# Relationship Between Stream Discharge and Dissolved Oxygen Levels at Canyon Creek, and Implications Towards Salmon Development and Physiology

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## INTRODUCTION

Stream discharge= velocity*water depth*wetted width [1]

Dissolved oxygen refers to the level of free oxygen present in water and plays a role in salmon development and physiological function. [2]

**Purpose**: To determine if there is a relationship between stream discharge and dissolved oxygen levels.

## HYPOTHESES

| | |
|---|---|
| HYPOTHESIS 1 | $H_0$:No significant correlation between stream discharge and dissolved oxygen levels<br>$H_A$: A significant correlation between stream discharge and dissolved oxygen levels |
| HYPOTHESIS 2 | $H_0$ : Stream discharge and $O_2$ levels will not differ significantly between the 2 sites<br>$H_A$ : Stream discharge and $O_2$ levels will differ significantly between the 2 sites |
| PREDICTION | Ripple sites $O_2$ > still sites $O_2$ due to constant $O_2$ replenishment with constant flow |

## METHODS

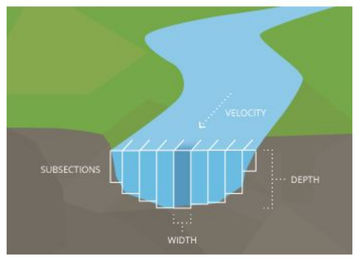
**Step 1**

Measure dissolved oxygen levels

**Step 2**

Measure stream velocity using Pooh Sticks Method

**Step 3**




Measure stream cross-sectional area (average of wetted depth at 0.3 meter increments * wetted width)

## RESULTS

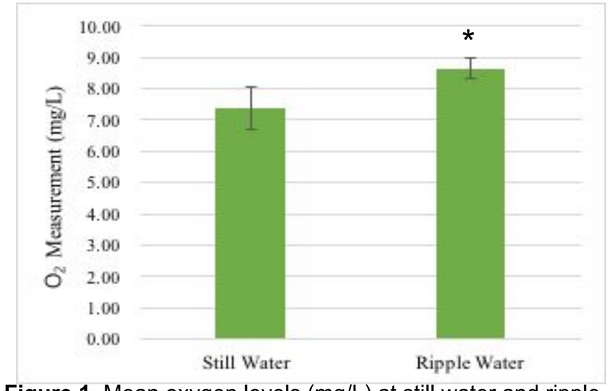



**Figure 1.** Mean oxygen levels (mg/L) at still water and ripple water sites (n=6).

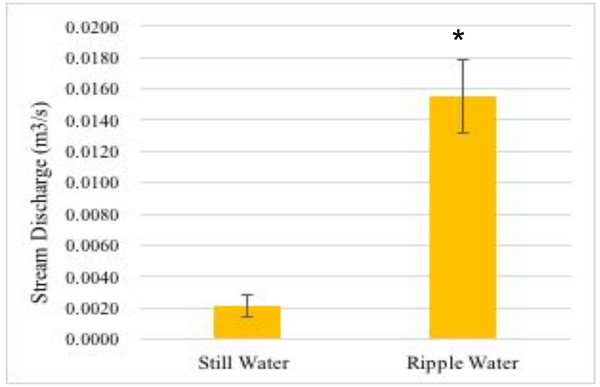



**Figure 2.** Mean stream discharge ($m^3/s$) at still water and ripple water sites (n=6).

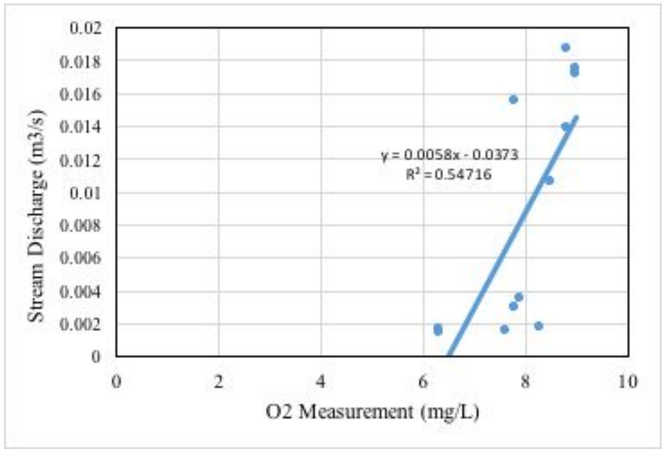



**Figure 3.** Correlation between oxygen levels (mg/L) and stream discharge ($m^3/s$) (xn=6).

## DISCUSSION

•The difference in oxygen levels and stream discharge between ripple and still sites is significant, as well as the positive correlation between oxygen and stream discharge levels (null hypothesis rejected)

•In slow-flowing sites (still), oxygen levels are depleted due to decomposition and consumption by the organisms that inhabit the stream. In faster-flowing water sites (ripple), oxygen levels get replenished, as the water has more contact with air.[3]

•A previous study found that higher oxygen levels→ higher embryonic survival rates.[4](minimum of 7 mg/L).

•The study also found correlation between water velocity, embryonic survival and dissolved oxygen levels. Higher stream discharge→ higher dissolved oxygen→ higher embryonic survival.[4]

•Decrease in salmon population → less trophic productivity and less food for consumers of salmon.[5]

## CONCLUSION & FUTURE DIRECTIONS

•For future studies: take into account other environmental factors that can also influence oxygen levels, such as water temperature, gravel composition, water murkiness, etc.[5], use more precise equipment, and obtain larger sample size.

•These findings can allow us to determine if a stream has adequate conditions for optimal salmon performance and reproduction.

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