

Lakes, Landscape, and R:

A framework for open science on freshwater cyanobacteria

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Chicago, IL

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Twitter?



hashtag: #usiale2018 #rstats #cyanobacteria

me: @jhollist

Open Science?

Why open science?

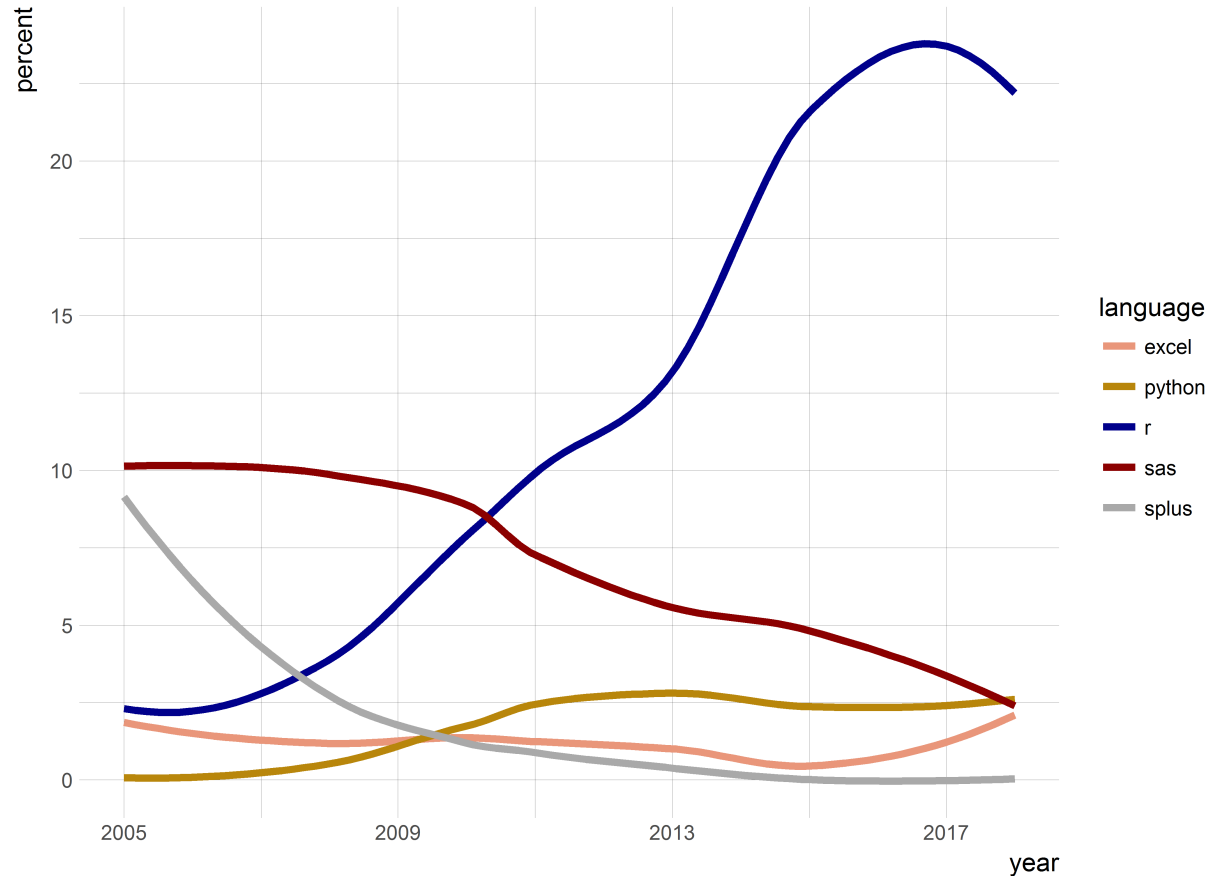
- Often required
 - Government/Funders/Journals
- Benefits researchers
 - [Mciernan et al. \(2016\) How open science helps researchers succeed](#)
- Improves quality
 - [The classic example: Reinhart and Rogoff](#)
- Benefits to society
 - ["Sharing of Data Leads to Progress on Alzheimerâ€™s"](#)



Open Science Solutions

- Publishing
- Data
- Code

R in Landscape Ecology



Text mining facilitated by [rOpenSci's](#) awesome [fulltext](#) package

R in Landscape Ecology

- Foundations
 - [sp](#), [rgdal](#), [raster](#), [rgeos](#)
 - [sf](#), [stars](#)
- Speciality
 - [landsat](#)
 - [SDMtools](#)
 - [nlmr](#)
 - [landscapetools](#)

R, lakes, and cyanobacteria at USEPA

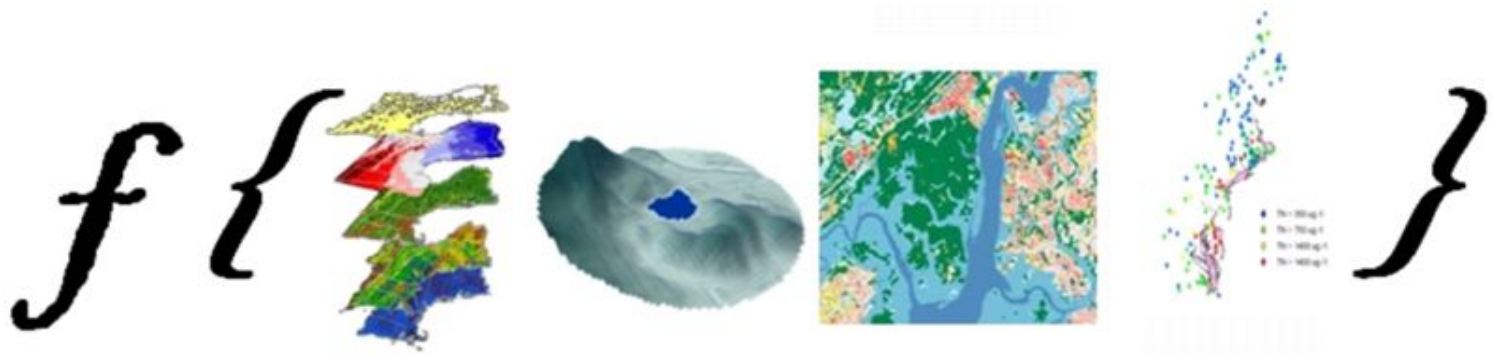
Who are we?

- Ecologists
- Computational focus
 - Enough to be dangerous
- 3 FTE
 - Myself
 - Betty Kreakie
 - Bryan Milstead
- 1 Post-doc
 - Stephen Shivers
- Alum
 - Farnaz Nojavan



What do we do?

- Apply computational approaches to understand water quality impacts in lakes
- Open Science
- Use R
 - Analysis
 - Sharing code
 - Solve common problems



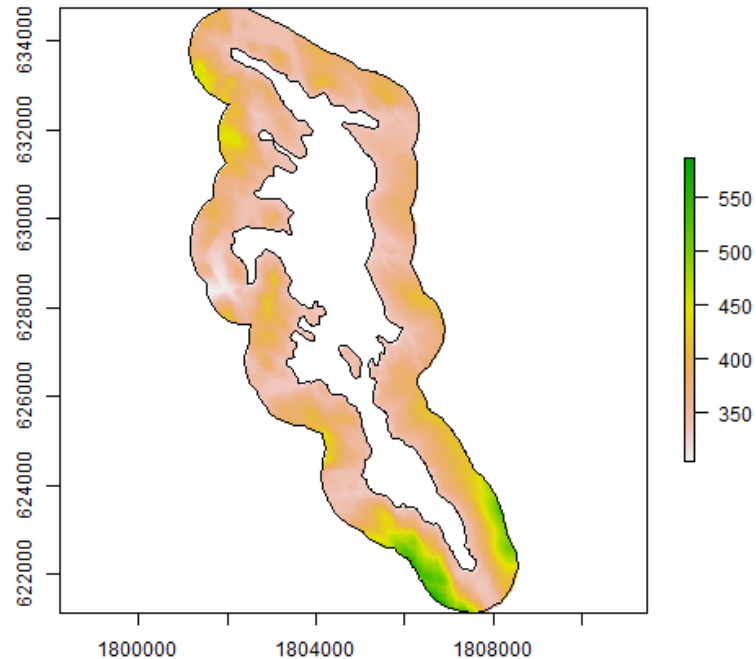
Packages to solve common problems

- lakemorpho
- elevatr
- goatscape (in development)

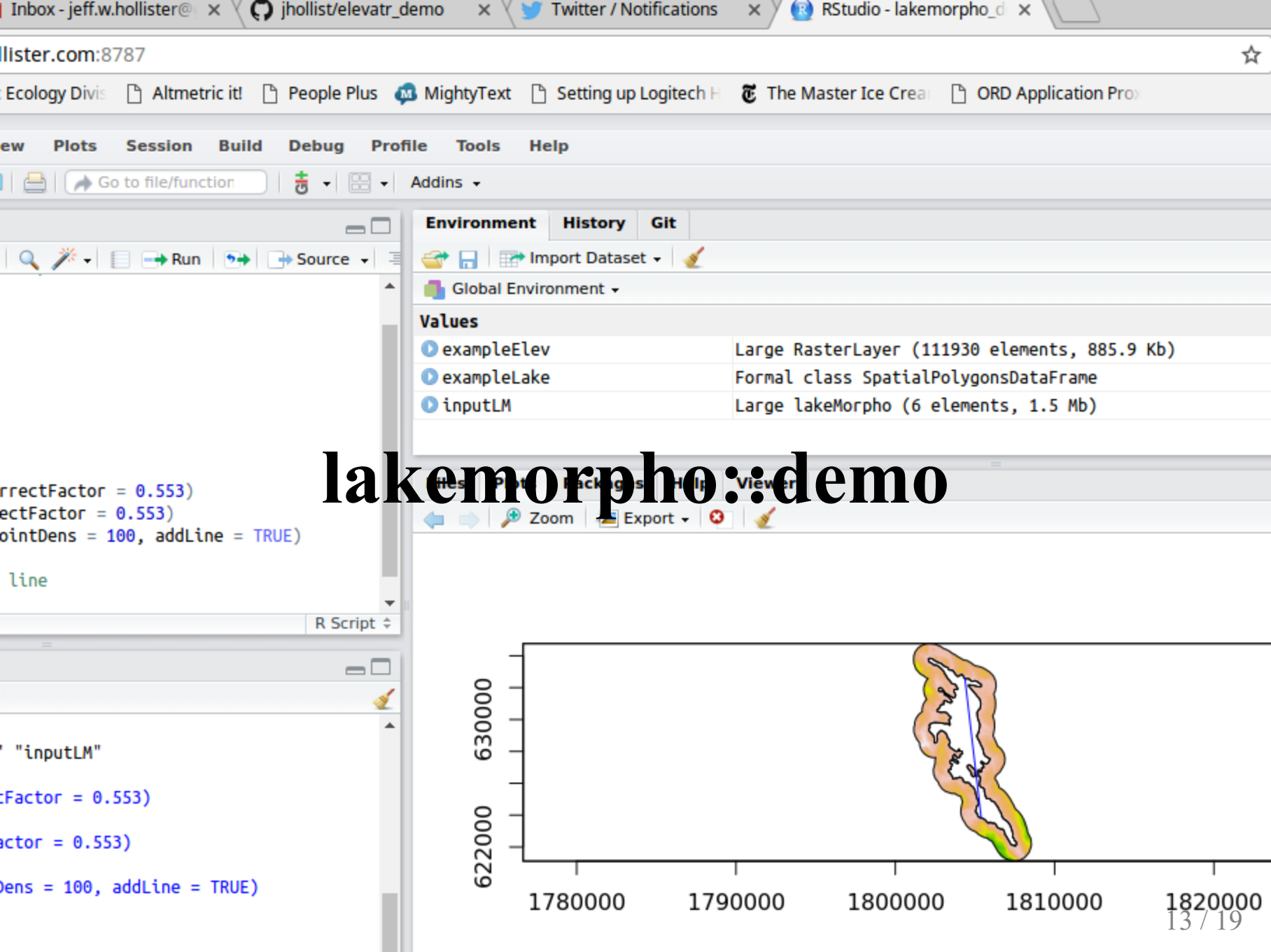


lakemorpho

- Lake morphometry metrics in R
- Built off of `sp`, `rgdal`, `rgeos`, and `raster` suite
- Version 1.0
 - August 2014
- Version 1.1.0
 - December 2016
- `sf` support to be added
- [National Lake Morphometry](#)
- [Some metrics included in NHD+](#)
- [Hollister and Milstead \(2010\)](#)
- [Hollister *et. al.* \(2011\)](#)
- [Hollister and Stachelek \(2017\)](#)

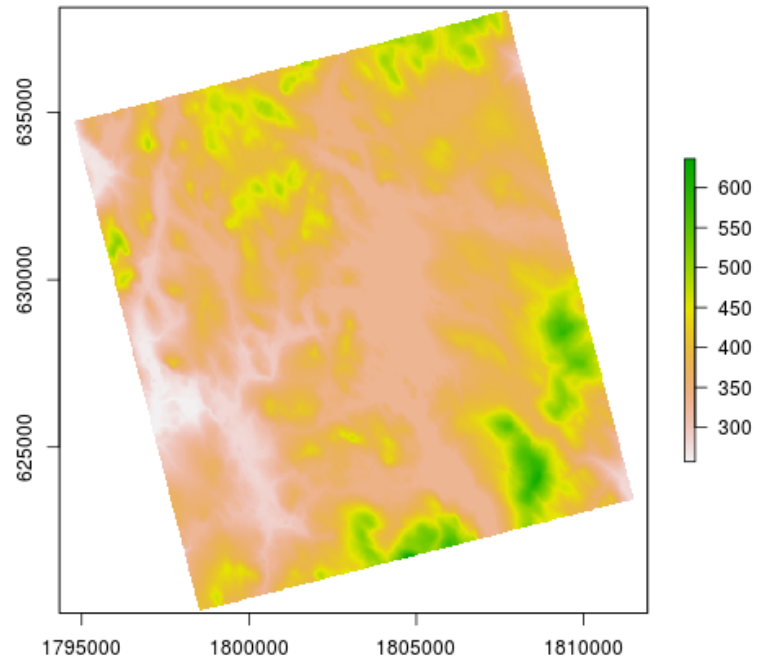


Package URL: <https://cran.r-project.org/package=lakemorpho>



elevatr

- Access elevation data in R
 - Mapzen
 - AWS
 - USGS
- Built off of `sp`, `rgdal`, `rgeos`, and `raster` suite
- Version 0.1.1
 - January 2017
- Version 0.1.3
 - March 2017
- Will be paired with `lakemorpho`
- `sf` support to be added



Package URL: <https://cran.r-project.org/package=elevatr>

hollister.com:8787

Ecology Divis | Altmetric it! | People Plus | MightyText | Setting up Logitech H | The Master Ice Crea | ORD Application Pro

ew | Plots | Session | Build | Debug | Profile | Tools | Help

Go to file/function | Addins

pt elevations
at +ellps=WGS84 +datum=WGS84 +no_defs"
point(pt_df, prj = ll_wgs84)

DEM
raster(lake, z = 12, src = "aws")

R Script

514 (nrow, ncol, ncell)
)
, 620036.4, 638140.2 (xmin, xmax, ymi
=20 +lat_2=60 +lat_0=40 +lon_0=-96 +x_0
n +no_defs +ellps=GRS80 +towgs84=0,0,0
n, max)

Environment | History

Import Dataset

Global Environment

Data

pt_df | 5 obs. of 2 variables

Values

lake | Formal class SpatialPolygonsDataFrame

Files | Plots | Packages | Help | Viewer

elevatr::demo

635000
625000

1780000 1790000 1800000 1810000 1820000 1

15 / 19

goatscape

- New effort with Bryan Milstead
- What's in a name?
- Summarizes ancillary data for a user-defined landscape polygon
 - Census (via `censusapi`)
 - Landcover
 - Impervious
- Accepts arbitrary spatial data for the landscape
- Based on `sf` and `tidy` by design
- <https://github.com/usepa/goatscape>



Take Home Message

Take Home Message

- R is awesome
- Can be used for a wide array of uses (including this talk)
- Increasing use in LE
- Our packages and Others

Thanks!

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Slides created via the R package [xaringan](#).