Methods

Site Description

Experimental Design

NDS Construction and Deployment

GPP and CR measurements

In some cases, the sponges were nearly consumed by heterotrophs and in other cases, the sponge was completely consumed. We are confident these sponges were consumed, not simply lost to the flowing water because: 1) in all cases, the caps on the cups were closed, preventing sponges from leaving and 2) in most cases, small strands of cellulose were still visible. If the sponge was still large enough to remain intact during transport, we still completed the GPP and CR measurements, but accounted for its smaller size by measuring its surface area. If the sponge was fully consumed, we were unable to measure GPP and CR. But clearly respiration occurred and at a higher rate than on the sponges that remained fully intact.

Rather than eliminate those data points, we estimated CR. We calculated the respiration rate necessary to consume an entire sponge, based on the C content of the sponge, a respiratory quotient of 0.85 mol CO2/mol O2, and the deployment time. With this approach, however, respiration rates far exceeded those measured in the lab, potentially because small chunks of the sponge floated downstream. To keep our respiration estimates reasonable, we instead added 10% to the largest measured respiration rate.

Lab incubations

Some of the summer incubations were completed in a greenhouse with full-spectrum lights. However, temperatures in the greenhouse steadily increased during the incubation and led to GPP and CR rates that were likely unrealistically high. As a result, all remaining incubations occurred in the laboratory. To determine the effect of different incubation locations, we simultaneously completed

Nutrient Limitation Table – Community Respiration

|  |  |  |
| --- | --- | --- |
| Cle Elum | Summer | N limitation with serial P limitation; serial Si limitation with the presence of P |
|  | Fall | N limitation with serial P limitation; Si suppresses N and P response |
| Ringer | Summer | N limitation with serial P limitation; Si suppresses N and P |
|  | Fall | N, P, Si, not limiting; Si and no P suppresses, but Si and P together is about as high as P with no Si |
| Roza | Summer | N limitation with serial P limitation; Si suppresses N and P response |
|  | Fall | P limitation; Si suppresses N and P response |
| Century Landing | Summer | No limitation; Si suppresses P response |
|  | Fall | N and P simultaneous limitation; |
| Mabton | Summer | P limitation; Si inhibits N and P |
|  | Fall | P inhibition in presence of N; Si inhibits (with N); Si neutral in presence of P (but not limiting)  \*does KH2PO4 buffer the high Si pH? |
| Kiona | Summer | No limitation; P and Si suppress N response; Si suppresses the P response |
|  | Fall | No limitation; N alone is suppressed relative to the control; Si suppresses N and P |