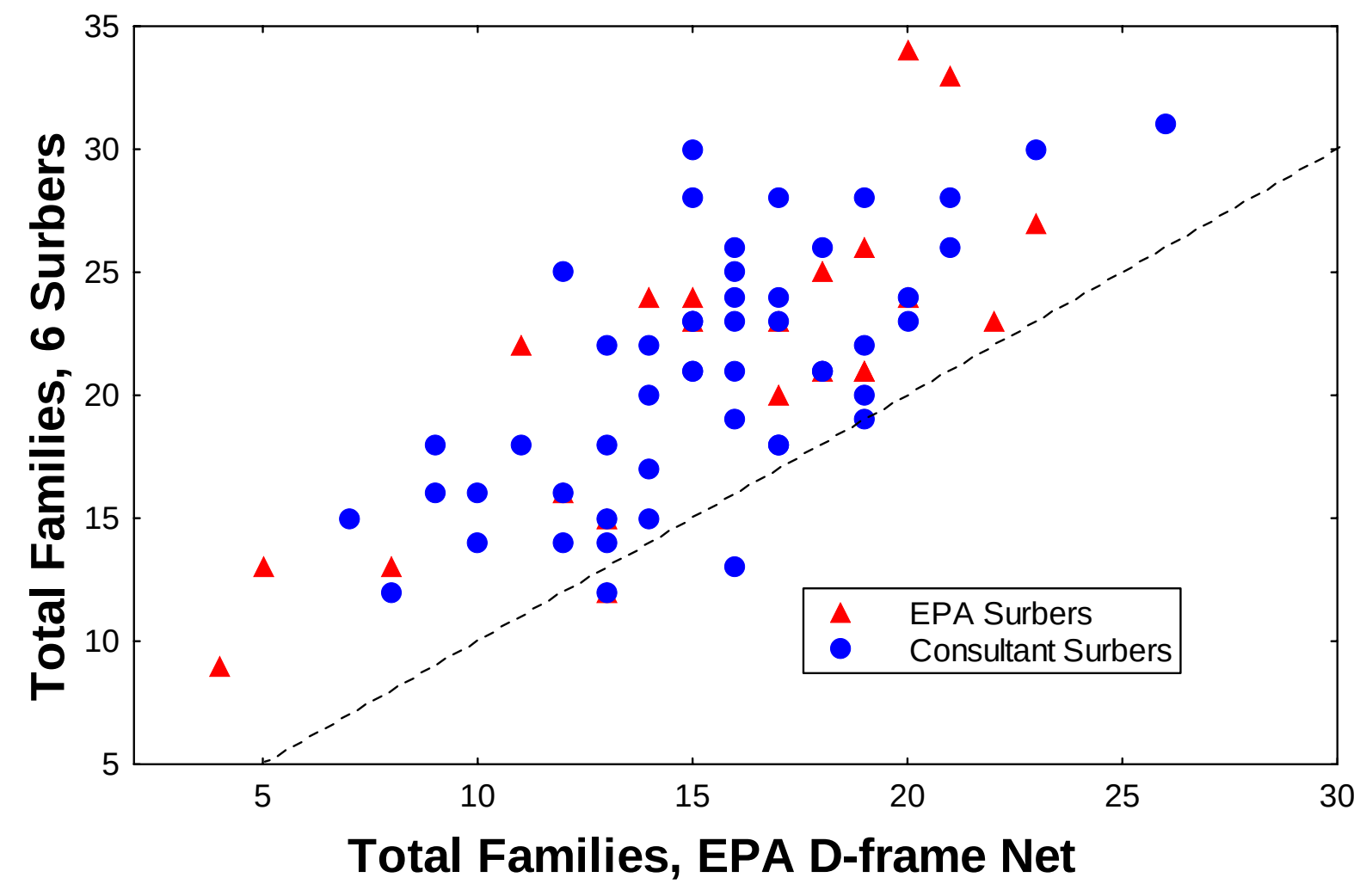
# Methods Matter

How comparable are data and assessments for benthic macroinvertebrates?

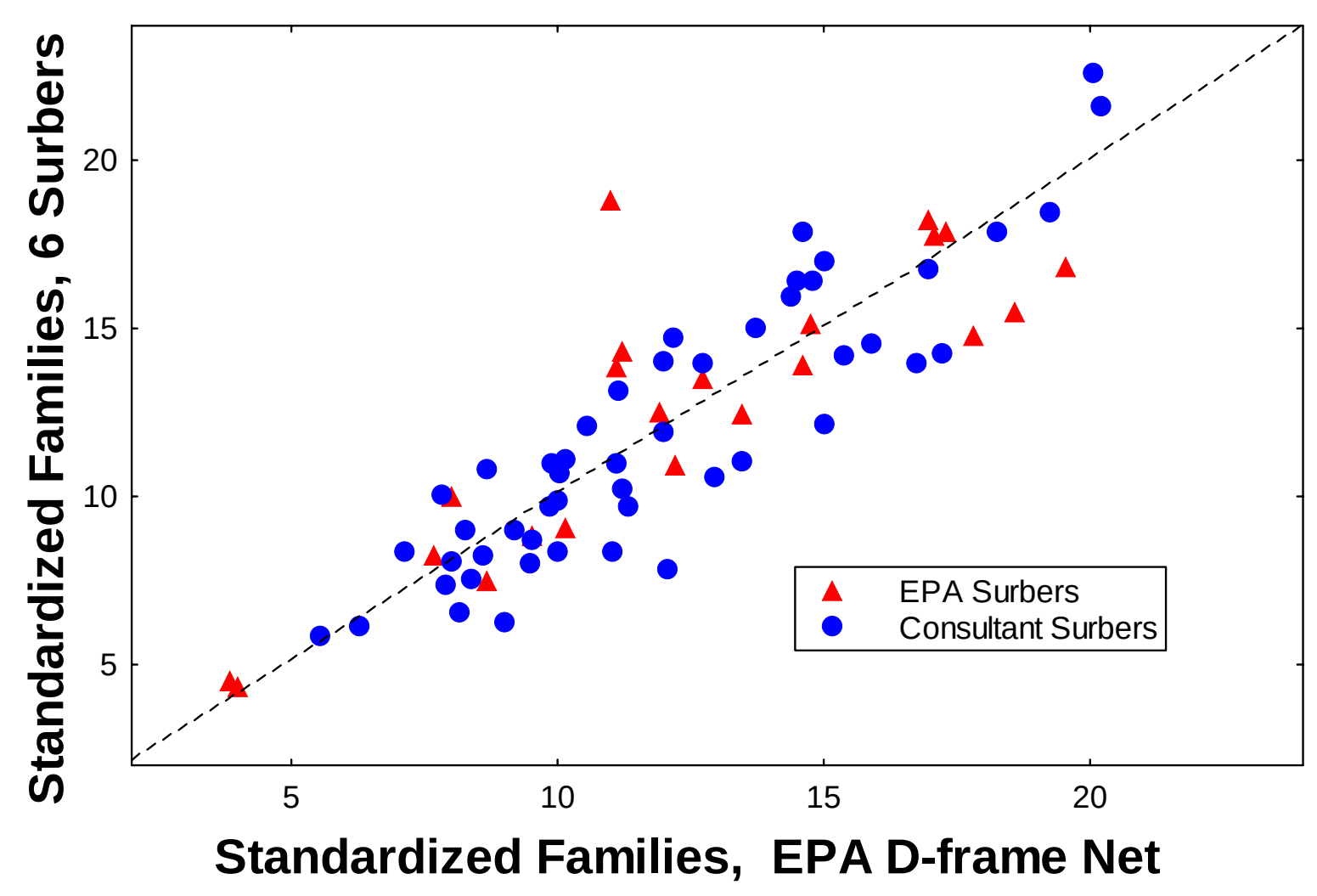
# When can data be combined?

- If targeted habitat is the same, but effort and gear may differ
- Example: combining data from agencies, consultants in EIS (mountaintop removal)
  - EPA method
    - 0.25 $m^2$ kick net
    - 4X, in riffle, 2 $m^2$ total, composited
    - subsampling: ½, ¼ , or 1/8
  - Consultant method
    - 0.093 $m^2$ Surber sampler
    - 6X, in riffle, 0.55 $m^2$ total, not composited
    - subsampling: none
  - Family level taxonomy

# Composited data



# Standardized data (rarefaction, 200)



# Precision

- EPA ¼ $m^2$ kick net had consistently higher precision (lower CVs) for all metrics, than supposedly more “quantitative” Surber samplers.
  - EPA CVs:  9-23%
  - Surber CVs: 12-47%
- Most likely due to larger area sampled of kick nets ($2m^2$ *vs.* $0.55m^2$)

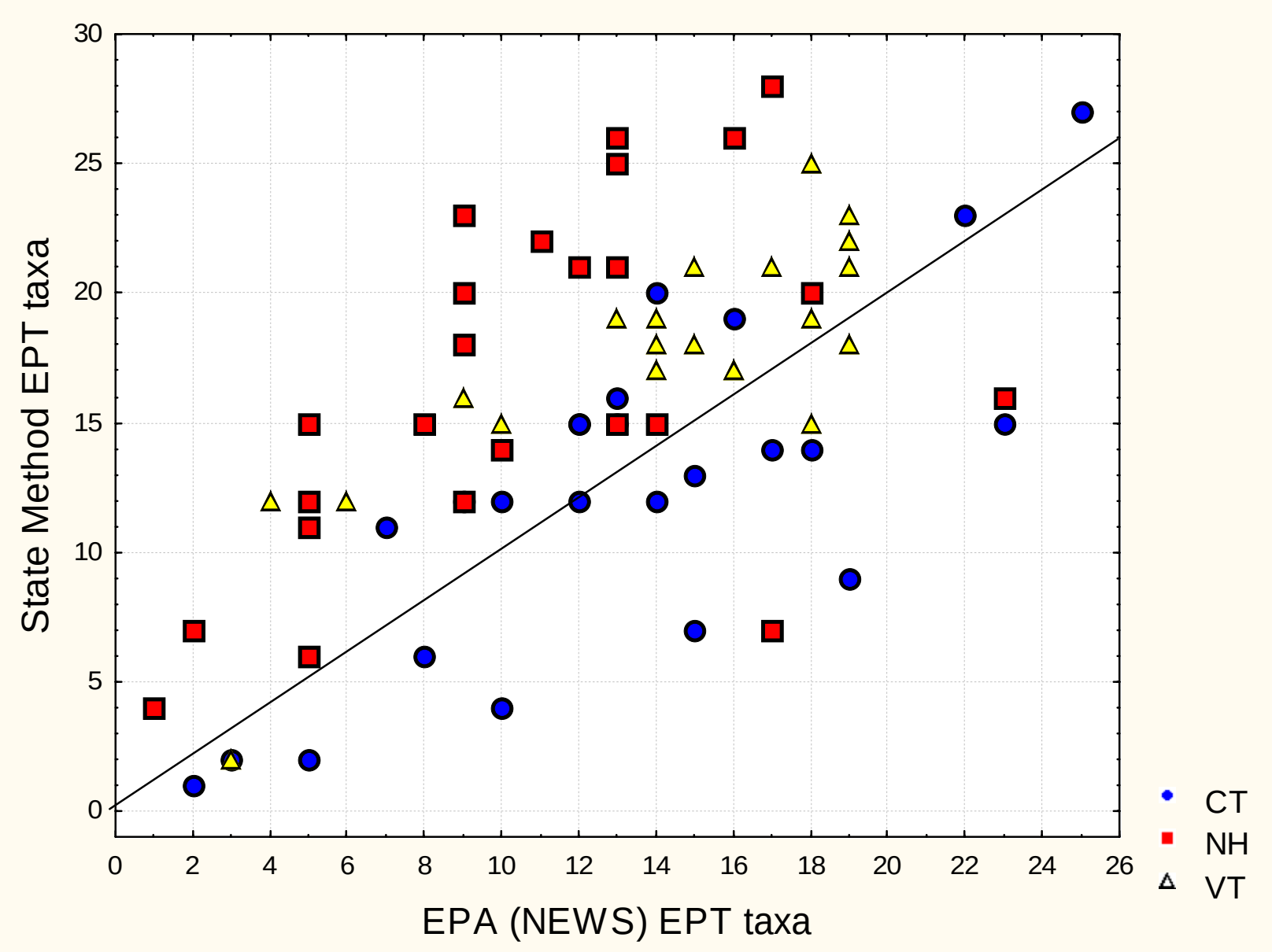
# When can data **not** be combined?

- When methods or design introduce bias
- Most common when habitats sampled are not the same
- Example:  State riffle-only samples and EPA multihabitat samples

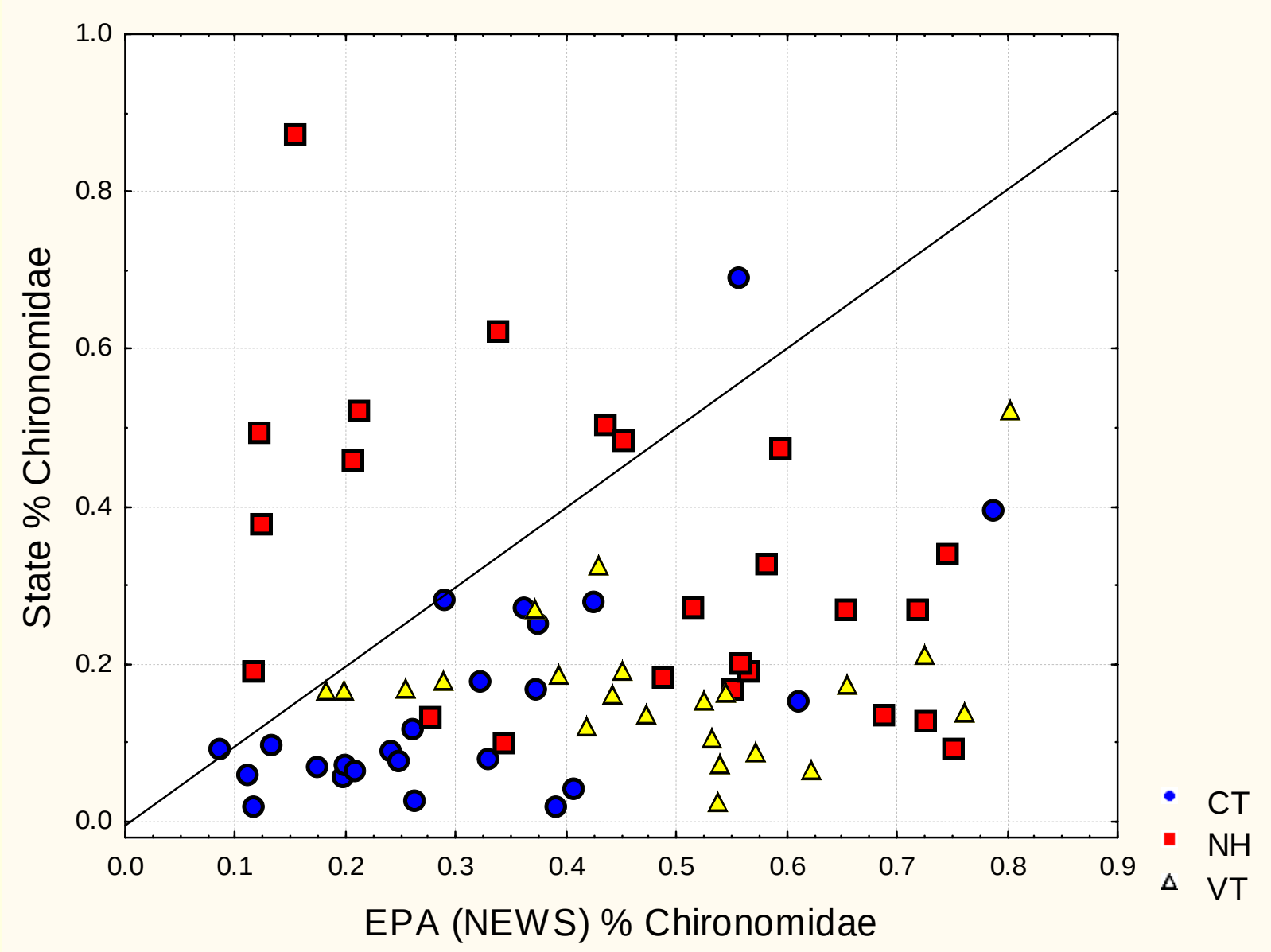
# New England (NEWS)

- EPA (NEWS)
  - 20 quadrats randomly thrown in stream (all habitats); composited (4 $m^2$), 200 subsample
- State Riffle kicks
  - CT: 12 kick samples in riffles, composited (2.4 $m^2$), 200 subsample
  - VT: 4 timed kicks in riffles, composited (0.8 $m^2$), ¼ subsample, 300 min
- Rock baskets
  - NH: 3 baskets, total 0.15 $m^2$, 56 days, ¼ subsample, 100 min
- Paired samples: NEWS and one state (N=22-24)

# EPT taxa

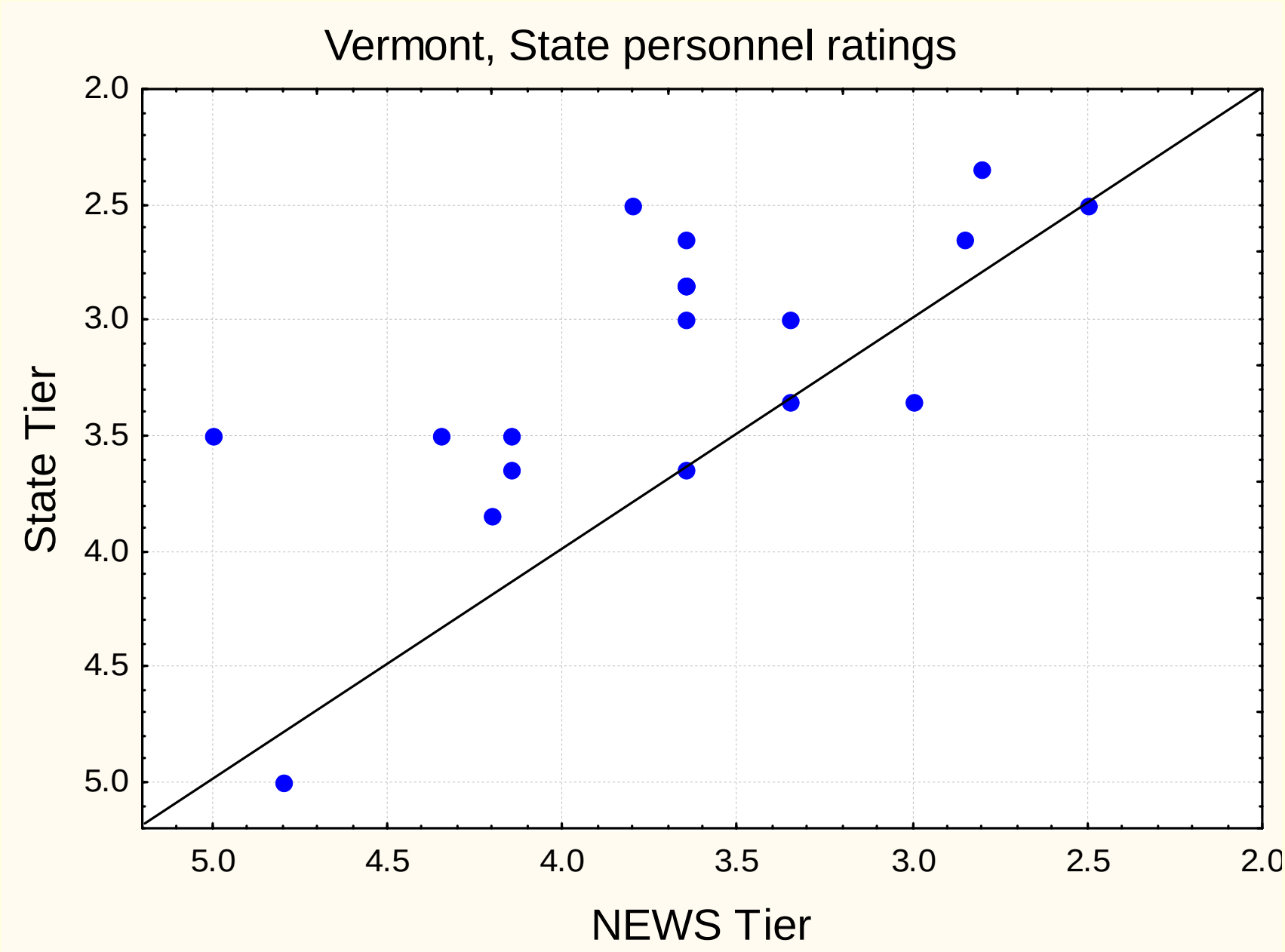

State Method EPT taxa
EPA (NEWS) EPT taxa
0
5
10
15
20
25
30
0
2
4
6
8
10
12
14
16
18
20
22
24
26
CT
NH
VT

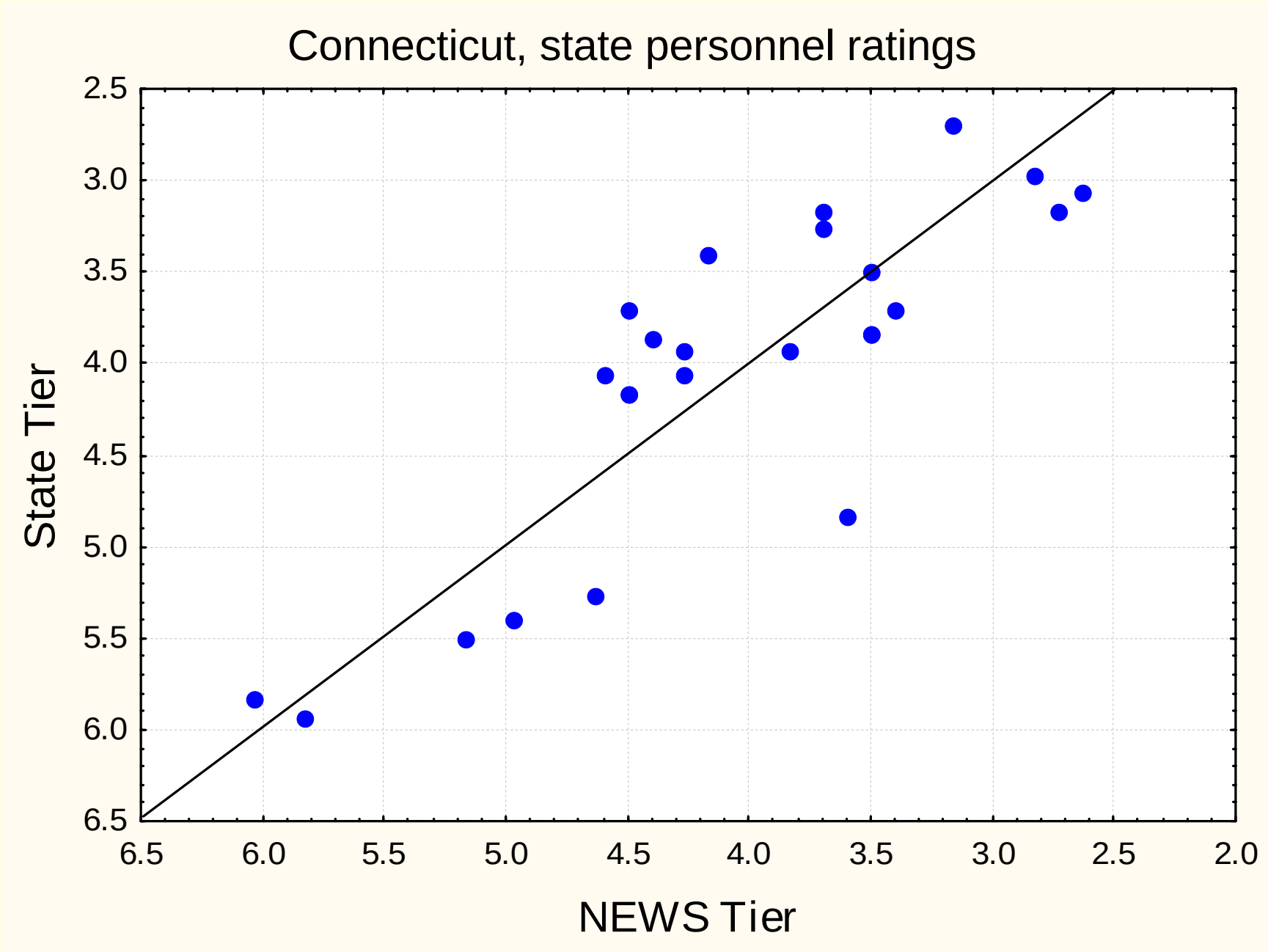
# % Chironomidae



# What about assessments?

- BCG assessment, professional consensus
  - Bias extends to biologists trained on riffle-only, high gradient cold water streams
  - BUT, with training and calibration, bias can be eliminated


Vermont, State personnel ratings
State Tier
NEWS Tier
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.0
4.5
4.0
3.5
3.0
2.5
2.0


Connecticut, state personnel ratings
State Tier
NEWS Tier
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0

# Common Assessment Requires:

- Single scale from pristine to completely degraded (as in BCG)
- Position of reference sites on scale must be determined
- Cross-calibration of biologists with different methods, habitats