

# **SEDAR 84**

Southeast Fisheries Science Center

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## Executive Summary

The SEDAR 84 St. Croix Stoplight Parrotfish stock assessment process consisted of four webinars between April 2024 and October 2024. The assessment used Stock Synthesis (SS3), a statistical catch-at-age model (Methot et al. 2020). SS3 uses a population model, an observation model, and an estimation model and applies a likelihood function in the estimation process. SS3 has been applied extensively worldwide for stock assessment evaluations (Methot and Wetzel 2013).

The Stock Assessment Continuum Tool was used to configure initial assessment models utilizing a data-limited modeling framework (Cope 2024). Models were initially configured using an annual catch time series and composite length data. Model development proceeded stepwise from the simplest configuration to those of moderate complexity, with some diagnostics, namely retrospective and likelihood profiling, being carried out at each step to examine the stability of parameter estimation. Two additional population features were configured outside the Stock Assessment Continuum Tool: hermaphroditism and continuous recruitment (i.e., protracted spawning throughout the year).

Applying SS3 with a data-limited framework resulted in inconclusive results due to relatively few years of data, small sample sizes, and low contrast in the available time series. The high correlations between key parameters  $R_0$  and the initial equilibrium fishing mortality rate and associated flat likelihood profiles indicated that the stock status was not reliably estimable. Since the SEDAR 84 stock assessment cannot estimate the overfished status for the St. Croix Stoplight Parrotfish stock, their status remains unknown. However, the lack of decline in the fishery-independent abundance index concurrent with a decrease in landings suggests that the St. Croix Stoplight Parrotfish is not likely to be undergoing overfishing.

# 1 Set-up

This is a template for a simple Quarto book output to html, PDF or docx format. It includes a GitHub Action that will build the website automatically when you make changes to the files. The NOAA palette and fonts has been added to `theme.scss`. The webpage will be on the `gh-pages` branch. Serving the website files from this branch is a common way to keep all the website files from cluttering your main branch.

The GitHub Action installs R so you can have R code in your `qmd` or `Rmd` files. Note, you do not need to make changes to your `Rmd` files unless your need Quarto features like cross-references.

## 1.1 GitHub Set-up

- Click the green “use template” button to make a repository with this content. Make sure to make your repo public (since GitHub Pages doesn’t work on private repos unless you have a paid account) and check box to include all the branches (so that you get the `gh-pages` branch).
- Turn on GitHub Pages under Settings > Pages . You will set pages to be made from the `gh-pages` branch and root directory.
- Turn on GitHub Actions under Settings > Actions > General
- Edit the repo description and Readme to add a link to the webpage. When you edit the description, you will see the link url in the url box or you can click on the Actions tab or the Settings > Pages page to find the url.

## 2 Customize

### 2.1 Edit and add your pages

Edit the qmd or md files in the `content` folder. qmd files can include code (R, Python, Julia) and lots of Quarto markdown bells and whistles (like call-outs, cross-references, auto-citations and much more).

Each page should start with

```
---  
title: your title  
---
```

and the first header will be the 2nd level, so `##`. Note, there are situations where you leave off

```
---  
title: your title  
---
```

and start the qmd file with a level header `#`, but if using the default title yaml (in the `---` fence) is a good habit since it makes it easy for Quarto convert your qmd file to other formats (like into a presentation).

### 2.2 Add your pages the project

- Add the files to `_quarto.yml`

## 3 Customization

### 3.1 Quarto documentation

Quarto allow many bells and whistles to make nice output. Read the documentation here [Quarto documentation](#).

### 3.2 Examples

Looking at other people's Quarto code is a great way to figure out how to do stuff. Most will have a link to a GitHub repo where you can see the raw code. Look for a link to edit page or see source code. This will usually be on the right. Or look for the GitHub icon somewhere.

- [Quarto gallery](#)
- [nmfs-openscapes](#)
- [Faye lab manual](#)
- [quarto-titlepages](#) Note the link to edit is broken. Go to repo and look in `documentation` directory.

## 4 Rendering

The repo includes a GitHub Action that will render (build) the website automatically when you make changes to the files. It will be pushed to the `gh-pages` branch.

But when you are developing your content, you will want to render it locally.

### 4.1 Step 1. Make sure you have a recent RStudio

Have you updated RStudio since about August 2022? No? Then update to a newer version of RStudio. In general, you want to keep RStudio updated and it is required to have a recent version to use Quarto.

### 4.2 Step 2. Clone and create RStudio project

First, clone the repo onto your local computer. How? You can click File > New Project and then select “Version Control”. Paste in the url of the repository. That will clone the repo on to your local computer. When you make changes, you will need to push those up.

### 4.3 Step 3. Render within RStudio

RStudio will recognize that this is a Quarto project by the presence of the `_quarto.yml` file and will see the “Build” tab. Click the “Render website” button to render to the `_site` folder.

**Previewing:** You can either click `index.html` in the `_site` folder and specify “preview in browser” or set up RStudio to preview to the viewer panel. To do the latter, go to Tools > Global Options > R Markdown. Then select “Show output preview in: Viewer panel”.

## 5 Figures and Tables

Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

### 5.1 Code

You can embed an R code chunk like this:

```
summary(cars)
```

speed		dist	
Min.	: 4.0	Min.	: 2.00
1st Qu.:	12.0	1st Qu.:	26.00
Median	:15.0	Median	: 36.00
Mean	:15.4	Mean	: 42.98
3rd Qu.:	19.0	3rd Qu.:	56.00
Max.	:25.0	Max.	:120.00

### 5.2 Including Plots

You can also embed plots and reference them, like so Figure 5.1.

Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

### 5.3 Including Tables

You can also embed tables and reference them with Table 5.1.

```
library(knitr)
kable(head(iris))
```



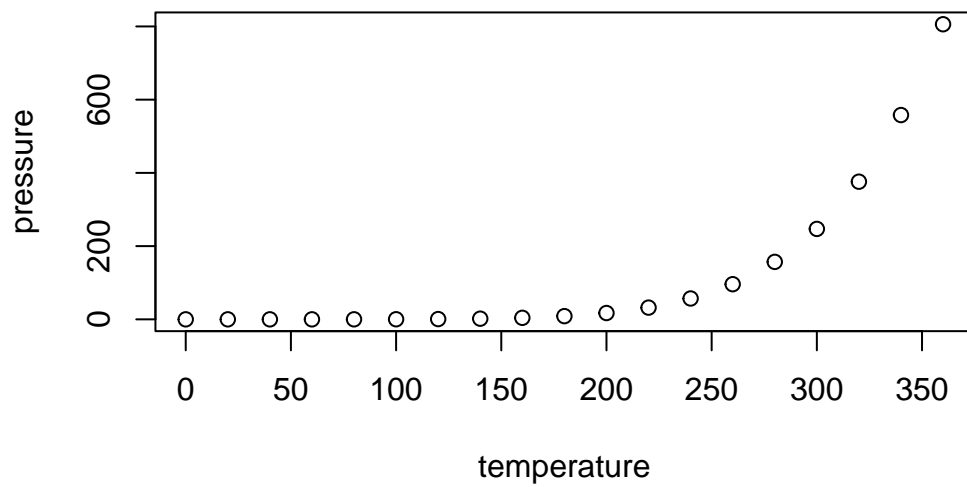


Figure 5.1: Plot of pressure

Table 5.1: Iris Data

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
4.9	3.0	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
4.6	3.1	1.5	0.2	setosa
5.0	3.6	1.4	0.2	setosa
5.4	3.9	1.7	0.4	setosa

## 6 Rendering with Code

You can have code (R, Python or Julia) in your qmd file. You will need to have these installed on your local computer, but presumably you do already if you are adding code to your qmd files.

```
x <- c(5, 15, 25, 35, 45, 55)
y <- c(5, 20, 14, 32, 22, 38)
lm(x ~ y)
```

Call:

```
lm(formula = x ~ y)
```

Coefficients:

(Intercept)	y
1.056	1.326

### 6.1 Modify the GitHub Action

You will need to change the GitHub Action in `.github/workflows` to install these and any needed packages in order for GitHub to be able to render your webpage. The GitHub Action install R since I used that in `code.qmd`. If you use Python or Julia instead, then you will need to update the GitHub Action to install those.

If getting the GitHub Action to work is too much hassle (and that definitely happens), you can always render locally and publish to the `gh-pages` branch. If you do this, make sure to delete or rename the GitHub Action to something like

```
render-and-publish.old.yml
```

so GitHub does not keep trying to run it. Nothing bad will happen if you don't do this, but if you are not using the action (because it keeps failing), then you don't need GitHub to run it.

## 6.2 Render locally and publish to gh-pages branch

To render locally and push up to the `gh-pages` branch, open a terminal window and then `cd` to the directory with the Quarto project. Type this in the terminal:

```
quarto render gh-pages
```

## 7 References

Quarto has powerful references functionality. You can easily insert citations from Zotero libraries that you maintain in the cloud (on Zotero). This allows the whole team to update the library and you can sync up to that library. Read about this on the Quarto documentation on [citations](#). Google youtube videos on this also to see it in action.

Add a `.bib` file in to your project or add a linked Zotero library via RStudio in Visual mode with Tools > Project Options... > R Markdown > select custom libraries from the Zotero dropdown.

Then you can type `@` and you will see a dropdown of the references in your libraries. You can then select the ones to add. If you don't see the one you need, you can paste in the DOI and it will be added to your references file (with all the info). The references will be added to your references section of your book automatically.

See the `references.qmd` file for how to include the references.

- `@ansley1981` will produce `(ansley1981?)`
- `[@ansley1981]` will produce `(ansley1981?)`.

## References

- Cope, Jason. 2024. *Stock Assessment Continuum Tool*. <https://github.com/shcaba/SS-DL-tool>.
- Methot, Richard D., Chantel R. Wetzel, Ian G. Taylor, and Kathryn Doering. 2020. “Stock Synthesis User Manual : Version 3.30.15.” *Northwest Fisheries Science Center (U.S.)*. <https://doi.org/10.25923/5WPN-QT71>.
- Methot, Richard D., and Chantell R. Wetzel. 2013. “Stock Synthesis: A Biological and Statistical Framework for Fish Stock Assessment and Fishery Management.” *Fisheries Research* 142 (May): 86–99. <https://doi.org/10.1016/j.fishres.2012.10.012>.