

Using the BCG in an Urbanizing Setting:

Opportunities and Challenges from the State Perspective

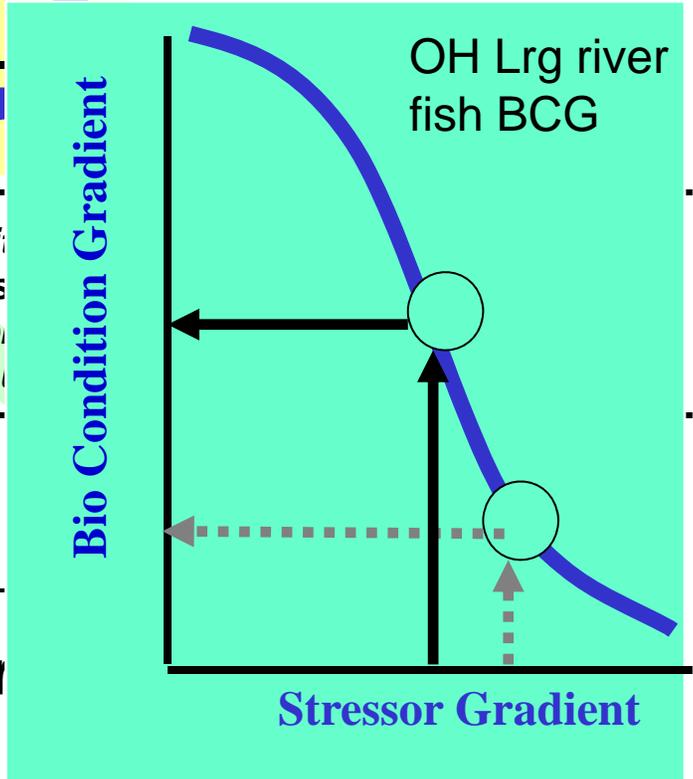
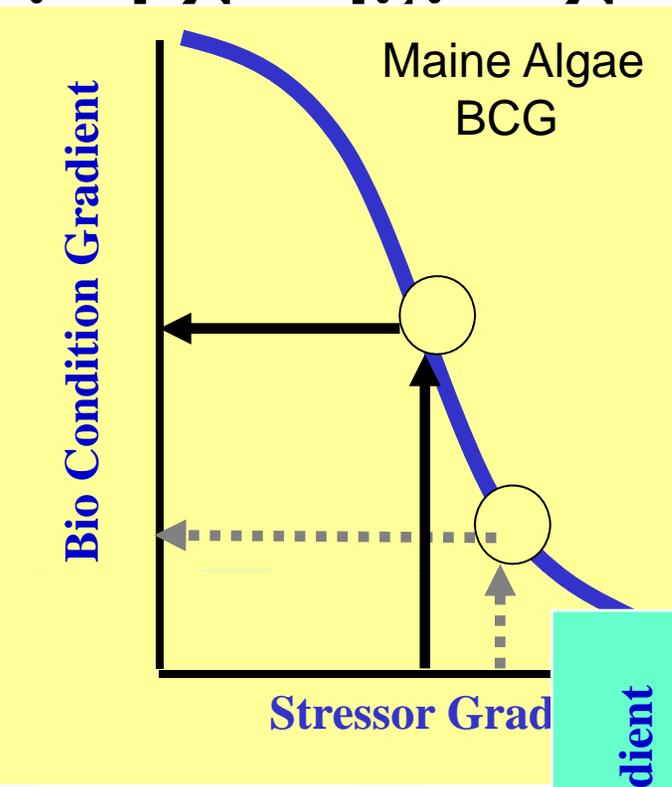
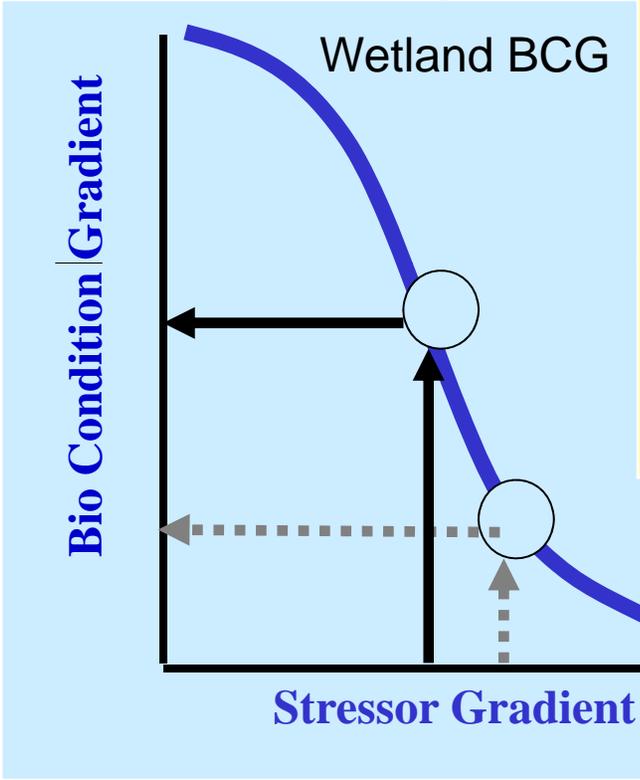
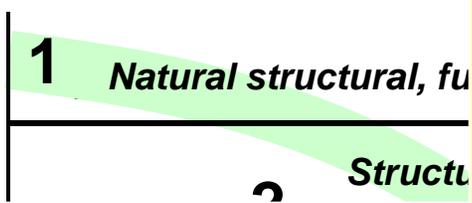
NWQMC
Denver, CO
April 27, 2010

Susan P. Davies
Maine DEP

“Unfortunately our skill in, and zeal for collecting data far exceeds our ability to interpret them, particularly in terms of system integrity and response. The preoccupation with minutiae, which is the foundation for the generation of sound data, is the most formidable obstacle to its enlightened use”

John Cairns 1980

Biological Condition Gradient



reserved.

community with some additional sensitive non-native taxa may be maintained

no loss of some rare native ecosystem level functions fully attributes of the system.

5 diminished; reduced distribution of species; organism condition poor; build

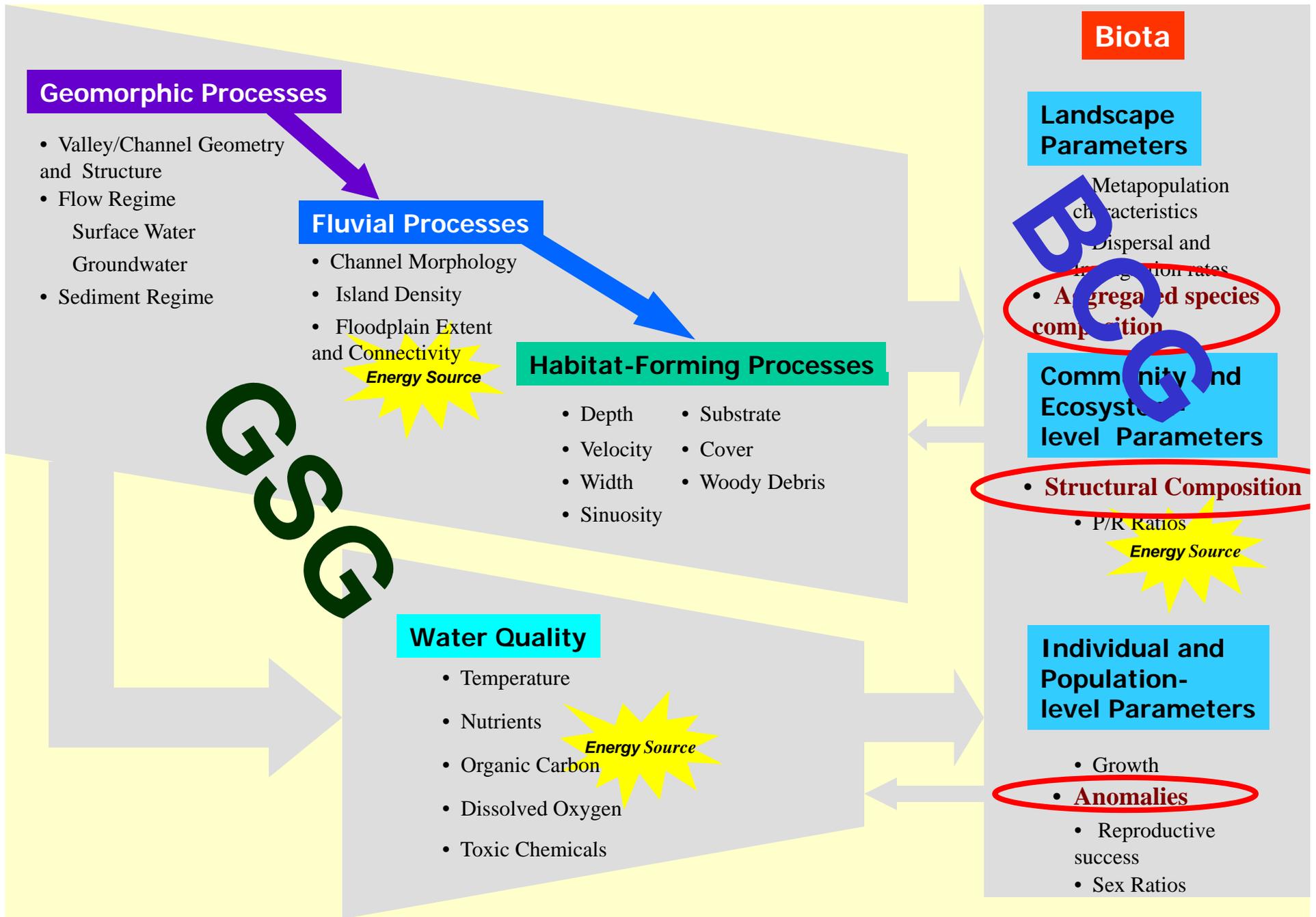
structure; wholesale changes in taxonomic composition; extreme alterations from normal densities; organism condition is often poor;

LOW ——— Level of Stressor

Using the BCG in an Urbanizing Setting:

Opportunities for States and Tribes

1. The BCG organizes complex information
2. The BCG helps us communicate science more clearly → better decisions
3. The BCG can help us learn how to prevent problems.



Conceptual model of river processes and potential measurements

Opportunity #1 for States and Tribes

The BCG organizes complex information

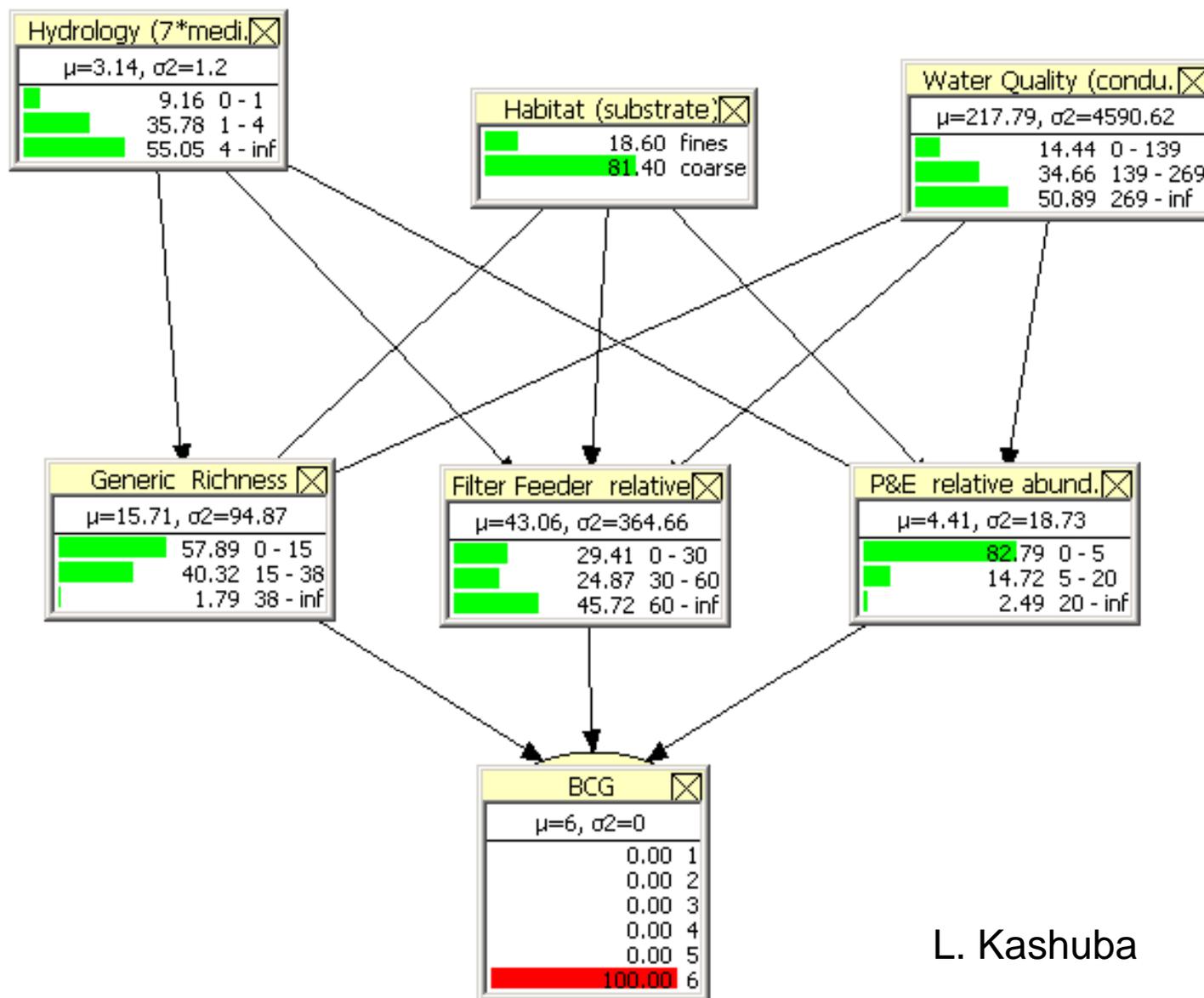
- Accommodates and organizes complexity
- Uncovers blind spots and biases
- A check against reductionist solutions
 - e.g., pollutant by pollutant “TMDLs”
 - “rapid” bioassessment approaches
- Helps us be better biologists

DATA → INFORMATION → KNOWLEDGE

Opportunity #2 for States and Tribes:

***The BCG helps us communicate
more clearly***

BCG Bayes-Net Model (Duke/USGS)

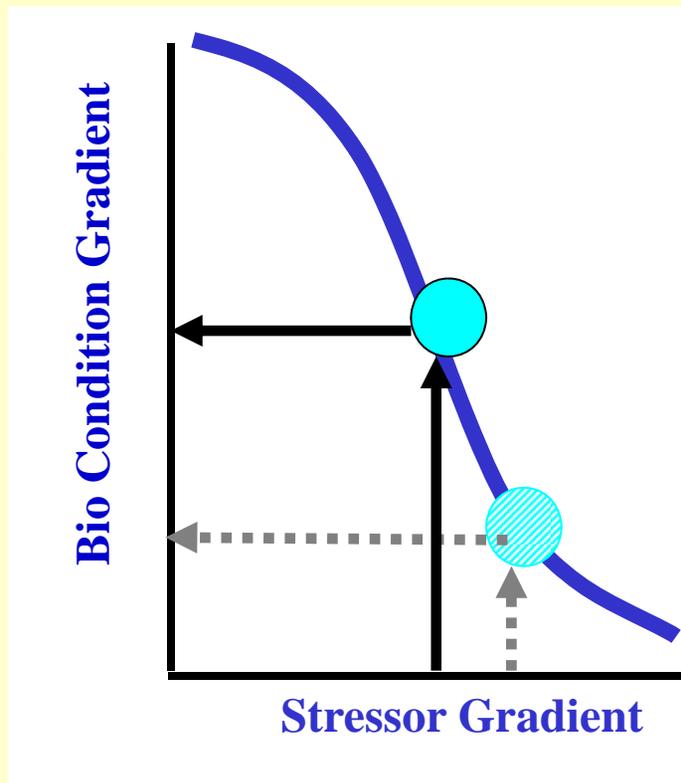


L. Kashuba

The Science behind Water Quality Goals

SCIENCE → **GOALS**

Biological Condition Gradient



A Scientific Model

Class A/AA

“as naturally occurs”

BCG Tier 1-2

Class B

“support all indigenous species; no detrimental change”

BCG Tier 2-3

Class C

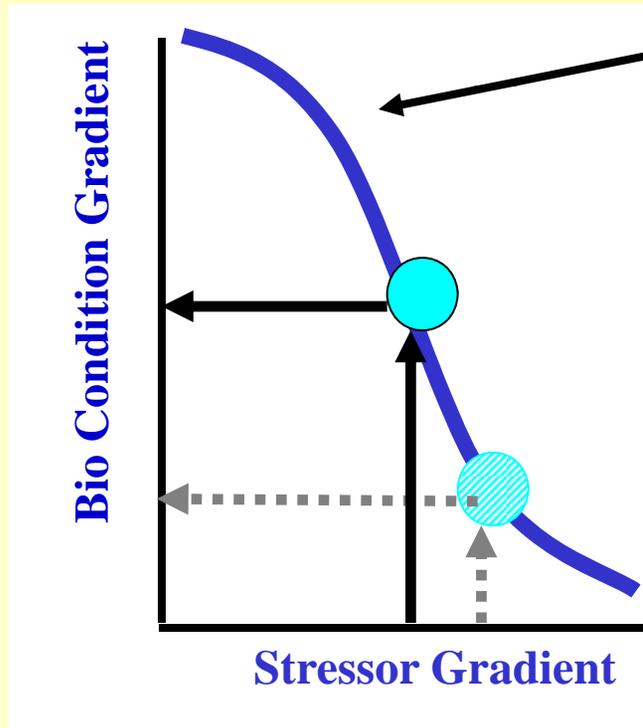
“support indigenous fish (salmonids); maintain structure and function”

BCG Tier 3-4

Water Quality Standards Framework (ex: Maine)

Opportunity #3 for States and Tribes: The BCG can help us learn how to prevent problems

Biological Condition Gradient



A Scientific Model

Early detection and prevention of decline is critical, in terms of both long-term ecological and economic costs

Impervious Surface in Class B Streams

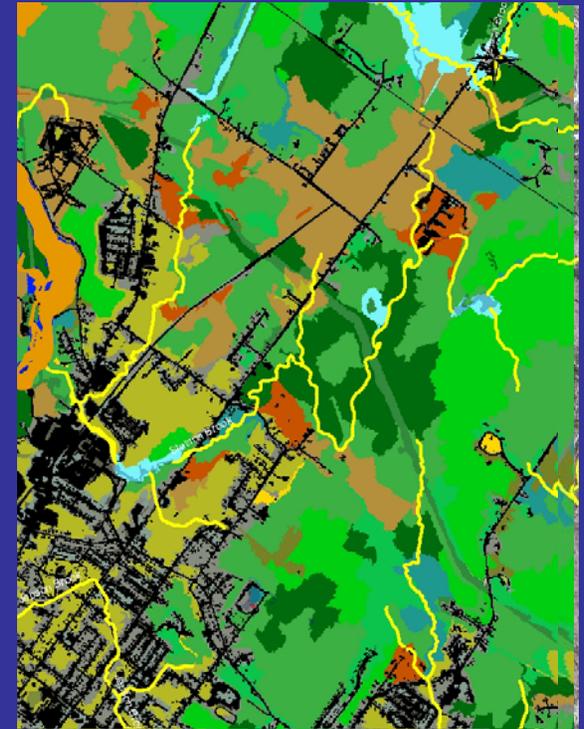
Jepson Brook- **NA**



Hart Brook- **Class C**



Stetson Brook- **Class A**



Impervious surfaces

“NA”= Non-attainment of C

Using the BCG in an Urbanizing Setting: Challenges for States and Tribes

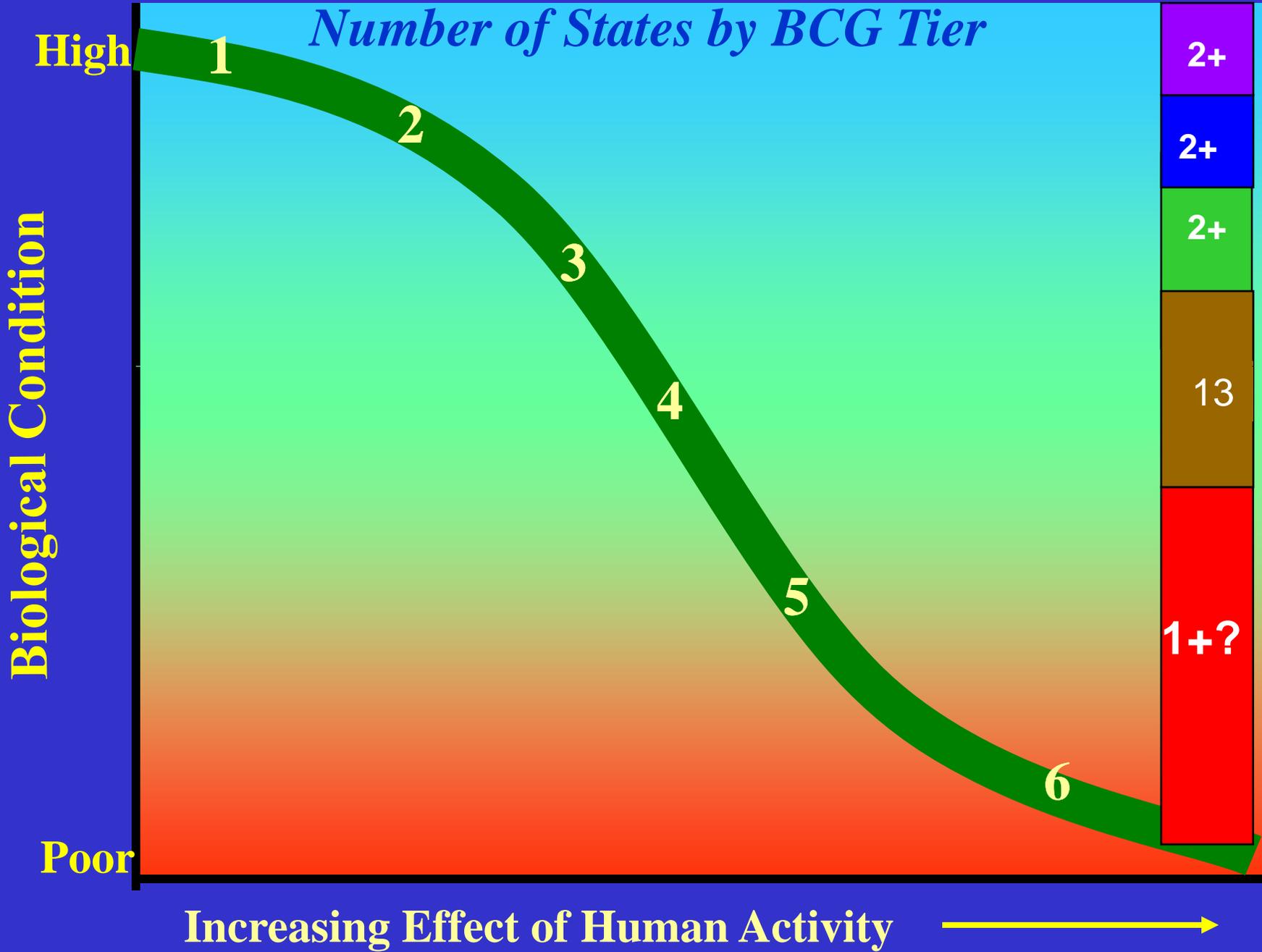
- Lack of policy mechanisms to prevent problems and/or protect existing high quality
- Ineffective (or non-existent) action-forcing to stop biological degradation

Challenges for States and Tribes:

Lack of policy mechanisms to prevent problems and/or protect existing high quality.

- Observed high biological quality is not adequately protected
 - Antidegradation is poorly suited to prevent biological decline
 - Aquatic life uses generally only protect to the CWA Interim Goal and ignore the CWA BioIntegrity Objective

13 States' Self-Evaluation of ALU Thresholds:



Challenges for States and Tribes: Ineffective (or non-existent) action-forcing

- Biological decline infrequently triggers management intervention unless severe
- Biological goals are poorly expressed & addressed
- Outdated policy structures over-simplify problems
- States and EPA have not prioritized implementation of Stressor ID → Causes of biological impairment
 - *Example: federal reporting “catch-all” for biological impairment is “Cause Unknown”*

Emerging Science Can Help

- Duke-USGS BCG Bayes Net Model
 - Balance of expert judgment and empirical data
 - Explicitly incorporates both X-axis and Y-axis
 - Elucidates both the biological responses and the stressor syndromes
 - Predicts likely biological response of different management (BMP) options