

The Health Gap: Rivers and Dams

In Section 3.1, we introduced the Bino et al. (2021) study and the “Fat Tail Proxy” (TVI) used to measure platypus health. While we now know how to visualize the health of a population, the real scientific question is *why* some populations are healthier than others.

Today, we investigate the impact of **River Regulation**. Many rivers in the Snowy River catchment are altered by dams and water diversions. We want to know: Is there a significant difference in the distribution of TVI scores between **Unregulated** (free-flowing) and **Regulated** (dammed) rivers?

1. The Friction of the Pencil (The n=30 Field Log)

Below is a raw log of 30 captures. Each entry shows the river type and the TVI health score. Before we use the power of R, we must organize this data by hand to see the association.

ID	River Type	TVI Score	ID	River Type	TVI Score
1	Unregulated	4 (Good)	16	Unregulated	3 (Average)
2	Regulated	2 (Fair)	17	Unregulated	5 (Excellent)
3	Unregulated	5 (Excellent)	18	Regulated	1 (Poor)
4	Regulated	3 (Average)	19	Regulated	2 (Fair)
5	Unregulated	4 (Good)	20	Unregulated	4 (Good)
6	Unregulated	4 (Good)	21	Unregulated	5 (Excellent)
7	Regulated	2 (Fair)	22	Regulated	2 (Fair)
8	Unregulated	3 (Average)	23	Regulated	3 (Average)
9	Regulated	1 (Poor)	24	Unregulated	4 (Good)
10	Unregulated	5 (Excellent)	25	Regulated	2 (Fair)
11	Regulated	3 (Average)	26	Unregulated	5 (Excellent)
12	Unregulated	4 (Good)	27	Unregulated	3 (Average)
13	Regulated	2 (Fair)	28	Regulated	1 (Poor)
14	Regulated	2 (Fair)	29	Regulated	2 (Fair)
15	Unregulated	5 (Excellent)	30	Unregulated	4 (Good)

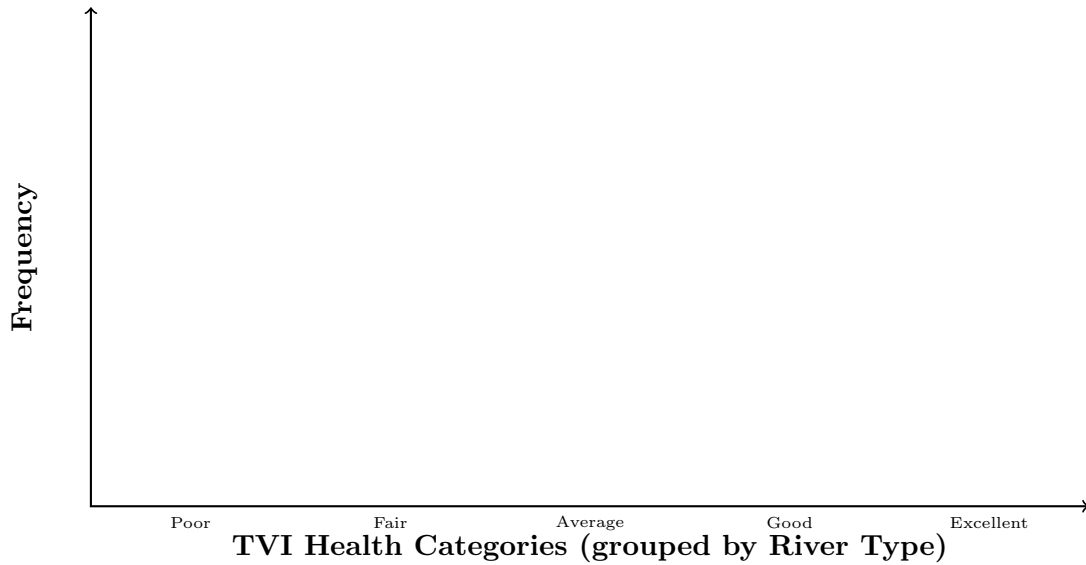
2. Organizing the Association

Use the $n = 30$ Field Log from Page 1 to complete the **Two-Way Contingency Table** below. This is a 2×5 layout that will allow us to compare the health distribution of each river type side-by-side.

River Type	Poor (1)	Fair (2)	Average (3)	Good (4)	Excellent (5)	Total
Unregulated						
Regulated						
Total						30

3. Sketching the Comparison

Open your text to **Section 3.2** at r.statypus.org to see the structure of a **Side-by-Side Bar Plot**. Using your table above, sketch the comparison below. Use different shading for Unregulated vs. Regulated bars.



Bill the Statypus says: This is taking forever. Sorting 30 rows by hand? My wrist is officially on strike. Why are we doing this when we have a computer sitting right here?

Sally the Statypus says: Patience, Bill! If you don't feel the "friction" of sorting the data yourself, you'll never appreciate how R builds a matrix. But look at the sketch—there's almost no one in the "Excellent" group for the Regulated rivers.

4. The Digital Shortcut

It's time to stop playing with pencils and trust the computer. We are going to scale our analysis from our tiny $n = 30$ sample to the full $N = 259$ regional archive.

Bill the Statypus says: You know the drill. Go to the site, find the **Chapter 3** pink box, and download the .RData file. Copy and paste the `load(url(...))` command from the textbook to activate the data.

Coding Corner: The Instant Table

In R, a two-way table is created by providing two variables to the `table()` function. Reference Section 3.2 and make a two-way table for these two variables in the same 2×5 format we had earlier. Once you have a nice two-way table that looks similar to the one you had before, wrap the `barplot()` function around it to turn it into a graph. Make a sketch of it below.

Coding Corner: The AI Mission: Grouped Bar Plots

Ask your AI assistant (Copilot) you want a side-by-side bar plot. Ask it how to use the `beside` and `legend` arguments and make a sketch below.

Statypus Insight: Why Beside

By default, Base R creates a “stacked” bar plot. Setting `beside = TRUE` is what tells R to put the bars for Unregulated and Regulated rivers next to each other, making the comparison much easier for our brains to process.

Executive Field Analysis

Statypus Insight: The Power of the Matrix

When you gave R two variables, it built a matrix. In the time it took you to tally 30 animals, R tallied 259 across 10 different categories without making a single counting error. This is why we trust the computer to do computer things.

Reflection: Is there an Association?

Look at your professional regional plot. If a platypus's health had *nothing* to do with the river type, the distributions (the relative heights of the bars) would look exactly the same for both groups.

1. Do the health distributions look the same?
2. Which river type has a higher concentration of better scores?
3. Do you feel confident that the two variables are related in some way?

5. Final Research Conclusion

Replication Report: River Regulation

1. **The Dam Effect:** Why might a dammed river lead to lower TVI scores? (Consider food flow and habitat changes).
2. **The Logic of Tallying:** In your own words, why is a two-way table (2×5) more useful for this research question than two separate frequency tables (1×5)?