

# von Bertalanffy Growth Function - Nunavut Exercise

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1. Load the `PG008_original.xlsx` file into a `data.frame` object and restrict the data to only those fish captured in **freshwater** in **2010**. Use these data for the following questions.
    - a. Examine the plot of length versus age. Do the data look linear or curved, is there an obvious asymptote, are young fish well represented, how variable are lengths within ages?
    - b. Fit the typical parameterization of the VBGF to these data. Construct a fitted-line plot (i.e., superimpose the fitted VBGF onto the length versus age plot) and a residual plot. Comment on model fit.
    - c. Compute the correlation between parameter values. Comment
    - d. Compute the parameter estimates. Carefully interpret the value of each parameter. Comment on how realistic you think each estimate is.
    - e. Construct 95% likelihood profile and bootstrap confidence intervals. How do the relative widths of the confidence intervals compare (between methods).
    - f. Predict the mean length, with 95% confidence interval, for an age-18 Charr. Comment on the width of this confidence interval?
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2. [*Time Permitting*] Repeat the previous question but using either the original, Gallucci and Quinn, or Mooij parameterizations of the VBGF. [Note that you can see the equations for these VBGFs with, for example, `growthFunShow("vonBertalanffy",param="GallucciQuinn",plot=TRUE)`. You can declare a function for these VBGFs by using, for example, `vb <- vbFuns("GallucciQuinn")`.]
    - a. How does the fit of this model (and estimates of the common parameters) compare with the results from the typical VBGF fit in the previous question?
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3. [*Time Permitting*] Repeat the first question but using either the Gompertz or logistic growth functions. [Note that you can declare a logistic growth function by using, for example, `lgf <- logisticFuns(msg=TRUE)`.]
    - a. How does the fit of this growth function compare with the results from the typical VBGF fit in the first question?
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