Marine Ecological Modelling
Global Climate Change

Dissemination of results under the Open Science framework

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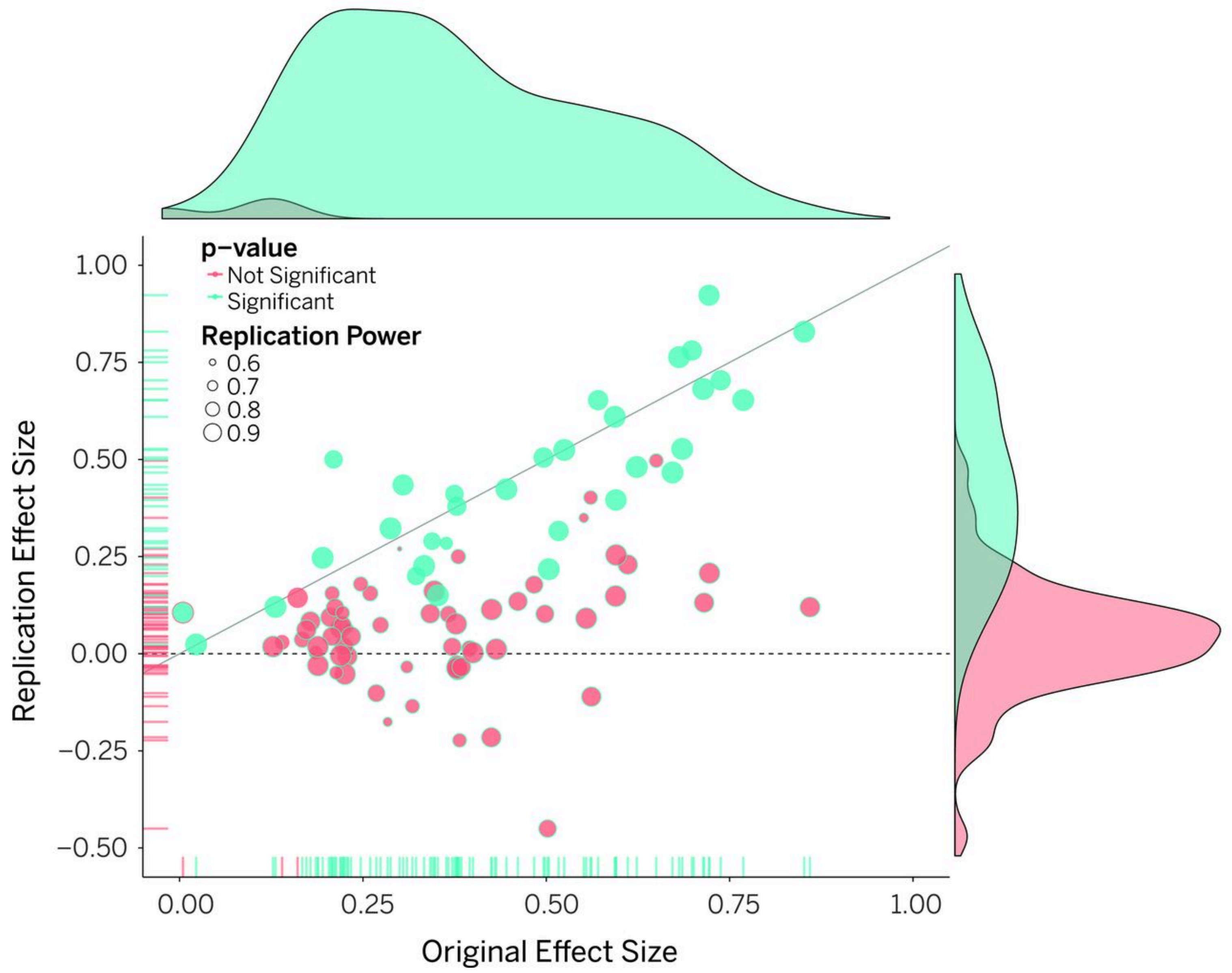
2020, Centre of Marine Sciences, University of Algarve

Open Science

Most scientists spend much time thinking about the types of data they need for their studies. Relatively **little effort is spent** considering **how to store**, **analyze** and **share their data**.

It is increasingly important to store and document scientific data in ways that facilitate: (i) Open Science; and (ii) their effective retrieval and interpretation in the future.



A replication os 100 studies show “97% of original studies had significant results … 36% of replications had significant results”. (abstract). If no bias is assumed in the original results, there is little potential for replication (lack of open science).

** Diagonal line represents replication effect size equal to original effect size.

Open Science Collaboration (2017)

Open Science

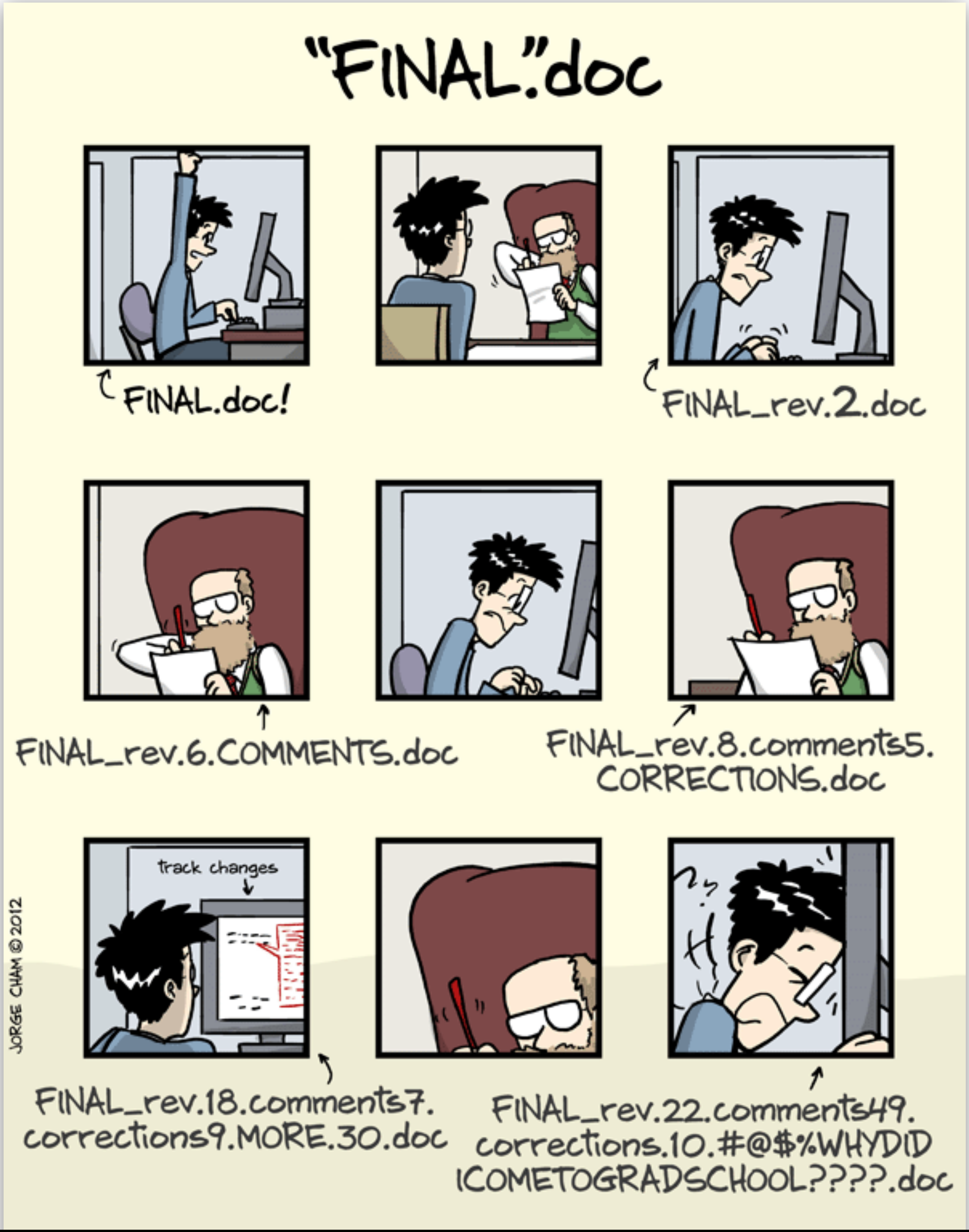
Sharing information is ideal in science, but the reality looks like this:

A scientist **collects data** and **stores it on a machine.**

He writes or modifies a few small programs (which also reside on his machine) to analyze that data.

With results, he writes and submits a paper. He **might include data** (a growing number of journals require it) **but not the code.**

The paper is published and might include a link to a copy of data, but the **paper** itself will be **behind a paywall.**


"FINAL".doc
FINAL.doc!
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corrections9.MORE.30.doc
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corrections.10.#@$%WHYDID
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JORGE CHAM © 2012

Open Science

For a growing number of scientists the process looks like this:

The data is stored in an open access repository like **figshare** or **Zenodo** and given its own **Digital Object Identifier** (DOI).

The scientist creates a new **repository on GitHub** to hold the work.

As he does the analyses, changes are pushed to that repository.

When he is happy with the state of the paper, he posts a version to **preprint server** to invite feedback from peers.

The **published paper includes links to the preprint, to the code and data repositories**, which makes it easier for other scientists to replicate or use the work as starting point for additional research.

Open Science

Associating open data can increase the **citation rate** of scientific papers by as much as **69%** regardless the journal impact factor, date of publication, and the author’s country of origin. But more than 80% of data never makes it to a repository.

Research articles that have been made Open Access are up to 600% more cited than those that have not.

Open Science

Simple Rules for Reproducible Computational Research:

For every result, keep track of how it was produced;

Avoid manual data manipulation steps (unique script does it all);

Archive the exact versions of all external programs used;

Version control all scripts (Git);

Record intermediate results, when possible in standardized formats;

For analyses that include randomness, note underlying random seeds.
e.g., in R use set.seed(42);

Provide public access to scripts (Git) and data (Open repository).

Sandve et al., 2013

Open access repositories

Online open access repositories allow researchers to **preserve and share their research outputs, including figures, datasets, images, and videos**.

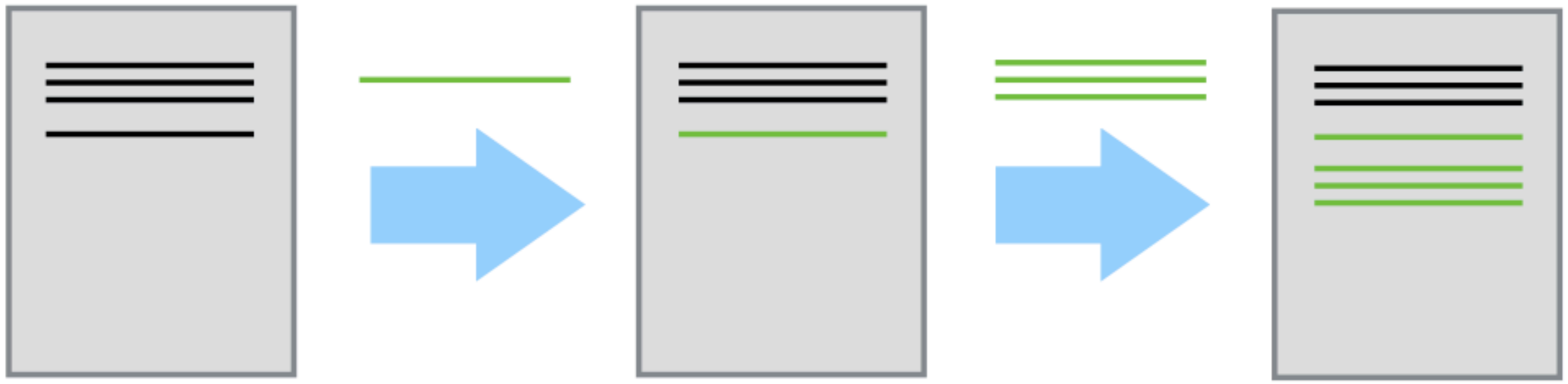
E.g., Figshare and Zenodo are free to upload content and free to access, in adherence to the principle of open data.

Version control systems

Keep track of changes, creating different versions of our files -allows us to decide which changes will be made to the next version (**changes are called commits**).

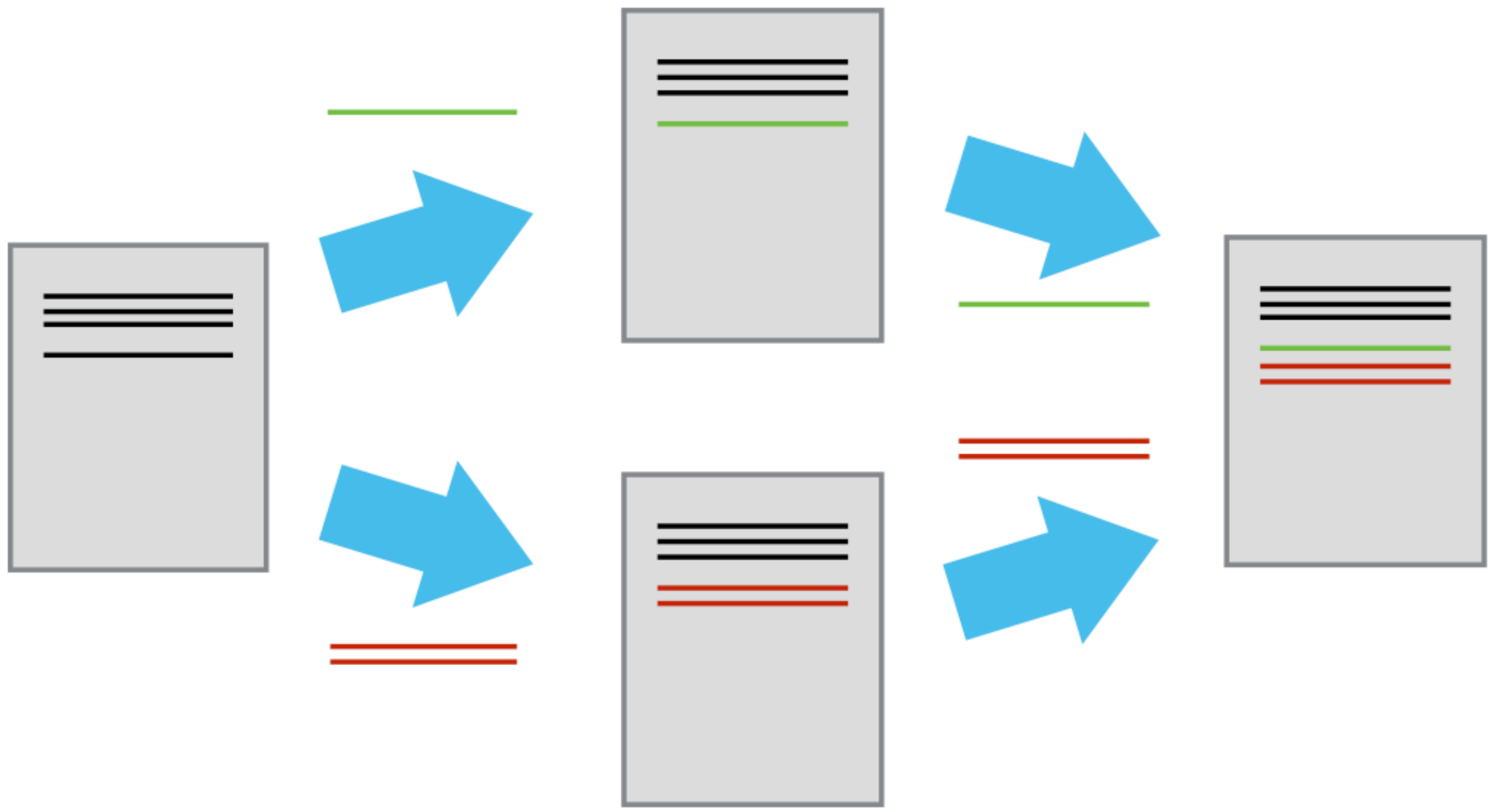
Complete history of commits make up a repository, which can be kept in sync across different computers, facilitating collaboration.

Version control systems **start with a base version** of the document and then **record changes** you make each step of the way. You can rewind to any state of the document.



Version control systems

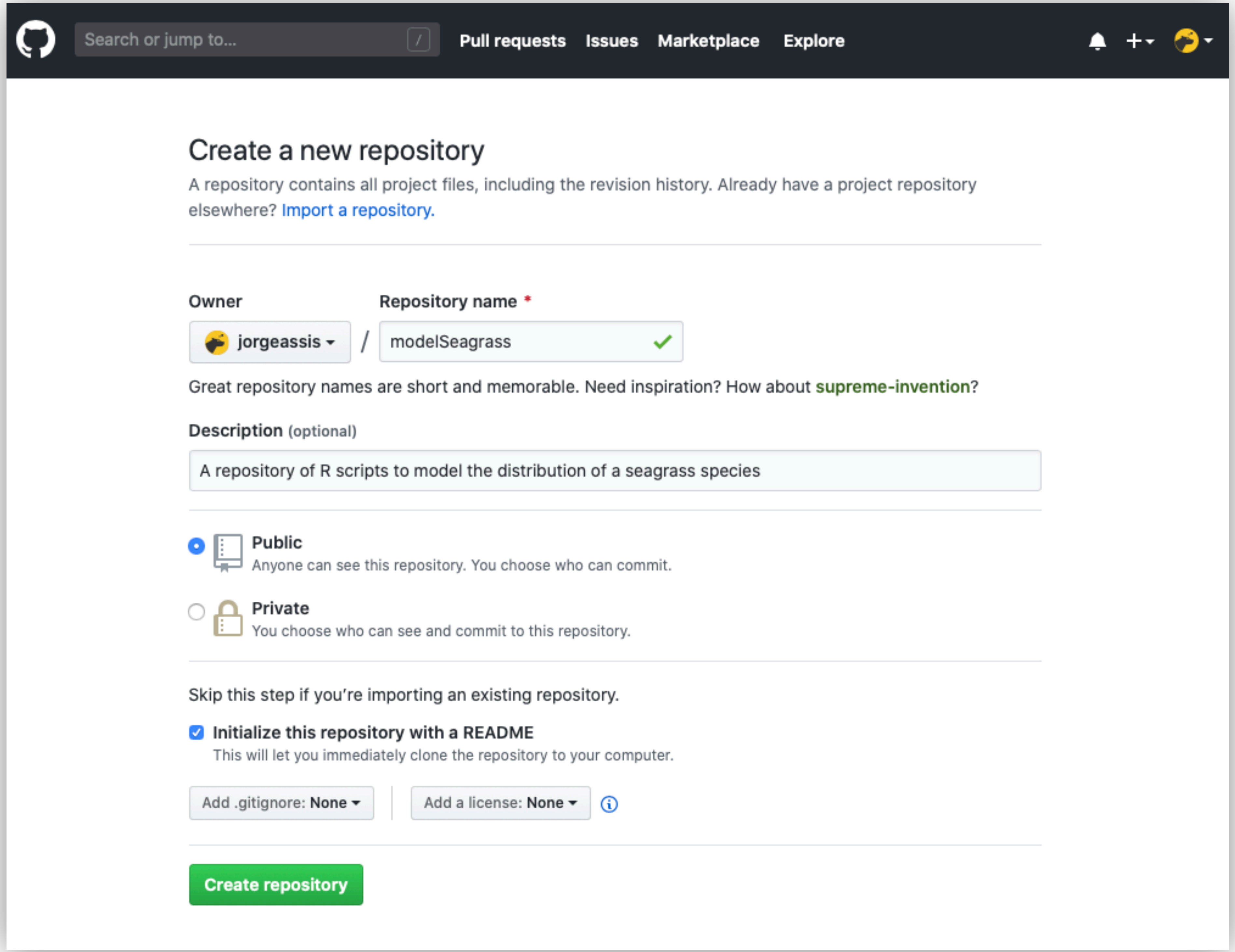
Users can make **independent changes** on the same document. Unless multiple users make changes to the same section of the document - a conflict - you can **incorporate multiple sets of changes** into the same base document.



Using Git from RStudio

Version control are useful when developing data analysis scripts. RStudio has built-in integration with Git with a nice interface for many common operations.

RStudio allows to create a **project associated with a Git repository** to track the development and changes of the project over time, revert to previous versions and collaborate with others.



Create a new repository

A repository contains all project files, including the revision history. Already have a project repository elsewhere? Import a repository.

Owner: jorgeassis / Repository name *: modelSeagrass ✓

Great repository names are short and memorable. Need inspiration? How about supreme-invention?

Description (optional): A repository of R scripts to model the distribution of a seagrass species

● Public
Anyone can see this repository. You choose who can commit.

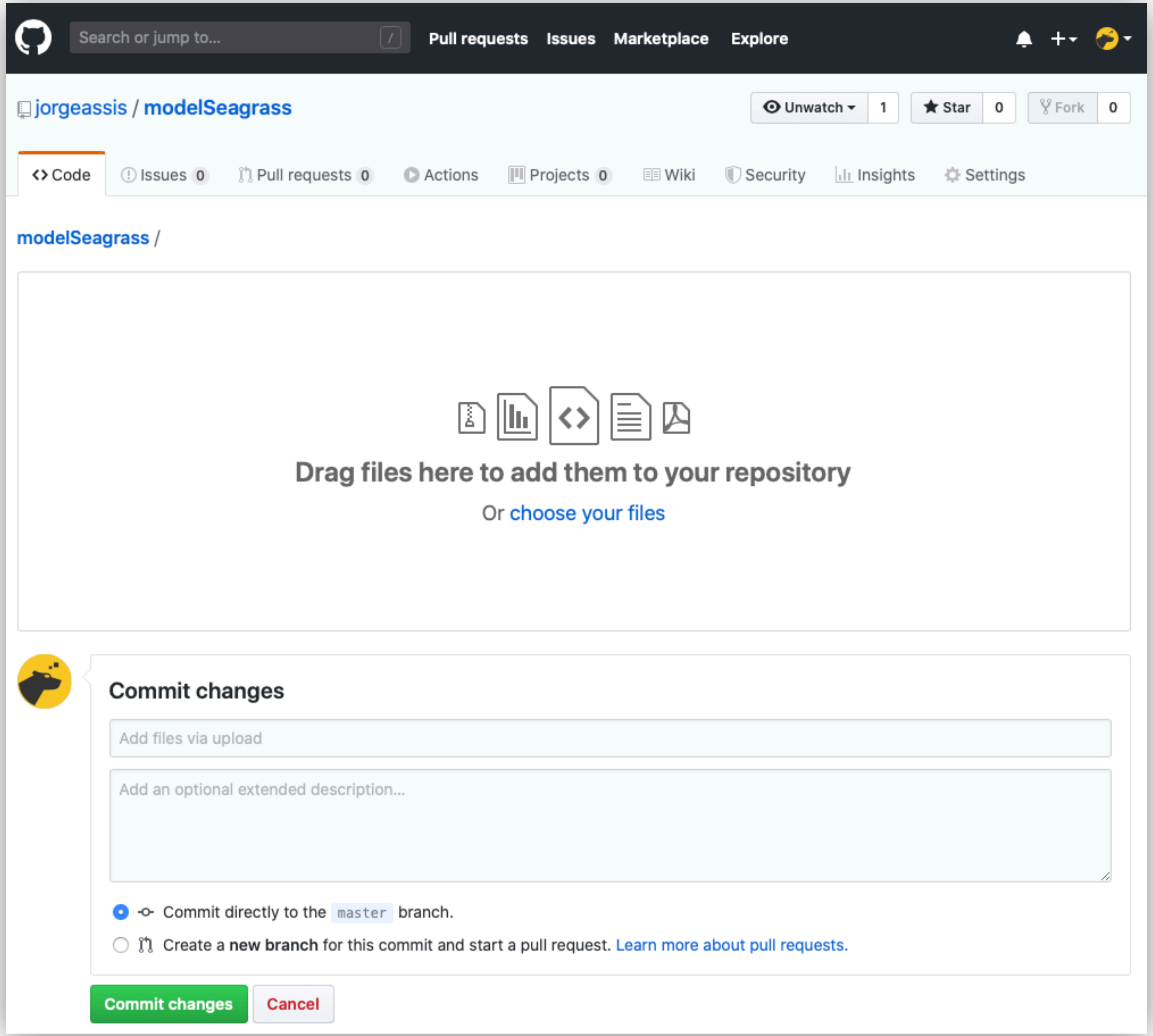
○ Private
You choose who can see and commit to this repository.

Skip this step if you're importing an existing repository.

☑ Initialize this repository with a README
This will let you immediately clone the repository to your computer.

Add .gitignore: None | Add a license: None

Start by creating a new repository (e.g., GitHub).


Search or jump to... Pull requests Issues Marketplace Explore

jorgeassis / modelSeagrass

Unwatch 1 Star 0 Fork 0

Code Issues 0 Pull requests 0 Actions Projects 0 Wiki Security Insights Settings

modelSeagrass /

Drag files here to add them to your repository

Or choose your files

Commit changes

Add files via upload

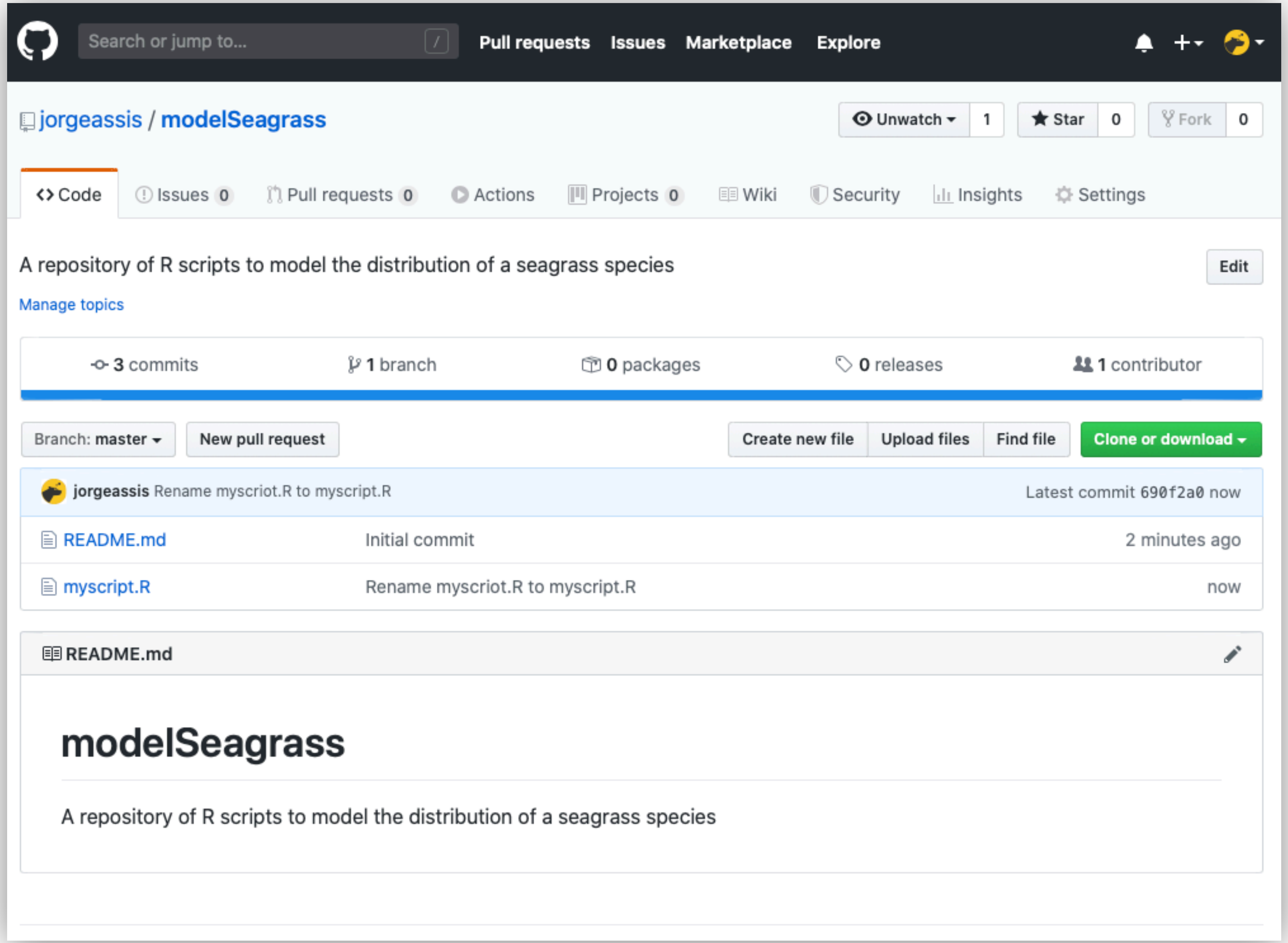
Add an optional extended description...

[✓ Commit directly to the `master` branch.]

Create a **new branch** for this commit and start a pull request. Learn more about pull requests.

Commit changes Cancel

The simplest way of sharing code is by uploading files to the repository.



jorgeassis / modelSeagrass

A repository of R scripts to model the distribution of a seagrass species

3 commits · 1 branch · 0 packages · 0 releases · 1 contributor

jorgeassis Rename myscriot.R to myscript.R — Latest commit 690f2a0 now

README.md	Initial commit	2 minutes ago
myscript.R	Rename myscriot.R to myscript.R	now

README.md

modelSeagrass

A repository of R scripts to model the distribution of a seagrass species

Permanently available at **https://github.com/jorgeassis/modelSeagrass**

README.md

Level of information to include in the readme file:

Repository name;

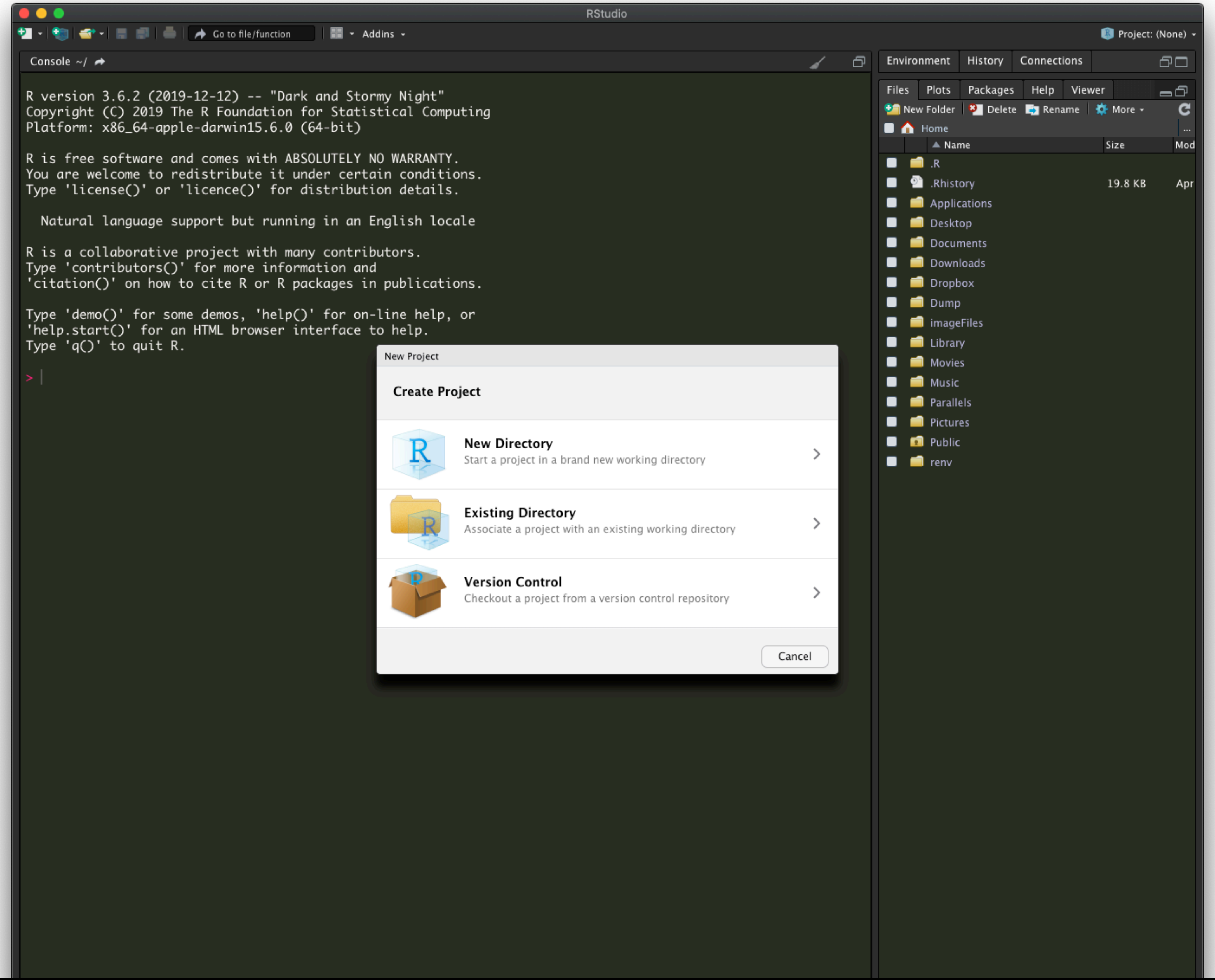
Project summary;

Funding information;

Primary contact(s) information;

Location of data and supporting information.

Proper integration of RStudio with a repository (e.g., GitHub).



```
R version 3.6.2 (2019-12-12) -- "Dark and Stormy Night"
Copyright (C) 2019 The R Foundation for Statistical Computing
Platform: x86_64-apple-darwin15.6.0 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

  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.

>
```

Name	Size	Mod
.R		
.Rhistory	19.8 KB	Apr
Applications		
Desktop		
Documents		
Downloads		
Dropbox		
Dump		
imageFiles		
Library		
Movies		
Music		
Parallels		
Pictures		
Public		
renv		

New Project

Create Project

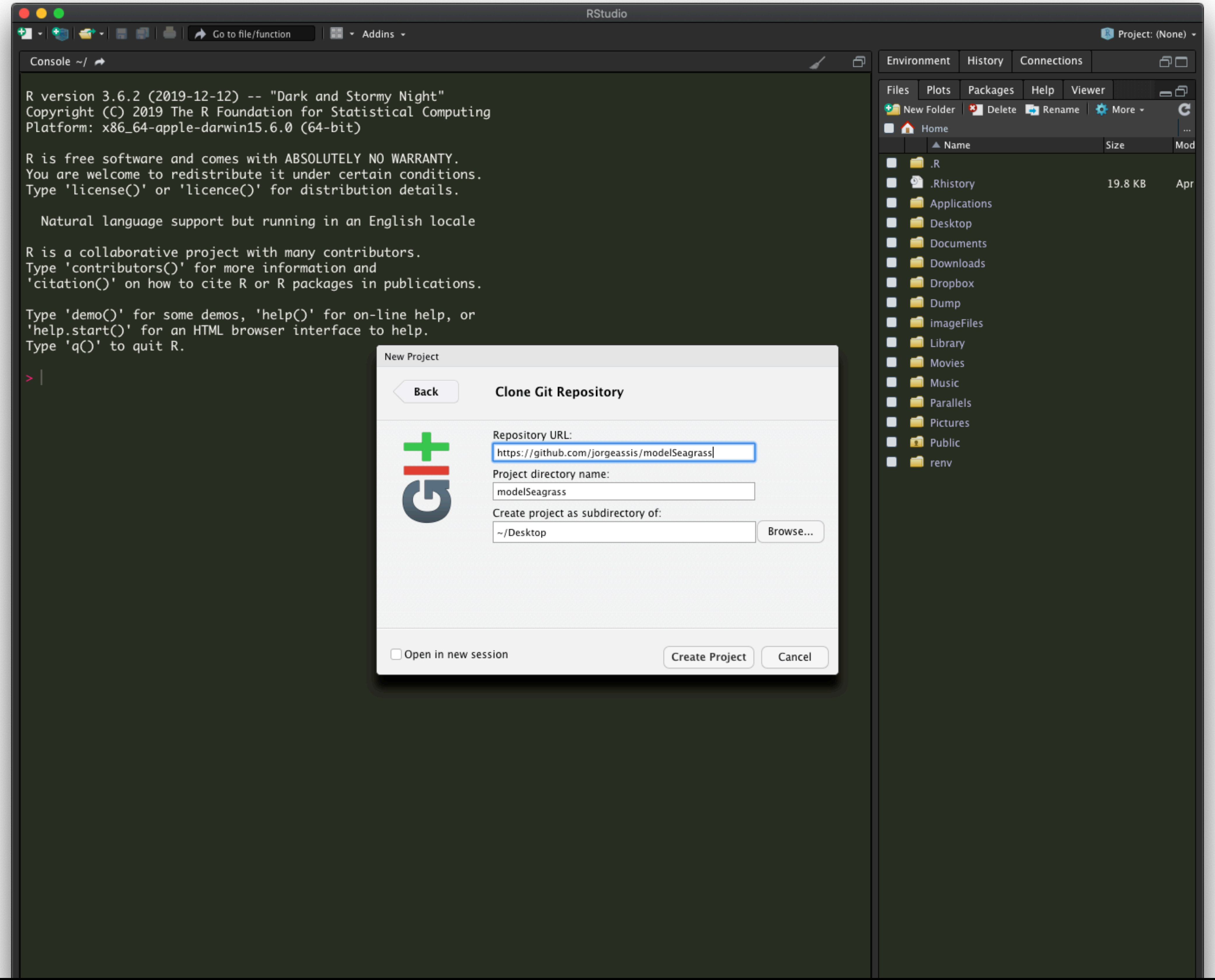
New Directory
Start a project in a brand new working directory

Existing Directory
Associate a project with an existing working directory

Version Control
Checkout a project from a version control repository

Cancel

Proper integration of RStudio with a repository (e.g., GitHub).



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Type 'q()' to quit R.

>
```

New Project

Clone Git Repository

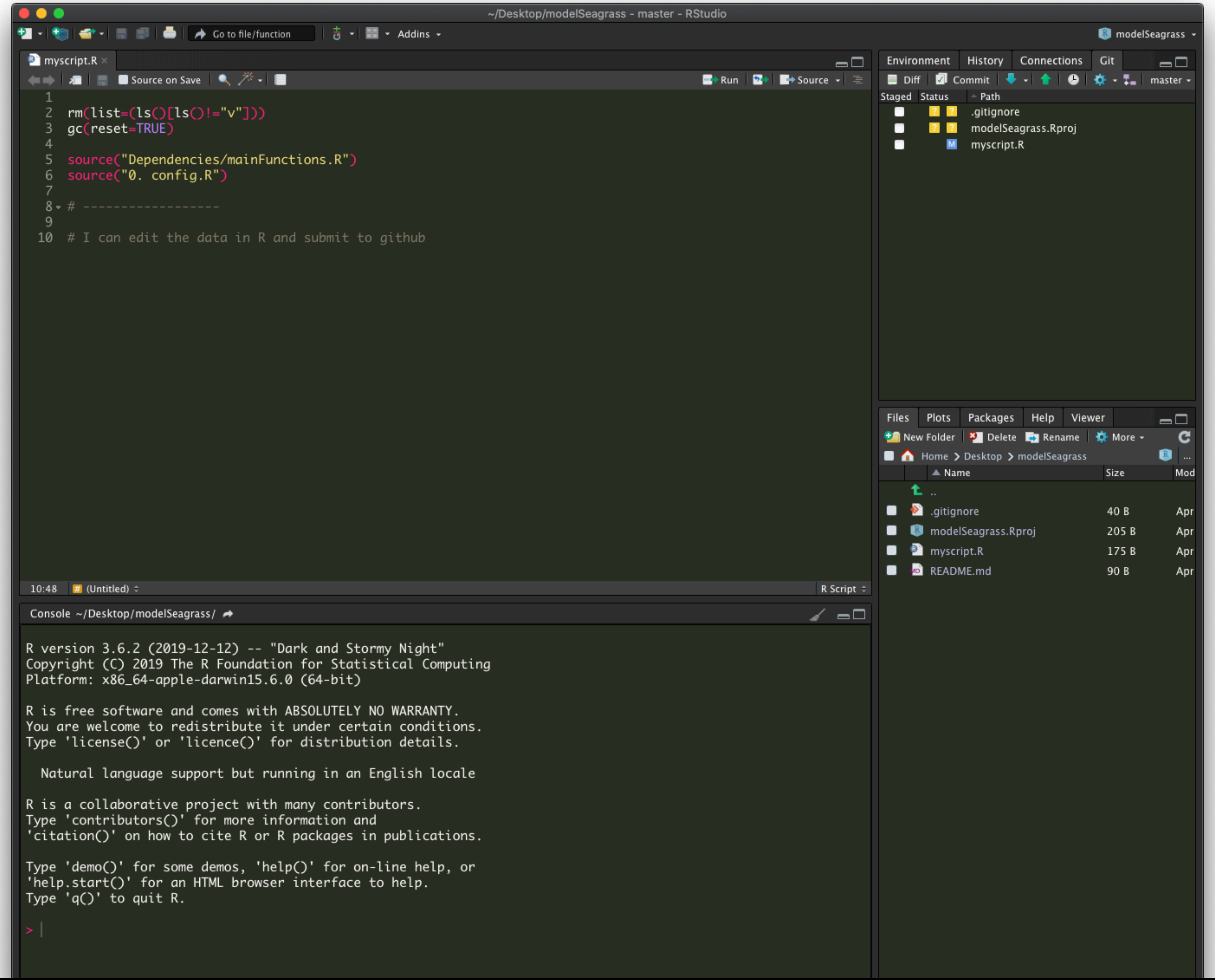
Repository URL: https://github.com/jorgeassis/modelSeagrass

Project directory name: modelSeagrass

Create project as subdirectory of: ~/Desktop

☐ Open in new session

Saved edited files can be submitted by clicking on “Commit…”


~/Desktop/modelSeagrass - master - RStudio

```
rm(list=(ls()[ls()!="v"]))
gc(reset=TRUE)

source("Dependencies/mainFunctions.R")
source("0. config.R")

# ------------------

# I can edit the data in R and submit to github
```

Console ~/Desktop/modelSeagrass/

```
R version 3.6.2 (2019-12-12) -- "Dark and Stormy Night"
Copyright (C) 2019 The R Foundation for Statistical Computing
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Type 'q()' to quit R.

> 
```

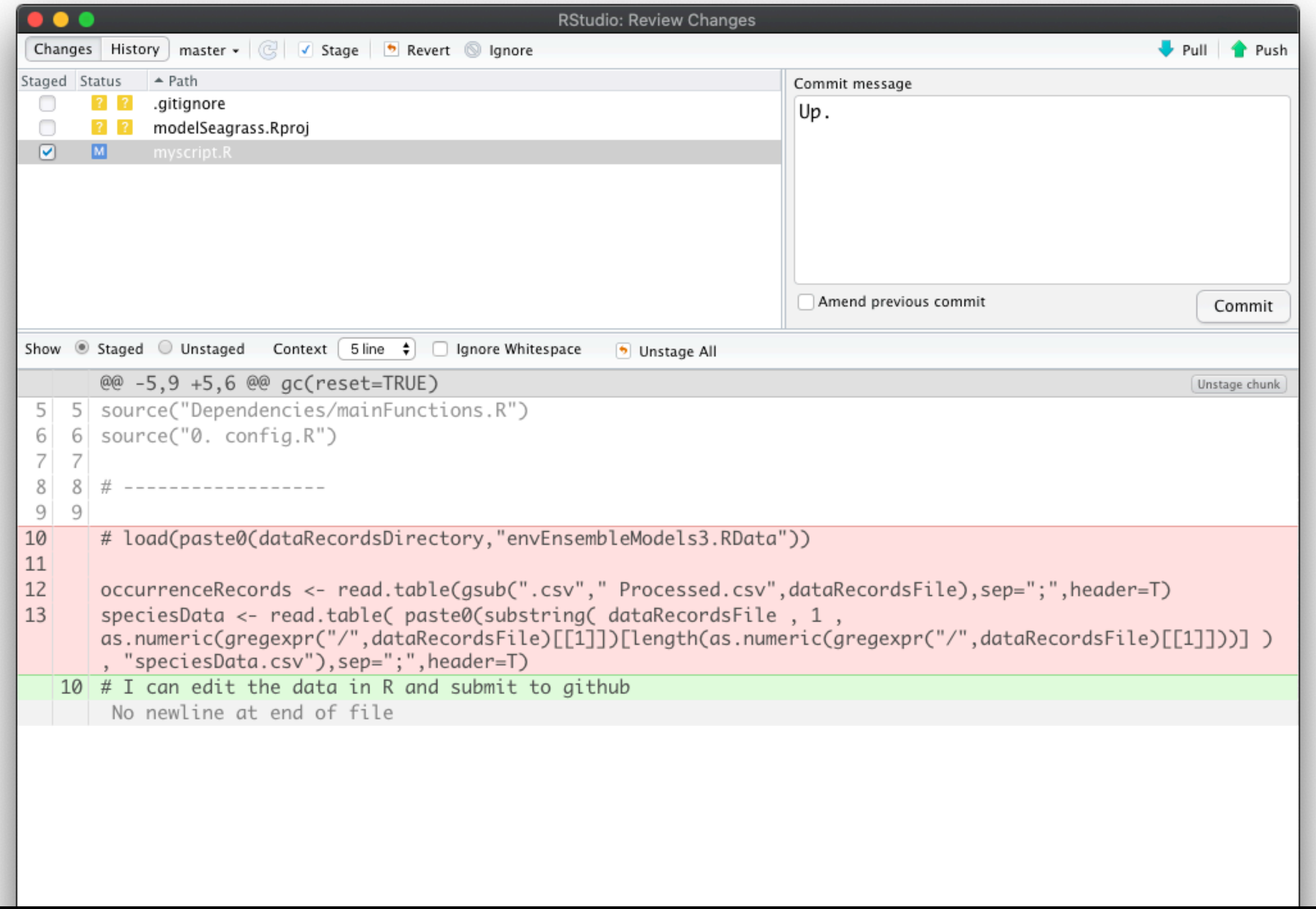
Git pane:

Staged	Status	Path
☐	? ?	.gitignore
☐	? ?	modelSeagrass.Rproj
☐	M	myscript.R

Files pane: Home > Desktop > modelSeagrass

Name	Size	Mod
..		
.gitignore	40 B	Apr
modelSeagrass.Rproj	205 B	Apr
myscript.R	175 B	Apr
README.md	90 B	Apr

A dialogue opens where we can select which files to commit, and enter a commit message. The icons in the “Status” column indicate the current status of each file (e.g., M for modified). Clicking on a file shows information about changes in the lower panel. Once everything is the way we want it, we click “Commit”. Changes can be pushed by selecting “Push Branch” from the Git menu.



Staged	Status	Path
☐	? ?	.gitignore
☐	? ?	modelSeagrass.Rproj
✓	M	myscript.R

Commit message: Up.

☐ Amend previous commit

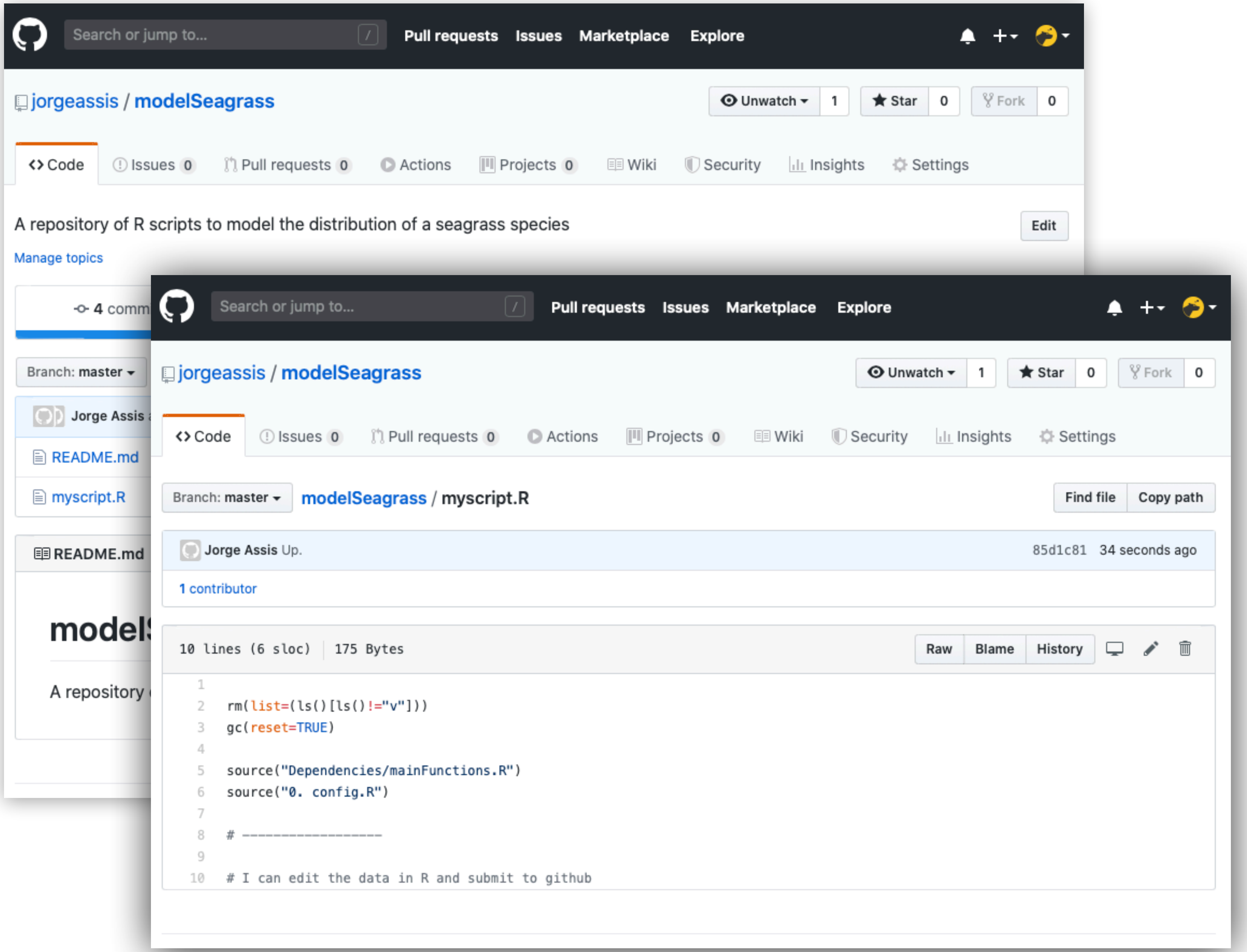
Show: [● Staged] Unstaged — Context: 5 line — ☐ Ignore Whitespace

```
@@ -5,9 +5,6 @@ gc(reset=TRUE)
source("Dependencies/mainFunctions.R")
source("0. config.R")

# ------------------

# load(paste0(dataRecordsDirectory,"envEnsembleModels3.RData"))

occurrenceRecords <- read.table(gsub(".csv"," Processed.csv",dataRecordsFile),sep=";",header=T)
speciesData <- read.table( paste0(substring( dataRecordsFile , 1 ,
as.numeric(gregexpr("/",dataRecordsFile)[[1]])[length(as.numeric(gregexpr("/",dataRecordsFile)[[1]]))] )
, "speciesData.csv"),sep=";",header=T)
# I can edit the data in R and submit to github
 No newline at end of file
```



A repository of R scripts to model the distribution of a seagrass species

modelS

A repository

```

rm(list=(ls()[ls()!="v"]))
gc(reset=TRUE)

source("Dependencies/mainFunctions.R")
source("0. config.R")

# -----------------

# I can edit the data in R and submit to github
```

Allows working in RStudio with a version control and backup system.