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Evaluation of North Carolina Stream Restoration Projects;

Biological Responses to Habitat Change.

Ecosystem Enhancement PROGRAM

Why Evaluate Stream Restoration Projects?

- Lack of Post-Construction Monitoring Nationwide
- Ecological recovery hasn't been evaluated
- Compliance with mitigation rules
- Stewardship of natural resources

Stream Restoration is big business in NC - EEP needs to restore 871,000 lf of streams in the next 3-5 years. All mitigation driven.

And can be extremely expensive - $276,000,000 for streams and wetlands in the next 3-5 years

Monitoring objectives for our group

- Evaluate restoration project status
  - Physical stability
  - Vegetation establishment
  - Habitat improvements and Benthic Macroinvertebrates
- Identify specific problems & recommend maintenance
- Provide recommendations to improve future projects

Can you conclude that a stream restoration project is “successful or practices effective” using aquatic insect populations?

Field of Dreams

If you build it – they will come

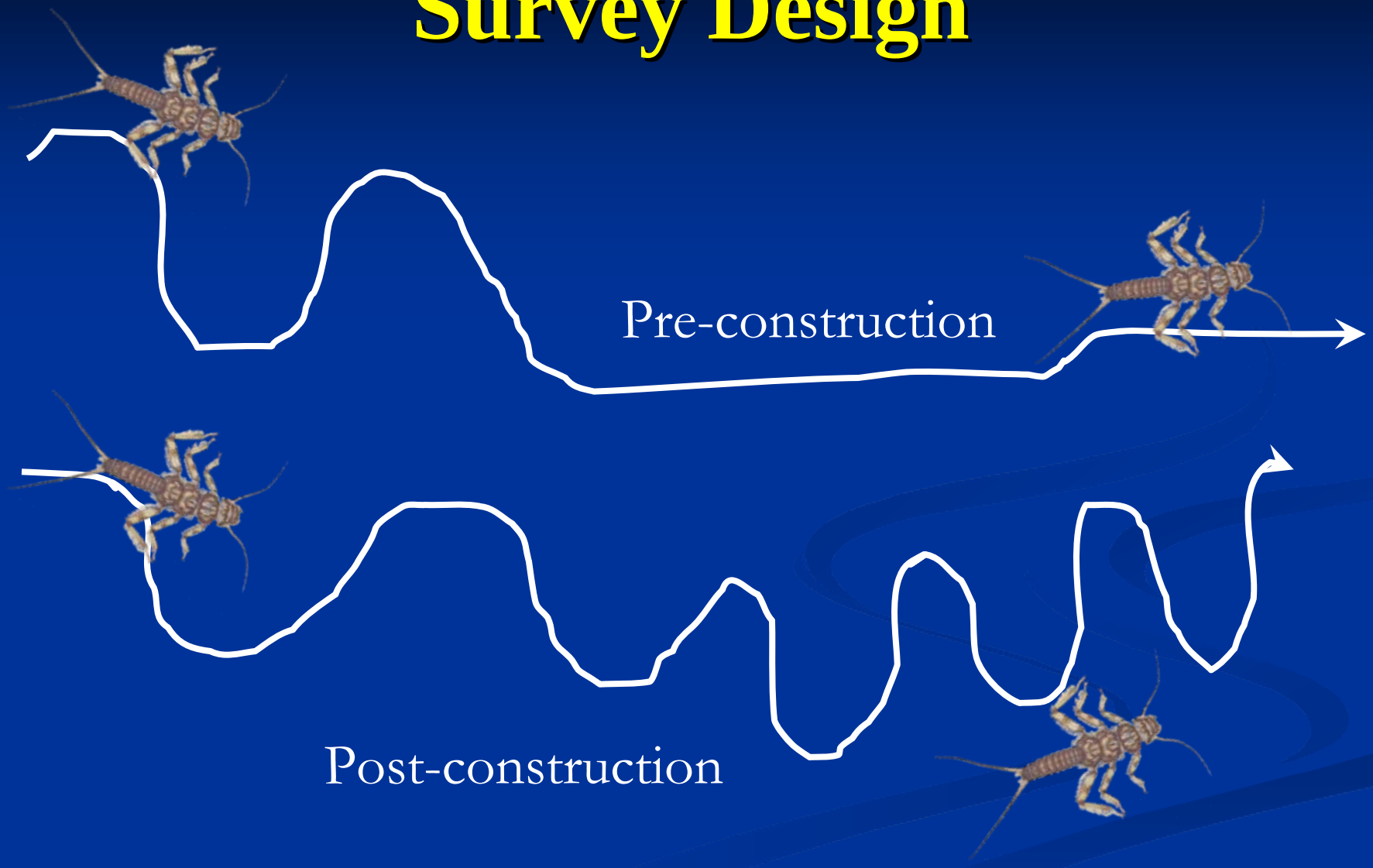
Rather…

If you build it, will you know why?

A Brief History of these projects

- All projects were priority 1 in which the pattern, dimension and profile were all modified. Profound restructuring of the stream habitat.
- 16 projects were sampled by NC regulatory biologists, data used to propose criteria to EPA
  - 75% Dominant in Common Taxa
  - Indicator Taxa Concept
- 12 projects were continued with a grant from EEP to NCSU

Survey Design



Dominant in Common

Number of the same taxa found in the Restored Reach - Expected

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Dominant taxa found in the Reference Reach - Observed

12/24 = 50% DCI or E/O

Are Provisional Criteria being met?

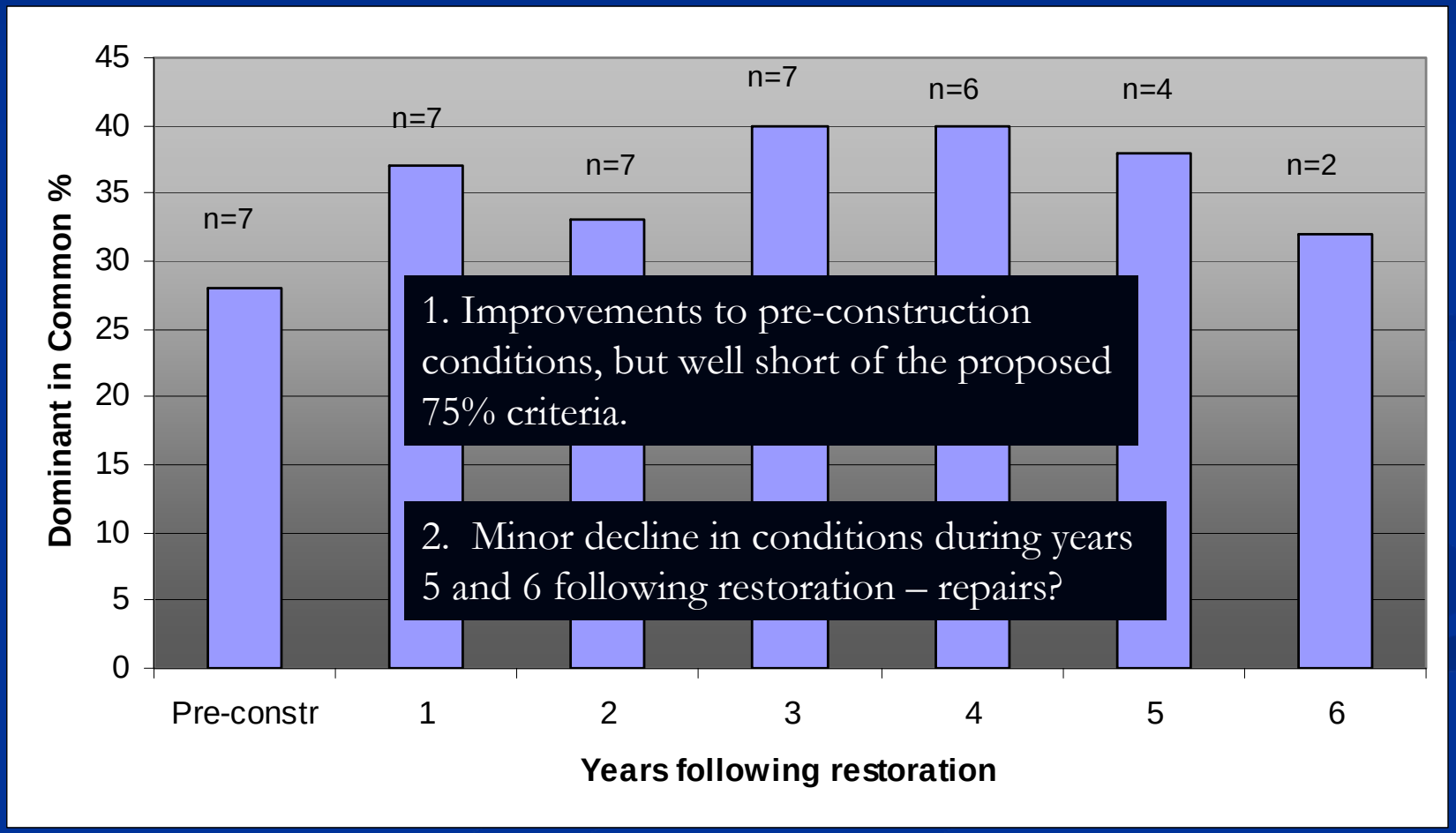
Project	Yrs after construction	Initial DIC	Most Recent DIC - 2007	Met "Criteria"
1	5	28	18 ⇩	No
2	4	78	64 ⇩	No
3	6	25	15 ⇩	No
4	5	40	28 ⇩	No
5	5	72	36 ⇩	No
6	4	50	60 ⇧	No
7	5	33/48	50/50 ⇧	No
8	5	22/48	7/14 ⇩	No
9	4	62	21 ⇩	No
10	3	None	42/19/31 ⇧	No
11	4	39/33	54/39 ⇧	No
12	7	93	43 ⇩	No

Let's take a closer look

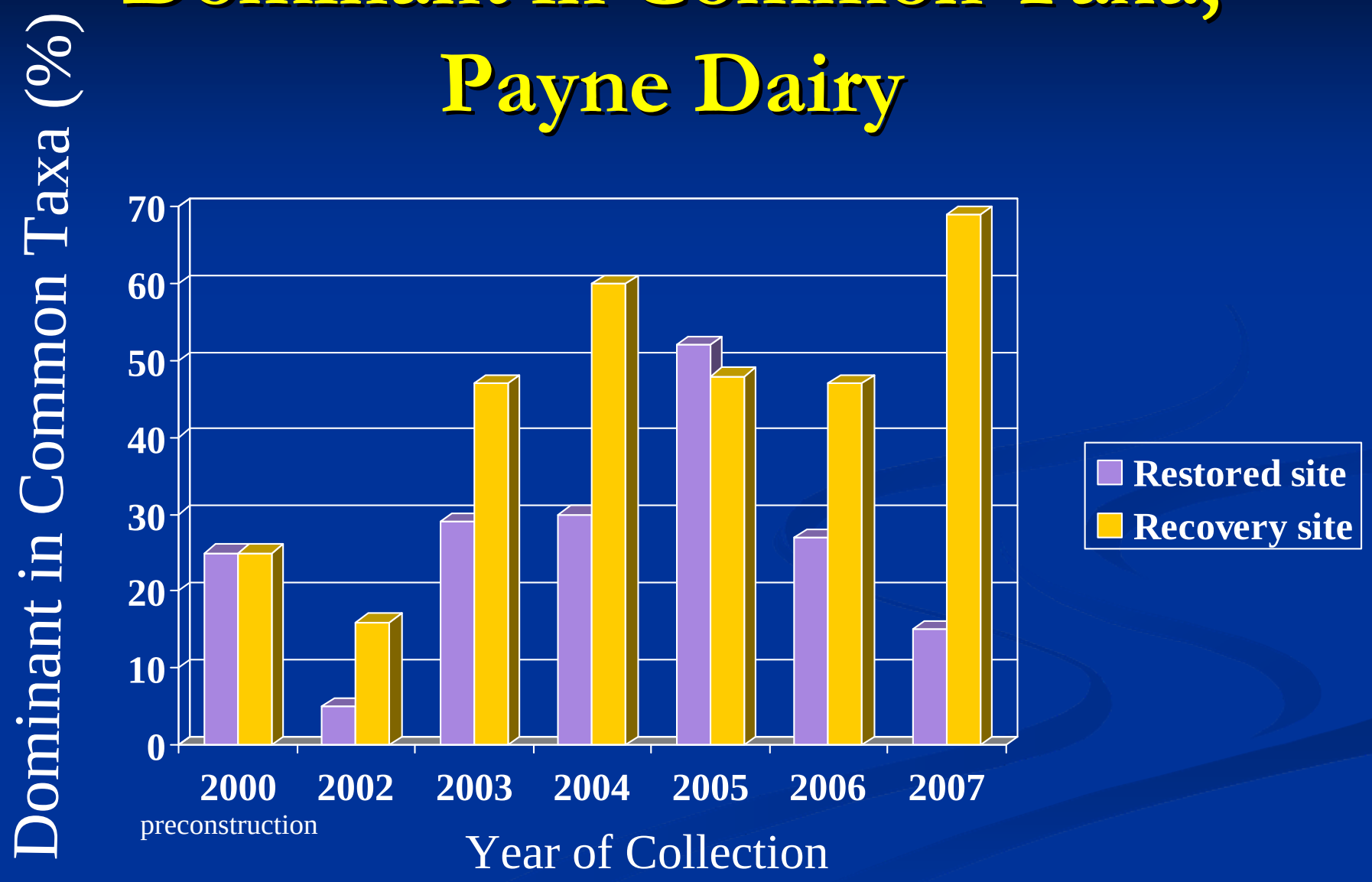
Re-think Criteria and use Preconstruction condition

1. Streams that have a low DCI prior to construction (n=6, where DCI<50%)
2. Streams that have a high DCI prior to construction (n=4, where DCI>50%)
3. Urban stream (n=2)

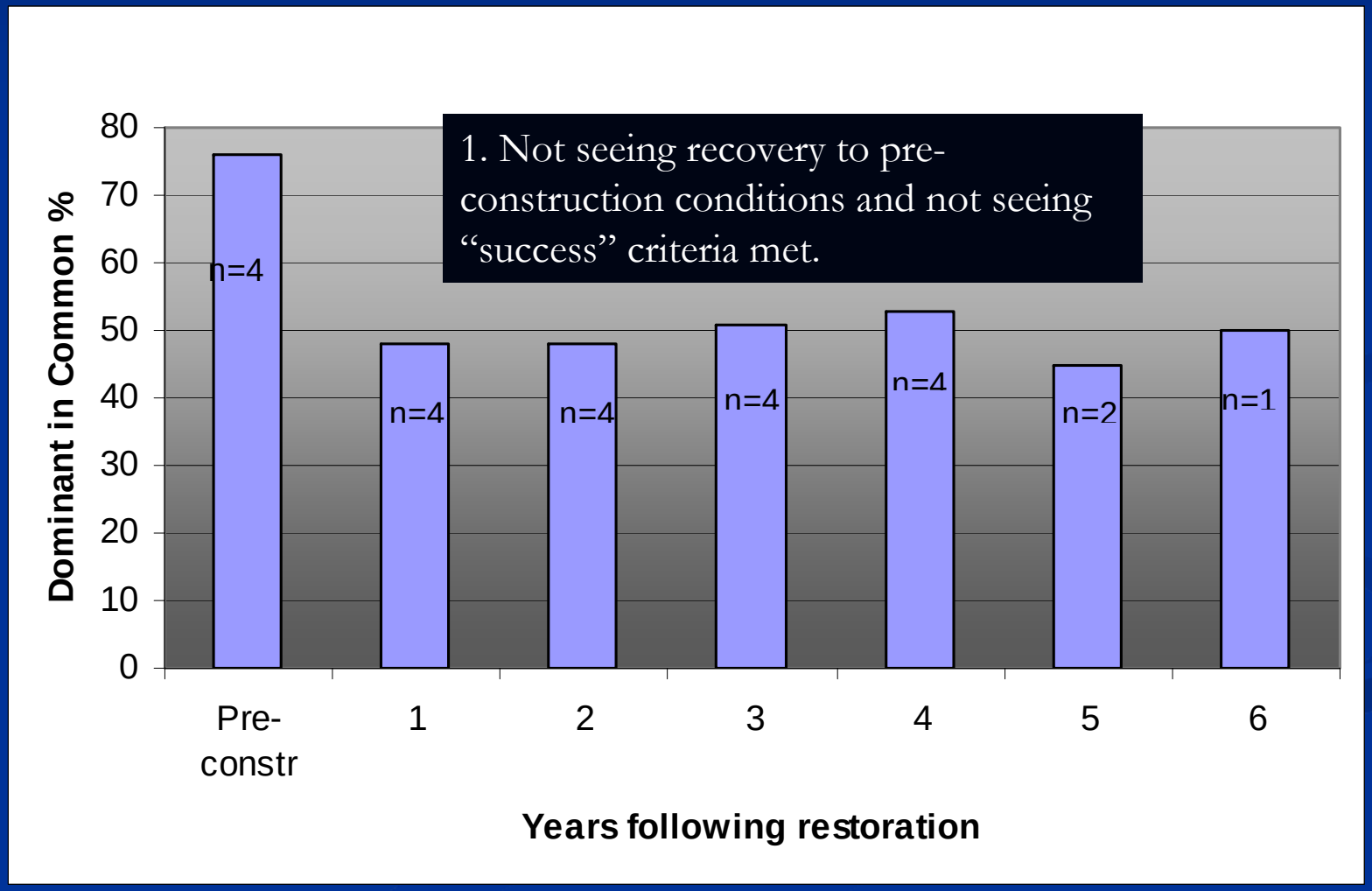
1. Average Dominant in Common Values at Stream Restoration Projects in NC (Pre-con DIC < 50%, n=6)



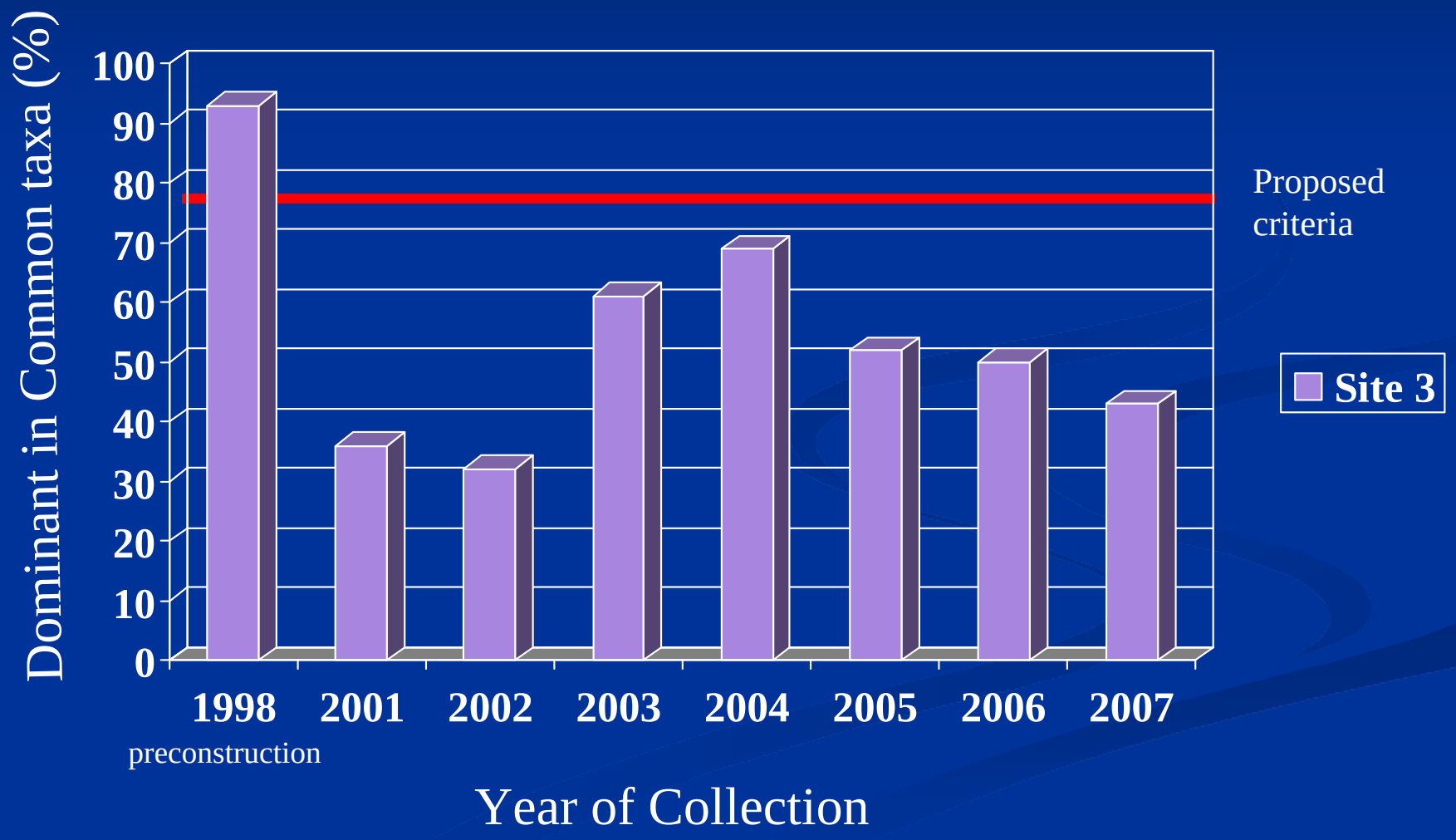
Dominant in Common Taxa, Payne Dairy

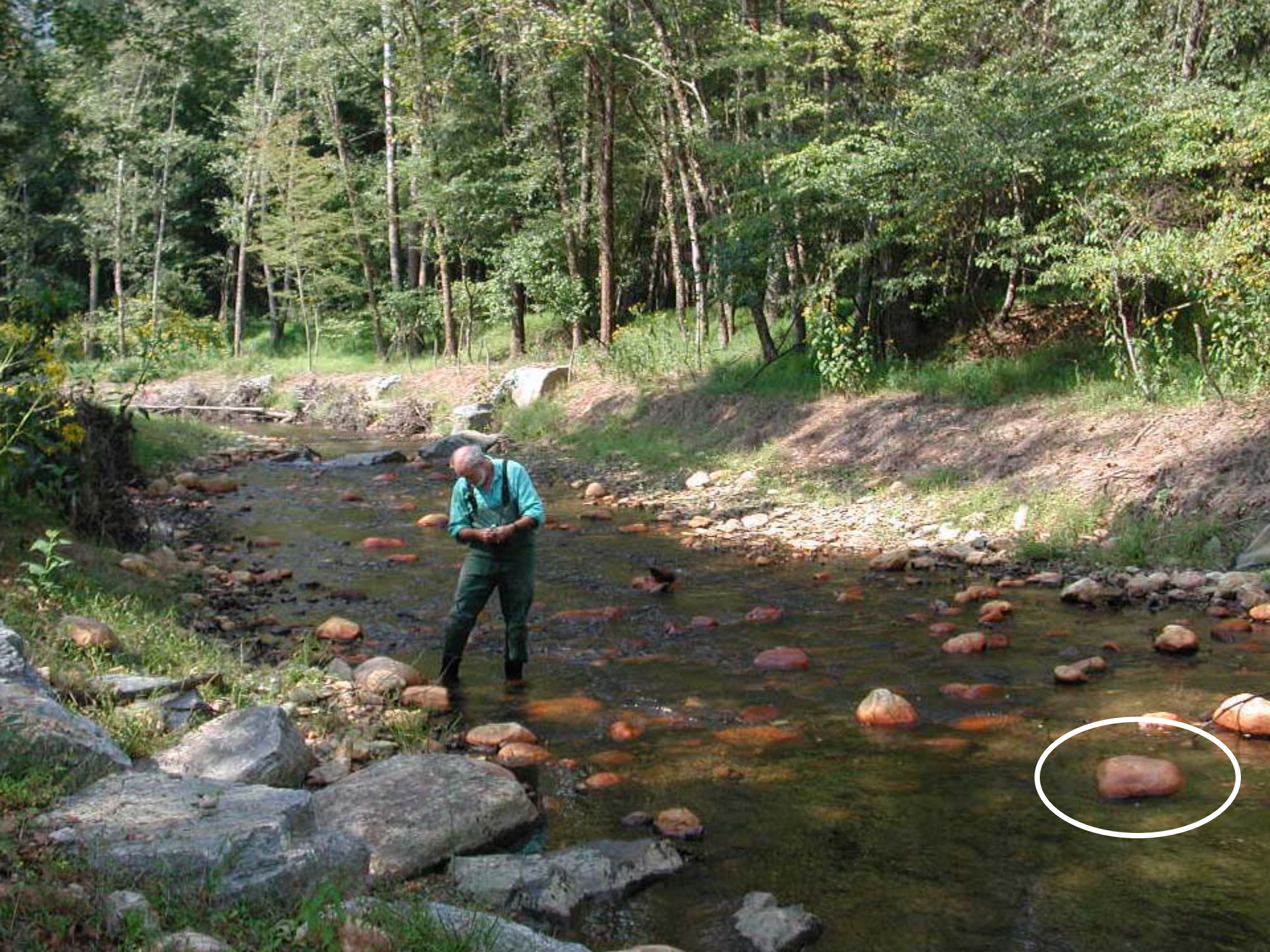


2. Average Dominant in Common Values at Stream Restoration Projects in NC (Pre-con DIC > 50%, n=4)



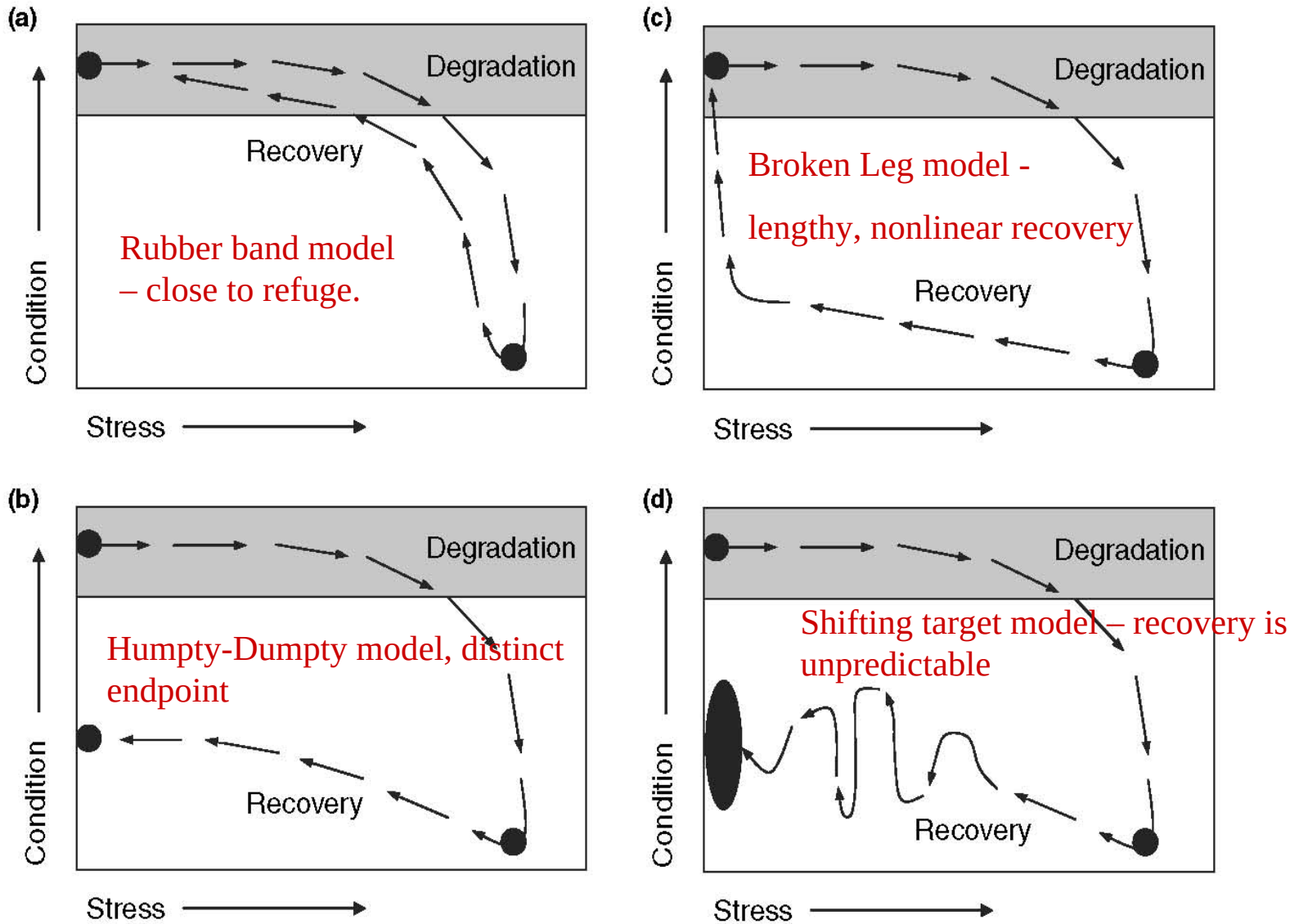
Stone Mountain Benthos Data (Dominant in Common Taxa)





Macrophytes

Degradation-recovery pathways
(Lake et. al., 2007)



Summary

- Recovery in habitat and benthic macroinvertebrate fauna are likely to take more than 5 years; esp DCI>50%
- Recovery has been recorded at many sites, but provisional success criteria or project effectiveness for biology have not been met; DCI<50% more variable
- Poorer habitat/water quality conditions have been noted at a small subset of projects following construction
- Riparian vegetation, aquatic-terrestrial coupling may be the weakest element of many projects
- More comparisons between habitat (i.e. riffles and banks) and bugs

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