

Parr and Spawner Abundances of Sockeye Salmon (*Oncorynchus nerka*) from Osoyoos Lake (British Columbia, Canada).

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Abstract

We analysed 106 (?) surveys, from the 27 years 1996–2022, of parr, the lacustrine life stage of Sockeye Salmon, in small, warm, and eutrophic Osoyoos Lake in the Columbia River watershed. All the surveys were aggregated for a regression to determine annual abundance and the pattern of mortality rate through this life stage. That regression provided abundance estimates for each year at standardized dates representing beginning and end of that life stage. Attention to (a) the relative precision of each survey as regression weights, and (b) factors known to affect parr survival (flows, a pollution event, parr size) improved the precision of estimates. The parents of these parr were surveyed repeatedly each year as spawners in the Okanagan River immediately upstream of Osoyoos Lake. A spawners to early parr regression similarly benefited by including river flows as a factor known to affect egg, alevin, and migrating fry survival. Given that spawners predict early parr, thus inform parr abundance, we merged these two models to determine how shared information might benefit both. ... and then what? Don't stop there! What the hell?

Keywords: Sockeye Salmon, Osoyoos Lake, *Oncorynchus nerka*

0.0.1. Doc Prep Notes

<https://www.elsevier.com/authors/policies-and-guidelines/latex-instructions> styles

Here are (Hyatt et al., 2015) example citations (Fryer et al., 2018, 2011) from Zotero shared library: Okanagan Sockeye 2023.

Here is an equation the ref is Equation 1 and that resulted in a numbered equation.

$$f_X(x) = \left(\frac{\alpha}{\beta}\right) \left(\frac{x}{\beta}\right)^{\alpha-1} e^{-\left(\frac{x}{\beta}\right)^\alpha}; \alpha, \beta, x > 0. \quad (1)$$

Inline equations work as well: $\sum_{i=2}^{\infty} \{\alpha_i^\beta\}$

This is @fig-meaningless from an R chunk. Does each fig and table need separate chunk? The journal format move pictures to end but not figures and tables from R chunks?

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¹This is the first author footnote.

²Another author footnote, this is a very long footnote and it should be a really long footnote. But this footnote is not yet sufficiently long enough to make two lines of footnote text.

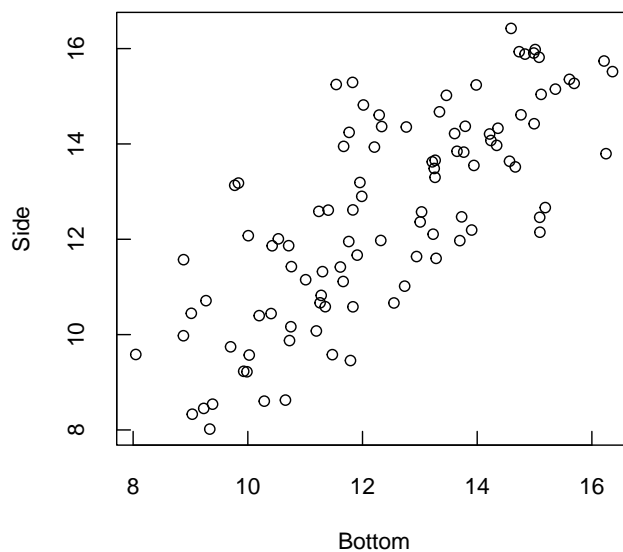


Figure 1: Samples from a bivariate normal distribution.

0.0.2. Pictures

Just use **Insert** in Quatro Visual, then adjust size after. This picture is referenced from **Attributes >> ID #fig-paths**. Journal format automatically moves pictures to end. (!)

0.0.3. Tables from R

Caption and label (for reference) in chunk, here is Table 1 as an example.

```
knitr::kable(head(mtcars)[,1:4])
```

Table 1: Caption centered above table

	mpg	cyl	disp	hp
Mazda RX4	21.0	6	160	110
Mazda RX4 Wag	21.0	6	160	110
Datsun 710	22.8	4	108	93
Hornet 4 Drive	21.4	6	258	110
Hornet Sportabout	18.7	8	360	175
Valiant	18.1	6	225	105

1. Introduction

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2. Methods

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3. Results

2

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4. Discussion

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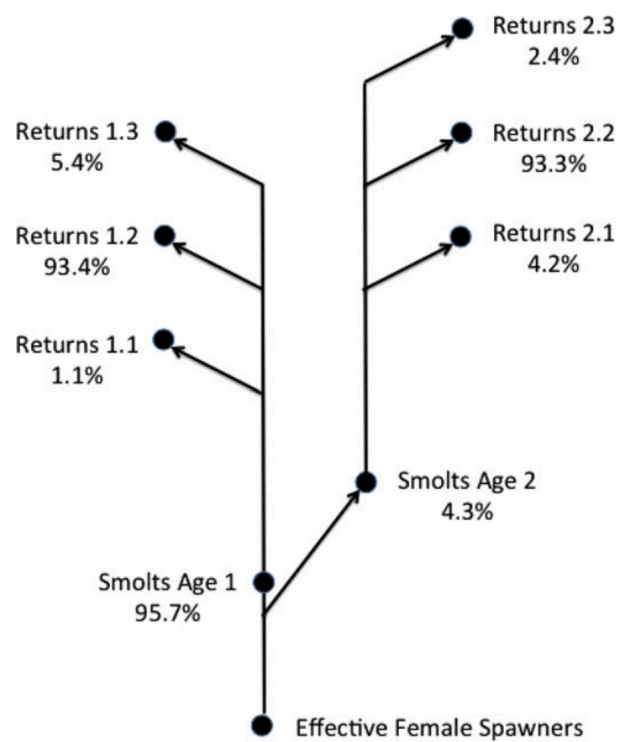


Figure 2: Life Paths of Chilko sockeye. Each cohort is observed nine times over 6 years. Percentages are the mean values from 1960–2008.

6. Tables

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References

- Fryer, J., Kelsey, D., Wright, H., Folks, S., Bussanich, R., Hyatt, K., Selbie, D., Stockwell, M., 2018. Studies into factors limiting the abundance of Okanagan and Wenatchee Sockeye Salmon in 2015. Columbia River Intertribal Fish Commission (CRITFC). Technical Report.
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- Hyatt, K., Alexander, C., Stockwell, M., 2015. A decision support system for improving “fish friendly” flow compliance in the regulated okanagan lake and river system of british columbia. *Can. Water Resour. J* 40, 87–110.