A National Autecology List for Benthic Macroinvertebrates

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Why a National List

- No single list existed for benthic macroinvertebrates for streams, that was readily available
- Analysis of data from different projects
  - EMAP & WSA
- Data sharing between agencies
- Starting point for new programs
- Same methodology used to develop this list could be used for other projects
- Discussion leads to better understanding
- Data Quality – foundation of analysis

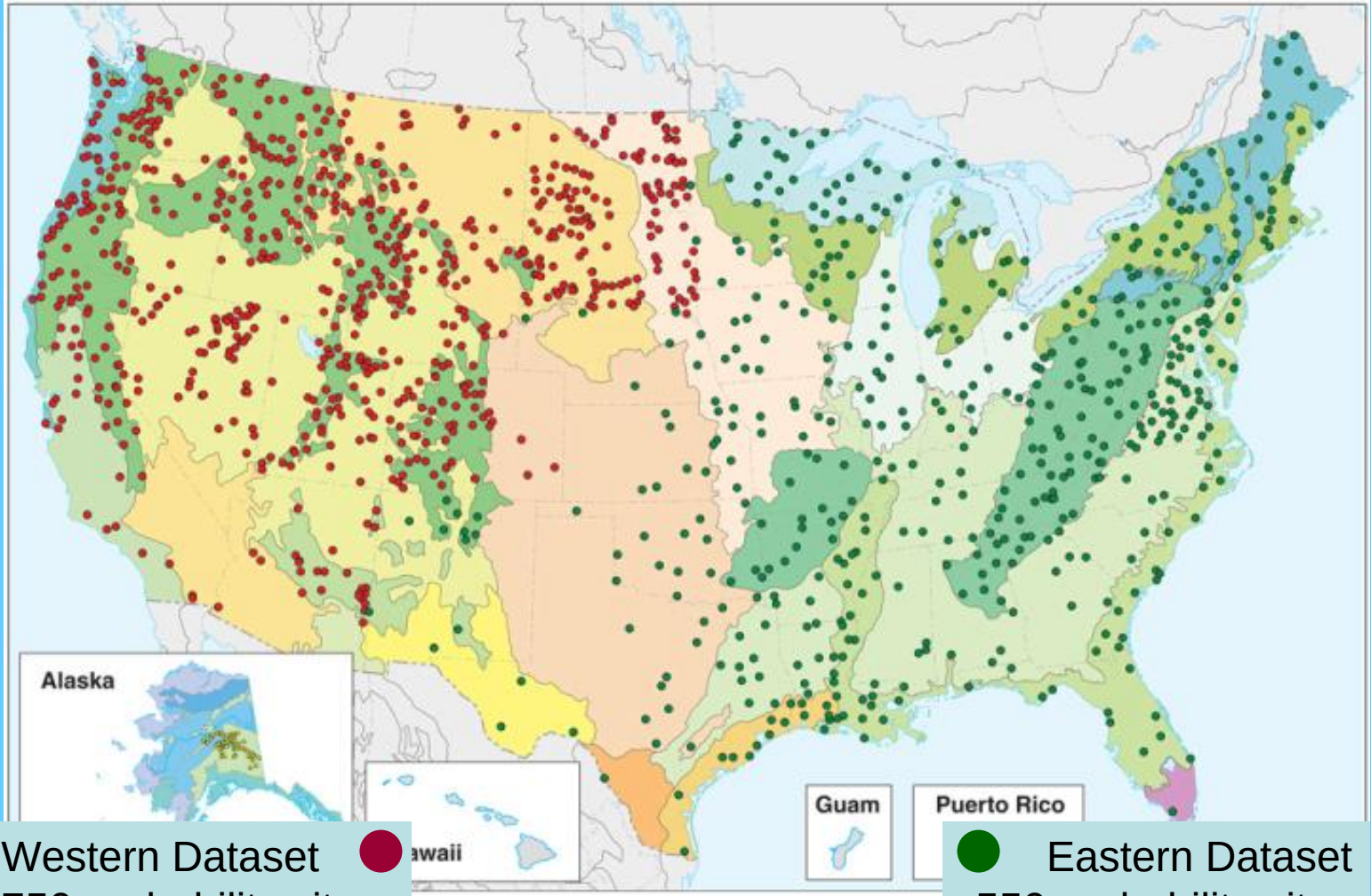
Importance of Good Quality Data

- Data quality objectives (DQOs) are qualitative and quantitative expressions that define requirements for data precision, bias, method sensitivity, and range of conditions over which a method yields satisfactory data (Klemm et al. 1990).
- GIGO – Garbage In, Garbage Out.
  - A poorly constructed master taxa list can have a large negative impact on analyses and assessments.

Importance of a Master Taxa List

- The master taxa list forms the foundation of any biological analysis be it multivariate or multimetric.
- The master taxa list is more than just the name of the organism but includes information about the organism and how it interacts with its environment.
  - What does it feed on?
  - How does it move about?
  - How tolerant is it to stress?

Extent of Sampling



Western Dataset
750 probability sites
50 repeat visits
50 reference sites

Eastern Dataset
550 probability sites
56 repeat visits
142 reference sites

Level of Effort

- Number of samples
  - 762
  - 36,583 lines of data from 8 labs
- Sample Size
  - lab sorted, 500 organism
- Taxonomic Identification
  - genus level (generally)
  - 1,468 unique taxa identified

What is in the Autecology List

- 1,468 taxa
  - most to genus level
- Phylogenetic Information
  - Phylum, Class, SubClass, Order, SubOrder, Family, SubFamily, Tribe, Genus, SubGenus, Species
- **Habits**
- **Tolerance Values**
- **Functional Feeding Groups**
- Taxonomic Serial Numbers (TSN)
  - For lookup on ITIS

Procedure

- Data Sources
  - Western EMAP
  - State and County taxa lists (27) from WSA study area
  - Rapid Bioassessment Protocols (5 regions)
  - WSA project
- Synthesized all information into a single list.
  - Including a conversion table for raw lab identifications to corrected names
- Phylogenetic information at each level was checked versus ITIS.
- Autecology information determined by a weight of evidence approach to condense multiple sources to a single value.

Error Sources

- Poor data management efforts can defeat the best field, lab, and analysis quality control procedures.
- The master taxa list forms the foundation of any biological analysis.
- You may end up with precise but biased data.

Case Study

- County and State IBI calculation
  - Using the same State collected data but calculating the IBI in separate databases.
  - Master taxa lists including autecology information for the County database was based on the State IBI report but over the years evolved on its own.
  - State-calculated vs. County-calculated IBI on the same data had an $r^2 = 0.82$.

Results

- The taxa list will be published and made available on the web.

Lessons Learned

- Data management extremely important
- Communication
  - Well defined roles
    - Who is in charge of what
  - Well defined goals
- It is possible to have quality control on taxonomy from multiple laboratories
- Everyone should follow the SOPs
- Useful to have a single taxa list when merging data between projects

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