**Project overview:**

Investigating how riparian forest structure (second-growth vs. old-growth) influence light and bottom up drivers in first-third order streams.

Hypothesis: Old-growth riparian forests allow more light to reach the stream benthos than second-growth riparian forest resulting in increased primary production leading to increased secondary production and predator (Cutthroat trout) biomass and growth rates.

**Premise for study:**

Studies have shown riparian clear-cuts can result in an obvious increase in solar radiation and short-term increased primary production and predator biomass…..but also

* Increased stream temperature, impacting down stream sites in addition
* Reduced Large Woody Debris (LWD)
* Reduction of in-stream habitat and spawning habitat for salmonids
* Succession can quickly lead to second growth forests (Closed canopies with less light & primary production)
* Increased sedimentation and turbidity
* Overall negative impacts outweigh the short-term increased primary and secondary production

Old-Growth Forests typically have better habitat for salmonids due to Large Woody Debris. Many researchers tend to focus on the instream habitat and wood but do not consider the importance of the canopy gaps created when that wood fell into stream. We believe these canopy gaps create productivity hotspots with increased primary and secondary production. But are these gaps big enough to have a noticeable effect, and do these “hotspots” lead to greater whole stream production?

**Increased Light**

Figure 1: McRae Tribuatary Fluorescein Vial data



Figure 2: STREON site Fluorescein Vial Data



**Increased light resulting in increased Chlorophyll a and Ash Free Dry Mass**

Figure 3: McRae Tributary Δ Fluorescence of fluorescein vials. Box indicates where periphyton samples were collected.



Figure 4: Δ Fluorescence vs. Chl. a, AFDM and Ratio of Chl. a to AFDM



**Nutrient Uptake**

Figure 5: Uptake velocity data from day/night nutrient releases on McRae Tributary

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Uptake Length (m)

|  |  |
| --- | --- |
| 2nd Growth Day | 454.5 |
| 2nd Growth Night | 500 |
| Old-Growth Day | 333.3 |
| Old-Growth Night | 909.1 |

**Increased Vertebrate Predators?**

Figure 6: Vertebrate biomass estimates at two paired reaches

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Figure 7: Vertebrate population estimates at two paired reaches

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| --- | --- | --- | --- | --- |
| Average Biomass (g) | McRae Trib 2nd G | McRae Trib OG | STREON 2nd G | STREON OG |
| Cutthroat Total | 8.74 | 8.30 | 8.77 | 12.25 |
| Cutthroat >50 cm | 10.51 | 10.76 | 17.08 | 18.29 |
| Cutthroat <50 cm | .255 | .33 | .15 | .17 |
| Salamanders | 7.65 | 7.25 | 19.86 | 21.39 |

**Fish Growth**

Fish are implanted with PIT tags allowing us to individually mark fish and measure growth over the summer. Will cutthroat growth rates be higher in old-growth reaches vs. second-growth reaches?...Ask me in a few weeks