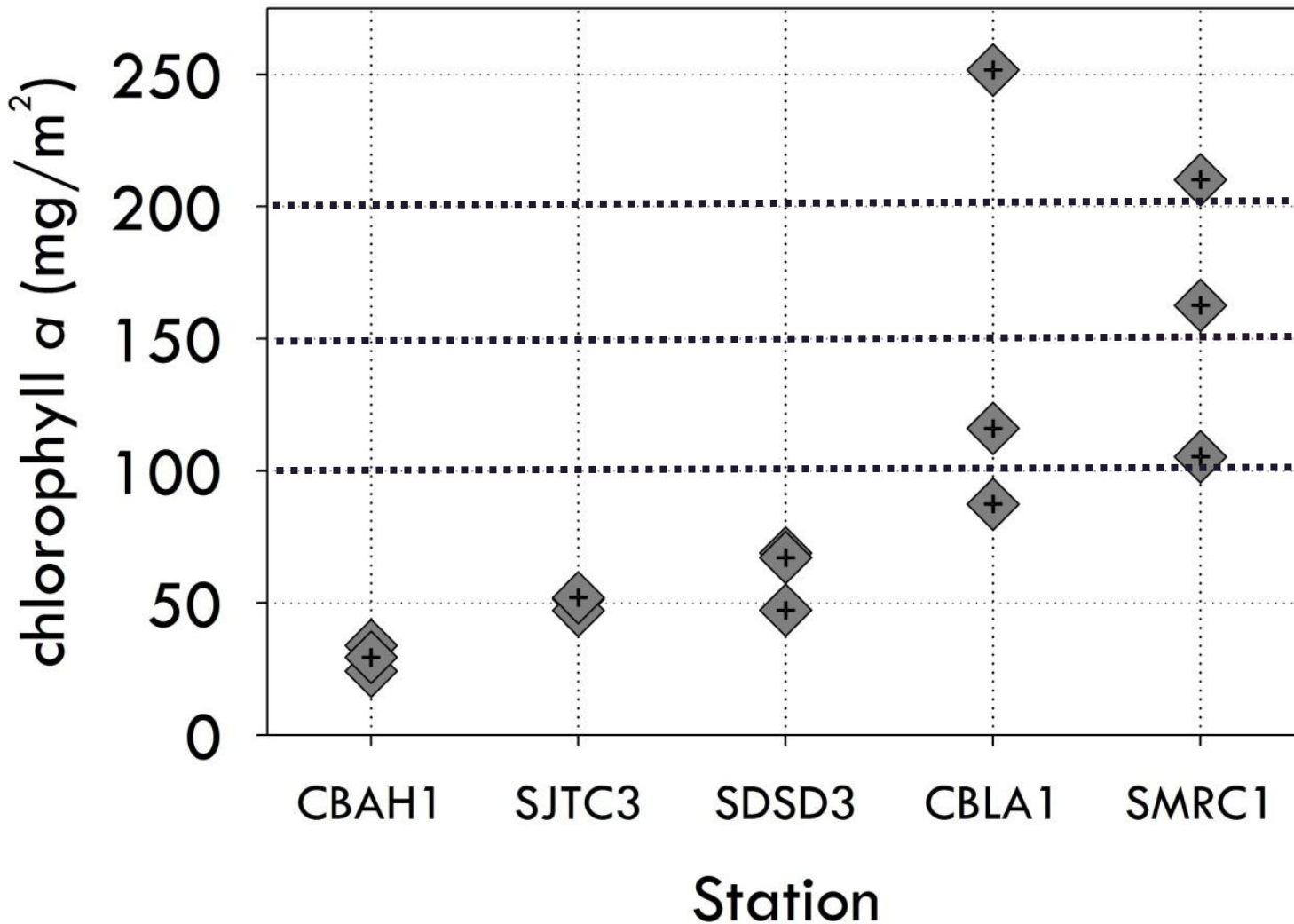


Studies to Improve
Precision and Accuracy
of Sampled and Modeled
Benthic Stream Algal Biomass

Background and Need

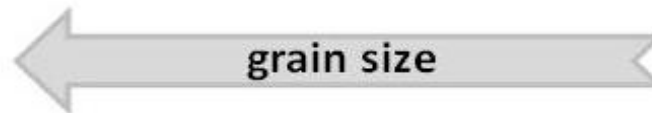
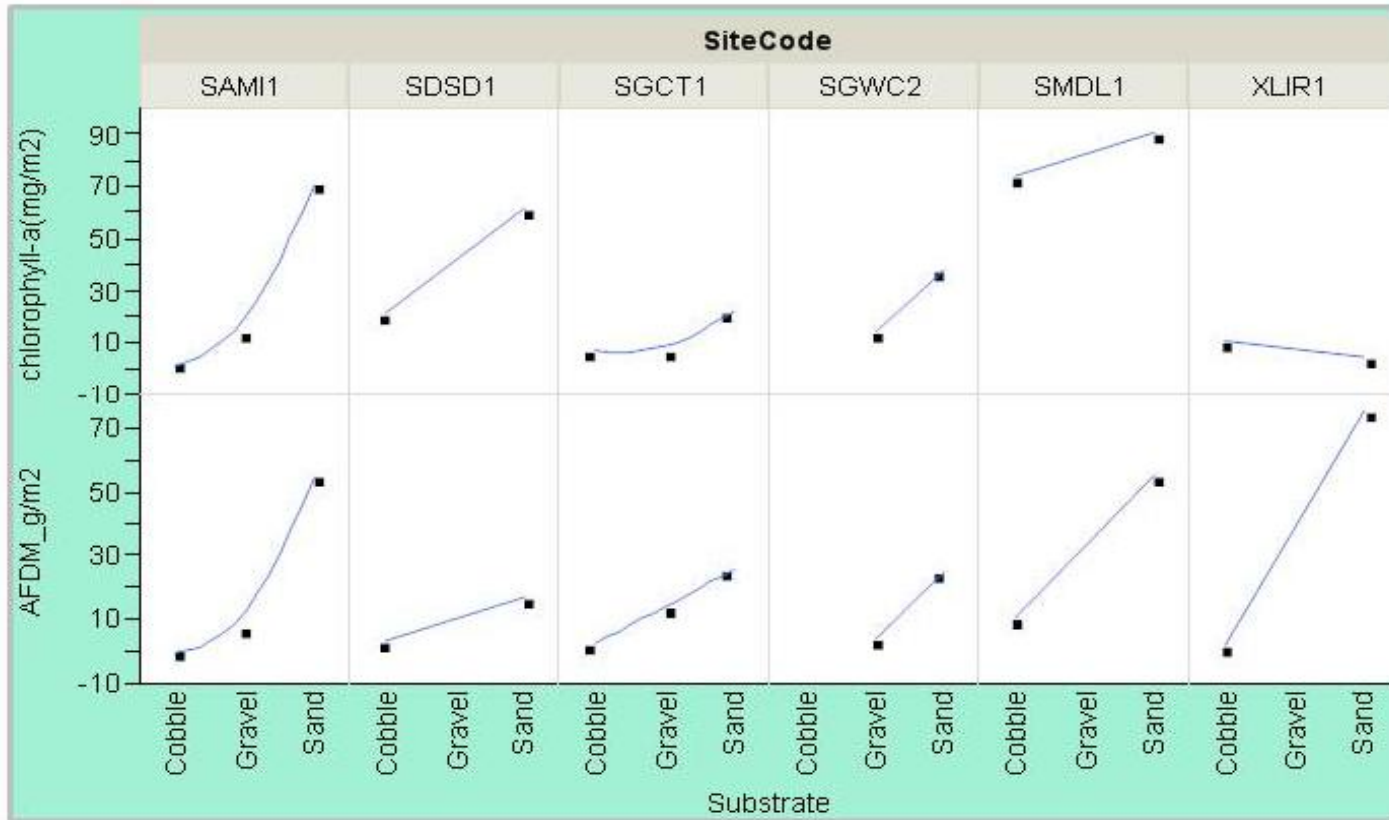
- NNE framework provides a strong foundation for improved nutrient management, but factors hinder its application:
 - Inadequate precision of existing sampling protocols for generating algal biomass estimates in streams
 - Lack of local data to parameterize models
- What we need:
 - Refined protocols for algal biomass data collection to improve the precision of estimates
 - Process-based studies to generate data for model parameterization

Pilot Study: Importance of Precision in Biomass Estimates for Comparison to NNE Thresholds

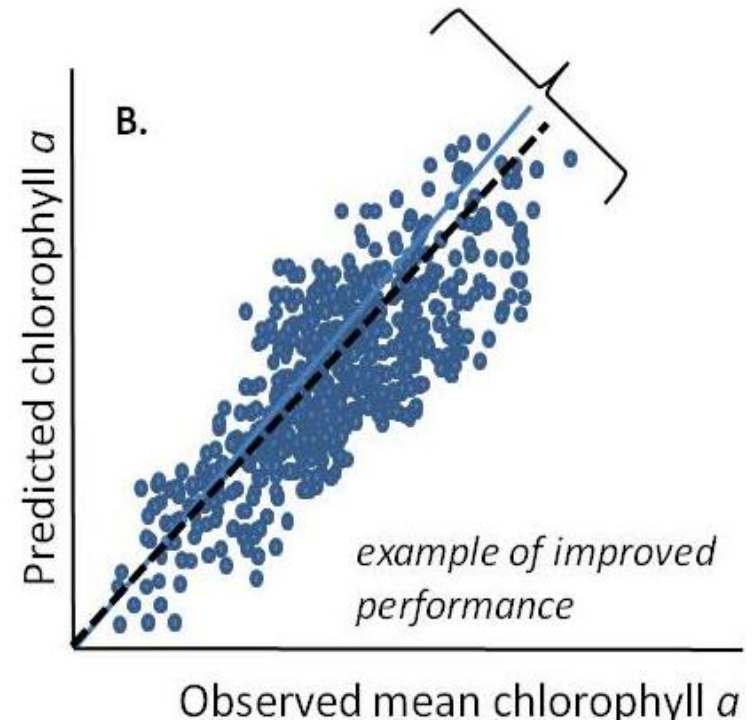
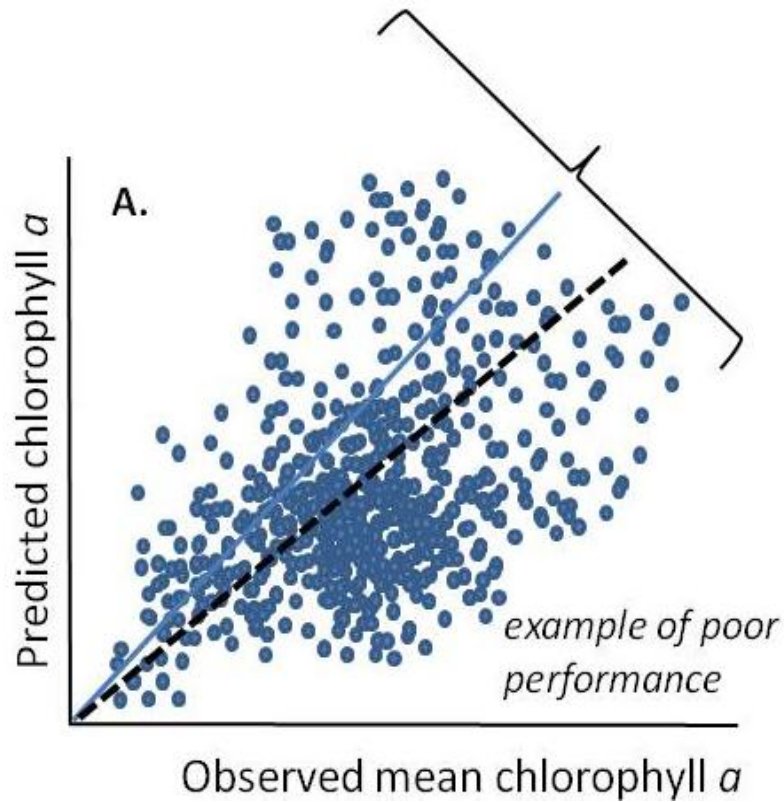


Pilot Study:

Effect of Substratum on Algal Accrual



Producing High-Performance Models



Key Questions

- How can the reliability of estimates of stream benthic algal biomass be improved?
 - What is the optimal level of subsampling to yield high-precision estimates of benthic chlorophyll *a*?
- How can stream benthic algal biomass predictive models be improved?
 - What is the rate of biomass accrual over time?
 - How does dominant stream substrate (*streambed material*) type effect algal accrual?

Design

- Biomass accrual over time, and substrate effects :
 - At 6 sites, distribute clean standardized material (e.g., marked, scrubbed cobbles) within each reach at “time zero”
 - Collect area-weighted biomass from subsets at regular intervals to estimate algal accrual (growth/decay) rates
 - Also collect samples from different substrates (silt, sand, gravel, cobbles, bedrock, concrete, wood, plants) from the same reach
- Improving precision of field estimates:
 - At 6 sites, sample 6 biomass replicates
 - Lab-analyze each replicate individually; post-aggregate mathematically at different levels of replication
 - Conduct power analysis to determine tradeoff between number of replicates and costs
 - Produce new protocol with prescribed number of replicates

Budget

Labor: \$90k

Materials/Travel: \$20k

Data Analysis and Report Prep: \$25k

Total: \$135k

Products

- Protocol for sampling stream algae for application in intensive site-monitoring
- Data to support development of models relating nutrients to stream algal biomass
- Oral presentation, technical report, and journal manuscript
 - level of subsampling effort yielding highest precision/sampling effort for benthic chlorophyll *a* estimates
 - effect of time of accrual and substrate type on benthic algal biomass