R You Ready for EDDIE?

Before coming to class, make sure your computer is ready to run the *Macro-Scale Feedbacks* module by completing the following tasks:

A) Download and install R **and** RStudio

If you have not used R before, you will need to download and install a copy of the software to your computer. In addition, RStudio provides a user-friendly interface for running R and viewing plots.

1) Go to the **R website** (https://www.r-project.org). Then, under the Getting Started section, click on the link that says **download R**.

   a. R software is downloaded from a CRAN (Comprehensive R Archive Network) mirror. For the fastest download, scroll to your country, then select the CRAN link that is closest to you, geographically. For example, in Blacksburg, Virginia, USA the closest CRAN would be http://archive.linux.duke.edu/cran, hosted by Duke University in Durham, North Carolina, USA.

   b. From your local CRAN, select the download link ("Download R for") that matches your computer operating system (Windows, Mac).
      i. **Windows:** Click the link that says **install R for the first time**. Then, within the gray box, click the link that says **Download R x.y.z for Windows**, where x, y, and z are different numbers that designate the current version of R. This should start the file download. Proceed normally as with any new PC program, following the automated download instructions.

      ii. **Mac:** Under the section labeled "Files", click on the first blue link that ends in .pkg. This is the most recent R binary file. This should start the file download. Proceed normally as with any new Mac application, following the automated download instructions.

2) Go to the **RStudio website** (www.rstudio.com/products/rstudio/download/#download).

   a. Under **Installers for Supported Platforms**, select the link that matches your computer operating system (Windows, Mac) to download and install RStudio.
      i. **Windows:** Double-click the .exe file and proceed normally as with any new PC program, following the automated install instructions.

      ii. **Mac:** Double-click the .dmg file; this will open a new window in your desktop. Drag the RStudio icon to the Applications folder to install it in your computer.

B) Install packages used in this Macrosystems EDDIE module

Within R, researchers have developed "packages" that group together code and functions to allow you to easily perform different types of computing tasks. You'll need to use multiple packages during the module activities, and it will be easiest to go ahead and install all of them ahead of time.

1) Now that R and RStudio are installed, open RStudio. The default window on the left of the screen is called the Console, and you can write commands in this window. The two

windows on the right include tabs that you can view to see the history of code you've already run and your workspace, plots of figures you've made with your code, packages you've installed, and the files you have open in your working directory.

2) To install the packages, copy and paste the following lines of code to the right of the > in the Console, then press Enter. **Note:** You need to be connected to the internet to complete the package installation.

```
install.packages('sp')
install.packages('devtools')
library(sp)
library(devtools)
devtools::install_github("CareyLabVT/GLMr")
devtools::install_github("CareyLabVT/glmtools")
```

As you're installing the packages, you might see a lot of red output messages. However, you can check that they downloaded successfully by running the following two commands to load the packages:

```
library(glmtools)
library(GLMr)
```

If the packages installed correctly, they should load without any error messages.

C) Download and unzip the Macro-Scale Feedbacks module files

All the files you'll need for the module are available for download online as a zip file (http://module4.macrosystemseddie.org/). We've organized the files within the folder to make it easy to load and run through RStudio. Follow the directions below to extract and organize your files:

1) Click on the .zip file link, and save to your computer (e.g., Downloads folder or Desktop)
2) Navigate to where the .zip file was downloaded, then right click and select extract (**PC**) or double click on the file to automatically unzip it into a new folder (**Mac**). Make sure the unzipped folder is moved to the **Desktop**.
3) Check that everything was extracted correctly by navigating to your Desktop and double-clicking the folder "macroscale_feedbacks". The following separate files and folders appear inside the folder. **Do not open** any files yet; just make sure they're in the folder.

In the main folder, you'll see two files: (1) MSF_R_script.R, and (2) Variable_Name_Metadata.xlsx

There are also subfolders named for each lake (e.g., Mendota, Sunapee, FallingCreek). Within each lake folder, you'll find the following file types and files:

- *Model parameter files*- (1) glm2.nml, (2) aed2.nml, (3) aed2_phyto_pars.nml, (4) aed2_zoop_pars.nml
- *Inflow/outflow files*- (1) inflow.csv, (2) outflow.csv
- *Meteorological driver file*- (1) met_hourly.csv, (2) met_hourly_plus2.csv, (3) met_hourly_plus4.csv, (4) met_hourly_plus6.csv