

US EPA ARCHIVE DOCUMENT

Comparisons of biological condition gradient (BCG) level assignments derived from expert panelists

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Overview

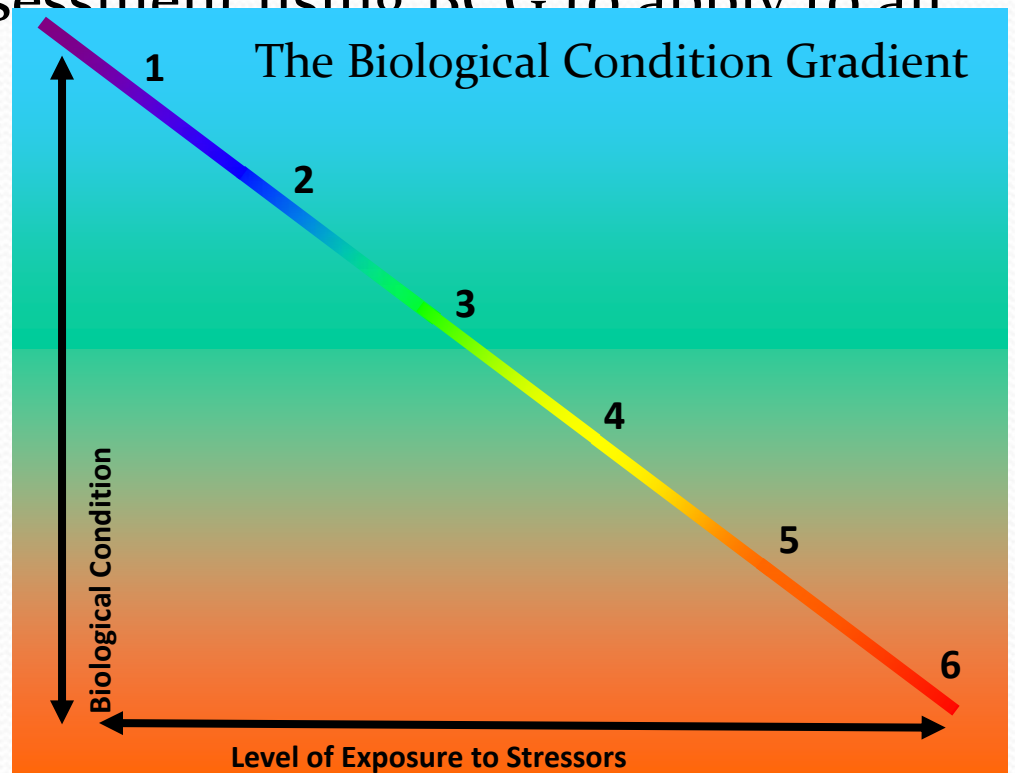
- Project Objectives
- Methods – Data Collection/Preparation/Analysis
- BCG level assignments by expert panelists
- Comparative analyses
 - BCG level assignments within state groups
 - BCG level assignments across state groups
 - BCG level assignments - kick vs. rock basket sampling methods
 - BCG level assignments – state assessment methods
 - BCG level assignments – WSA (federal) assessment method
- Conclusions/Recommendations

Main Project Objectives

- Examine compatibility, comparability of sampling methods
- Develop universal assessment using BCG to apply to all methods

- Methods:

- Maine
- New Hampshire
- Vermont
- Connecticut
- NEWS
- WSA

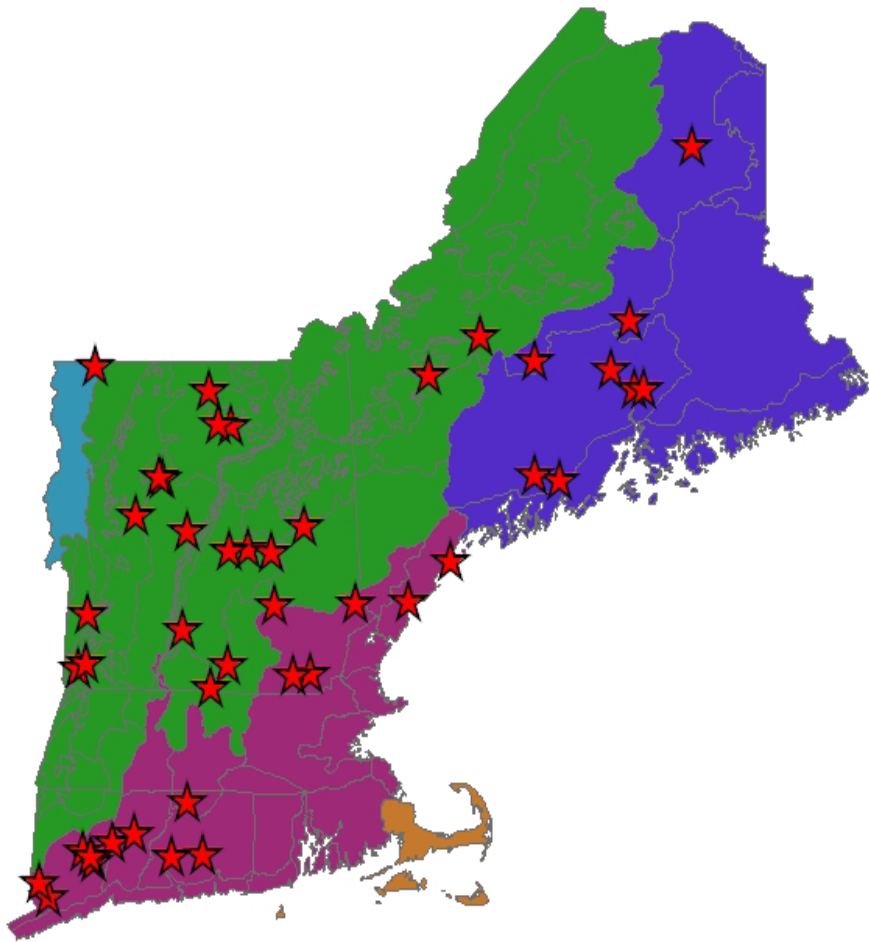


Watershed, habitat, flow regime and water chemistry as naturally occurs.

Chemistry, habitat, and/or flow regime severely altered from natural conditions.

2004 & 2005

- Side-by-side sampling of 4 state methods, NEWS, and WSA
- Removed (most) low gradient sites



★ Methods Comparison Sites

Ecoregion (Draft Oct 07)

LEVEL3_NAM

- Atlantic Coastal Pine Barrens
- Eastern Great Lakes and Hudson Lowlands
- Maine/New Brunswick Plains and Hills
- Northeastern Coastal Zone
- Northeastern Highlands

# Sites	State
12	Maine
11	New Hampshire
11	Vermont
10	Connecticut
44	Total

# Sites	Methods
44	VT, CT
42	ME, NH
36	WSA
20	NEWS

Kick samples (CT, VT)

CT

- 12 riffle kicks
- 18" net, 800-900 μm mesh
- 2 m^2
- 200-organism subsample, random
- October 1-November 30

VT

- 4 riffle Kicks 30 sec each, in 4 different locations in the sampling reach.
- 18" D-frame, 500 μm mesh
- 1 m^2
- Subsample: 1/4 of the sample, minimum 300 organisms
- September - mid-October

Rock Basket (ME, NH)

- 3 cylindrical rock baskets; riffle-run preferred
- ME: 4 weeks; NH: 6-8 weeks
- Contents washed with 600 μm mesh
- Approximately 0.3 square meters per basket
- ME: entire sample; NH: $\frac{1}{4}$ of sample, 100 orgs minimum
- July 1 - September 30

Multihabitat (NEWS, WSA)

NEWS

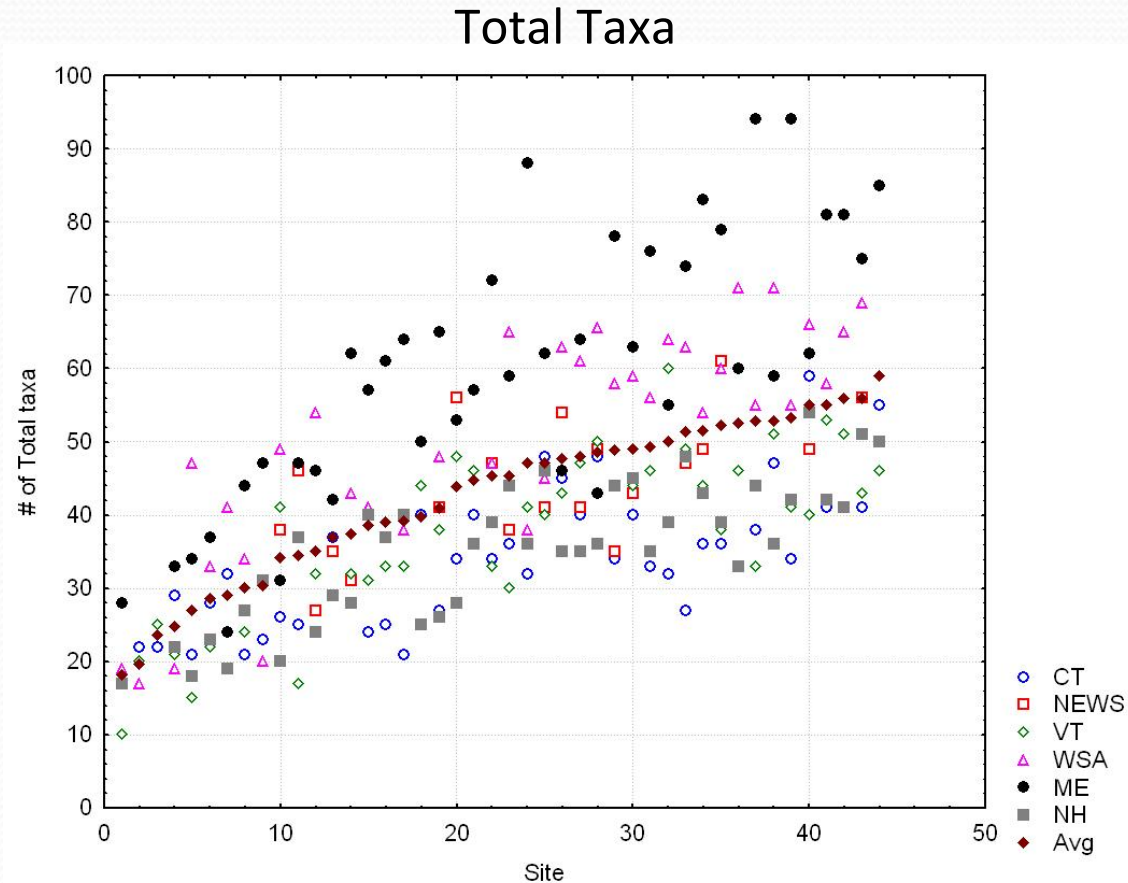
- 1/5 m² quadrat, randomly tossed in stream 20X
- 500 µm mesh.
- Multihabitat Composite
- 4 m²
- 200-organism count, random
- July-September

WSA

- 1 ft² sampled for 30 seconds at random location on 11 transects, composited
- 500 µm mesh
- Multihabitat Composite
- 1 m²
- 500-organism count, random
- June - September*

METHOD COMPARABILITY

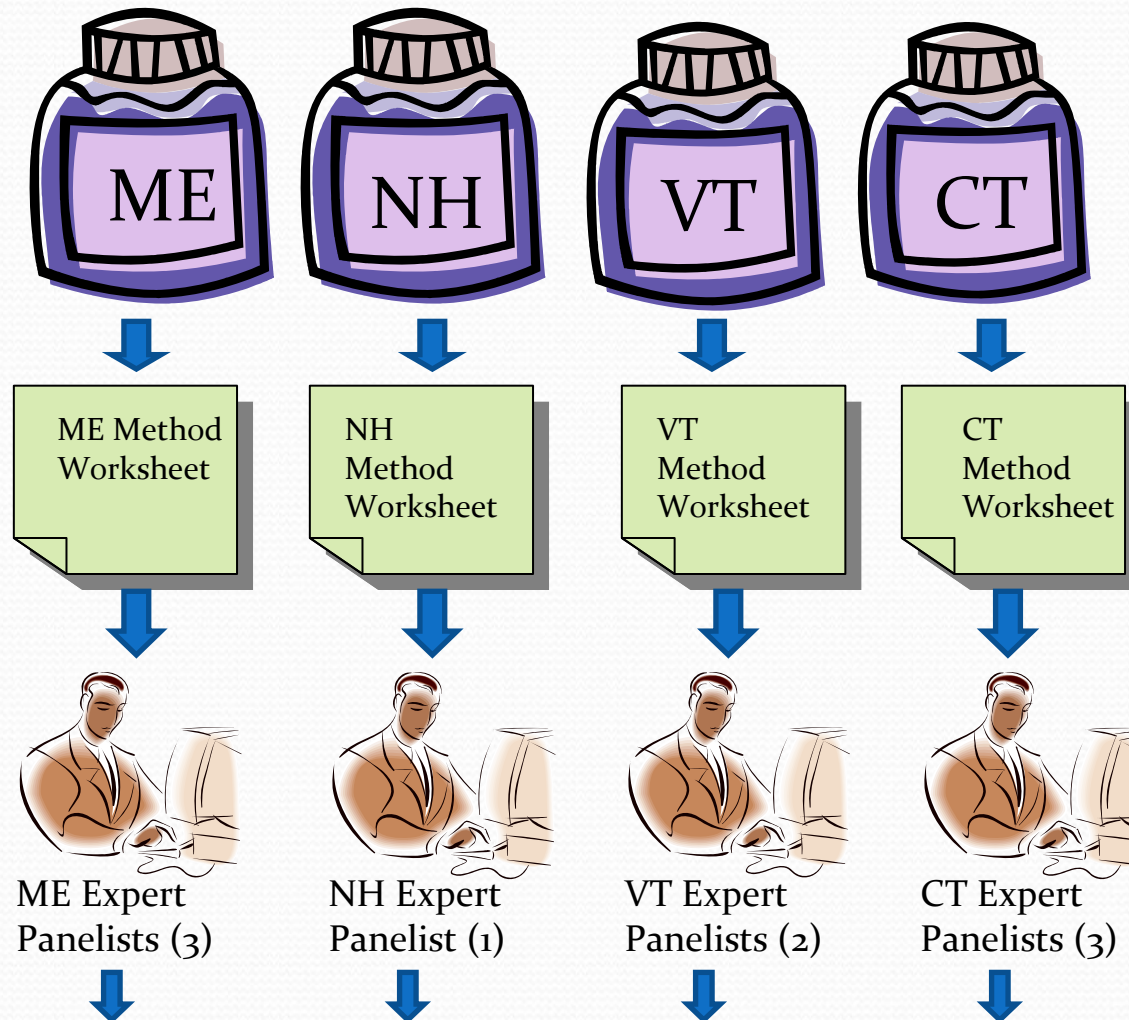
examined values of commonly-used metrics for systematic differences across methods



Can experts panelists make similar BCG level assignments despite differences in sampling methods?

2009 - BCG level assignments exercise

used for development of NE Decision Criteria Model 2 (The NEIWPCCC MMI)



Panelists worked independently to make BCG Level Assignments for each site, based on samples collected and processed in accordance with their state Standard Operating Procedures (SOP). They also wrote down reasons for their assignments.

Sample worksheet

ExerciseID	Samp31	Assigned Tier	Reasoning
Collection Method	Ben_NH	4	missing some lower tier taxa or in low abundance; low abundance of >T3 trichops
Collection Date	10/21/2004		
Elevation (ft)	542.36		
Watershed Area (km²)	32.8		
% Agriculture	10.52		
% Developed	0.9		
% Forest	85		
Gradient	high		
pH	7.4		
Conductivity	109		
Number of Replicates	3		

BCG Attribute	FinalID	Individuals	Order	Family (Tribe)
4	Acerpenna	6	Ephemeroptera	Baetidae
3	Acroneuria abnormis	1	Plecoptera	Perlidae (Acroneuriini)
3	Atherix	1	Diptera	Athericidae
4	Baetidae	2	Ephemeroptera	Baetidae
4	Baetis	1	Ephemeroptera	Baetidae
4	Baetis tricaudatus	6	Ephemeroptera	Baetidae

BCG Attribute 2=Sensitive and rare taxa
 BCG Attribute 3= Sensitive but ubiquitous taxa
 BCG Attribute 4= Taxa of intermediate tolerance
 BCG Attribute 5= Tolerant taxa

BCG level assignments *within* state groups

Dif'ce in BCG Level	# of Sites		
	State 1	State 2	State 3
0	7	20	22
1	32	24	19
2	3	0	3

Almost all of the BCG assignments were within a single level of each other

NOTE: These BCG level assignments were made by the expert panelists (they were not derived from the NEIWPC model)

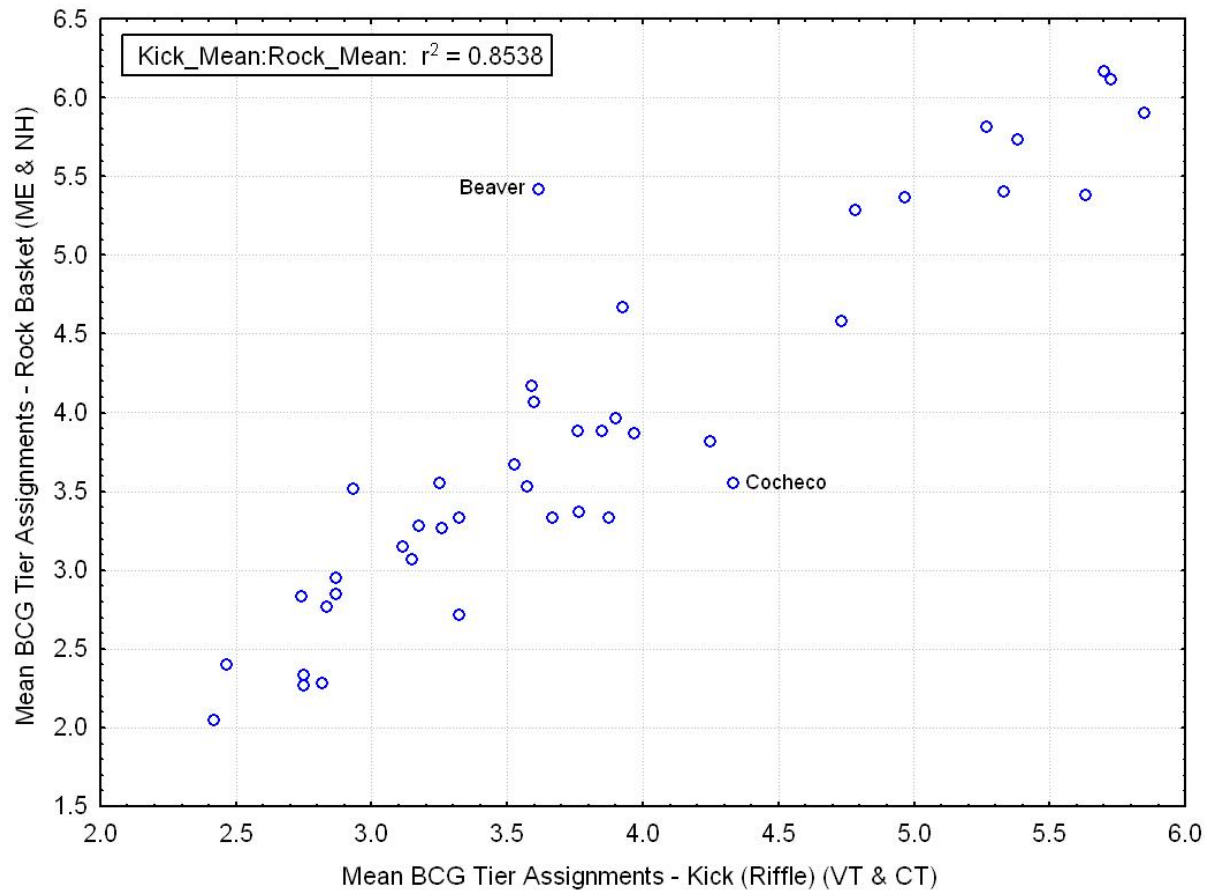
BCG level assignments *across* state groups

Dif'ce in BCG Level	# of Sites
0	9
1	30
2	5

Most of the BCG assignments were within a single level of each other

NOTE: These BCG level assignments were made by the expert panelists (they were not derived from the NEIWPC model)

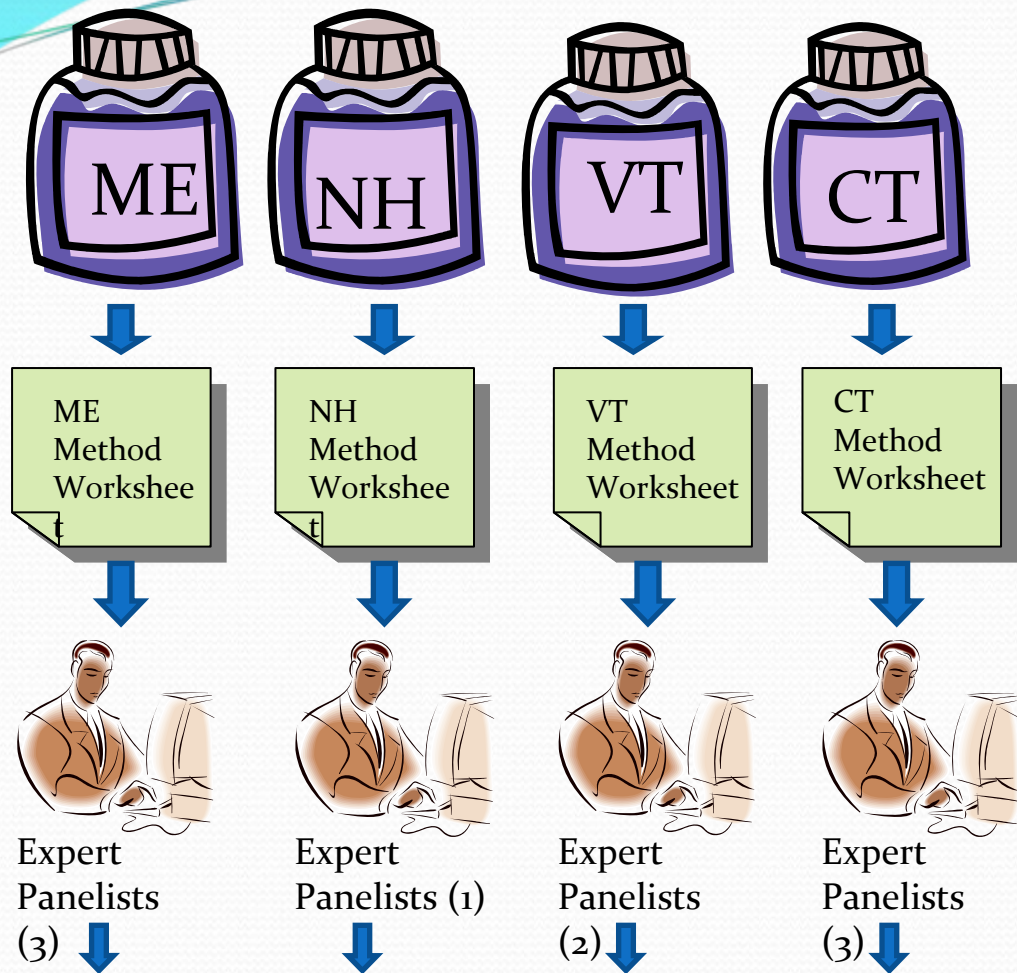
BCG level assignments – kick vs. rock basket sampling methods



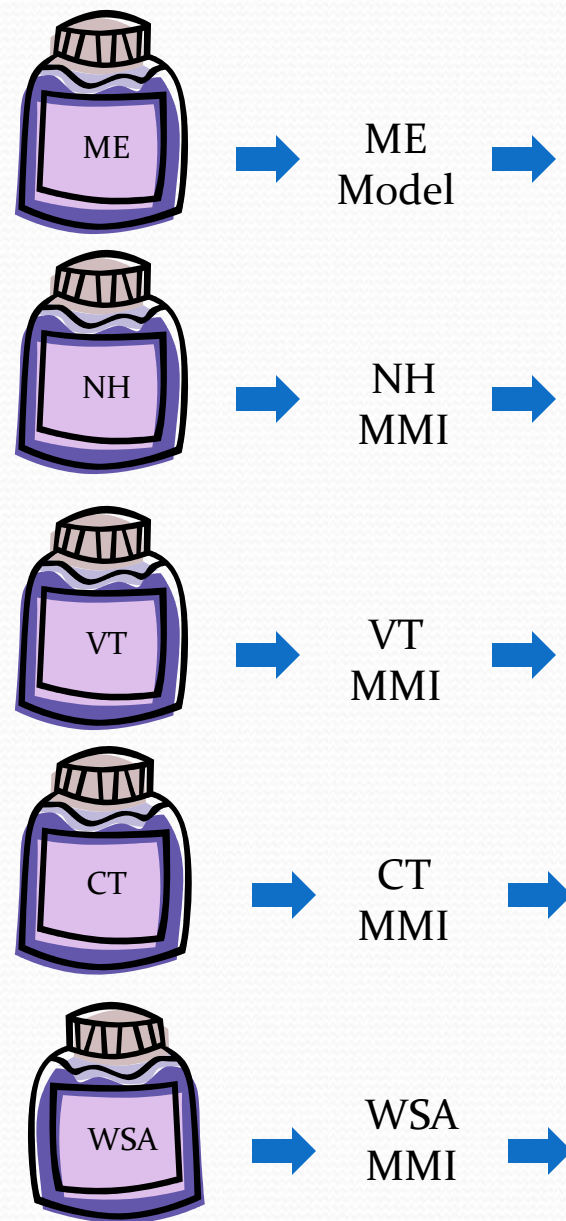
NOTE: These BCG level assignments were made by the expert panelists (they were not derived from the NEIWPC model)

Comparison of expert panelist BCG
level assignments to state and federal
(WSA) assessment ratings

BCG level assignments



State method assessments



State & Federal Assessment Ratings

Panelists worked independently to make BCG Level Assignments for each site, based on samples collected and processed in accordance with their state Standard Operating Procedures (SOP). They also wrote down reasons for their assignments.

BCG level assignments – state assessment methods (all state samples pooled together)

BCG level	State Rating		
	Good	Fair	Poor
1	13		
2	77	1	
3	142	9	1
4	34	14	10
5	7	15	49
6	1		11

% Expected	82
% Unexpected	18

- Both the BCG and all of the state indexes separate out best from worst
- The degree of agreement among experts and among states is a strong indication that the BCG reflects our best estimate of condition
- Additive multi-metric indexes have difficulties in sorting out the intermediate conditions (good and fair)

BCG level assignments – state assessment methods

- When analyzed by state, some states have better level of agreement than others
- There are a number of potential reasons for this:
 - Had to compromise on some sampling index periods and rock basket deployment periods; therefore expert panelists had to make calls on some samples that were outside their experience temporally
 - Samples came from all over New England; therefore expert panelists had to make calls on some samples that were outside their experience geographically
 - Subsampling issues

BCG level assignments – federal (WSA) assessment methods

BCG	WSA Rating		
	Good	Fair	Poor
2	2	3	
3	10	6	2
4		2	4
5			7

% Expected	86
% Unexpected	14

NOTE: BCG level assignments were based on state method samples (not on WSA method samples); the WSA MMI calculations were based on data from WSA method samples.

Conclusions

- There was a high level of agreement among BCG assignments despite differences in sampling methods; sites at which the greatest differences occurred were low gradient sites or had unique site-specific issues
- The high degree of agreement between expert panelist BCG assignments, state and federal assessment ratings is a strong indication that the BCG reflects our best estimate of condition
- BCG, state and federal indexes are effective at separating out best from worst
- Additive MMI indexes have difficulties in sorting out the intermediate conditions (good and fair)

Recommendations

- Encourage use of BCG to help guide management decisions (some states are already doing this)
- Figure out ways to get more states involved
- Work with states that are interested in utilizing the BCG-based NEIWPC model to make sure they can derive automated outputs (i.e. by incorporating the model into their databases)
- Consider doing a similar exercise for low gradient sites
- Consider doing a similar exercise utilizing fish (this may already be in the works...)
- In future work, consider lessons learned from this project (i.e. take steps to reduce database QC issues, pay closer attention to subsampling issues, deployment periods, collection of consistent habitat and chemistry parameters across states)

New England NEWS/BCG team

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- Doug Burnham
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- NH DES
- NEIWPCC

Questions?

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