GitHub for Fisheries Scientists

AFS-AK Chapter Workshop

February 23, 2022

12:00–1:30 PM

Instructors: Justin Priest and Sara Miller

https://github.com/justinpriest/github_demo_adfg

Welcome! Your Instructors:

Sara Miller

ADF&G Biometrician 3

Justin Priest

ADF&G Fisheries Biologist 3

Overview

1 – What is GitHub

2 – Why use GitHub?

3 – How to use GitHub

4 – Show me the demo!

5 – Concluding Thoughts / Best Practices / Resources

1 – What is GitHub?

1 – What is GitHub?

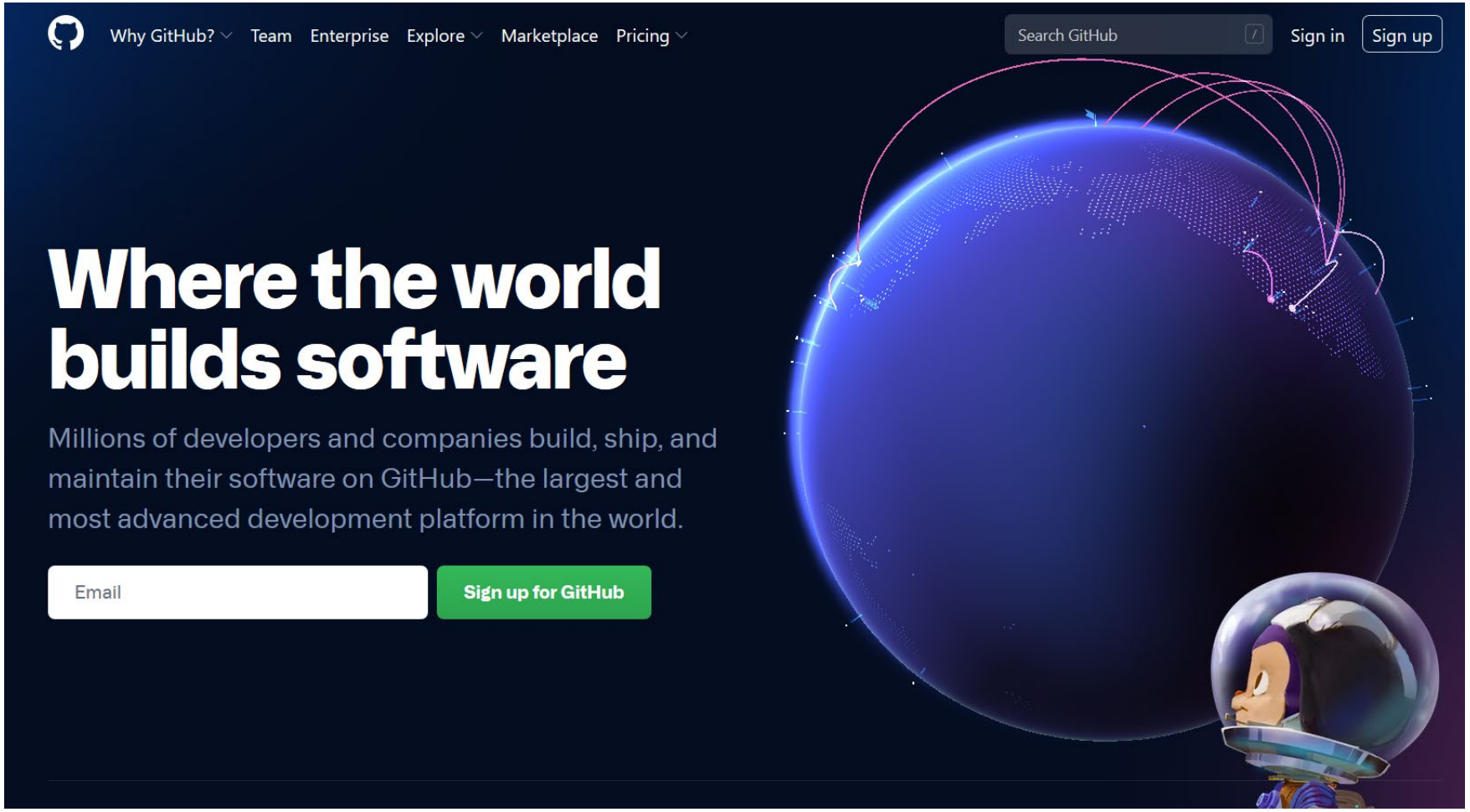
GitHub

- Git is the underlying tech
  - Integrates a version control program into other programs
- Backend (behind the scenes)

- GitHub is a specific site
  - Other sites too (e.g., GitLab and BitBucket)
- Front end (website interface)

1 – What is GitHub?

GitHub is a website that syncs with software on your computer to upload your files to github.com



1 – What is GitHub?

- Git is versioning control software
- This means we can keep track of new additions (in green) and deletions (in red)
- Later, we'll cover more about benefits

Created first draft of the trigger assessment RMD

Browse files

master

justinpriest committed on Dec 6, 2020 1 parent d592030 commit 14fb5a26a6c3063885f786a7a73380be35c8cdfe

Showing 2 changed files with **574 additions** and **2 deletions**. Unified Split

7 code/3_US_figures.R

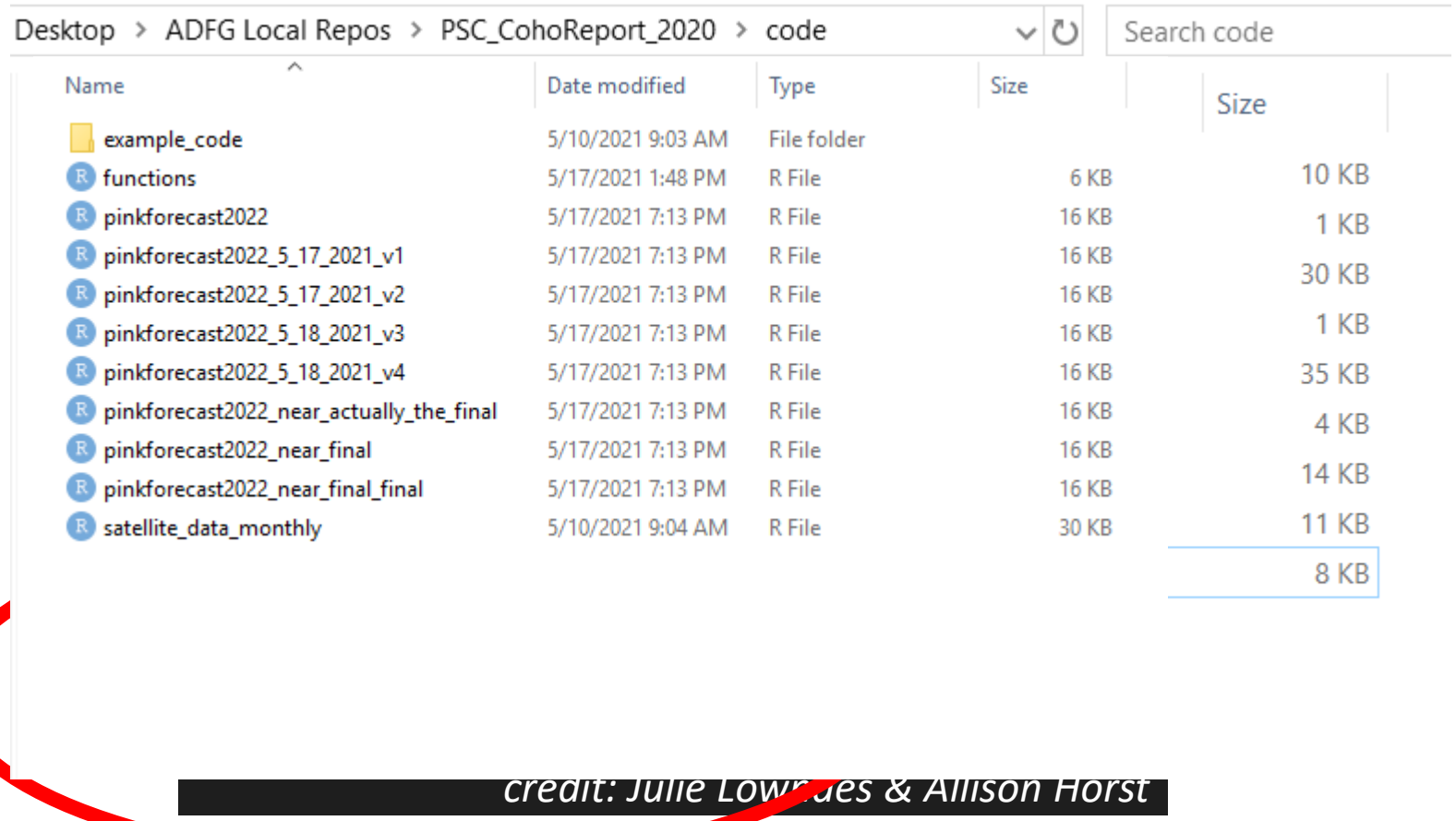
```
@@ -14,6 +14,7 @@ source(here::here("code/1_US_data_import.R"))
14 14   troll_cpue <- read_csv(here::here("data/SEAK_Coho_TrollFPD_1981-2019.csv"),
15 15                          guess_max = 84000) %>% #increased guess b/c of many blanks
16 16      rename("Gear" = `Gear Code`,
   17 +           "TripNum" = `Trip No`,
17 18             "SellDate" = `Sell Date`,
18 19             "StatWeek" = `Stat Week`,
19 20             "TrollArea" = `Troll Area`,
@@ -25,8 +26,10 @@ troll_cpue <- read_csv(here::here("data/SEAK_Coho_TrollFPD_1981-2019.csv"),
25 26      mutate(SellDate = as_date(as.POSIXct(SellDate, format = "%m/%d/%Y", tz = "US/Alaska")),
26 27             District = as.factor(District),
27 28             Effort_boatdays = DaysFished * HoursPerDay / 13, # Effort is standardized to a 13 hour boat day
28    -            CohoCPUE = CohoCatch / Effort_boatdays) %>%
29    -    dplyr::select(Year, SellDate, StatWeek, TrollArea, District, StatArea, CohoCatch, Effort_boatdays, CohoCPUE)
   29 +            CohoCPUE = CohoCatch / Effort_boatdays,
   30 +            TripNumber = paste0(Year, "-", TripNum)) %>%
   31 +    dplyr::select(Year, TripNumber, SellDate, StatWeek, TrollArea, District,
   32 +                  StatArea, CohoCatch, Effort_boatdays, CohoCPUE)
```

2 – Why Use GitHub??

2 – Why use GitHub: Version Control

Versioning: The bane of digital file storage

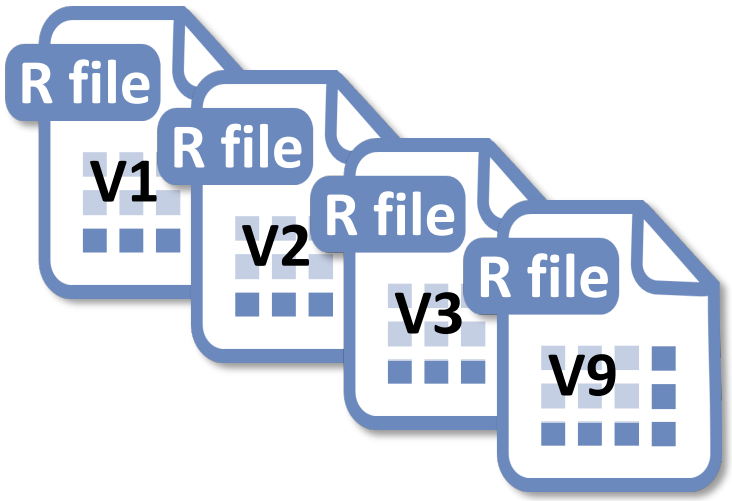
Enter Version Control!

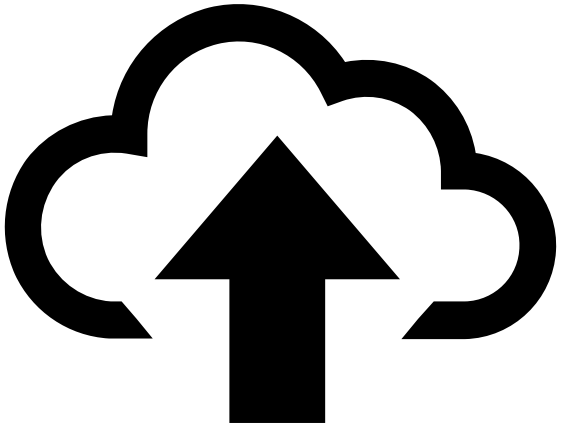


2 – Why use GitHub?

GitHub helps scientists with:

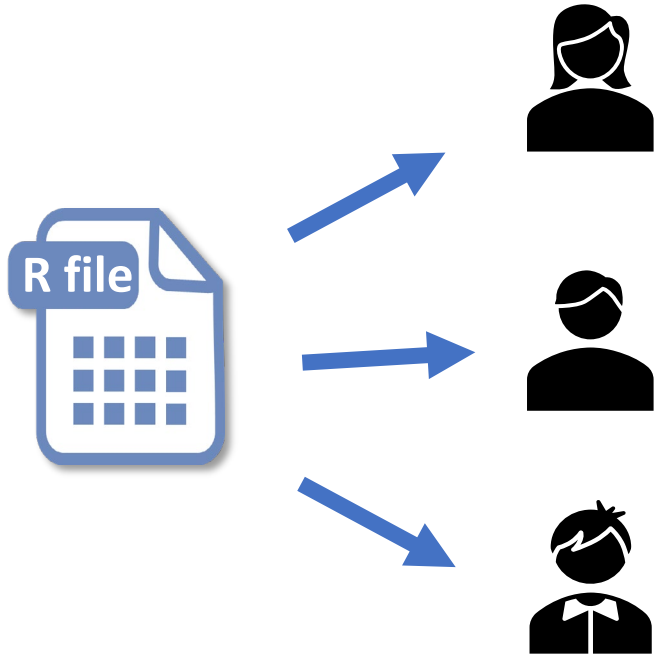
Version control helper





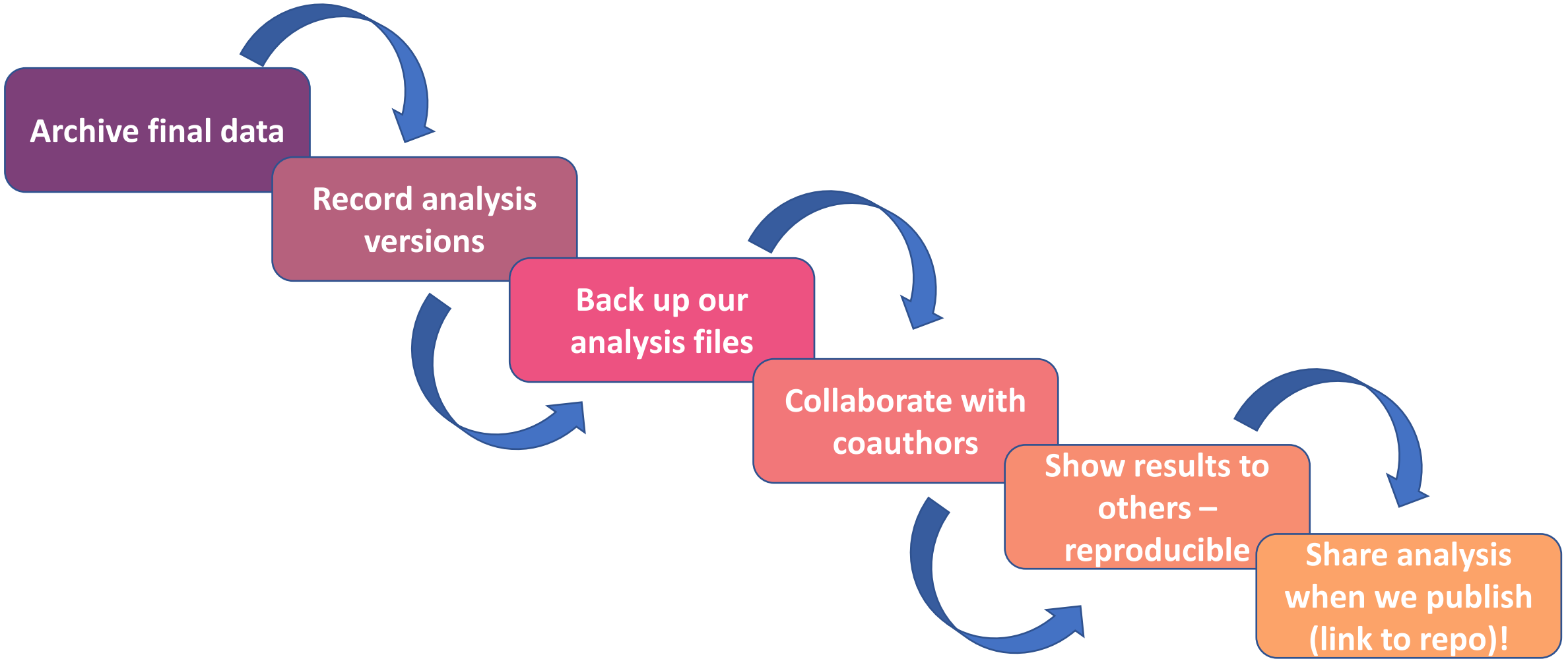
Project & data analysis storage

Code sharing



2 – Why use GitHub?

As scientists, we can use GitHub over a project's lifecycle:



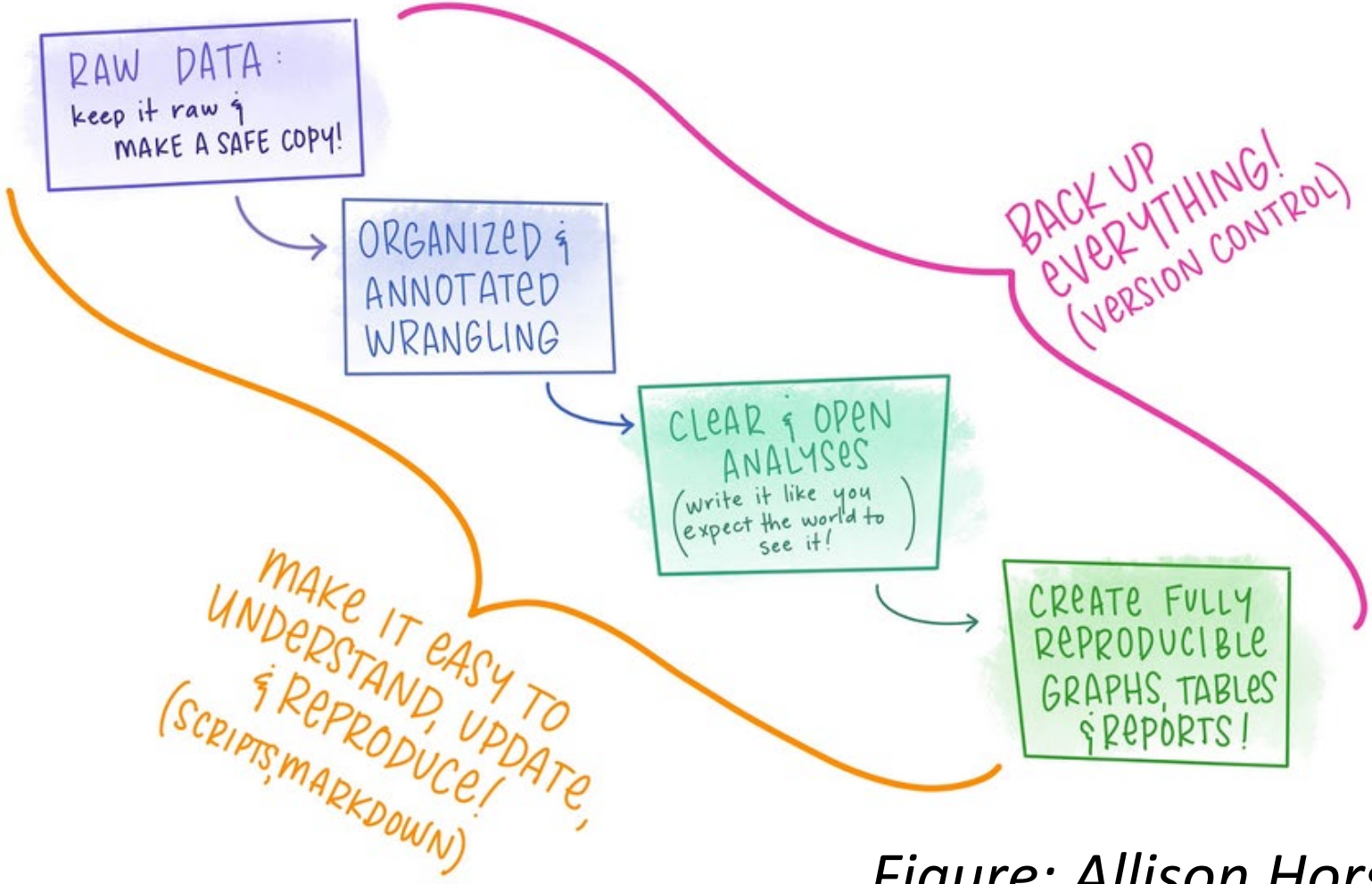


Figure: Allison Horst

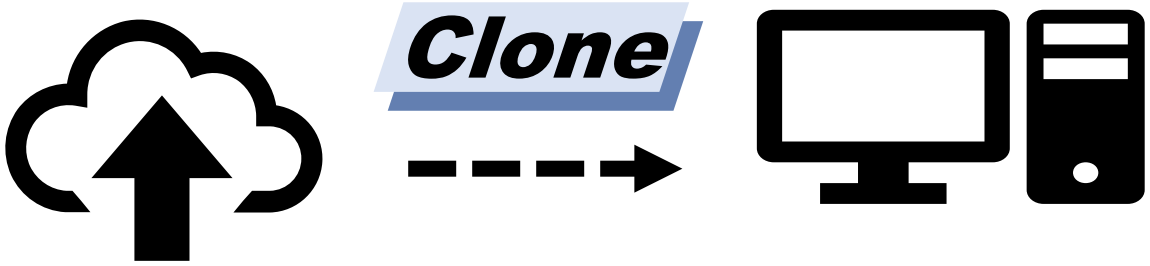
3 – How To Use GitHub

One time setup & daily usage

3 – A bit of Jargon

repo (repository)	=	a “folder” containing an individual project
remote	=	the repo on github.com
local	=	the repo on your computer
clone	=	copy the remote repo to your computer
pull	=	fetching in changes or merging them
push	=	send changes to a remote repo
commit	=	individual change to a file
fork	=	copy of a repo (allows you to freely experiment with changes without affecting the original project)

3 – A bit of Jargon



3 – How to use GitHub: Setup

One Time Setup, part 1

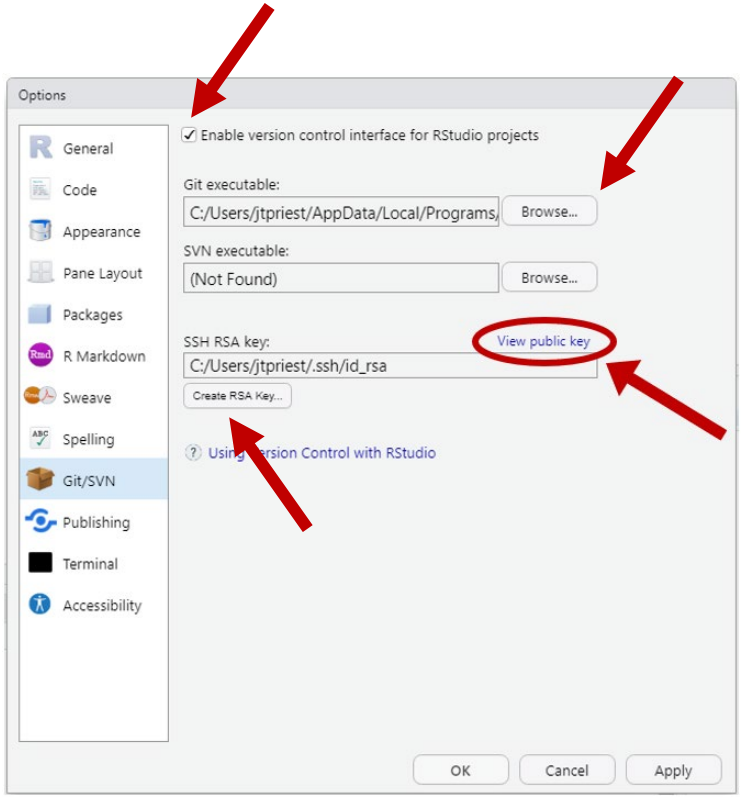
- Get a free account from github.com

- Download & install the program “git”
  - Note the folder where this installs. In Windows common places are
    C:\Users\jtpriest\AppData\Local\Programs\Git *(change to your username)*
    C:\Program Files\Git
  - Accept all default settings and click through until installed.

3 – How to use GitHub: Setup

One Time Setup, part 2

- In RStudio, under Tools, -> Global Options ->“Git/SVN”
  - In the window that pops up, select “Enable version control interface for RStudio projects”.
  - Under “Git executable” click browse and select the correct folder noted before. Select the git.exe file, typically found in folder “bin”.
  - Next click “Create RSA Key”. Note folder location. Give it a memorable password, then click Create. Once it is done, you’ll see some random art and file info. Click Close.
  - Now you’ll want to open up and view this key. Click the small blue “View public key”. At this point you’ll see some random text that starts with “ssh-rsa”. Copy this!
- Open up github.com and go to your profile settings
  - Click on “SSH and GPG keys” on the left. Click the green “New SSH key” button. Paste the key from RStudio in the key section. Give this key a unique title describing which computer you’re using.



3 – How to use GitHub: Setup

One Time Setup, part 3

- In RStudio, install and load package “usethis”. Run this code

```
library(usethis)
use_git_config(user.name = “Your Name”, user.email = “your.email@alaska.gov”)
git_sitrep() # This shows current name, directory, and other settings
```

Yes, you do have to change these!

3 – How to use GitHub: Setup

Setup complete!

Only a little painful and you'll never have to do that again!

3 – How to use GitHub: New proj

How to set up a new project to work in

Step 1 – Create/choose repo on github.com

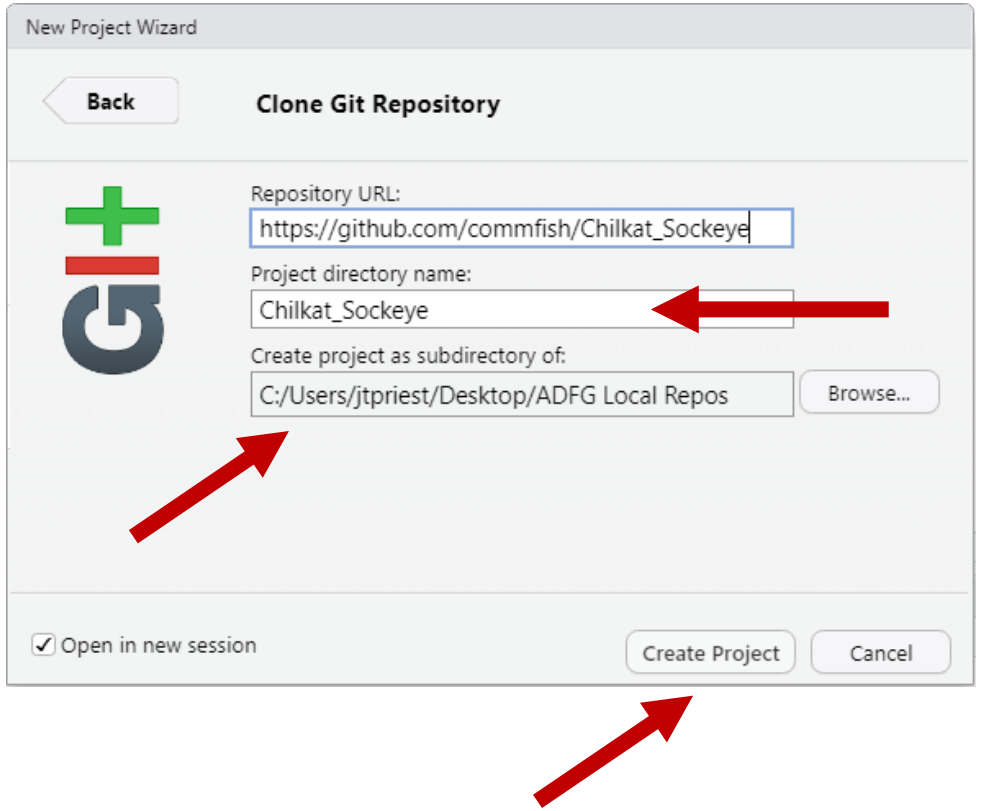
- Project already exists on GitHub (“clone” it to your computer)
  - Go to repo webpage on GitHub and copy entire URL at the top (e.g., https://github.com/commfish/Chilkat_Sockeye); or
  - Click on green code button in the repo (https://...) OR
- Create a new project
  - While logged in, click green “New” repo button or go to https://github.com/new
  - Give it a name, chose public/private, add readme, (optional license & gitignore)
  - Copy entire URL at top

3 – How to use GitHub: New proj

How to set up a new project to work in (cloned project)

Step 2 – Connect RStudio Rproject to the repo

- Open RStudio. Click File -> New Project -> Version Control -> Git. Paste in the github.com address into the Repository URL (https://github.com/commfish/Chilkat_Sockeye)
- It auto fills Project Directory Name (this will be local folder name; change if you like). Set the directory where this folder will be. Open in a new RStudio session (or not).
- Click Create Project and all files on GitHub repo will sync. If large project, might take a few min.



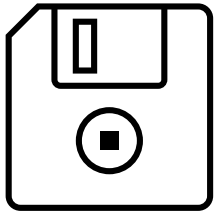
3 – How to use GitHub: Review

Review. We just:

- Created a GitHub account
- Connected our RStudio to this GitHub account
- Synced an RProject with a github.com repo

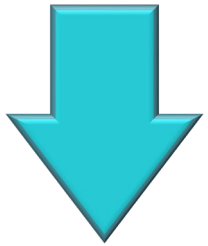
This. Is. huge! Now onto daily usage

3 – A bit (more) Jargon



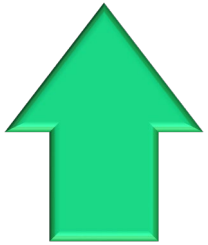
Commit

Prepping your changes for upload



Pull

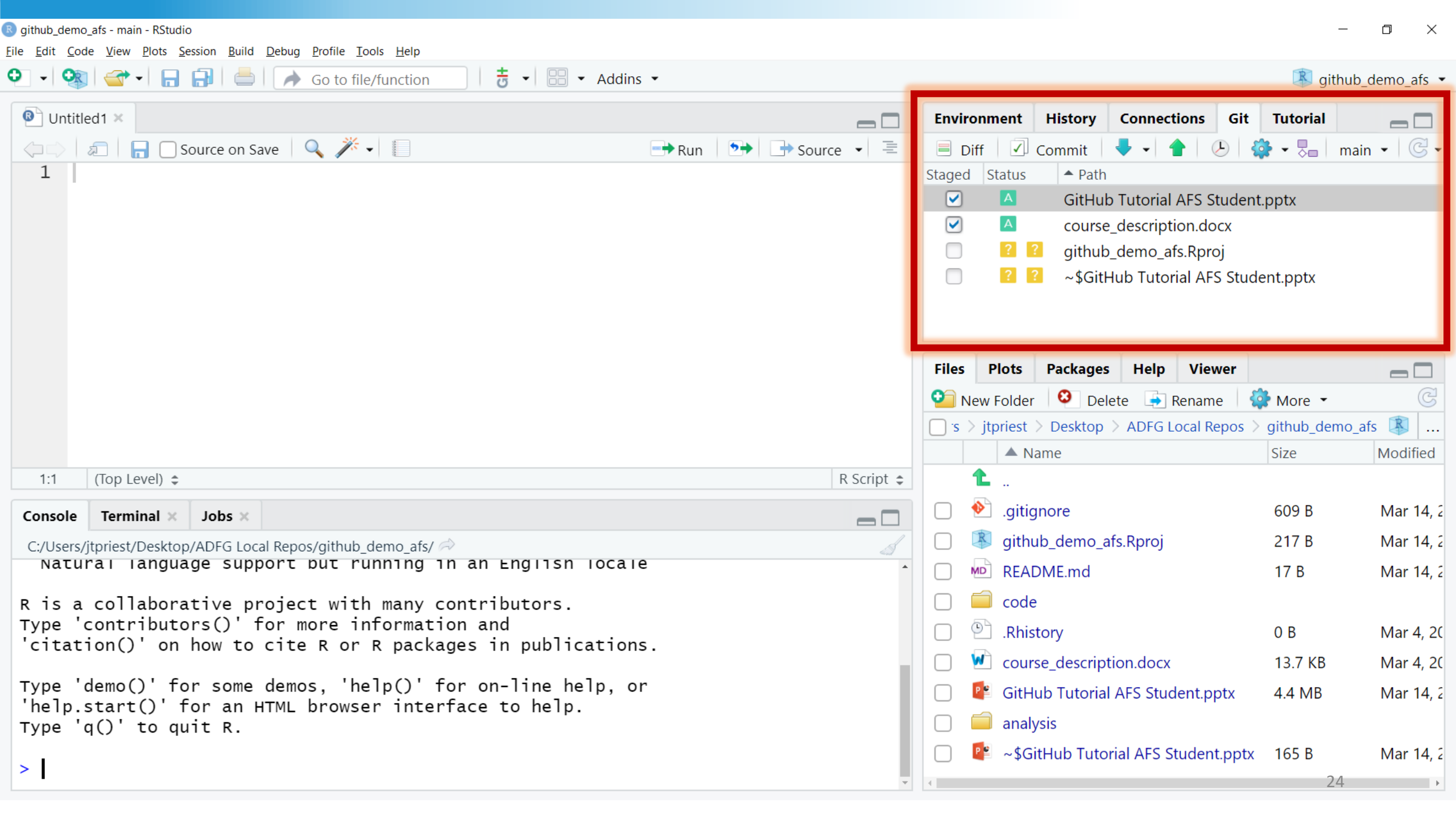
Download changes from github.com



Push

Upload commits to github.com

Perform them in this order!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Natural language support but running in an English locale
R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.
Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.
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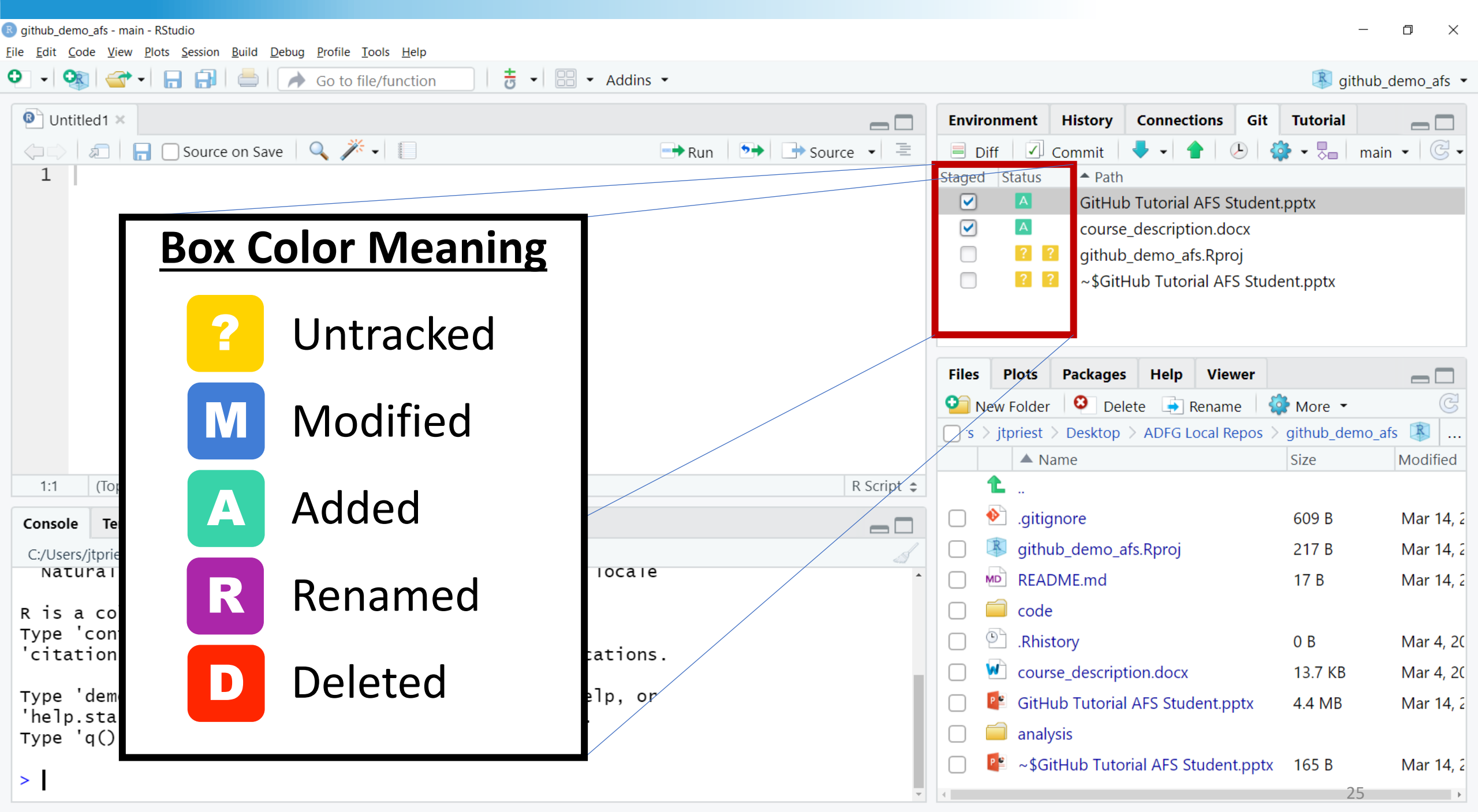
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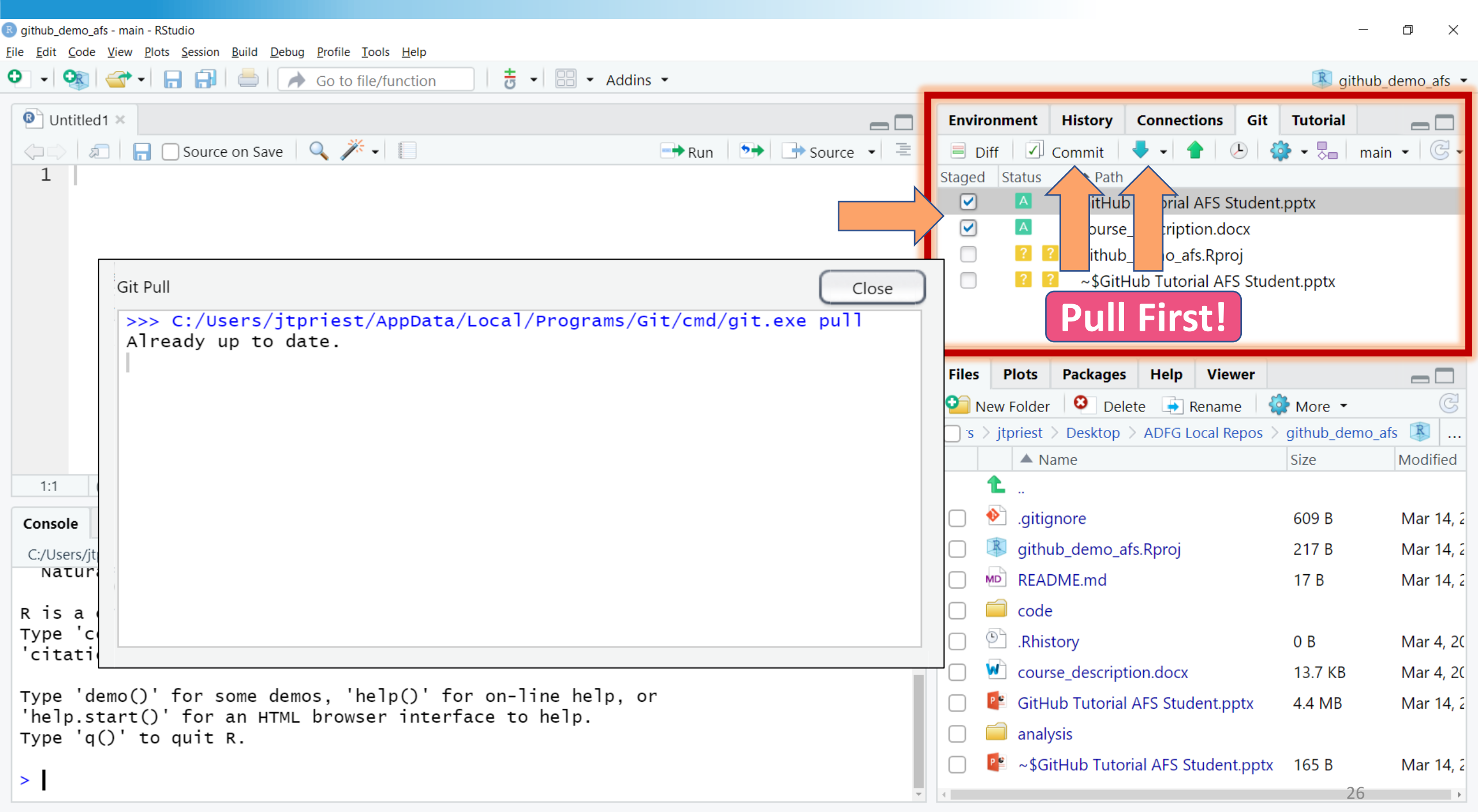
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Pull First!
Git Pull
Close
>>> C:/Users/jtpriest/AppData/Local/Programs/Git/cmd/git.exe pull
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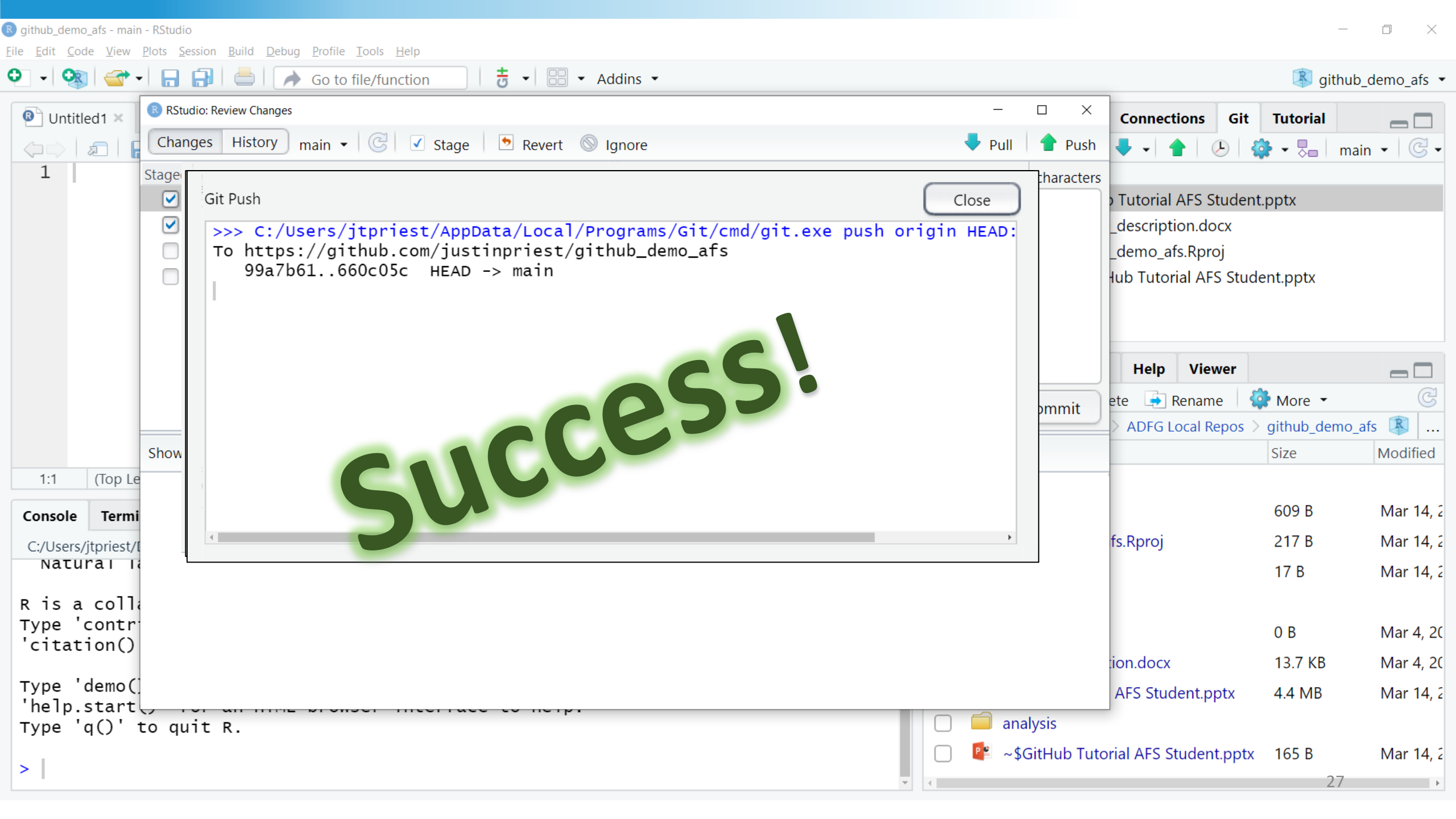
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RStudio: Review Changes
Changes History
main
Stage
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Ignore
Pull
Push
Git Push
Close
>>> C:/Users/jtpriest/AppData/Local/Programs/Git/cmd/git.exe push origin HEAD:
To https://github.com/justinpriest/github_demo_afs
99a7b61..660c05c HEAD -> main
Success!
Connections
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Tutorial
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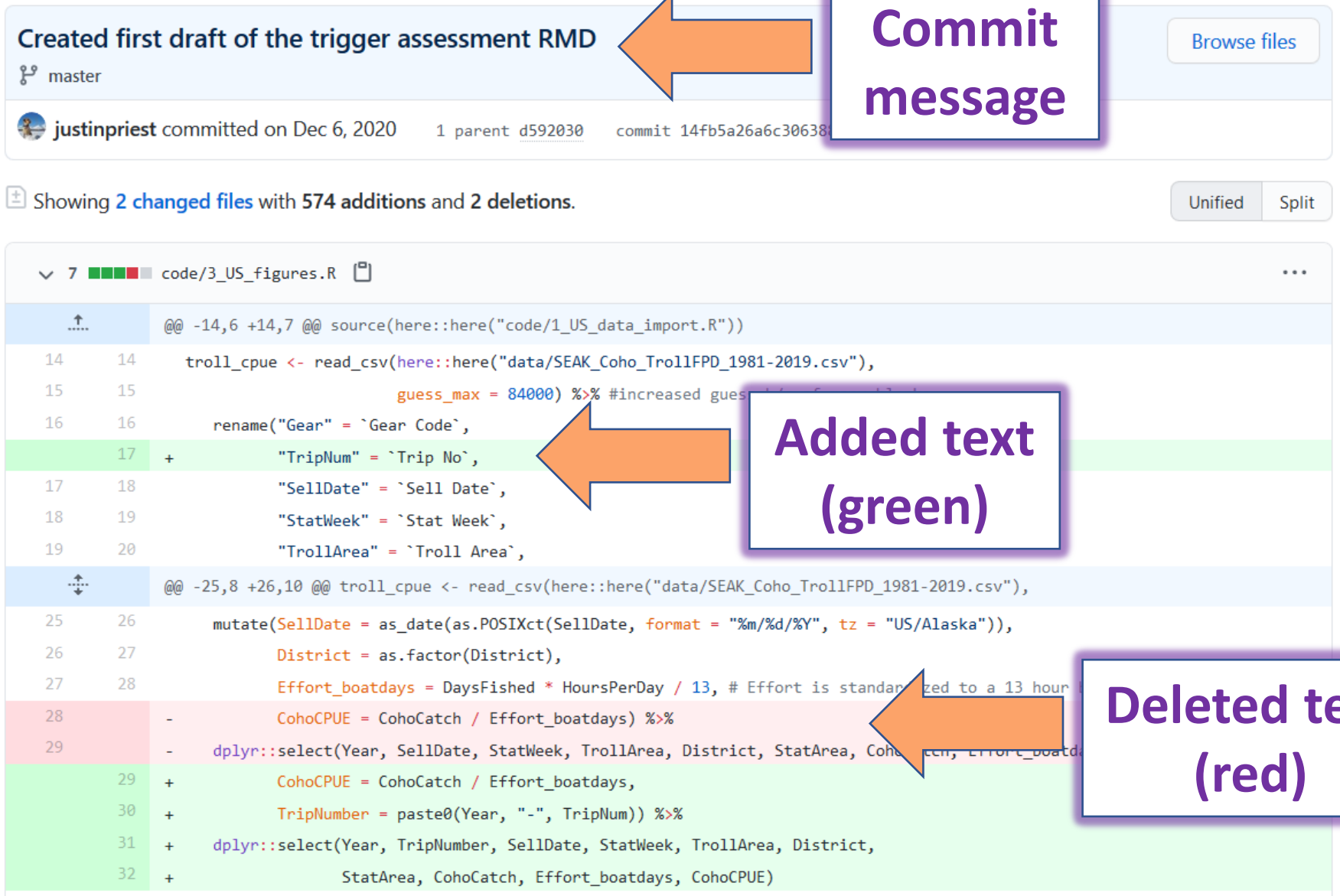
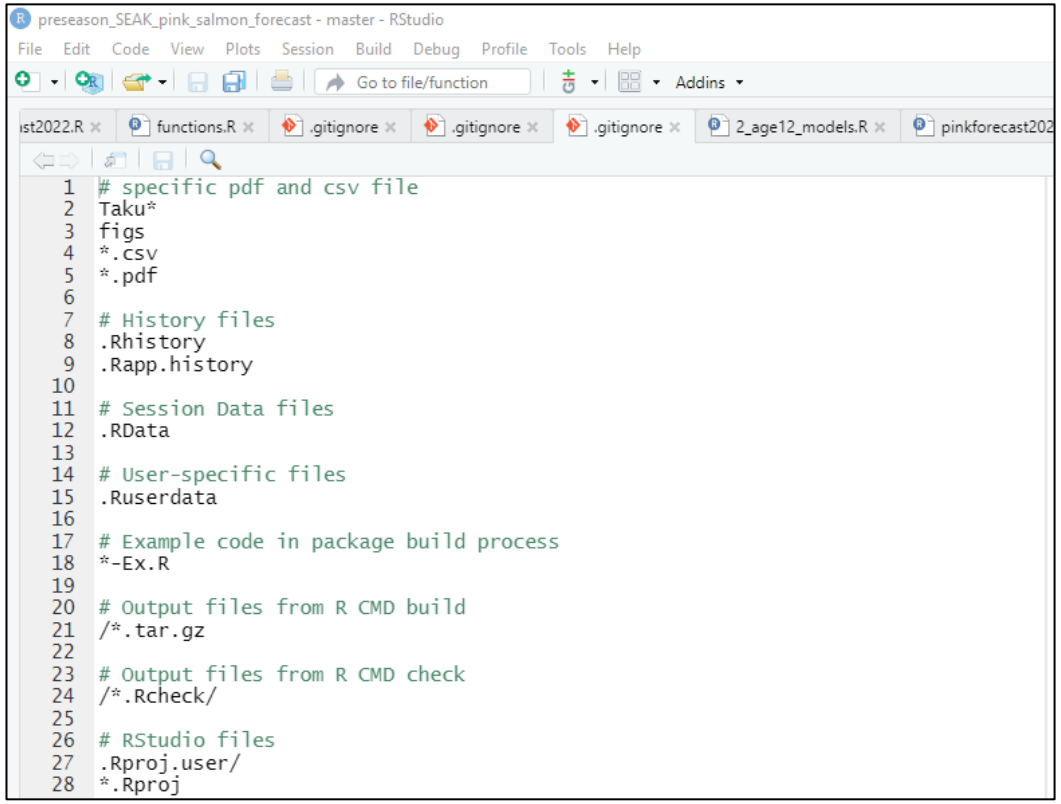
3 – How to use GitHub: Commits



3 – How to use GitHub: Private data

How to deal with confidential data

- Private repository (only invited individuals can see it)
- Summarize data
- Add to gitignore file
  - Don’t upload and add a readme file to the data folder (“Confidential data is not stored publicly. Contact someone@alaska.gov for access”)



4 – Show Me the Demo!

4 – Demo 1: Creating a repo

1

Follow along as I share my screen

4 – Demo 2: Cloning an existing repo

2

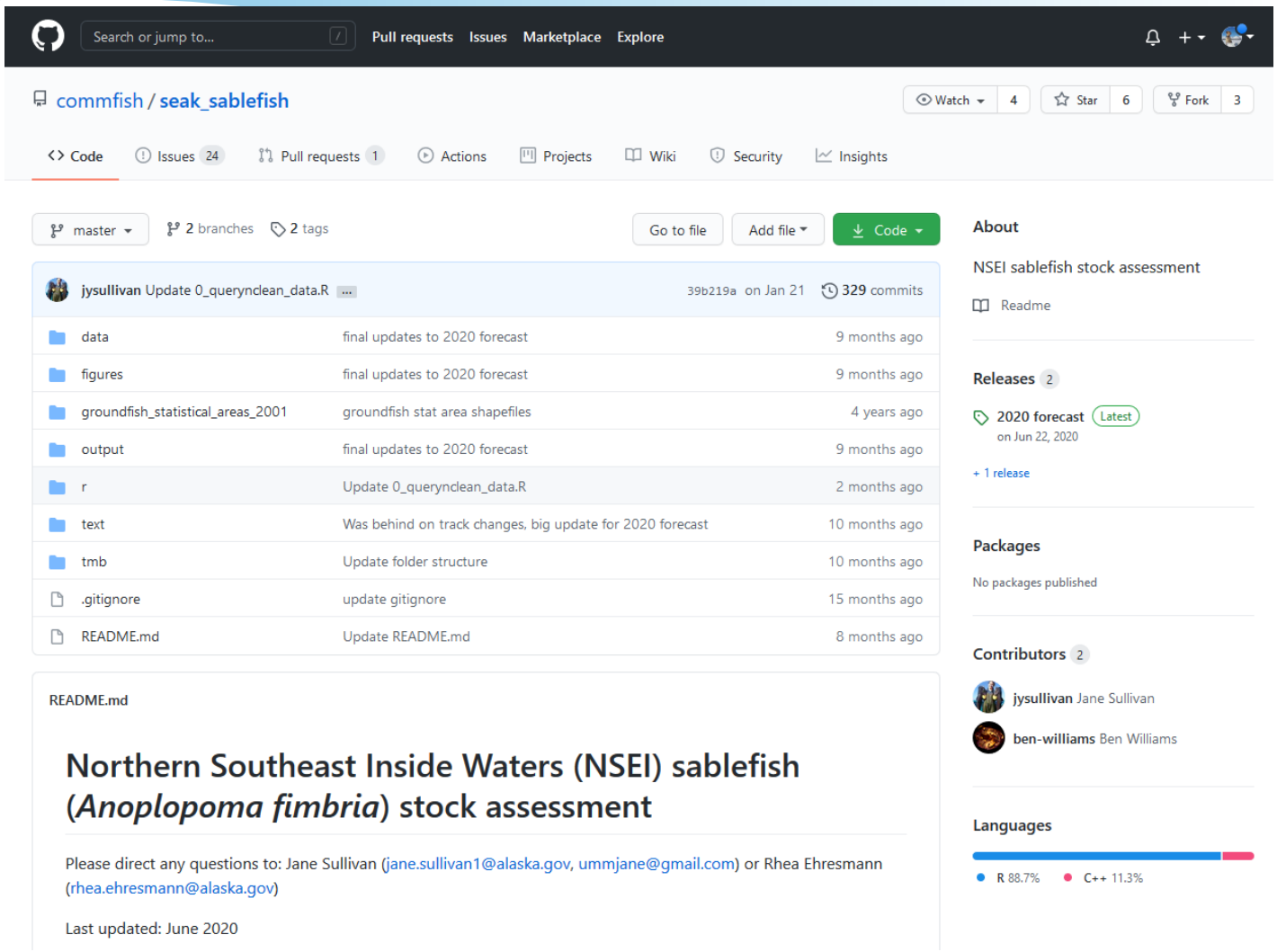
Follow along as I share my screen

4 – Demo 3: Collaboration!

3

Follow along as I share my screen

4 – Demo 4: Issues



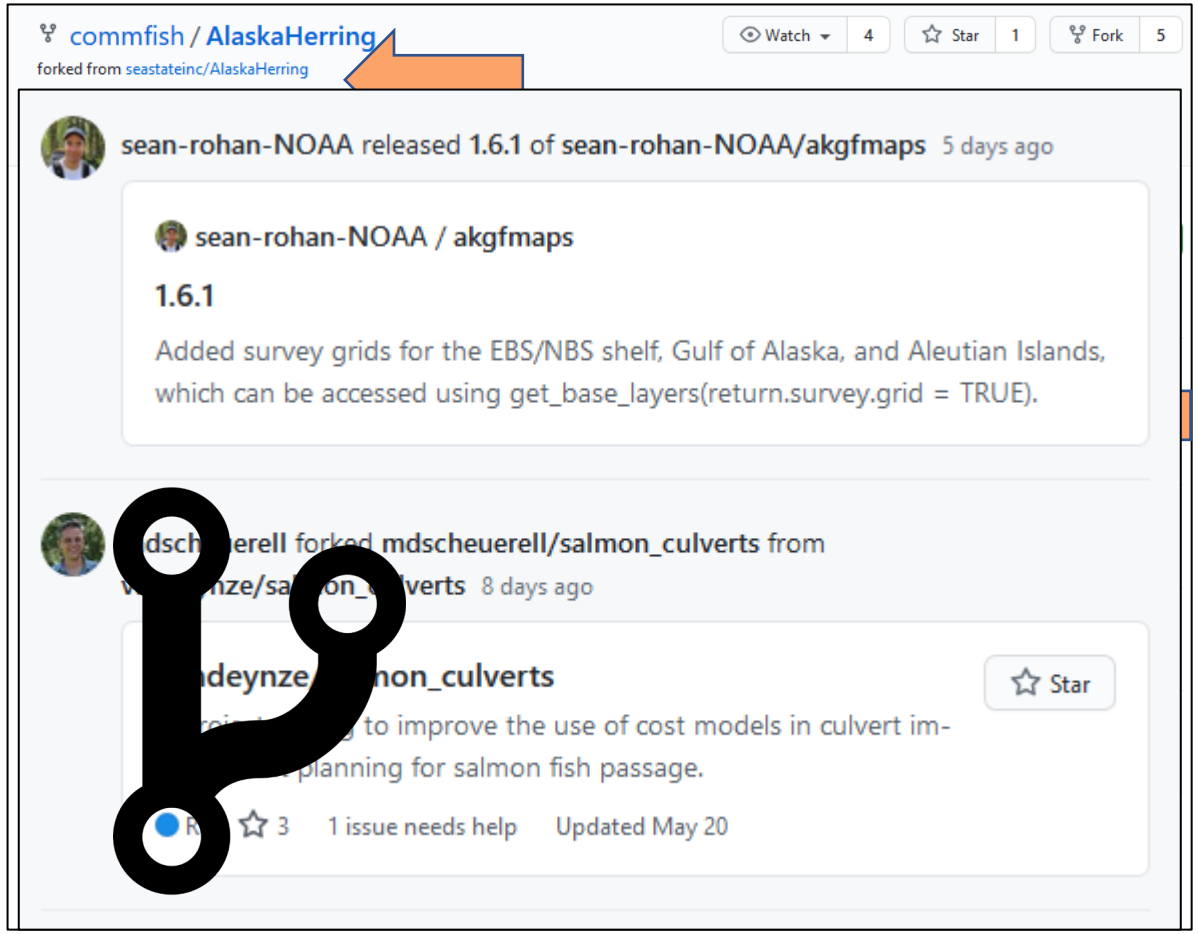
https://github.com/commfish/seak_sablefish

5 – Concluding Thoughts / Best Practices

5 – What else can GitHub do?

We've barely shown the capabilities of GitHub

- Issues can be assigned to people
- "Fork" an existing repo to modify it to your purposes
- Create a project website
- Build and store an R package
- Follow / learn others' code
- Add a "branch" to explore test features without modifying the main analysis



5 – Best Practices: CSVs

- Git works best with “raw” or script-based files: R scripts, RMD presentations, CSV files, etc.
- It works with MS Word, PowerPoint, .XLSX files, but difficult to compare changes
- Takeaway: If you can, use CSV files!

VS

5 – Best Practices: Reading Data

It's common to manipulate your data in Excel, save this file, then import/analyze in R

It's MUCH better to do all cleanup in R

- Saves steps for cleanup that are performed each time

5 – Best Practices: Naming

- If possible, don't use spaces, mixed cases, or periods in filenames or directories

Example:
X10_20.16_T_AND_Y410.csv
versus
taku_sockeye_age_comp.csv

- Name data and R files descriptively
  - If you are **changing** files, then adding a date can be beneficial
  - Be consistent across projects

Example:
sablefish_chathamsurvey_bio_1988_2016.csv
secm_survey_cpue_1988_2016.csv

- Use variables / column names that are:
  - Easy to understand
  - Short yet descriptive

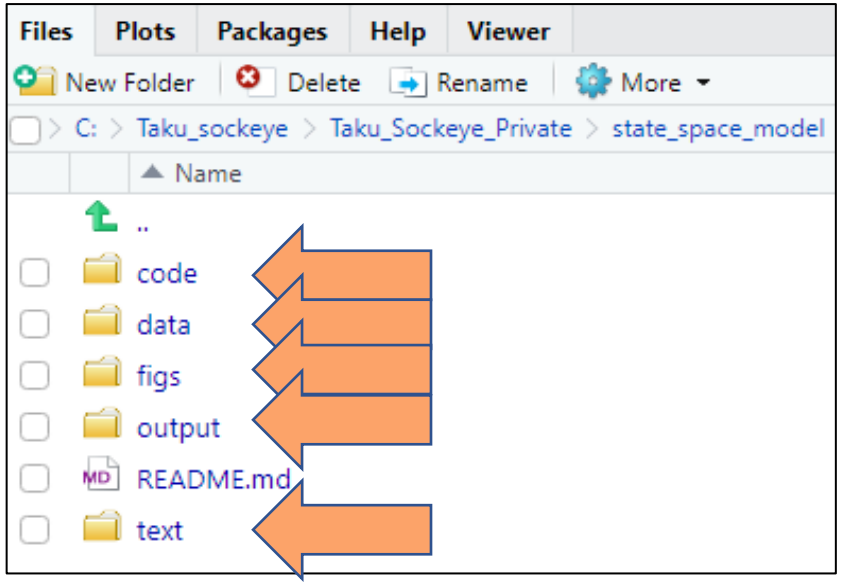
Example:
year, catch instead of c
cohocatch2016

Source: ADF&G Biometrics Best Practices

5 – Best Practices: Folders

Folder structure

- code
  - All scripts go here (use separate folders for R code, admb, etc.)
- data
  - Use raw data treat as a read only file; never adjust the contents of this file, access/modify via code only
  - Create a metadata text file describing all fields within the data files
- figs
  - Output charts as .png here
- output
  - results of analyses
- text
  - if writing a document it is easier to keep separate



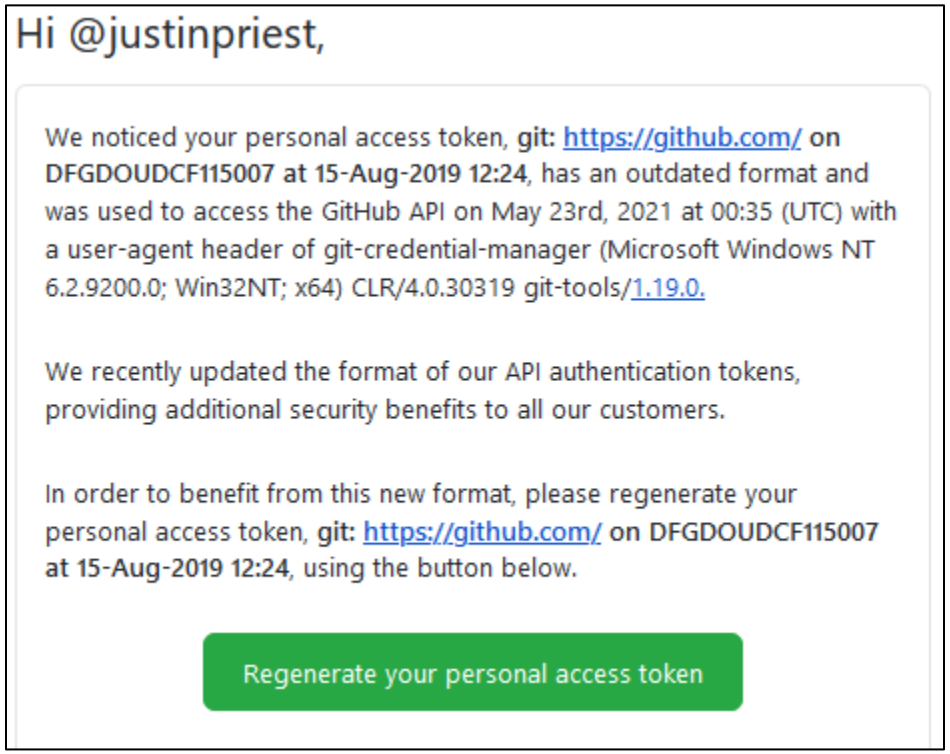
Source: [ADF&G Biometrics Best Practices]

5 – Best Practices: Other

```
# inputs
year.forecast <- "2022_forecast"
year.data <- 2021
year.data.one <- year.data - 1
sample_size <-  24 # number of data points in model
forecast2021 <- 28 # input last year's forecast for the forecast plot
data.directory <- file.path(year.forecast, 'data', '/')
results.directory <- file.path(year.forecast,'results', '/')
source('2022_forecast/code/functions.r')

# STEP 1: DATA
# read in data
read.csv(file.path(data.directory,'var2021_final.csv'), header=TRUE, as.is=TRUE, strip.white=TRUE) -> variables # update file names

# restructure the data
variables$CPUE <- variables$CPUEcal # Use CPUEcal as CPUE index
n <- dim(variables)[1] # number of years including forecast year
variables %>%
  mutate (SEAKCatch_log = log(SEAKCatch)) %>% # log catch variable
  dplyr::select(-c(SEAKCatch, CPUEcal)) -> log_data

# STEP #2: HARVEST MODELS AND SUMMARY STATS
# define model names and formulas
model.names <- c(m1='CPUE',
                 m2='CPUE + ISTI20_MJJ')
model.formulas <- c(SEAKCatch_log ~ CPUE,
                    SEAKCatch_log ~ CPUE + ISTI20_MJJ)
```

5 – Recent Update

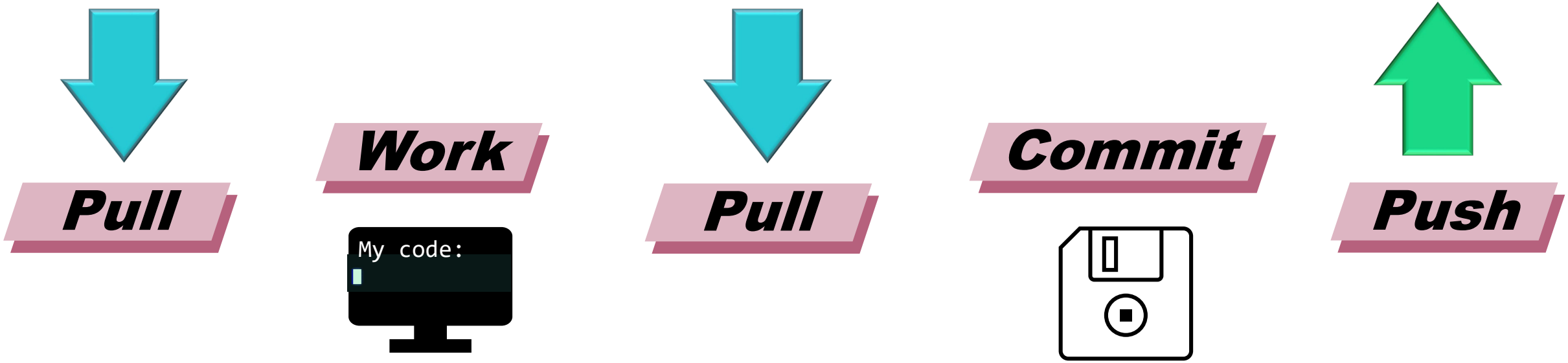
If you are already a GitHub user and got this email:



- In RStudio: Update packages “usethis”, “gh”, and “gitcreds”
- In Email: Click “Regenerate your personal access token”
- On GitHub.com: Click Regenerate token, copy text on next screen! (starts with “ghp_”)
- In RStudio: Run “gitcreds::gitcreds_set()”, select “2: Replace these credentials”, paste in new token text
- In RStudio: Run “usethis::gh_token_help()” to double check that everything looks good

Remember!

Pull -> Do your work -> Pull -> Commit -> Push



Additional Resources

- GitHub course for new users
- Library “Usethis” Config and Setup for GitHub
- Happy Git with R
- GitHub for Advanced Ecological Data Analysis
- R for Excel Users – Github brief intro

Troubleshooting

What if I have an existing RProject that I want to push to GitHub?

- Technically it's possibly to push an existing RProject to GitHub, but it gets tricky (requiring command line git). It's simplest to create a new RProject, copy over files, and delete the old project.

I can't push to GitHub!

- Pull first. A collaborator probably made edits to the remote (GitHub.com) version and you need to grab that before you make any edits

How do I add a collaborator?

- Go to the repo page on github.com and click settings -> Manage Access. Now they can push code to this same repo! Remember to work in the file separately and push/pull often!!

Questions? Contact us!

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