

How should we measure 'fine woody debris' in streams?

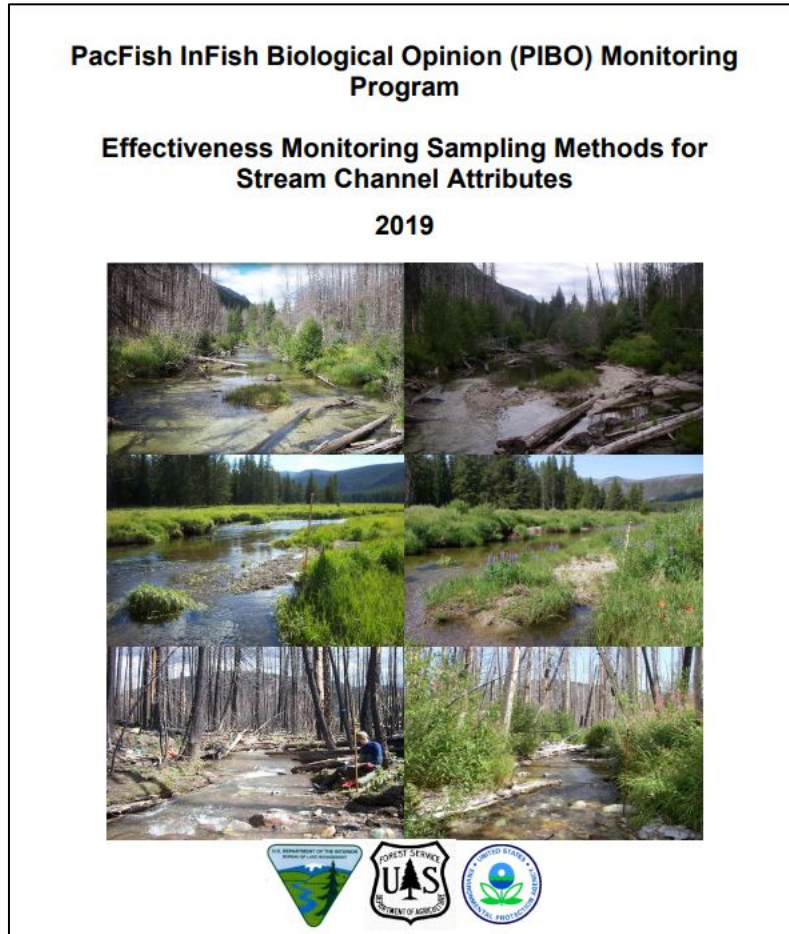
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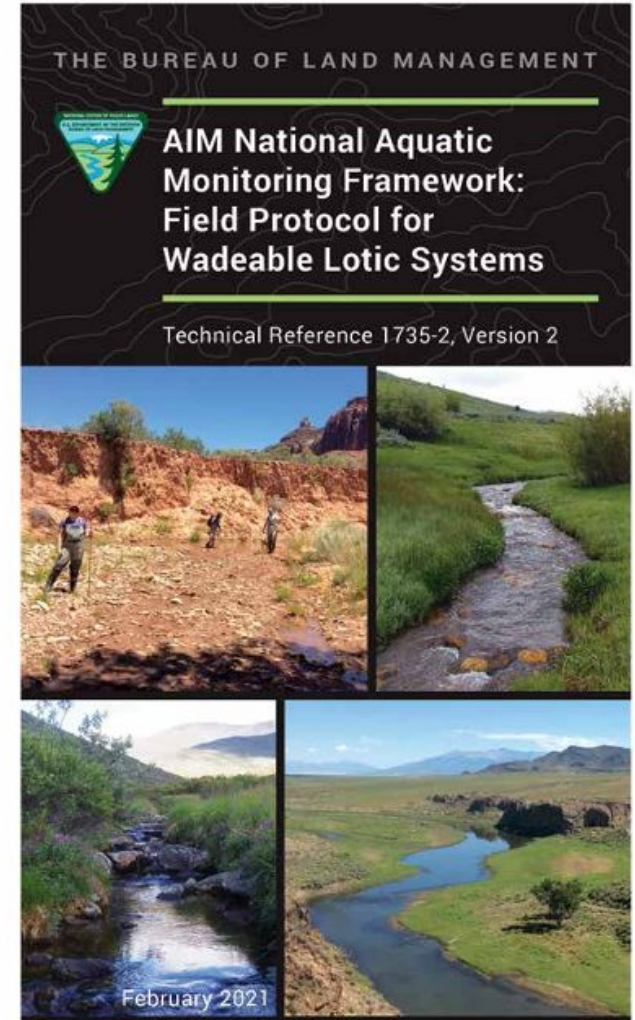


**CARROLL & NANCY FIELDS O'CONNOR CENTER FOR THE
ROCKY MOUNTAIN WEST**

Large wood monitoring protocols are more or less consistent

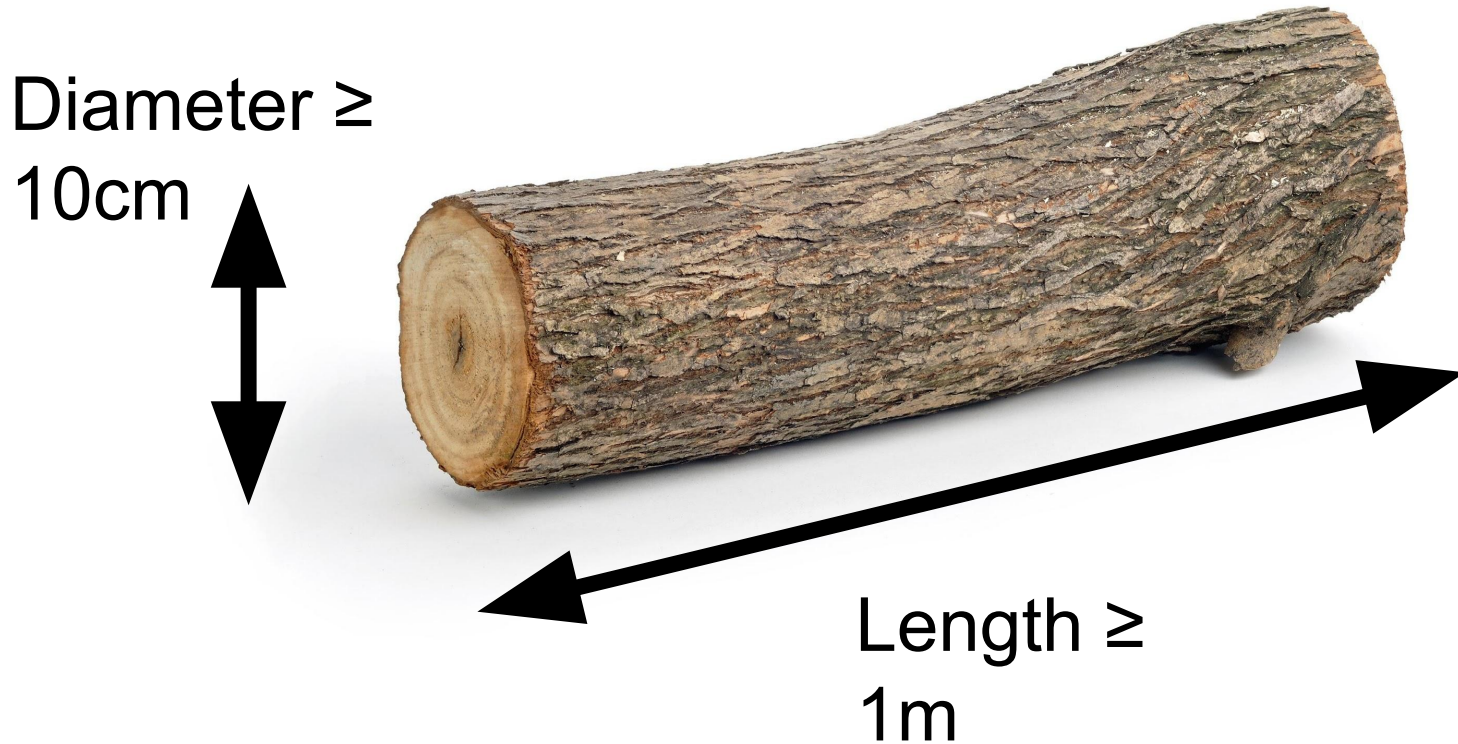


USFS-
PIBO

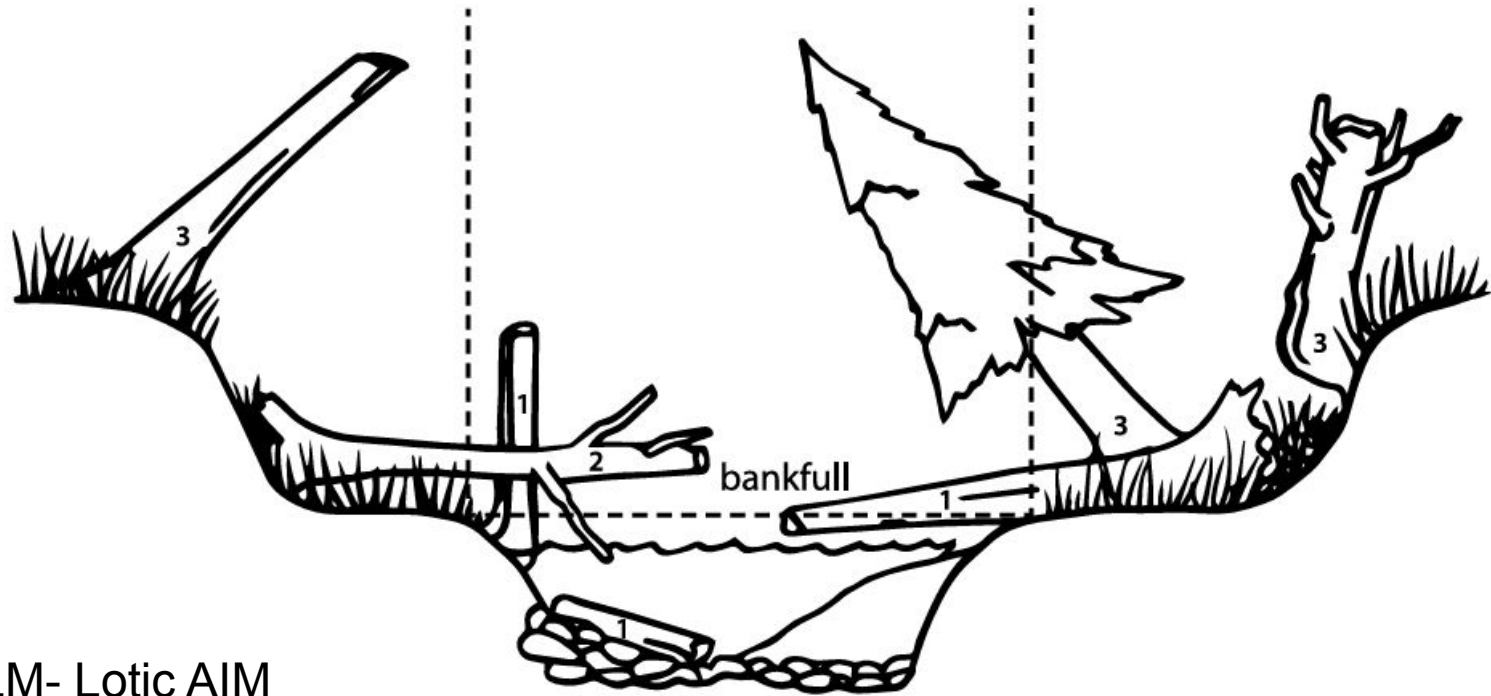


BLM-
AIM

Large wood monitoring protocols are more or less consistent



Large wood monitoring protocols are more or less consistent



BLM- Lotic AIM
protocol

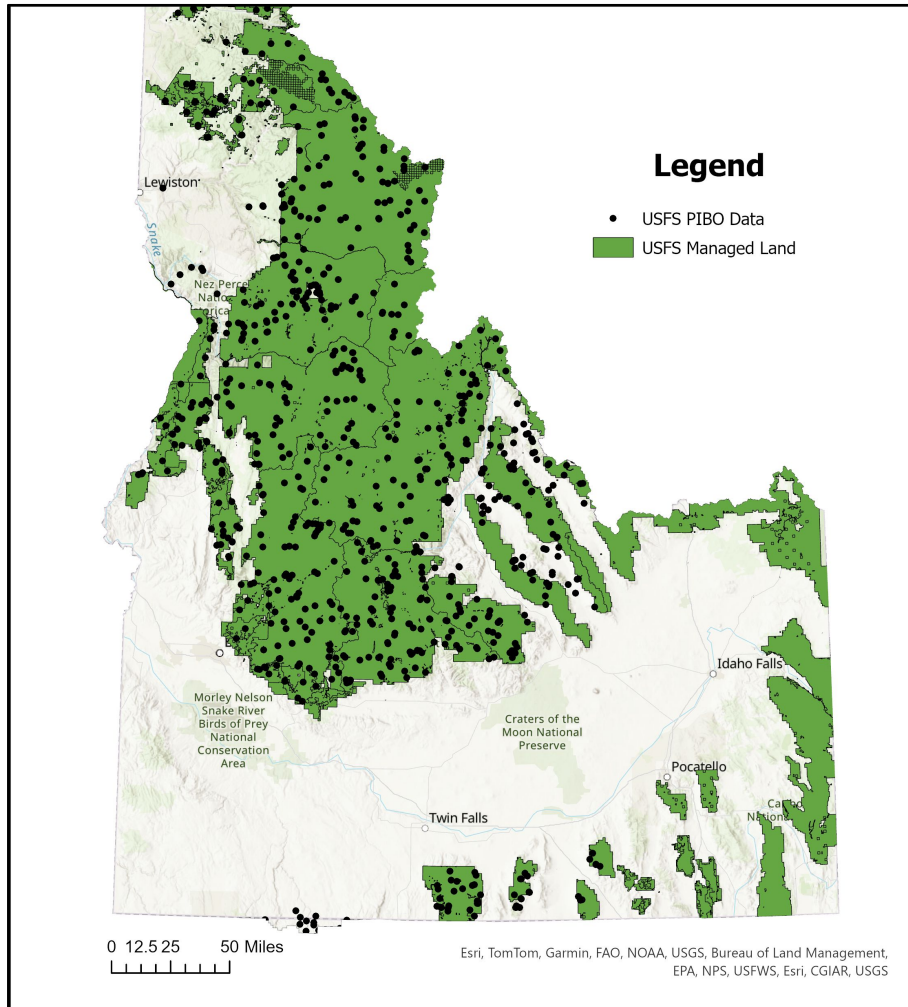
Figure. 18. Pieces of wood labeled with a 1 are within the bankfull channel; pieces labeled with a 2 are spanning the bankfull channel; and pieces labeled 3 are not counted. The branch from the log labeled with a 2 that extends into the bankfull channel is < 10 cm, and thus this piece is counted as spanning the bankfull channel rather than within the bankfull channel (Archer et al. 2015).

'Large woody debris' is not distributed equally on the landscape...

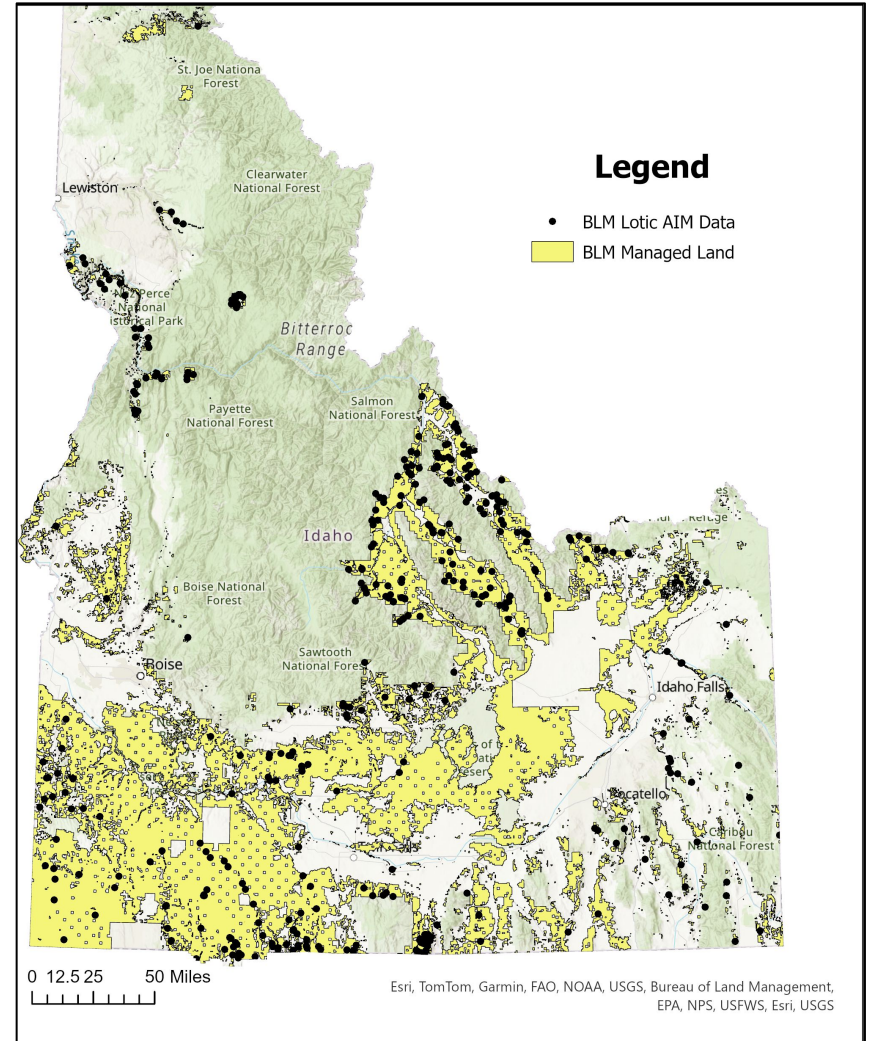


Example: Monitoring data in ID

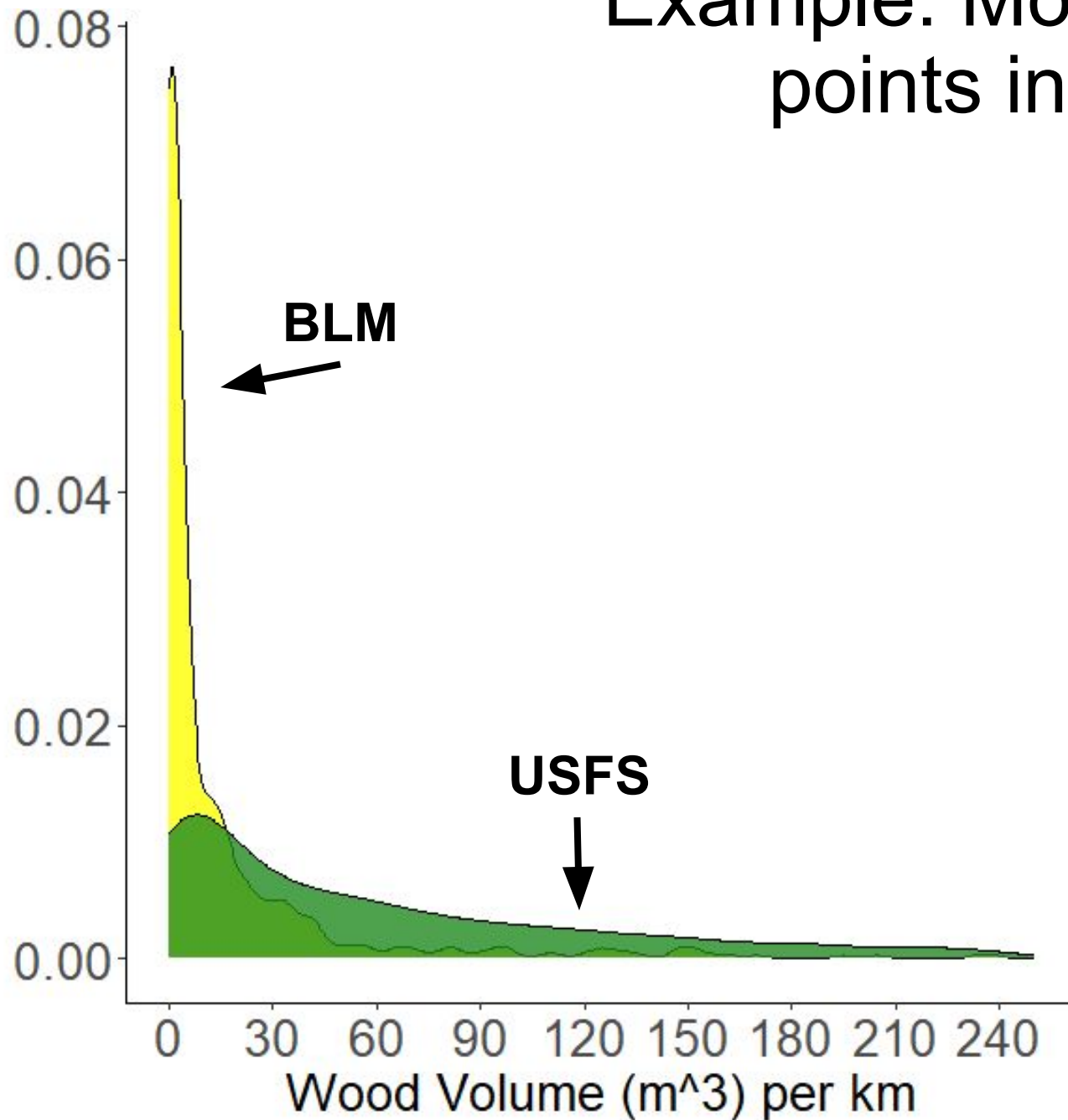
USFS-PacFish/InFish Biological Opinion (PIBO)



BLM- Lotic Assessment, Inventory, and Monitoring (AIM)



Example: Monitoring points in ID



What about 'small/fine woody debris'?



Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland

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Much less research and no established protocol

Let's review the literature!

1. Summarize the quantitative response of fishes and aquatic insects to FWD
2. Describe the approaches used to measure and categorize FWD in streams
3. Provide suggested best practices and suggest a consistent naming convention and sample approach



Lit review fast facts

- Web of Science

fine woody debris or small woody debris AND

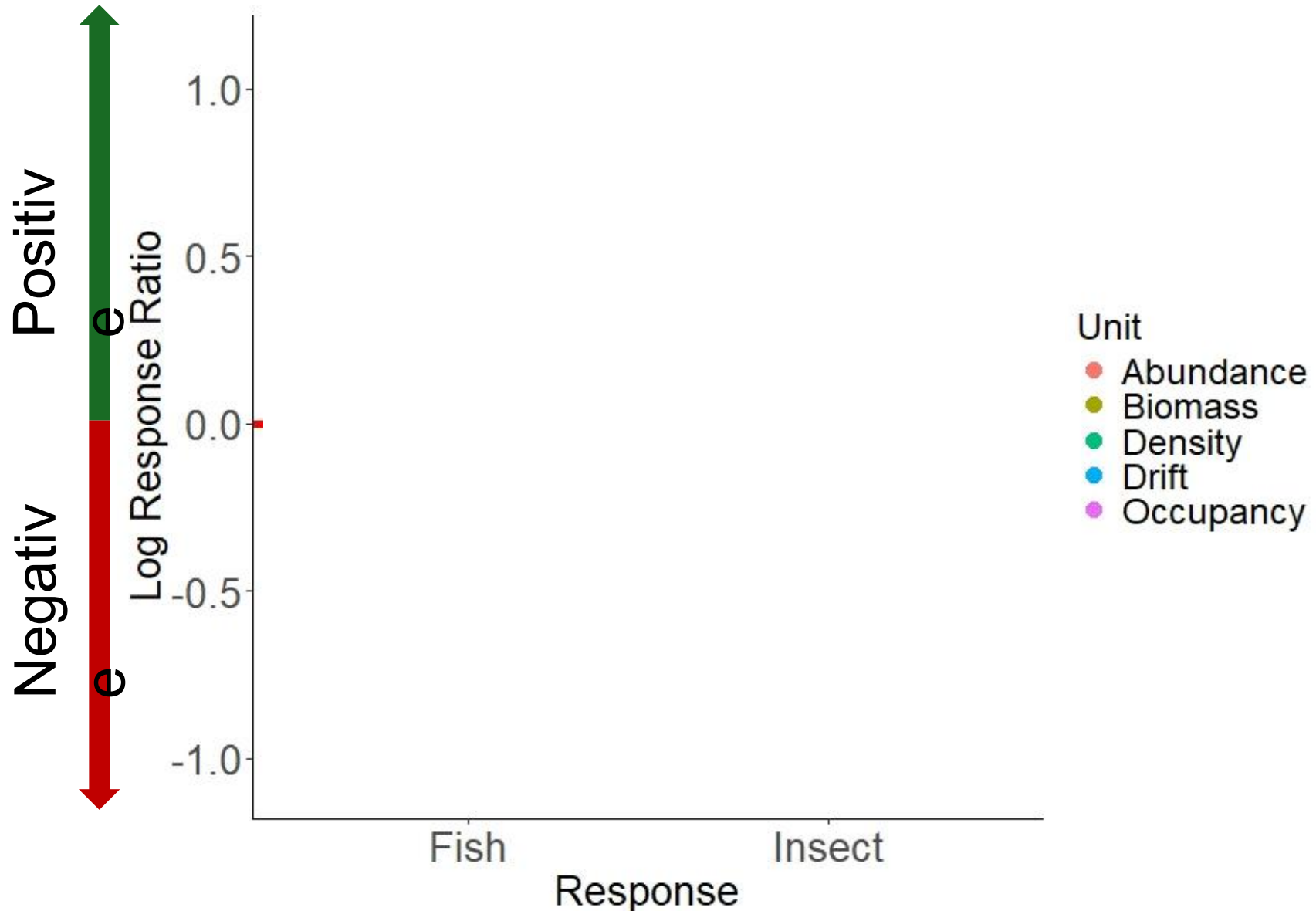
stream or river or creek AND

NOT course woody debris or large woody debris

- 57 of 322 papers were relevant
 - 30 described a size class relevant to FWD
 - 18 ***did not*** describe a size class
- 13 experimental studies for 22 response ratios
 - abundance, biomass, density, occurrence, and drift

$$\text{response ratio} = \ln \left(\frac{\text{mean treatment value}}{\text{mean control value}} \right)$$

Response of fishes and insects to experimental FWD addition



FWD collection methods

Census

- Count everything everywhere!

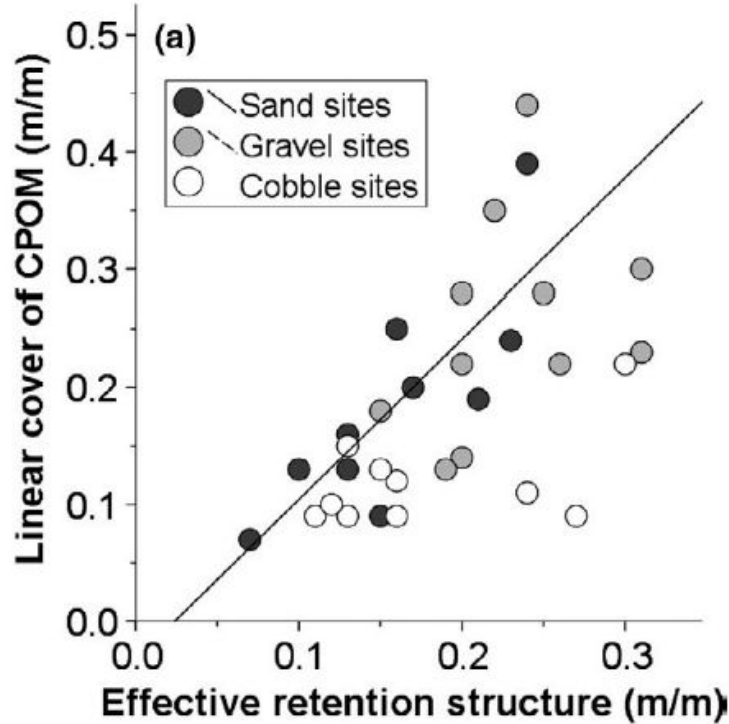
Sub-sampling

- Count everything in a few places

Retentiveness

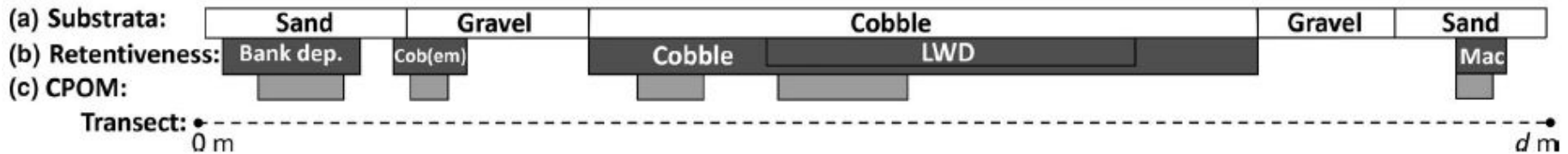
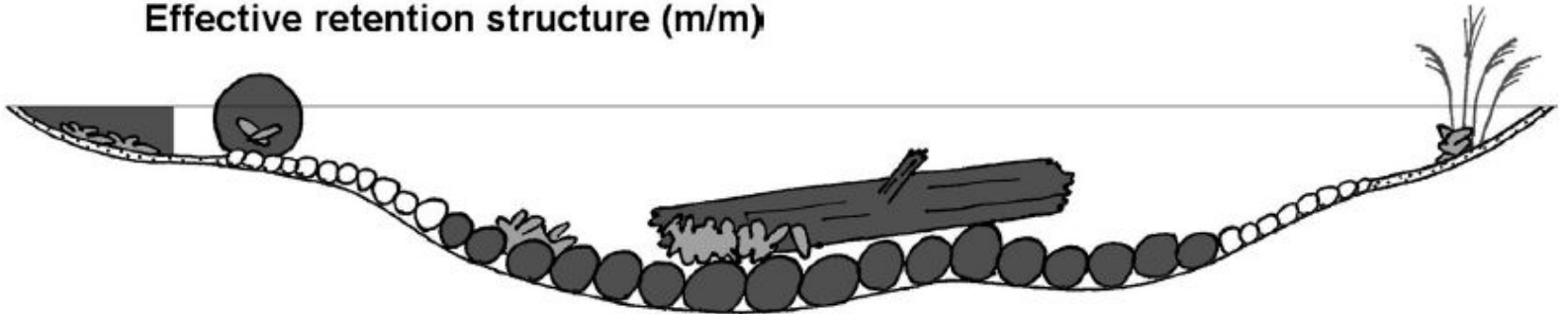
- Document 'retentive features'

FWD collection methods



Retentiveness

- Document 'retentive features'



FWD collection methods

Census

- Count everything everywhere!

...not feasible at scale



Sub-sampling

- Count everything in a few places

...more feasible; Useful?



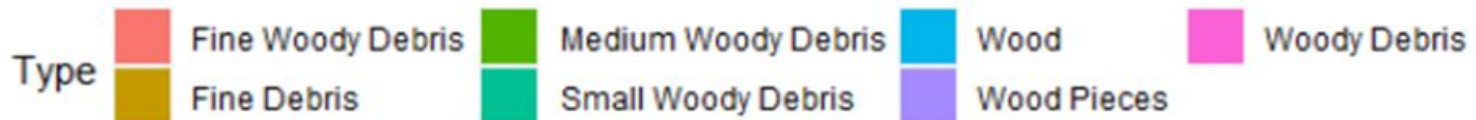
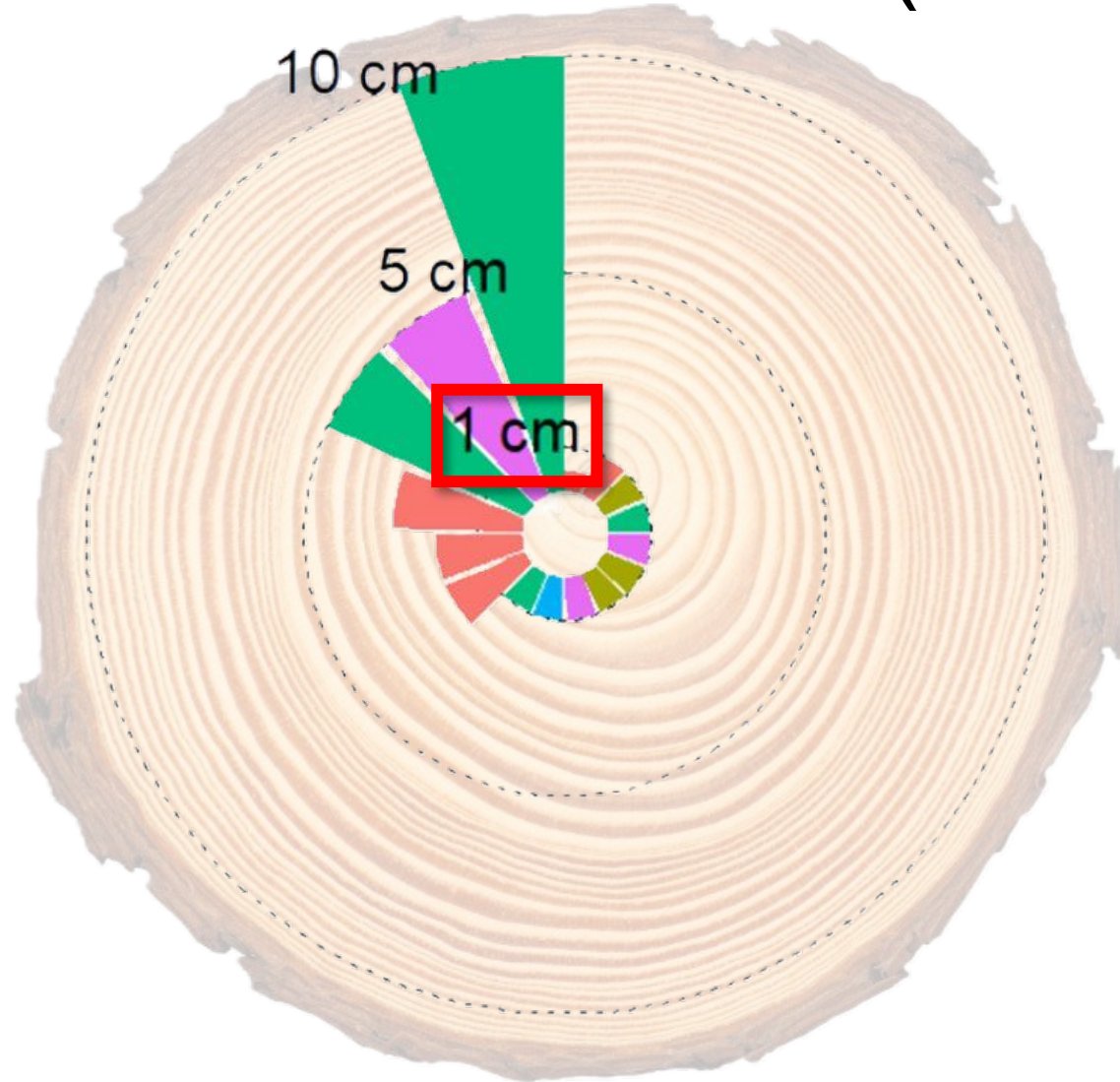
Retentiveness

- Document 'retentive features'

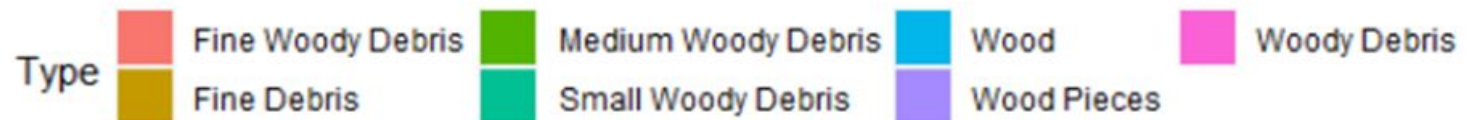
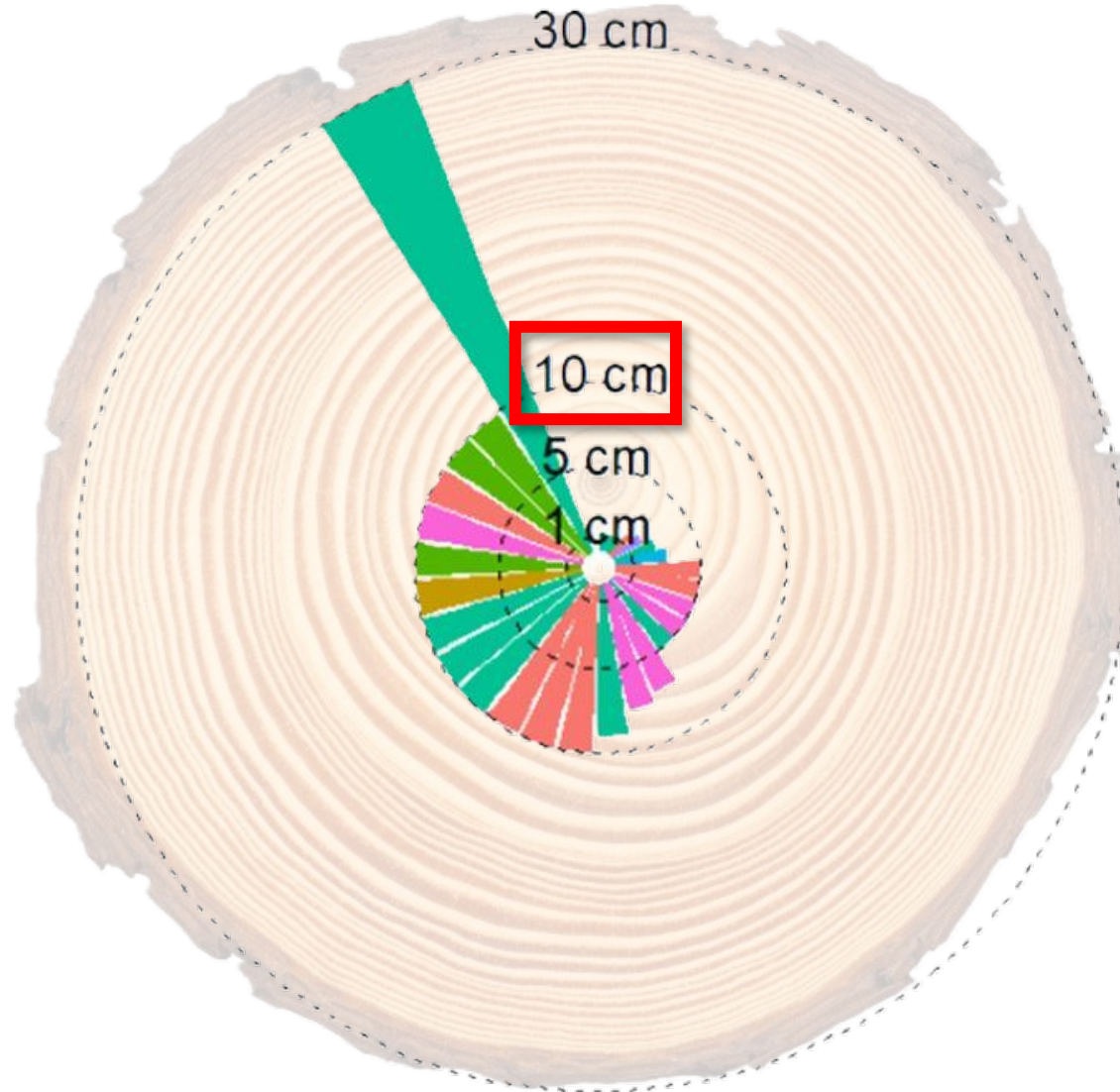
...intriguing, but likely not replicable



Minimum diameter (n=16)

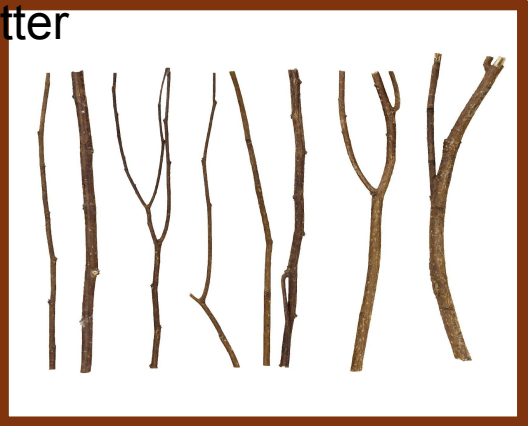


Maximum diameter (n=28)



Fine Particulate Organic Matter

Course Particulate Organic Matter



Fine Woody Debris

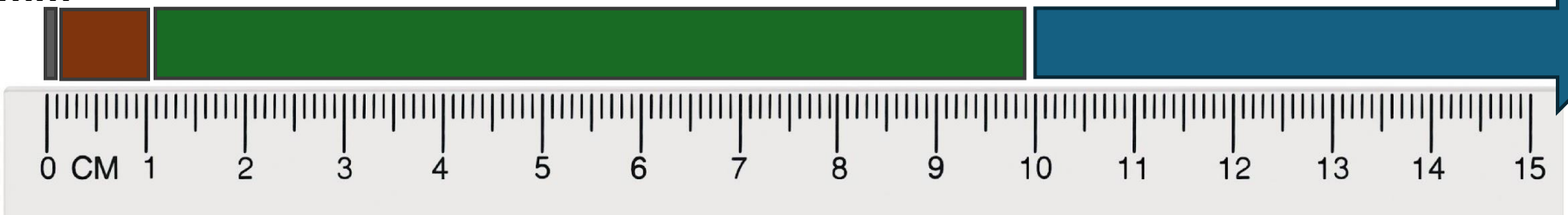


Course Woody Debris



<1mm <1cm

>10 cm

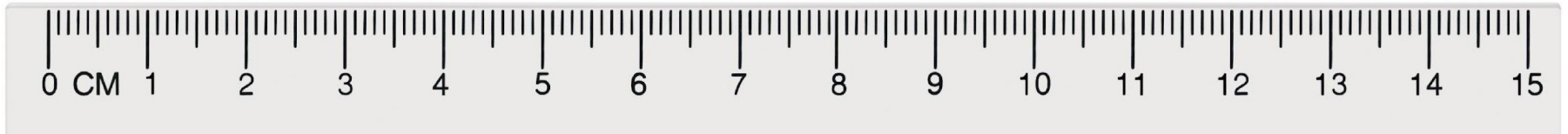


Conclusions

- FWD more often than not improves variables representing fish and insect success
- The 'happy medium' of collecting FWD data is sub-sampling (but more research is needed!)
- FWD classifications are mostly consistent, but language varies (..to the detriment of literature reviews)

Suggestions

Fine Woody Debris



- Test the replicability of sub-sampling and retentive features approaches

Questions?

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