Synthesized Dataset of Length-Weight Regression Coefficients for Delta Fish

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INTRODUCTION

- Biomass is a commonly used metric to describe fish communities within the Delta. Calculating this value requires weight data for each fish specimen, which is commonly obtained via the equation $\text{Weight} = a\,\text{Length}^b$. This formula requires two species-specific parameters.

- We created a synthesized dataset of these fish-specific parameters for all fish species commonly found in the Delta so scientists can easily calculate weight data for their fish specimens.

- The dataset is published via the Environmental Data Initiative (EDI).

THE DATASET

As fish are commonly measured in three different ways (total length (TL), fork length (FL), and standard length (SL)), we reported both the aggregate a and b parameters as well as the parameters for each length measurement separately.
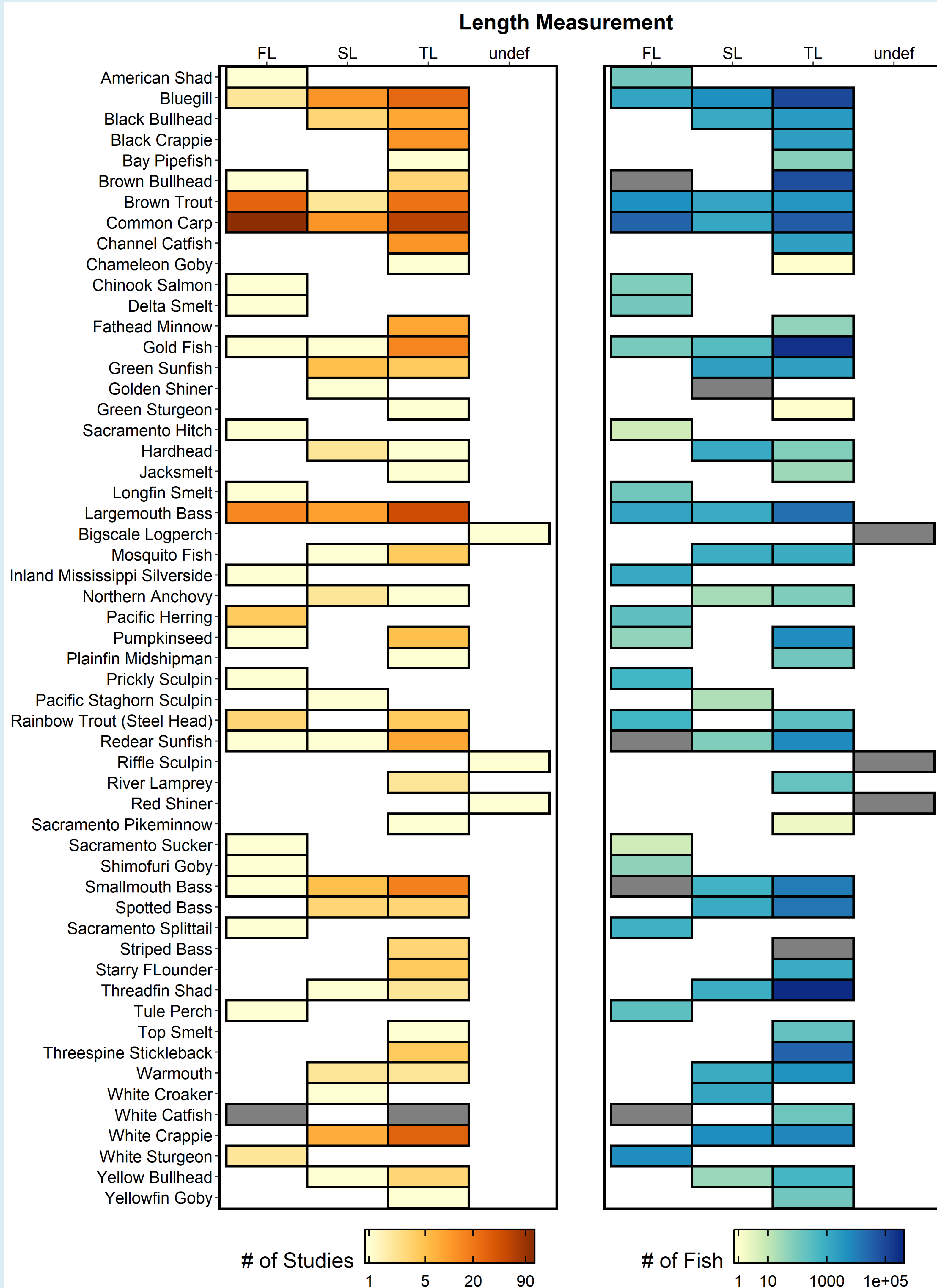
Heat maps showing, for a given **fish species** and **length measurement**, either the (right) **number of studies** or (left) **number of fish** used in the dataset. Scales are logarithmic. Gray squares indicate NA values.

METHODS

The values for this dataset were compiled via three **sources**:
- Via the fishbase.us database, which compiles all **references** that report these values for a given fish and determines the average values
- Via single studies focusing on Delta fish, primarily Kimmerer et al., 2015 and Schneider et al., 2009
- By calculating them using published length-weight data
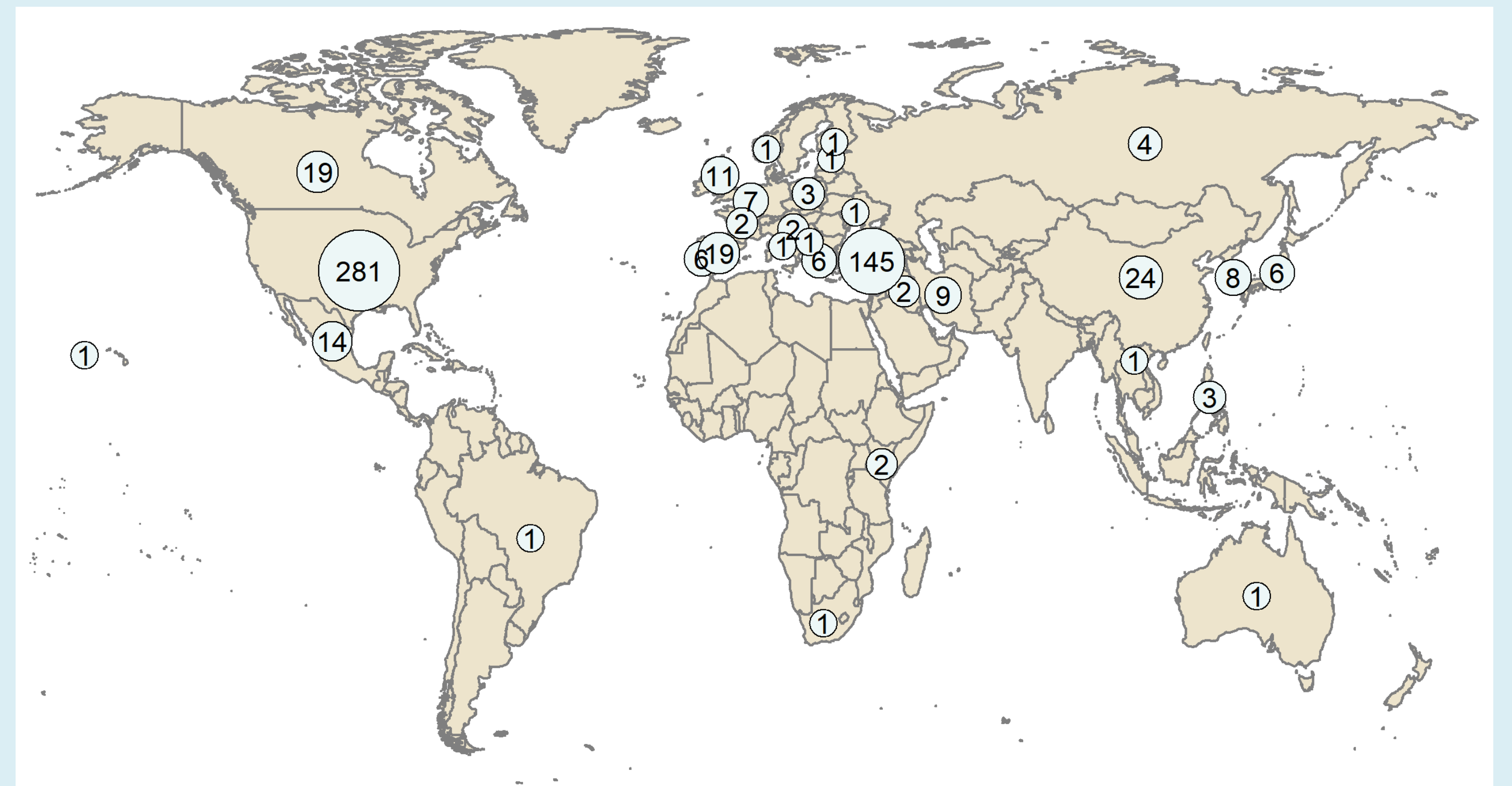
World map showing what countries reference studies were conducted in. Symbols show the number of references from each respective country.
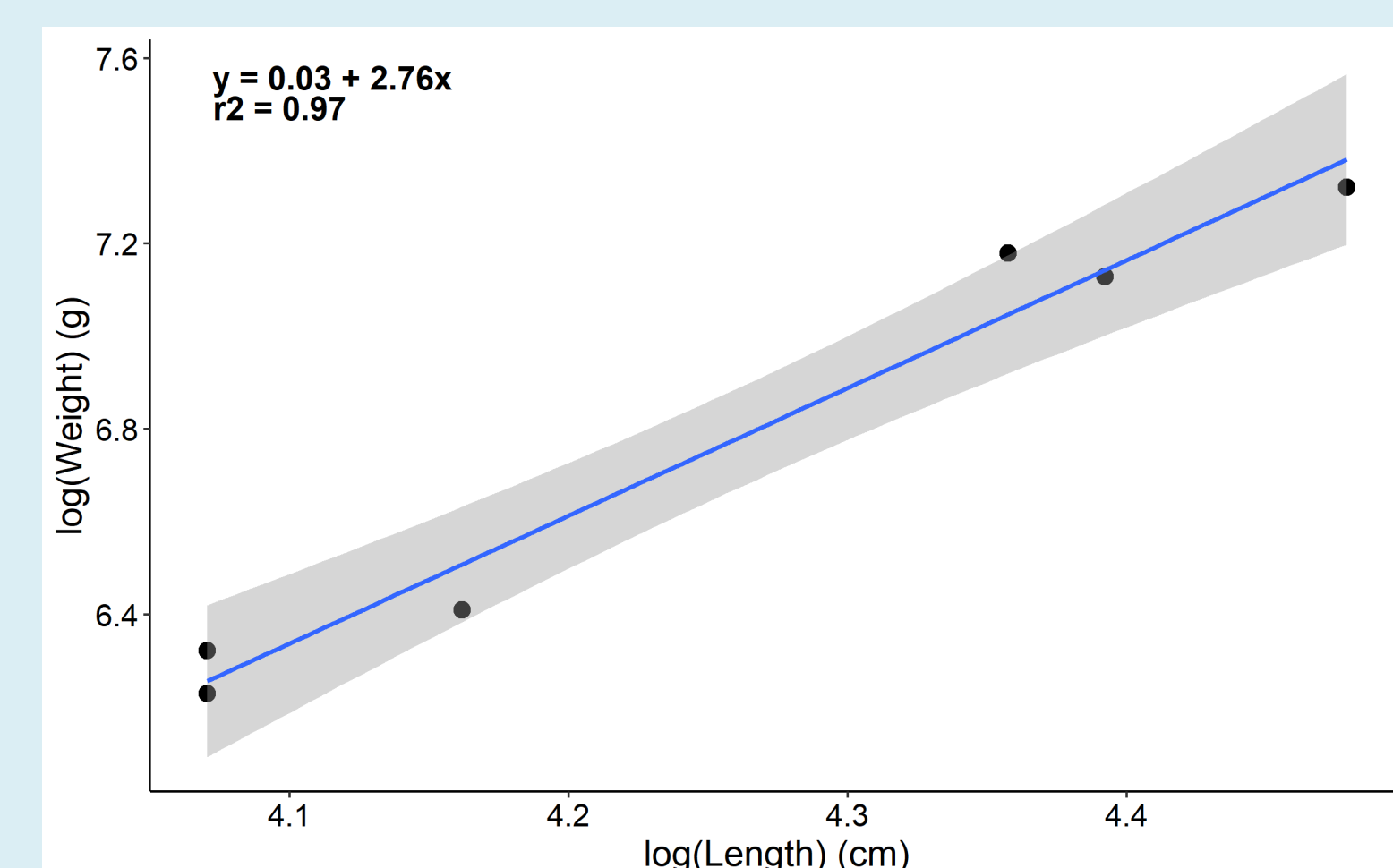
Fish weight is calculated via the exponential function:
$$\text{Weight} = a\,\text{Length}^b$$
which requires two species-specific parameters. These can be calculated by using the log-transformed equation:
$$\log(W) = \log(a) + b\log(L)$$
with $\log(a)$ corresponding to the intercept and b to the slope.

Linear regression of the log-transformed length-weight equation for Sacramento Hitch. Data from Jeffres et al., 2006

COMPARISON

Length-weight regressions were previously calculated for 18 Delta fish by Gartz, 2004. For data validation purposes, we graphically compared the regression formulas derived from their dataset to ours. As the formulas were similar for all fish species, we concluded our dataset is valid.
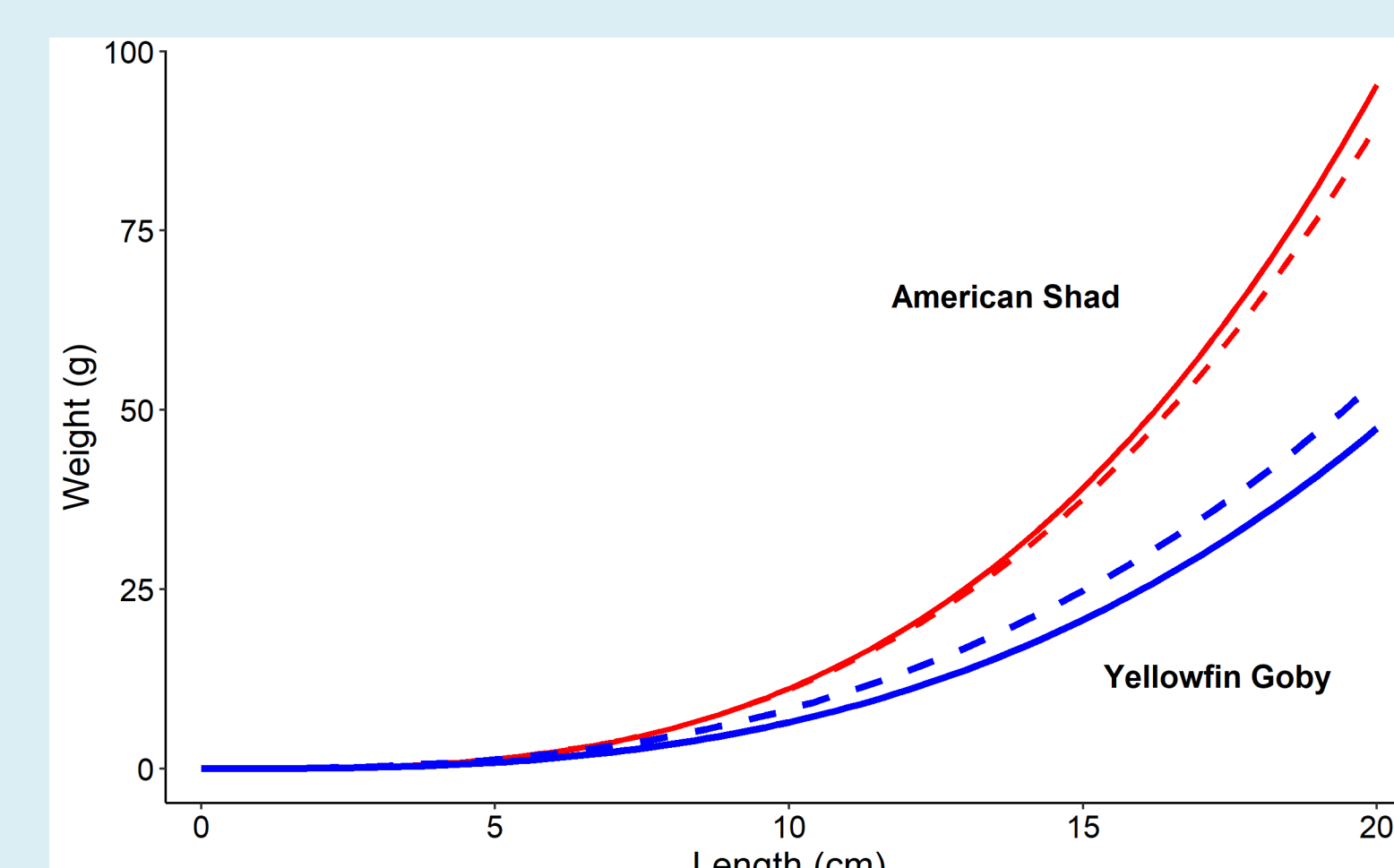
Comparison of regression formulas derived from this dataset (solid line) to those from Gartz, 2004 (dashed line). Two fish species, American Shad (red) and Yellowfin Goby (blue), are shown.