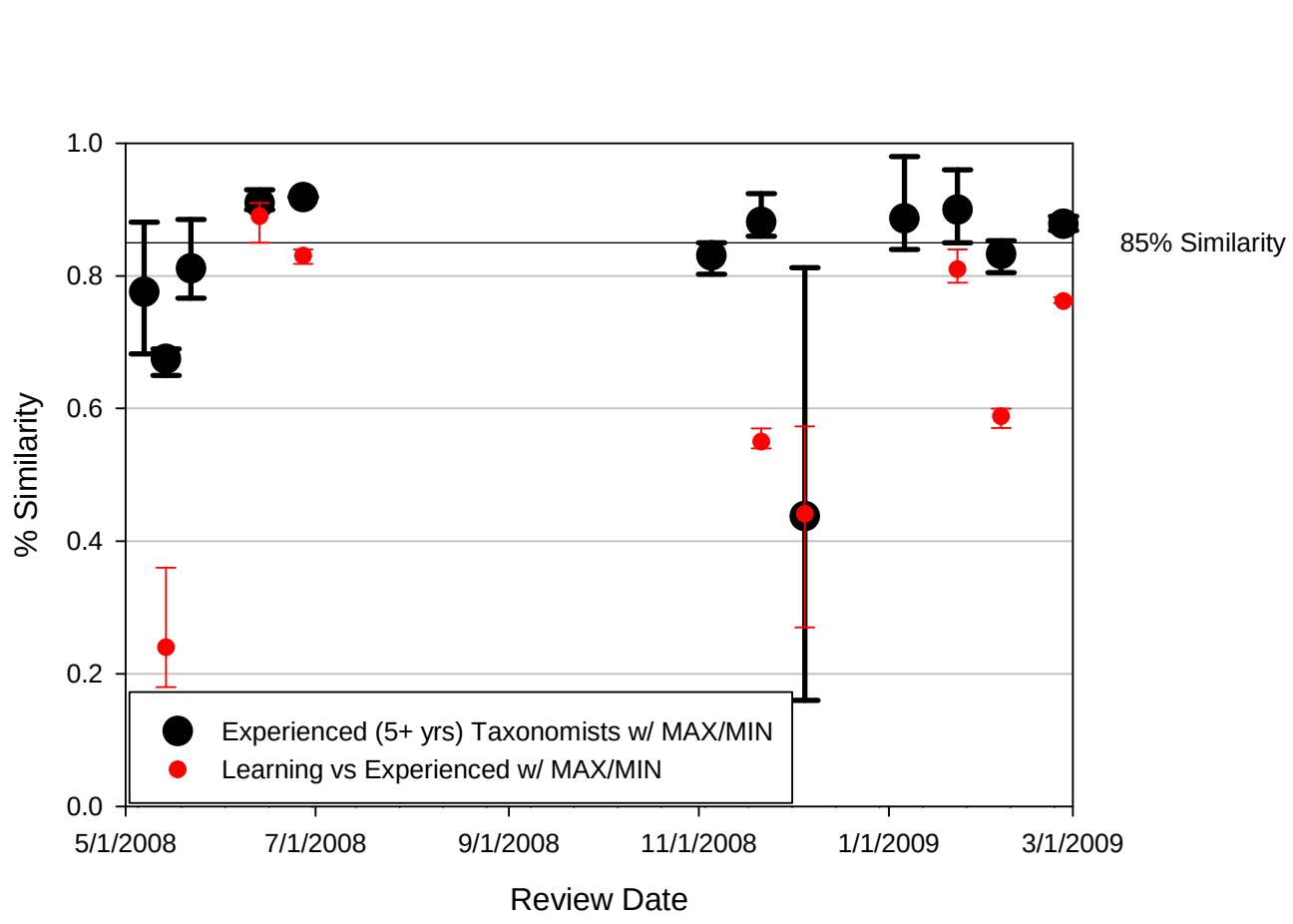
Effect of Taxonomic Dissimilarity



How does this benefit the lab?

1. Severity of error (ie Type I, II, III)
2. Hash out and focus on problem areas
3. Dissemination of expertise
4. Helps new taxonomists
5. Increase consistency with literature and nomenclature
6. Increase confidence in data

Experience Matters

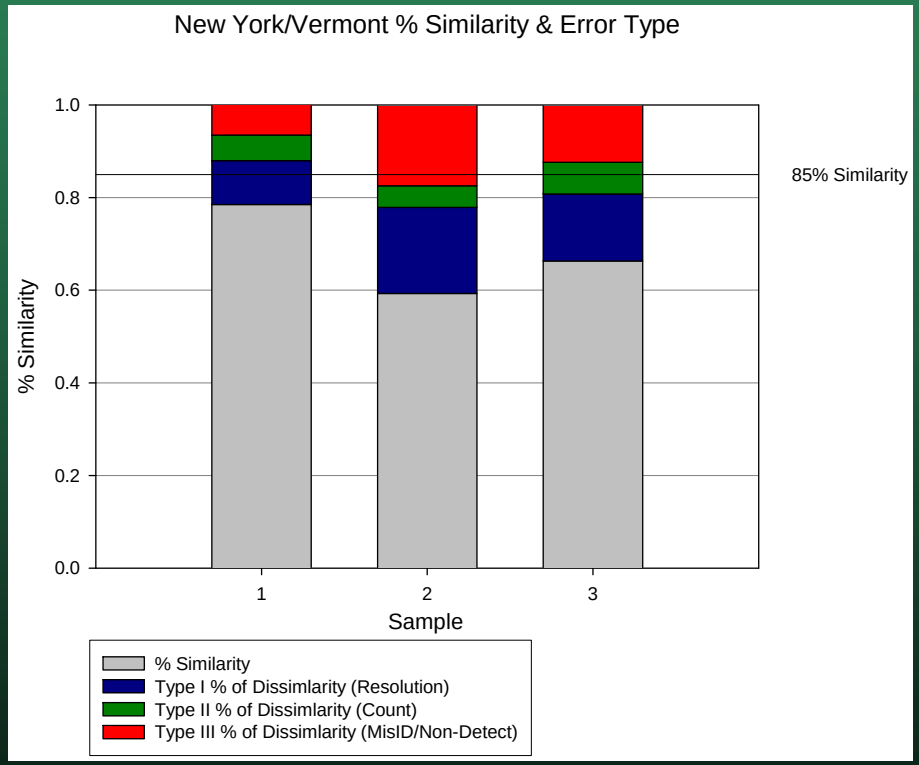


Advantages of Teamwork

- Old, experienced taxonomists helps out the new
- 4 eyes are better than 2

Future Taxonomic QC Efforts

- We have currently exchanged samples with Vermont
- We would like to create a regional round robin to create taxonomic discussion and regional consistency



Questions?