Update On Progress of the Pilot Study

April 20, 2011

At The Last
Science Advisory Group Meeting

- Described our conceptual workplan steps
- Generally liked our direction
  - Full understanding really required more details
- Science Advisory Group recommended a pilot study to explore details
  - Identify challenges and opportunities

9-Step Bio-Objectives Workplan

- Reference condition
- Stressor response models
- Waterbody classification and scoring
- Stressor identification
- Information management
- Implementation Plan Development
- Rulemaking
- Outreach
- Training and standardization

Technical Elements

At The Last Stakeholder Meeting

- Talked about our common understanding for modeling and classification
- Identified where there was uncertainty
- Agreed on a Pilot Study Region
- Presented some approaches/options to clarify the uncertainty
  - Reached some concurrence

Common Understanding

- Reference condition is a good thing
  - Conceptual agreement on how reference is defined
- Some sites are never going to reach reference condition
  - Highly developed streams
- Likely a different biological expectation for these highly developed streams

Areas of Uncertainty

- What stressor metrics are used to classify streams as highly developed?
- What should our biological expectation be for these highly developed streams?
- How to assign these expectations to actual streams?

Road Map For Today

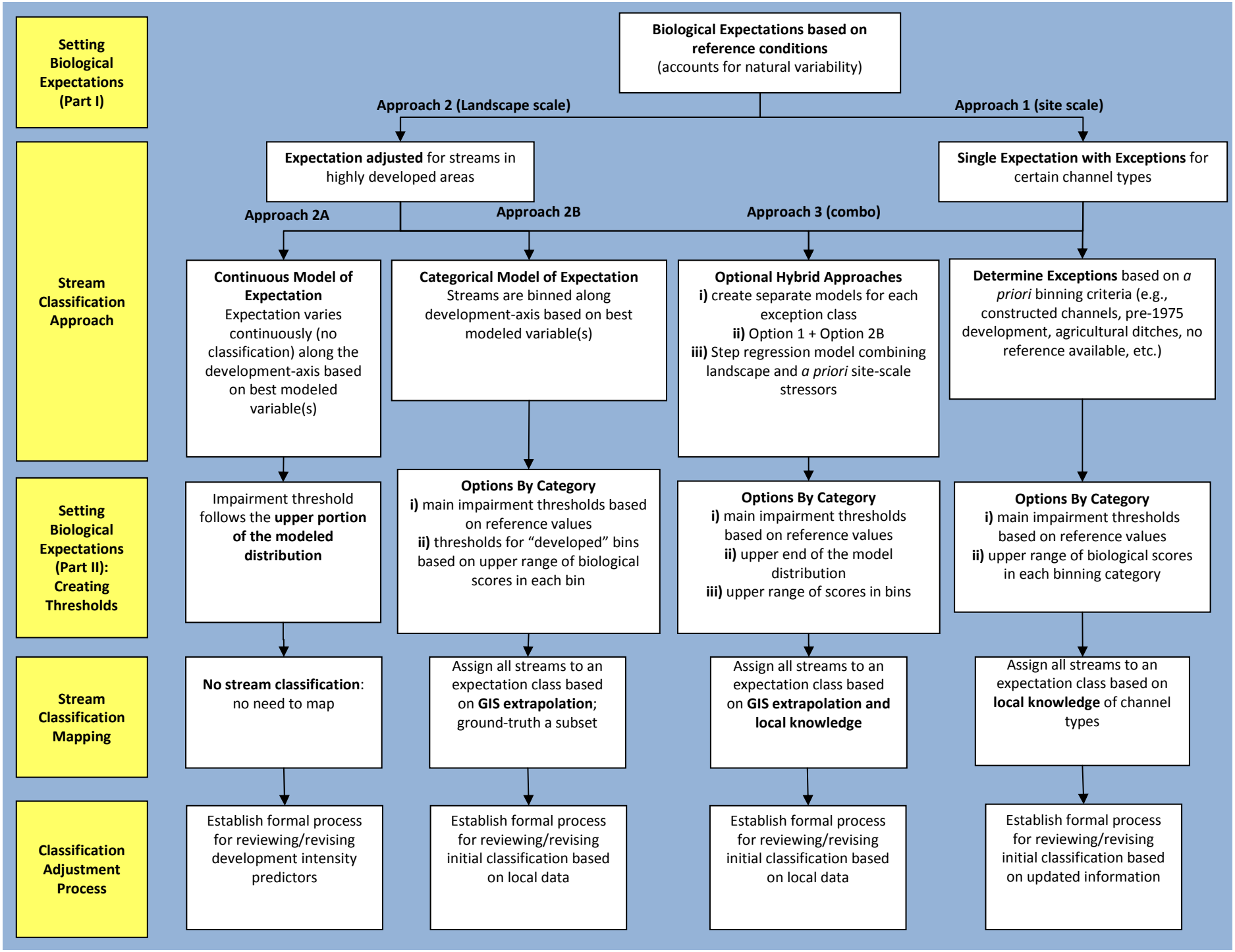
- Conceptual framework
  - Flow chart
- Begin applying the framework in our pilot region
  - Allows us to test alternative modeling approaches and options
- Please give us guidance on preferred options

Questions for the Panel

- Which modeling/classification approach do you think is best?
- Can you recommend improvements on the preferred approach?
- What are some outcomes you would like to see at our next meeting?

Major Elements of Our Conceptual Framework

- Start with establishing biological expectations
- Create stream classes
- Identify thresholds for biological expectation within each class
- Extrapolate biological expectation to all streams in the state (mapping)
- Establish a mechanism to evaluate and adjust classification maps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Biological Expectations based on reference conditions (accounts for natural variability)
Approach 2 (Landscape scale)
Approach 1 (site scale)
Stream Classification Approach
Expectation adjusted for streams in highly developed areas
Single Expectation with Exceptions for certain channel types
Approach 2A
Approach 2B
Approach 3 (combo)
Continuous Model of Expectation
Expectation varies continuously (no classification) along the development-axis based on best modeled variable(s)
Categorical Model of Expectation
Streams are binned along development-axis based on best modeled variable(s)
Optional Hybrid Approaches
i) create separate models for each exception class
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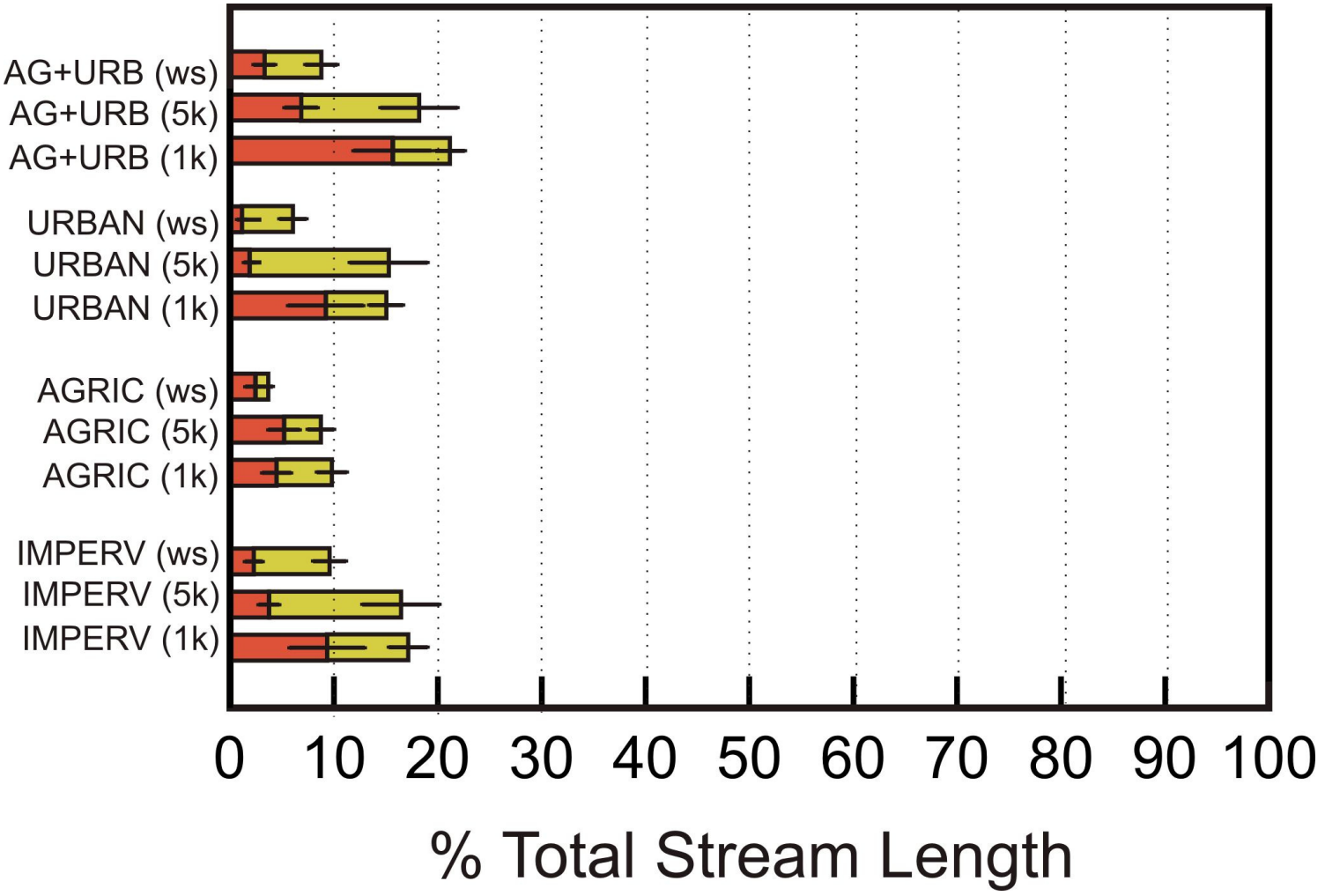
Setting Biological Expectations at Reference sites

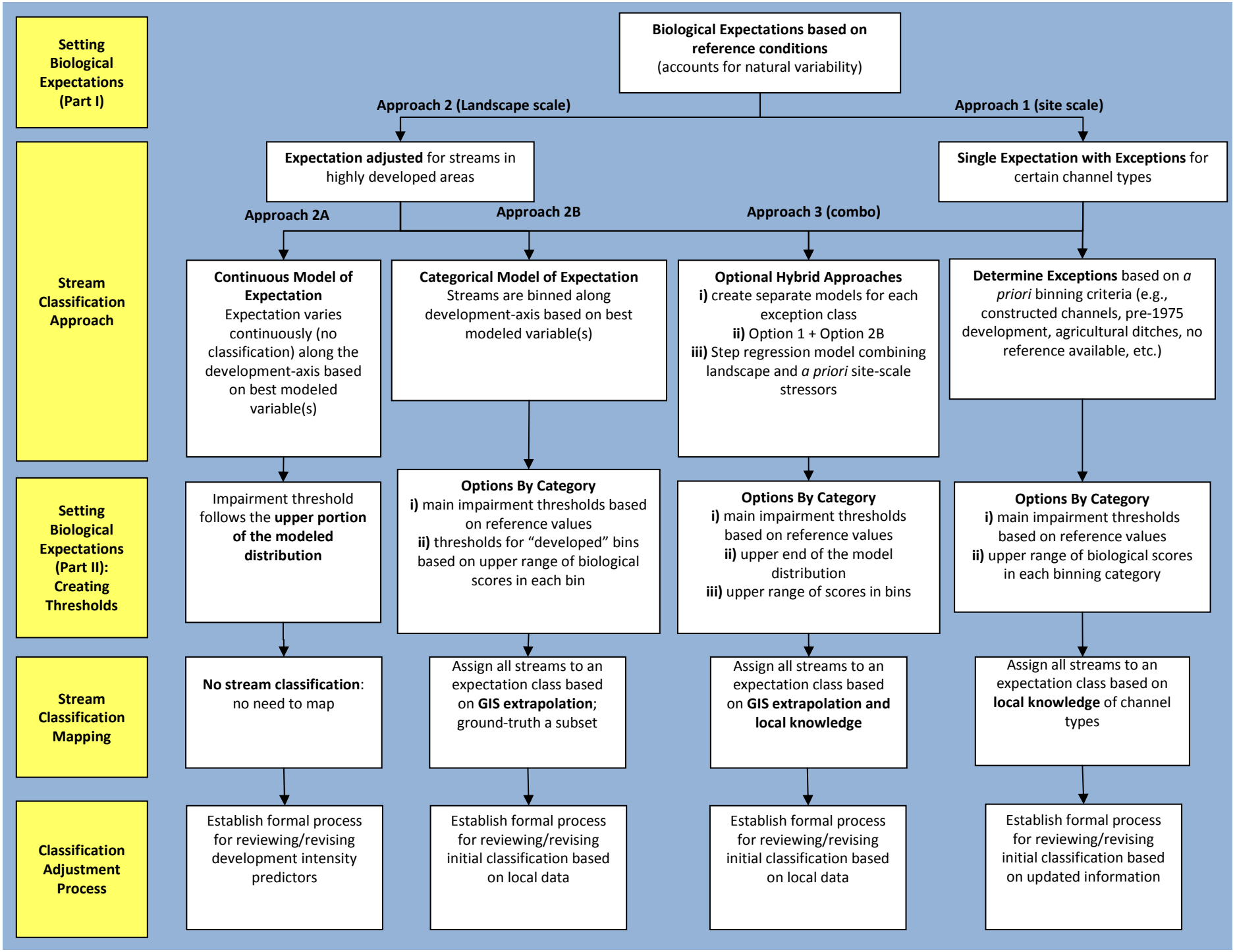
- Described in detail this morning
- Preferred expectation
  - Both now and into the future
- Assume this will be the expectation at the majority of stream reaches in the state



Percentage of statewide stream length with landuse values greater than moderate (yellow) or severe (red) thresholds. Moderate/Severe as follows: AG > 5/25%, URB > 10/50%, IMPERV > 2/10%, AG+URB > 10/40. Codes in parentheses refer to spatial scale at which the landcover variable was calculated: ws= entire upstream watershed, 5k = 5 kilometer area upstream of site, 1k = 1 kilometer area upstream of site.

Setting Biological Expectations in Highly Developed Streams

- Three basic approaches to choose from
  - Each has their pros and cons
- Site scale stressors
  - Largely empirical data
- Landscape scale stressors
  - Largely remotely sensed data
- Hybrid of site and landscape stressors
  - Stakeholders preferred this option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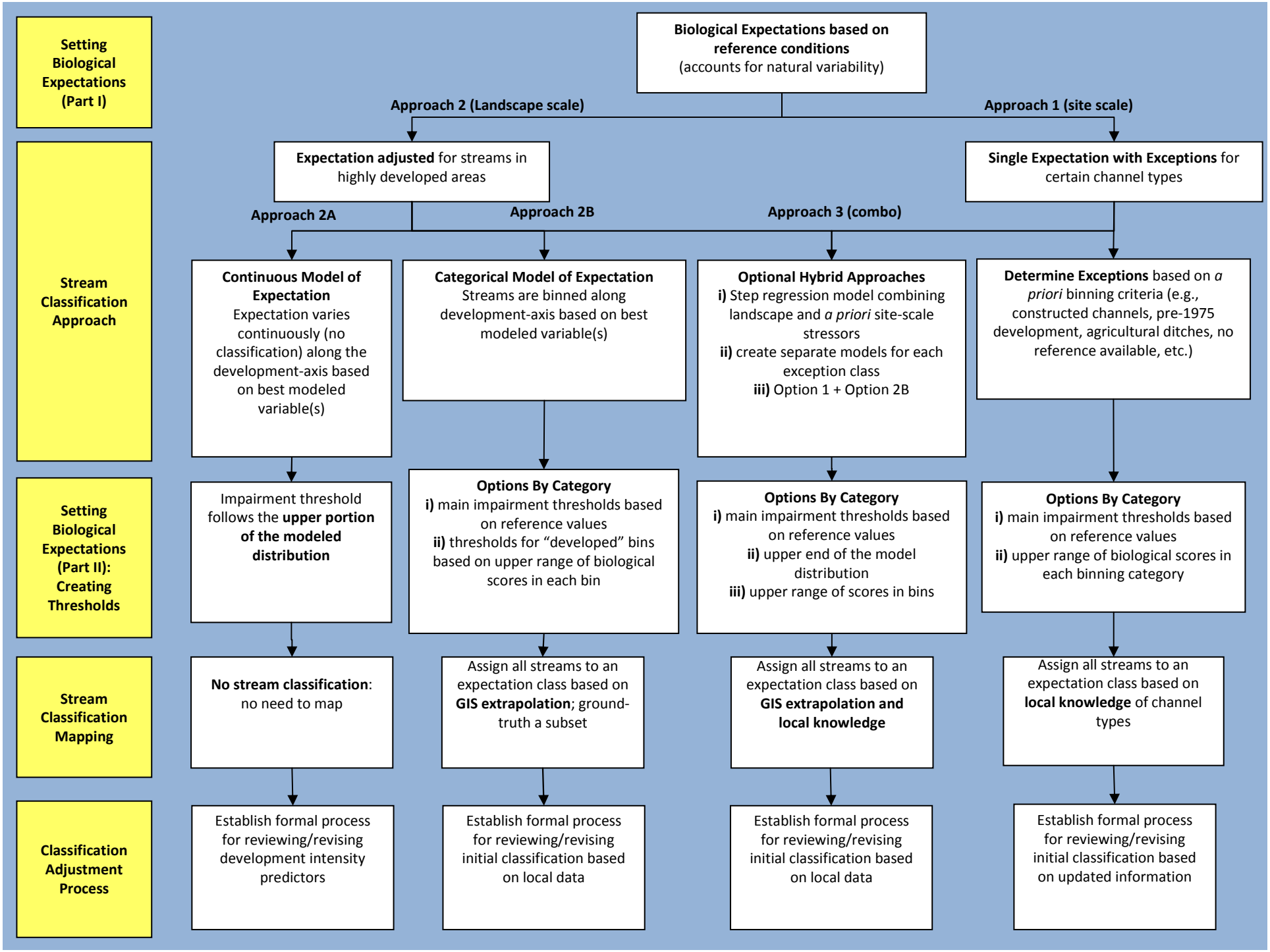
Approach 1 (Site Scale Stressor) Pros and Cons

- Simple, straightforward and easy to understand
- *A priori* selection of stream classes is not necessarily a technical exercise
- Likely lacking sufficient data in each classification
- Threshold selection is based on population-based estimators
- Difficult to impossible to identify all streams in the state with the same classification characteristics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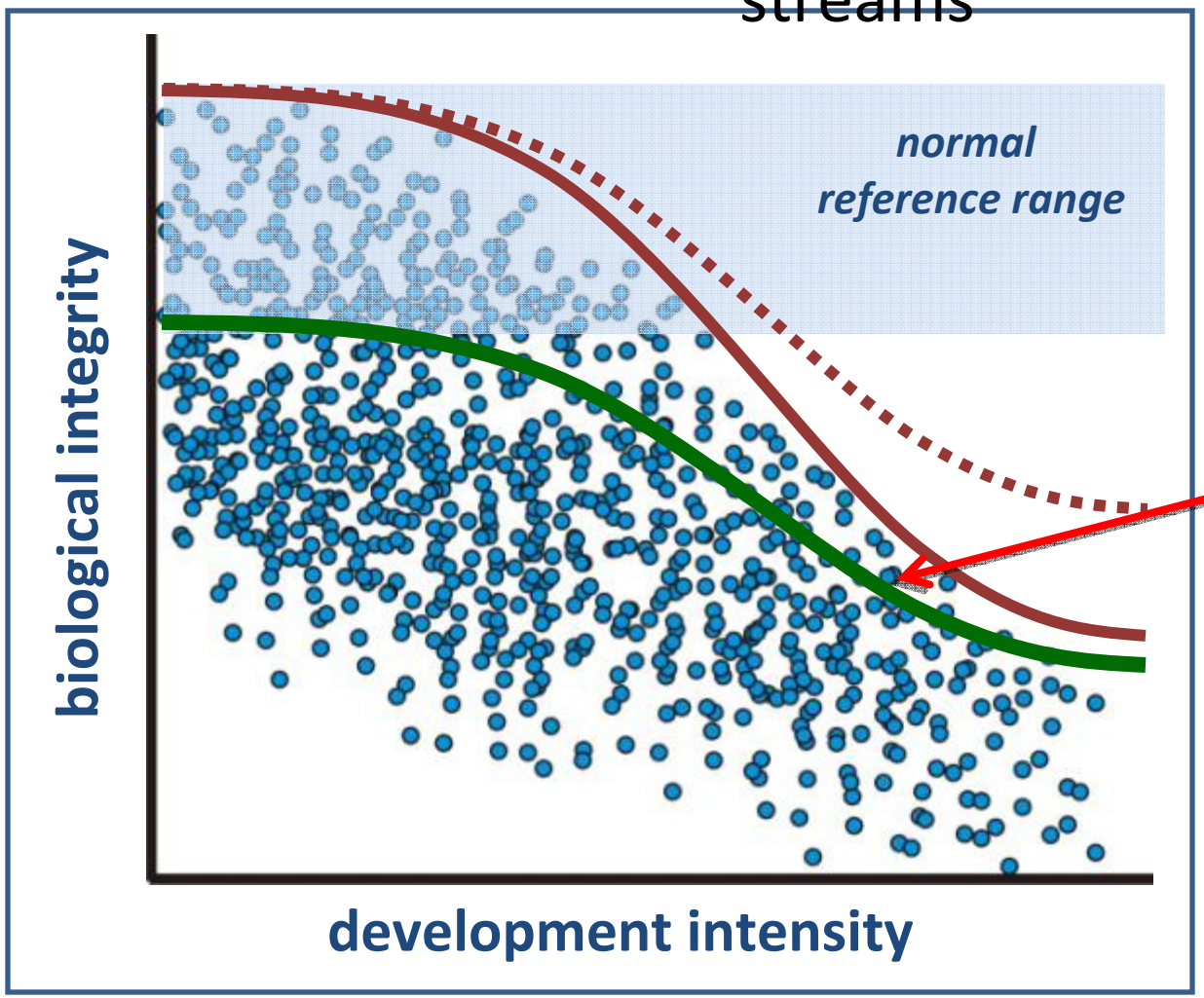
Reference is the foundation of bio-objectives, but stressor- response modeling provides an **objective** basis for setting biological expectations in non-reference streams



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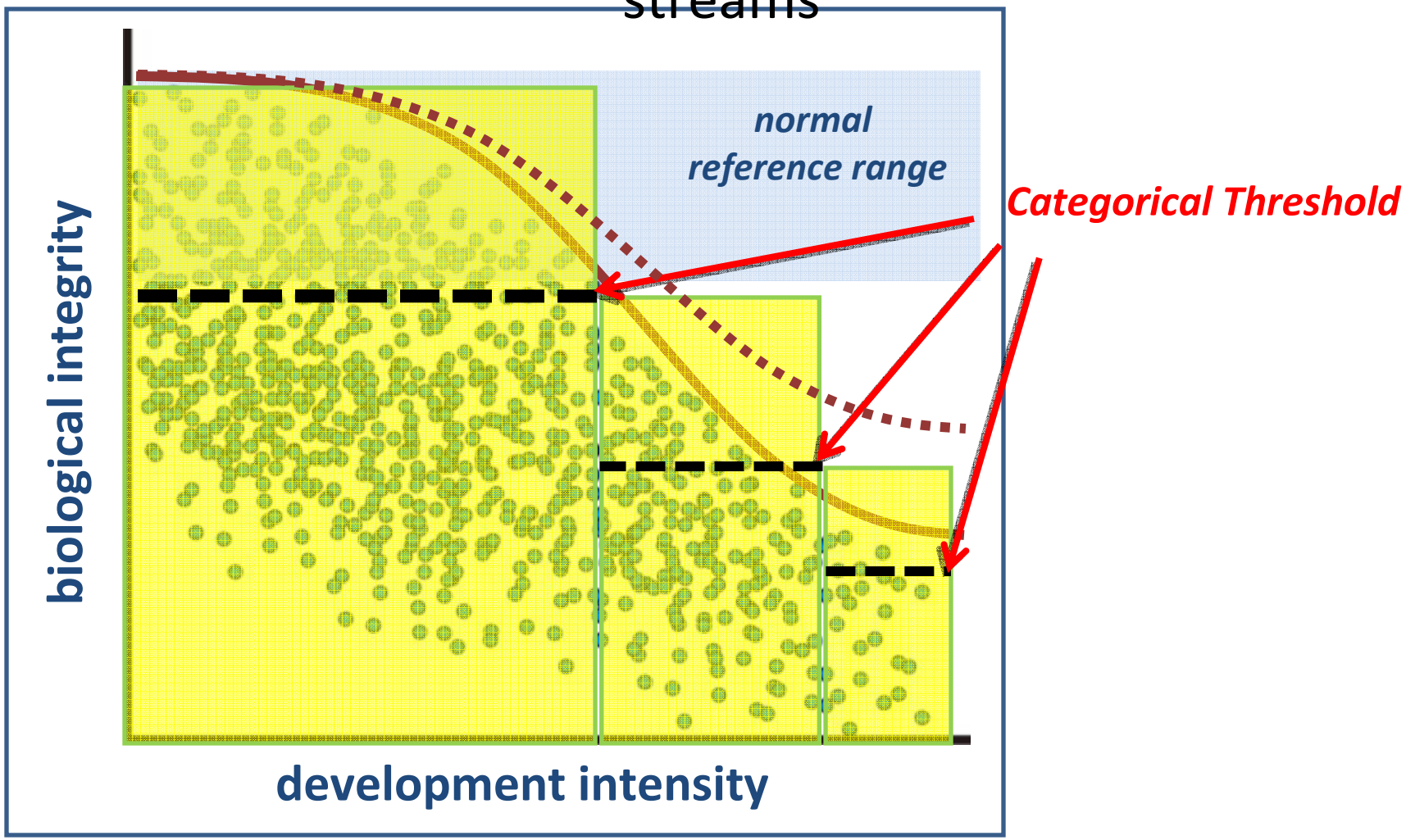
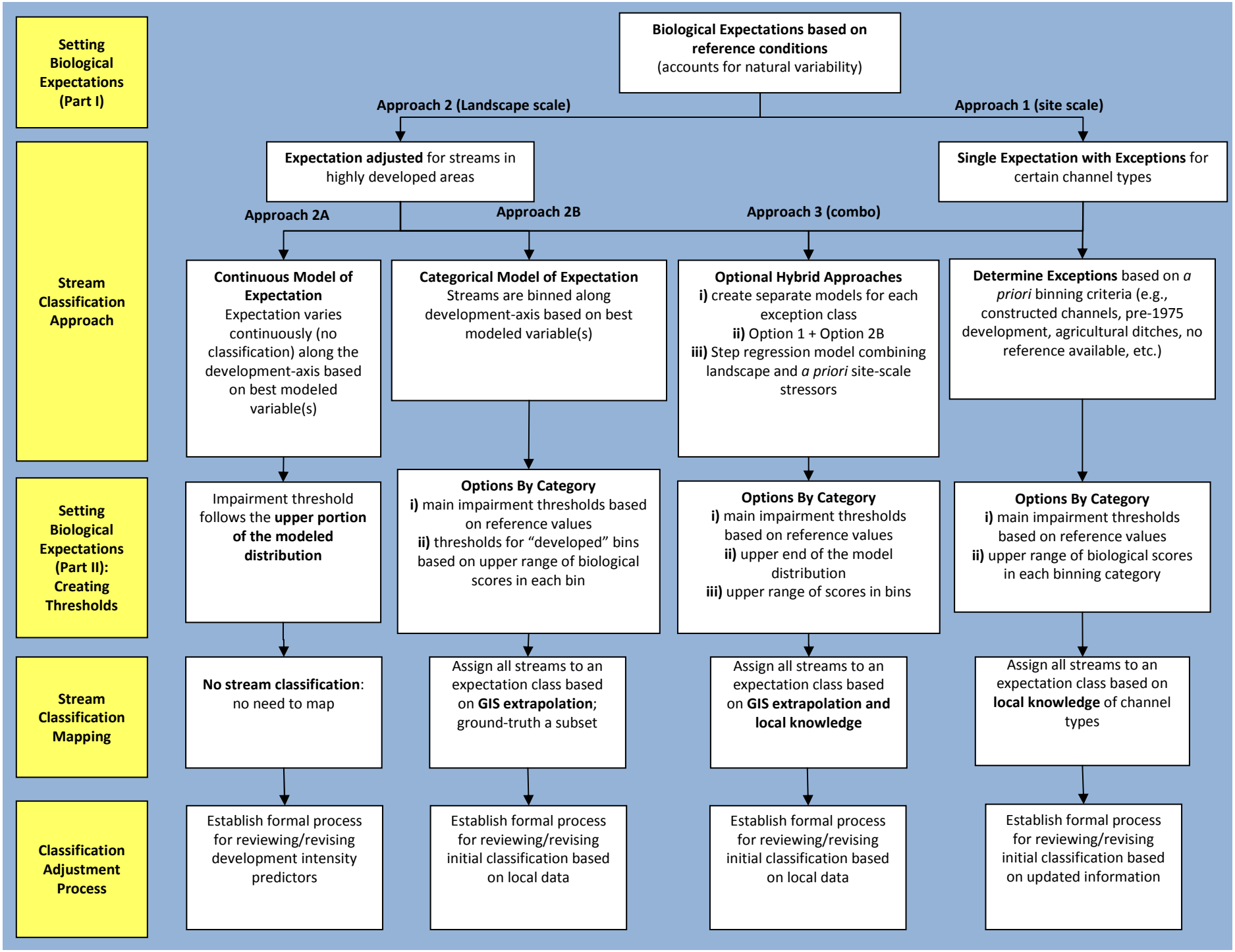


Approach 2 (Landscape Scale Stressor) Pros and Cons

- More complex to explain
  - Although keeping the model simple will help
- Stressor selection would be objectively based on model fit
  - Confounding with site stressors
- Optimizes threshold selection by selecting the upper end of the modeled distribution
  - Tries to maintain rigorous and objective standards for best attainable biology
- Use GIS to identify all streams with the same classification characteristics
  - We know GIS has inaccuracies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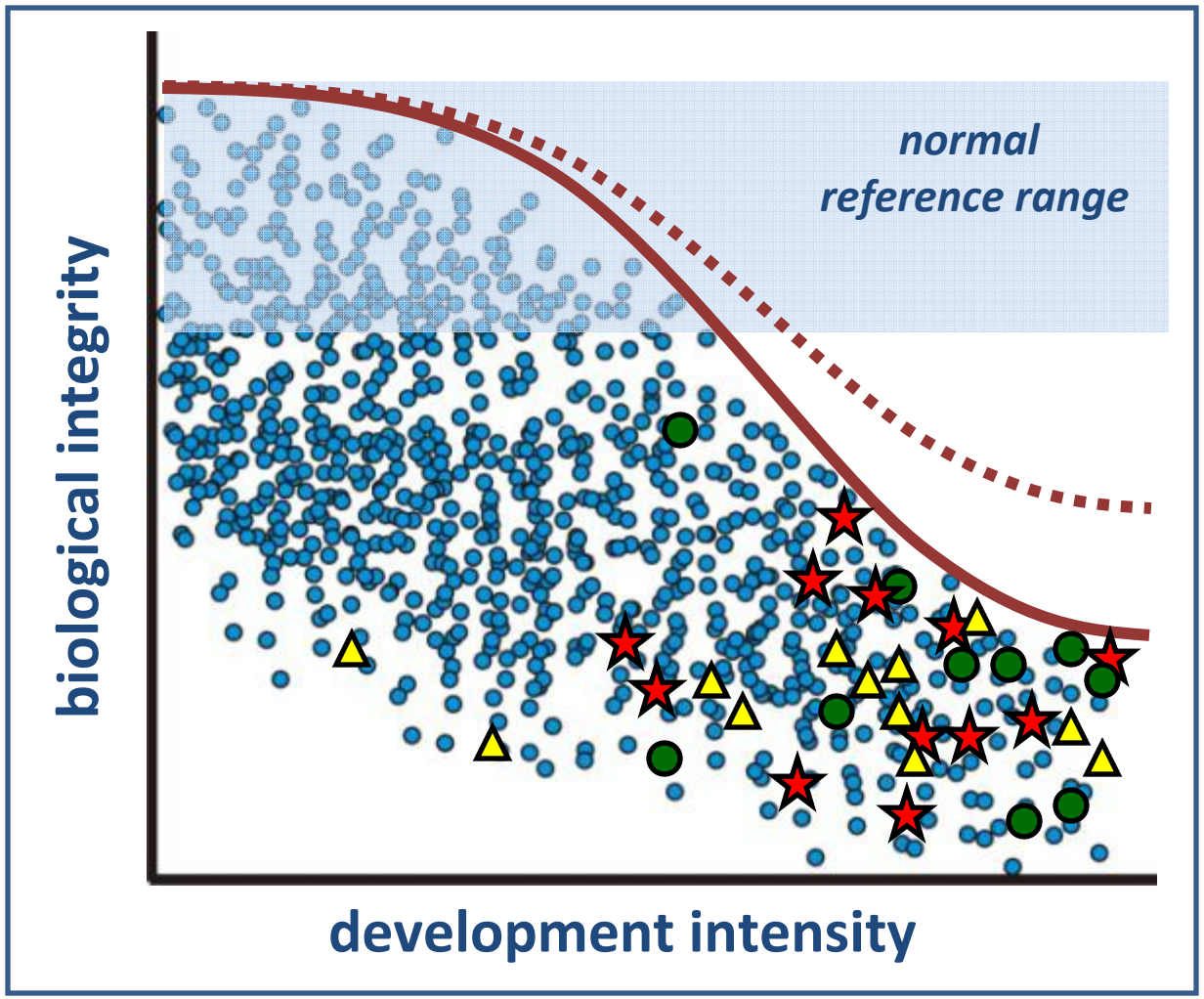
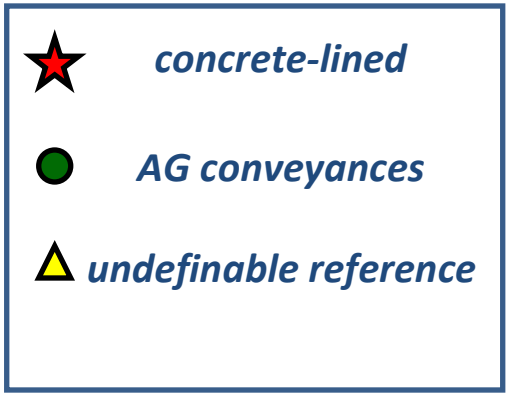
Reference is the foundation of bio-objectives, but there are multiple options for hybrid scenarios to account for highly developed streams



- Create separate models for each exception class
- Pull exception classes out of the model and treat empirically
- Adjust the model by forcing local variables



Approach 3 (Hybrid combination) Pros and Cons

- Has some element that everyone will like
  - And an element of discomfort
- Use landscape stressor modeling as the default approach
  - Incorporates model utility of objectively based stressor selection
  - Hybrid adapts local knowledge to ensure accuracy
- Currently uncertain how best to create thresholds
  - Can use elements of both modeling and/or empirical approaches
- Uses GIS to identify all streams with the same classification characteristics
  - Local knowledge should counter GIS inaccuracies

Road Map For Today

- Conceptual framework
  - Flow chart
- Begin applying the framework in our pilot region
  - Testing options
- Please give us guidance on preferred options