25 Years of Water Quality Change in Rhode Island Lakes and Ponds

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The University of Rhode Island’s Watershed Watch Volunteer Monitoring Program has been collecting water quality data on dozens of Rhode Island lakes and ponds for over 25 years, allowing us to explore long-term trends in common water quality parameters. Not all lakes and ponds in the study area were sampled across the full time period and lakes were often added in geographic clusters (e.g. in urbanized northern Rhode Island). Not unlike how long-term temperature records are analyzed, we centered and scaled (i.e., the z-score) water quality measurements on a per-station basis. This provides a robust and commonly scaled measurement to explore this data for long-term trends. State-wide aggregation shows increasing temperature, chlorophyll *a*, and total nitrogen. Interestingly, total phosphorus is showing a decline, perhaps reflecting the management focus on phosphorus reductions. While yearly trends are useful, they do mask month-to-month variability differences across sites. Additionally, while most sites track the yearly trend in decreasing water quality, there are bright spots with a few sites improving over the 25 years. Contrary to previously reported analyses that show relatively stable water quality at the regional scale, our analysis shows that long-term water quality trends within Rhode Island show some parameters improving while others are in decline. Importantly, this analysis also points out the incredible value and importance of data from long-term monitoring programs, like Watershed Watch, for identifying trends in environmental condition.

# Introduction

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# Methods

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rnorm(10)

## [1] -1.16964948 -0.06321182 -0.36241356 -1.88637480 -0.13103413  
## [6] -0.58911844 -0.42572970 -0.26175884 1.50178680 -0.51473326

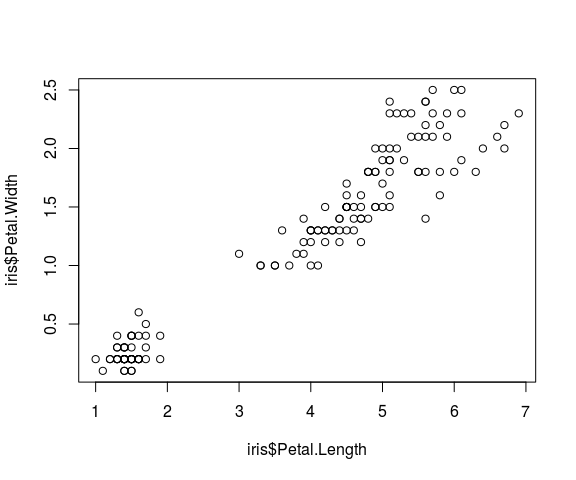
mean(rnorm(10))

## [1] -0.3492332

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# Results

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 Figure 1: An example of my first FABULOUS figure.

## Section 2

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| --- | --- | --- | --- | --- |
| Sepal.Length | Sepal.Width | Petal.Length | Petal.Width | Species |
| 5.1 | 3.5 | 1.4 | 0.2 | setosa |
| 4.9 | 3.0 | 1.4 | 0.2 | setosa |
| 4.7 | 3.2 | 1.3 | 0.2 | setosa |
| 4.6 | 3.1 | 1.5 | 0.2 | setosa |
| 5.0 | 3.6 | 1.4 | 0.2 | setosa |
| 5.4 | 3.9 | 1.7 | 0.4 | setosa |

Table 1: Everybody loves a table, especially tables of very novel data such as the iris data which has never been seen before.

### Section 3

Pellentesque eget tellus et ante tristique euismod. Proin at scelerisque ex, ac faucibus sem. In nec efficitur nulla. Nam libero augue, tristique et neque sed, pellentesque commodo lacus(Table 2). Morbi vitae ultrices arcu.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 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 |

Table 2: This is table number 2. Neat!

#### Section 4

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##### Section 5

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###### Section 6

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# Conclusions

The end

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