Literature Review (Ongoing)

Daniel Hawtree

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Intro

- This report summarizes the literature related to regression based prediction methods of fecal indicator bacteria (FIB).
  - A key source of much of this information is: "*Modeling Fecal Indicator Bacteria Concentrations in Natural Surface Waters: A Review*"; from Brauwere et al. (2014).
  - Studies conducted post-2014, and other studies not included in this review paper, are being added by myself on an ongoing basis.
- The purpose of this report is to provide a broad overview of the state of the field, to answer:
  - **When and where previous studies have been conducted?**
  - **What methods and explanatory variables have been most commonly used?**
  - **What journals are studies being reported in?**
  - **Approximately how many samples (rouded to hundreds) were taken per sampling site?**
  - **Approximately how long is the duration of the studies?**

Notes

- Almost all studies use log transformed FIBs (the dependent variables).
- Only explanatory variables which were found to be significant by study authors are included in this summary
- All variable related to light or lack of light (e.g. sunshine, cloud cover) are grouped under "Sunlight"
- Only explanatory variables which vary over relatively short time-intervals were included; site characteristics, such as "distance to stream outlet" or "percent urban cover" are excluded.
- I excluded "*previous day response variable*" as a predictor variable, as we wont have that available for our predictions.
- Wind speed and direction are merged together under a single "Wind" variable.
- "Advanced MLR" refers to multiple linear regression methods which use more advanced techniques for the model algorithms and/or variable selection; while the other MLR summarized use more standard approaches.

Papers Currently in Report

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## [1] "Studies currently included in summary: 45"
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##  [1] "Kay & McDonald (1983)"      "Beliaeff & Cochard (1995)"
##  [3] "Ferguson et al. (1996)"     "Serrano et al. (1998)"
##  [5] "Christensen (2001)"         "Crowther et al. (2001)"
##  [7] "Smith et al. (2001)"        "Christensen et al. (2002)"
##  [9] "Skraber et al. (2002)"      "Francy et al. (2003)"
## [11] "Lin et al. (2003)"          "McLellan & Salmore (2003)"
## [13] "Olyphant et al. (2003)"     "Rasmussen & Ziegler (2003)"
## [15] "Kelsey et al. (2004)"       "Olyphant & Whitman (2004)"
## [17] "Eleria & Vogel (2005)"      "Kashefipour et al. (2005)"
## [19] "Kay et al. (2005)"          "Nevers & Whitman (2005)"
## [21] "Olyphant (2005)"            "Parkhurst (2005)"
## [23] "Francy et al. (2006)"       "Hou et al. (2006)"
## [25] "Jin & Englande (2006)"      "Ge & Frick (2007)"
## [27] "Hellweger (2007)"           "Nevers et al. (2007)"
## [29] "Siewicki et al. (2007)"     "Frick et al. (2008)"
## [31] "He & He (2008)"             "Heberger et al (2008)"
## [33] "Lin et al. (2008)"          "Nevers & Whitman (2008)"
## [35] "Ge & Frick (2009)"          "Nevers et al. (2009)"
## [37] "David & Haggard (2011)"     "Nevers & Whitman (2011)"
## [39] "Stidson et al. (2011)"      "Francy et al. (2013)"
## [41] "Brooks et al. (2013)"       "Brooks et al. (2016)"
## [43] "Jones et al. (2013)"        "Maimone et al. (2007)"
## [45] "Seis et al. (2018)"
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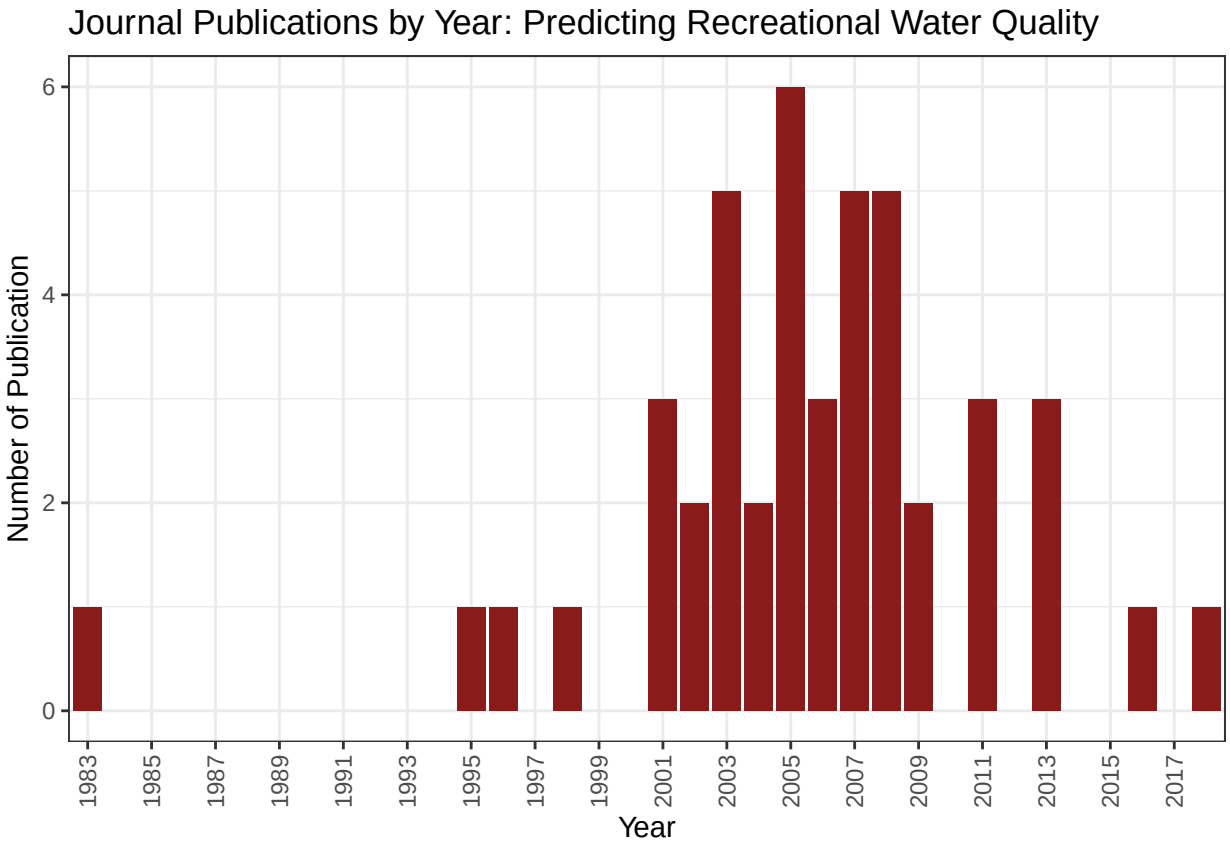
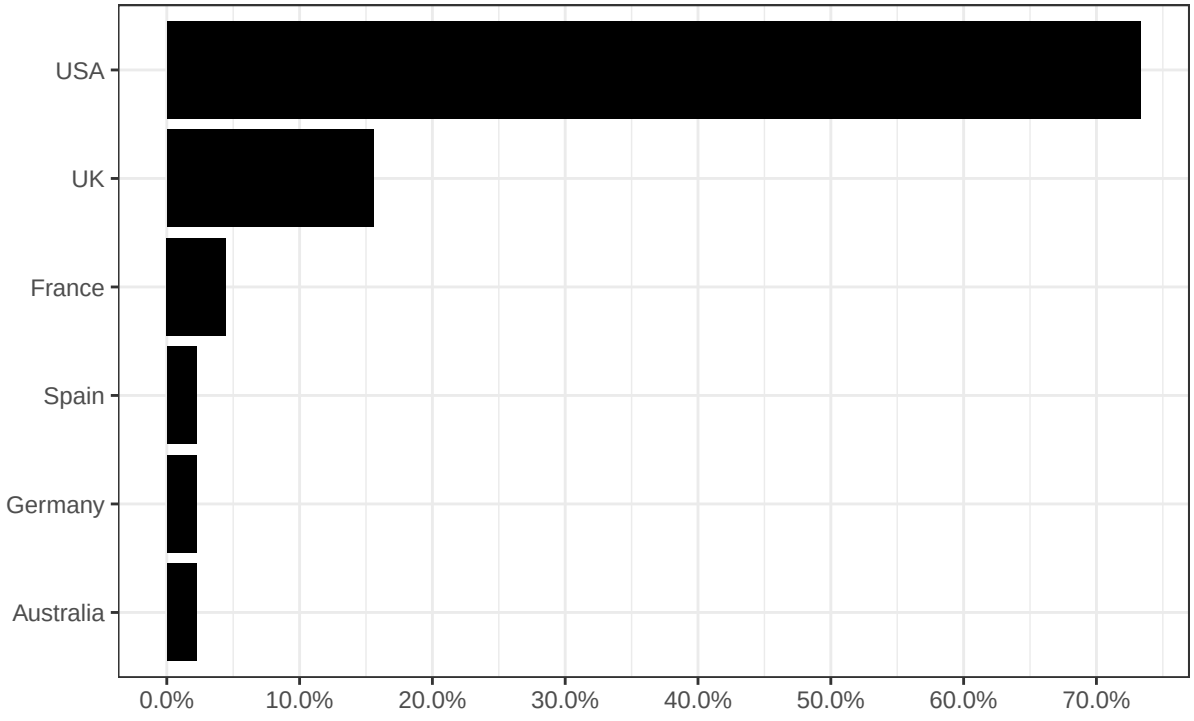
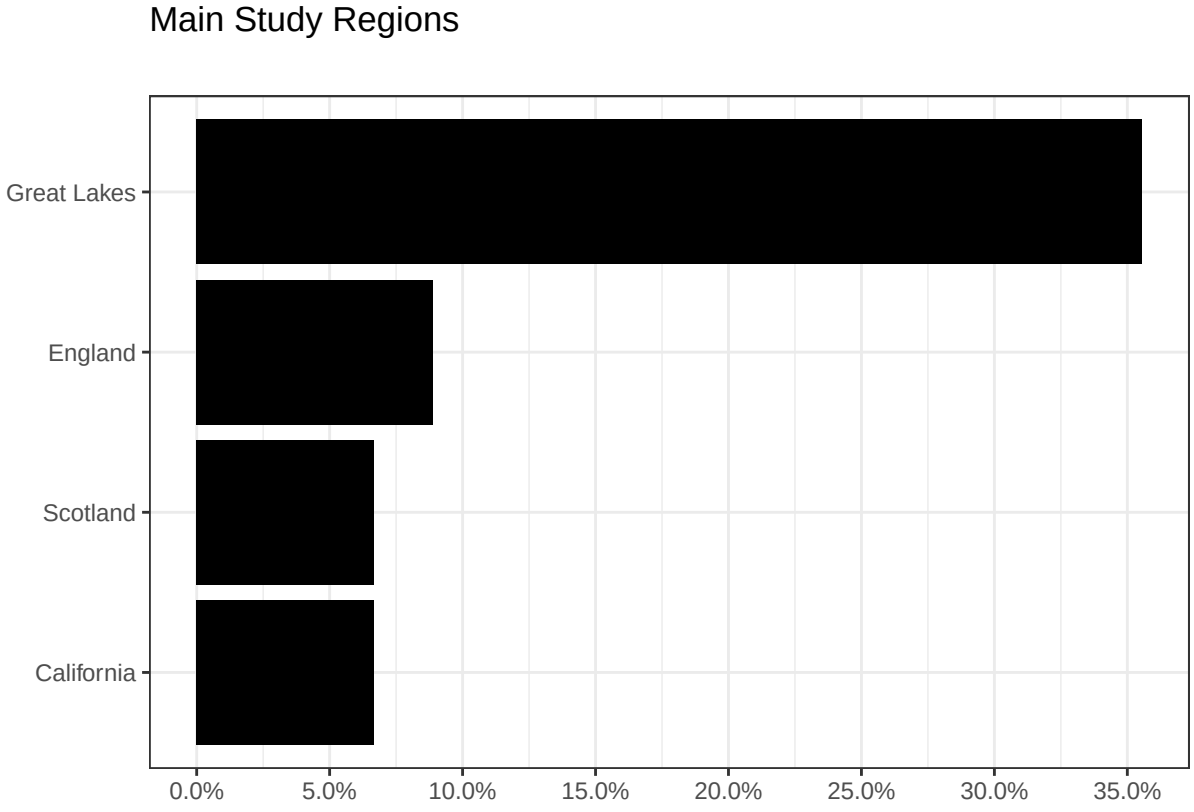
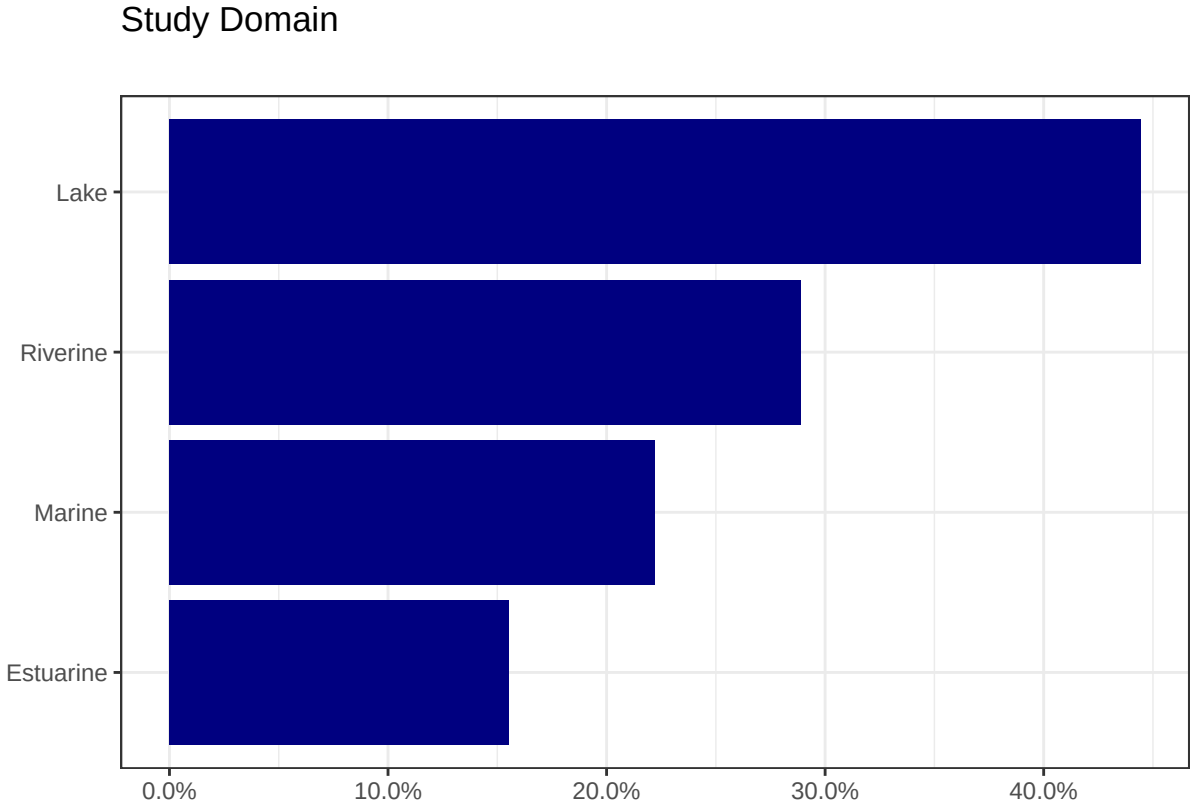
Summary Figures

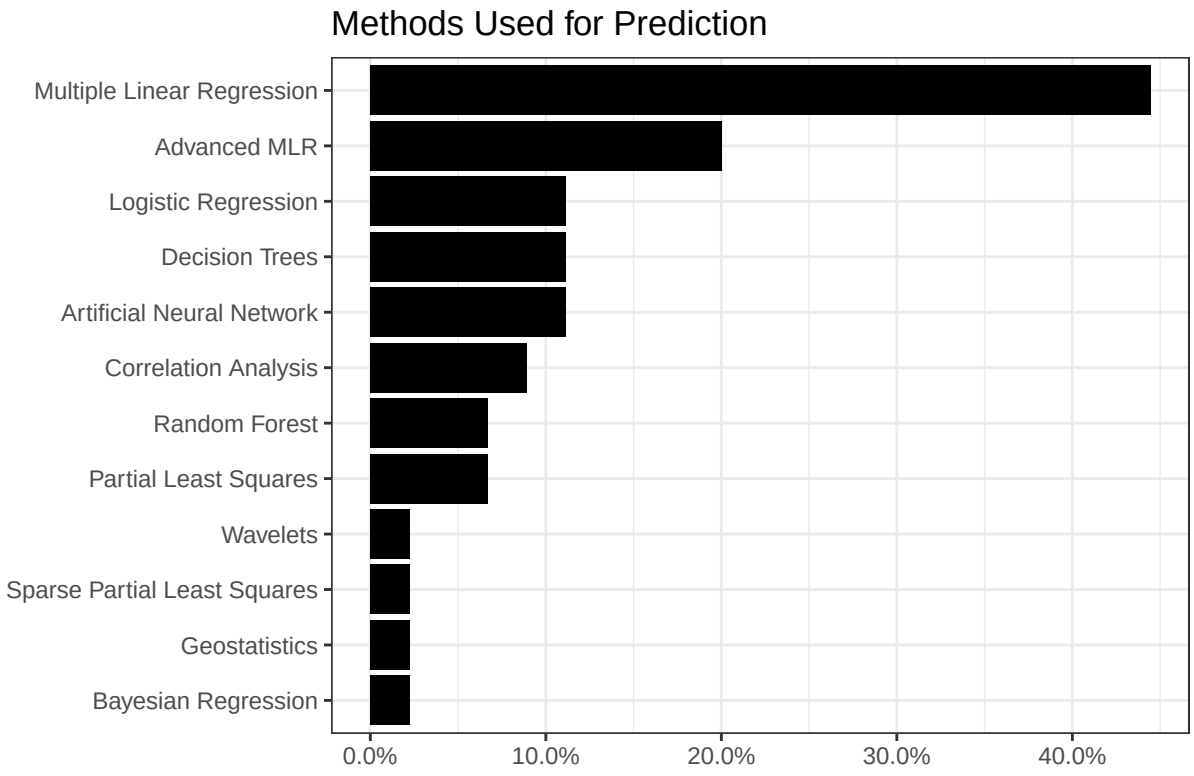


Study Country

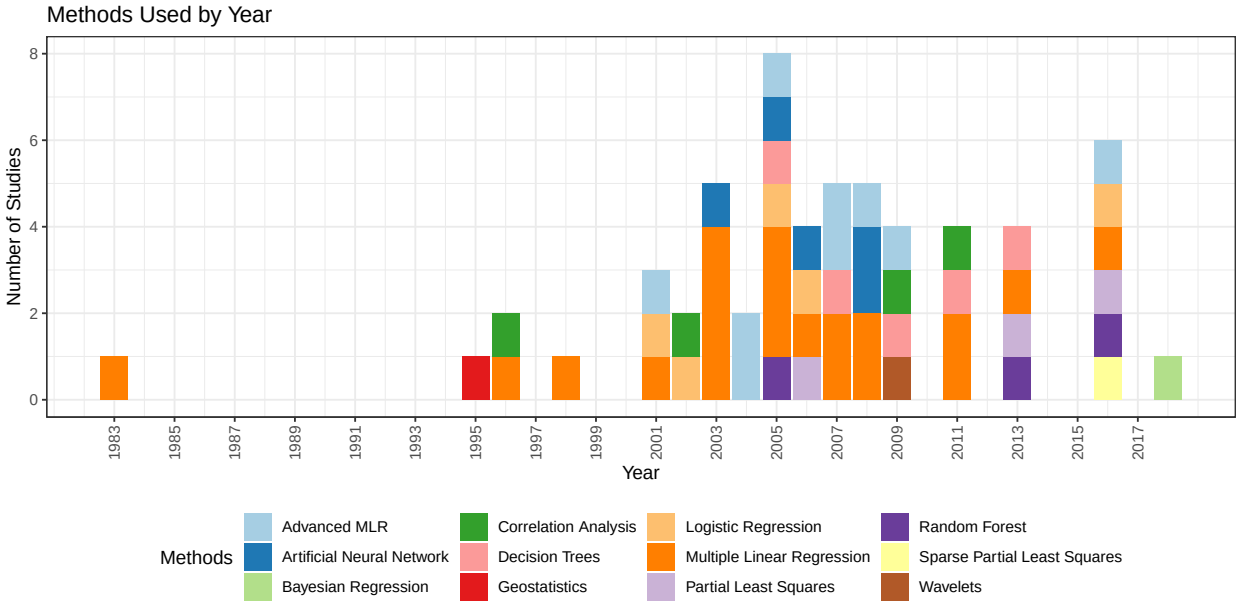


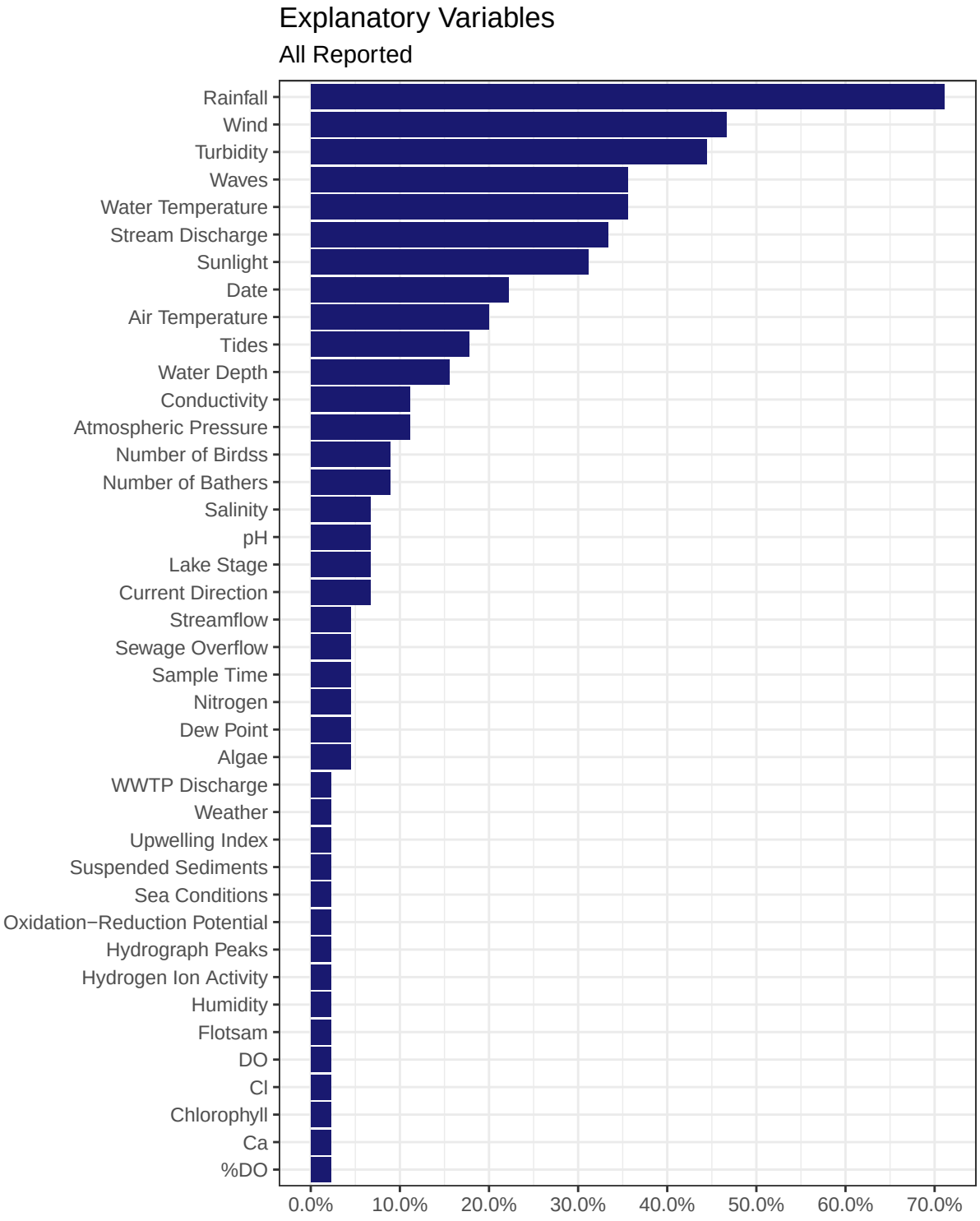

Main Study Regions
Great Lakes
England
Scotland
California
0.0%
5.0%
10.0%
15.0%
20.0%
25.0%
30.0%
35.0%

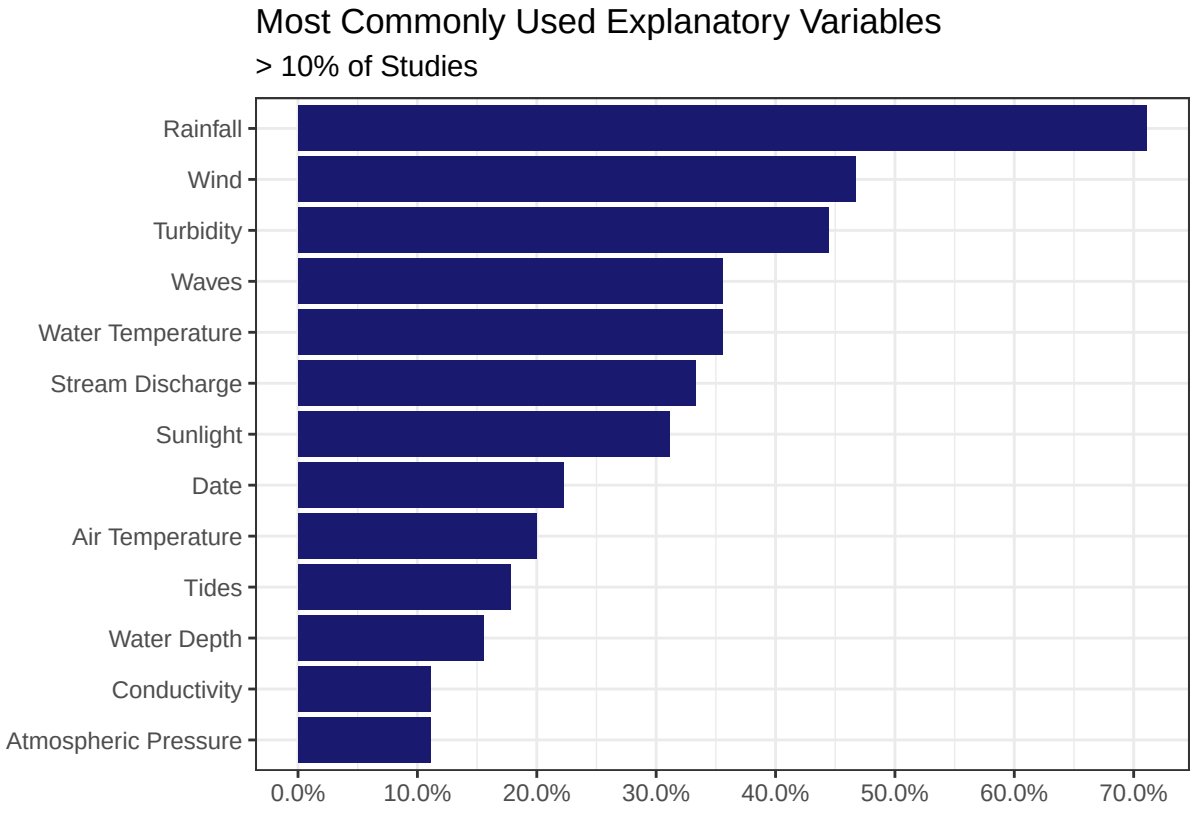

Study Domain
Lake
Riverine
Marine
Estuarine
0.0%
10.0%
20.0%
30.0%
40.0%



*Advanced MLR = multiple linear regression using advanced techniques




Explanatory Variables
All Reported
Rainfall
Wind
Turbidity
Waves
Water Temperature
Stream Discharge
Sunlight
Date
Air Temperature
Tides
Water Depth
Conductivity
Atmospheric Pressure
Number of Birdss
Number of Bathers
Salinity
pH
Lake Stage
Current Direction
Streamflow
Sewage Overflow
Sample Time
Nitrogen
Dew Point
Algae
WWTP Discharge
Weather
Upwelling Index
Suspended Sediments
Sea Conditions
Oxidation−Reduction Potential
Hydrograph Peaks
Hydrogen Ion Activity
Humidity
Flotsam
DO
Cl
Chlorophyll
Ca
%DO
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
60.0%
70.0%


Most Commonly Used Explanatory Variables
> 10% of Studies
Rainfall
Wind
Turbidity
Waves
Water Temperature
Stream Discharge
Sunlight
Date
Air Temperature
Tides
Water Depth
Conductivity
Atmospheric Pressure
0.0%
10.0%
20.0%
30.0%
40.0%
50.0%
60.0%
70.0%