Updated Documentation of the

Fishery Regulation Assessment Model (FRAM)

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**Introduction**

Since the prior documentation was prepared, analysts from Washington Department of Fish and Wildlife (WDFW), Puget Sound Treaty Tribes, the Northwest Indian Fisheries Commission (NWIFC), and the National Oceanic and Atmospheric Administration (NOAA) have made functional and design changes to the Fishery Regulation Assessment Model (FRAM) software in response to management needs and software advancements. FRAM now has new algorithms, has undergone reparameterization of the Chinook base period, and was moved to a Visual Studio.Net platform structured around MS Access databases. These changes have improved the representation of stock-specific fishery impacts and enhanced the organization and sharing of model run information. These changes have also warranted the development of revised and updated documentation. Major FRAM content updates have included:

* Separate sections for Chinook and Coho
* List of Chinook and Coho differences
* Figure illustrating FRAM interactions with other models
* Expanded glossary
* Chinook and Coho tables demonstrating how a stock is reduced from starting cohort to escapement by major FRAM processing steps
* Addition of mark-selective fishing bias calculations
* Addition of a Backwards FRAM chapter
* Addition of size-limit corrected algorithms
* Descriptions of tables and FRAM variables in the Access database
* Alphabetical list of FRAM variables and their origin

Staff from WDFW and NWIFC have adopted the approach taken with the 2019 update of the FRAM User Manual[[1]](#footnote-2) to produce a readily accessible documentation website: <https://framverse.github.io/fram_doc/>. This online living document is based on a public code repository that provides many attractive features, including ease of collaboration and project management across organizations (<https://github.com/FRAMverse/fram_doc>). It is hoped that the revised documentation can increase the mutual technical understanding among users of FRAM, and thereby increase confidence in and support for decisions based on those outputs.

**Methodology**

During the spring of 2019, WDFW and NWIFC staff decided on an online “living document” approach to a revised User Manual, producing a website from a shared code repository. This approach was well received and has been maintained with the expansion to cover additional material in the new documentation website. Behind the public-facing site, a collection of Rmarkdown[[2]](#footnote-3) scripts and associated resources (images, pdf references, etc.) are hosted on the public FRAMverse GitHub account. These scripts are “knit” into html output organized into a simple static site. Although the collection of html files that form the website are hosted in association with the source repository, they can be easily downloaded as a standalone offline copy (or re-hosted elsewhere).

**Website Organization**

A viewer navigating to the fram\_doc website finds a landing page with sections describing the background and history of the model development, as well as an overview of differences between the Coho and Chinook implementation (Figure 1). The top-level menu then provides options to find content describing model details (e.g., species-specific parameterization, calculations, outputs), applications in pre-season planning and post-season evaluation, and construction of the Chinook base period[[3]](#footnote-4) via the FRAMBuilder. In addition, the content from the 2019 User Manual has been migrated into the new site design. The top menu also contains a link to the source repository, where it is hoped that users can report issues (Figure 2). Throughout the site, specialized terms are linked to definitions in a glossary (Figure 3), and supporting literature is available as downloadable .pdf files.

**Website Highlights**

The ease of updating content facilitates synchronization with the underlying FRAM application, i.e., since multiple documentation pieces link to the same appendix, appendices are only updated once. The webhosted, living documentation provides fast, intuitive navigation through refreshed content.

Users can navigate via various mouse-click and keyboard options, including the collapsing chapter sidebar and embedded links to other related content.

Keeping all relevant FRAM documentation in one place and linking to reference materials facilitates the user experience.

The static Word files that also can be produced from the source Rmarkdown scripts preserve some of this functionality within that application’s Navigation sidebar.

As noted, content creation and revision for this project is fully tracked in the commit log that is generated by the Git version control system (Figure 2). Project management boards and issue threads facilitate the integration of user feedback and ensure attribution. In combination, these features build collaborative confidence, foster transparency, and encourage testing ideas.

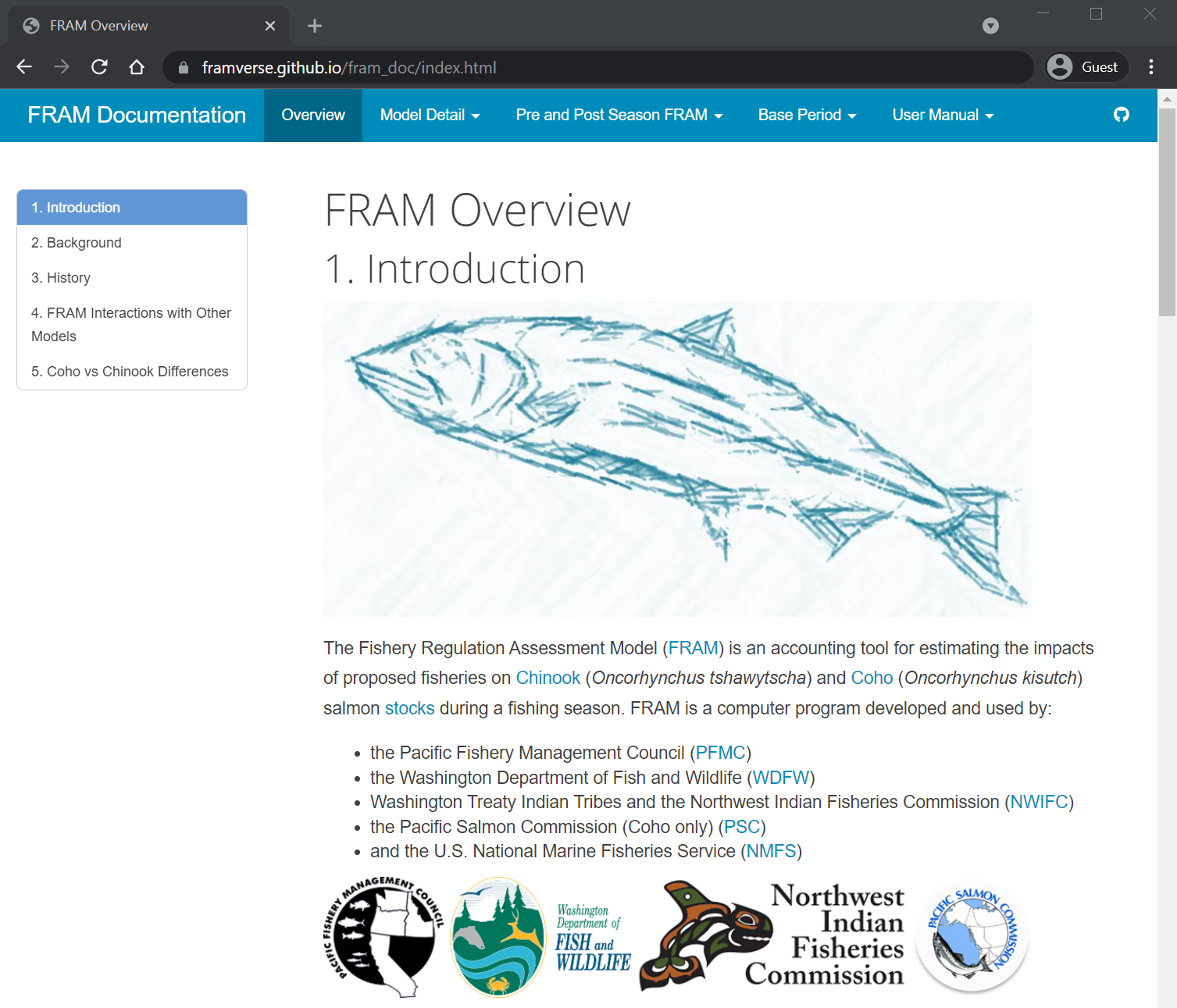


Figure 1 Documentation website landing page

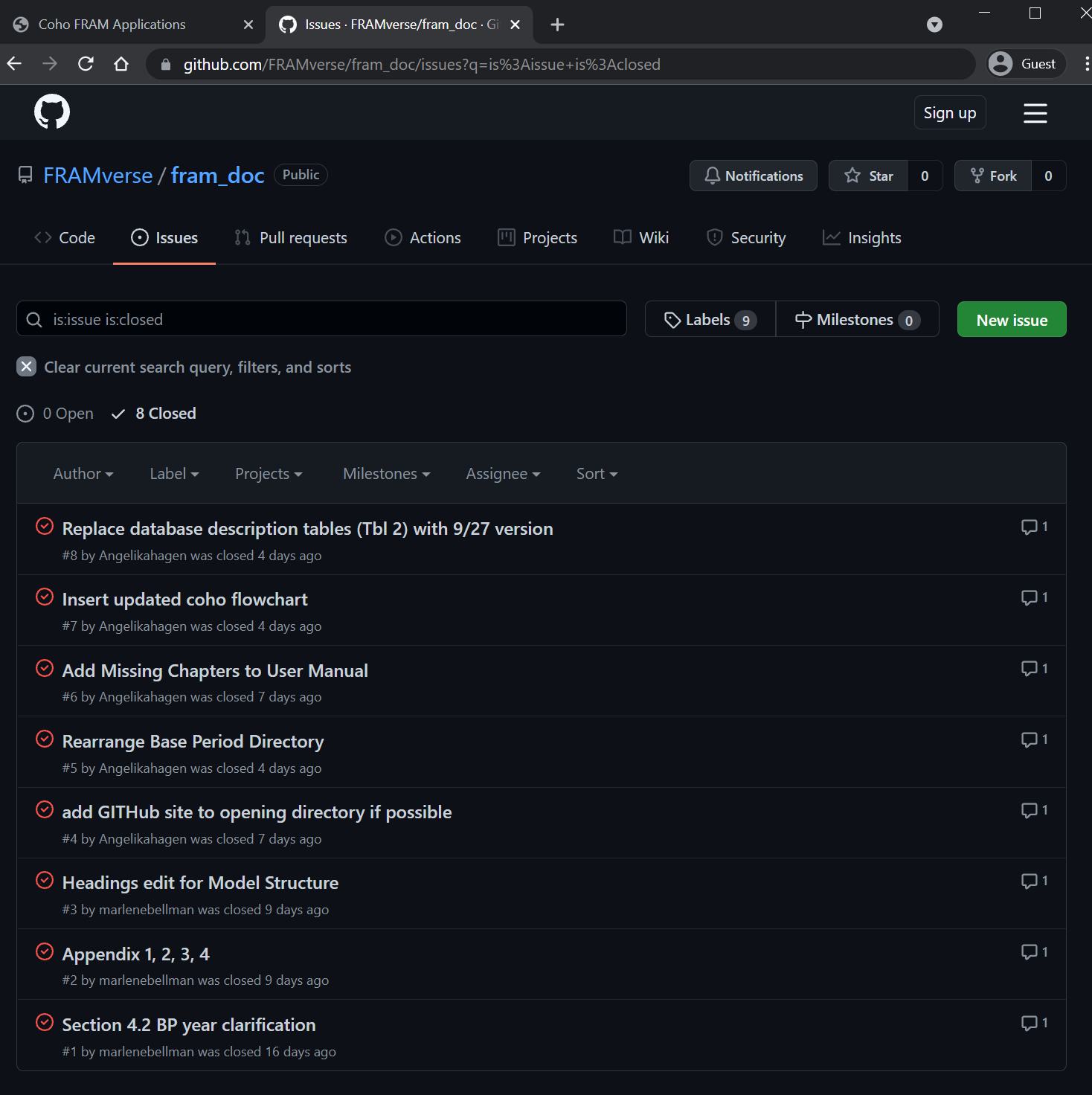


Figure 2 Issue tracking on the source repository provides a convenient means to report, discuss and resolve problems or suggest enhancements.

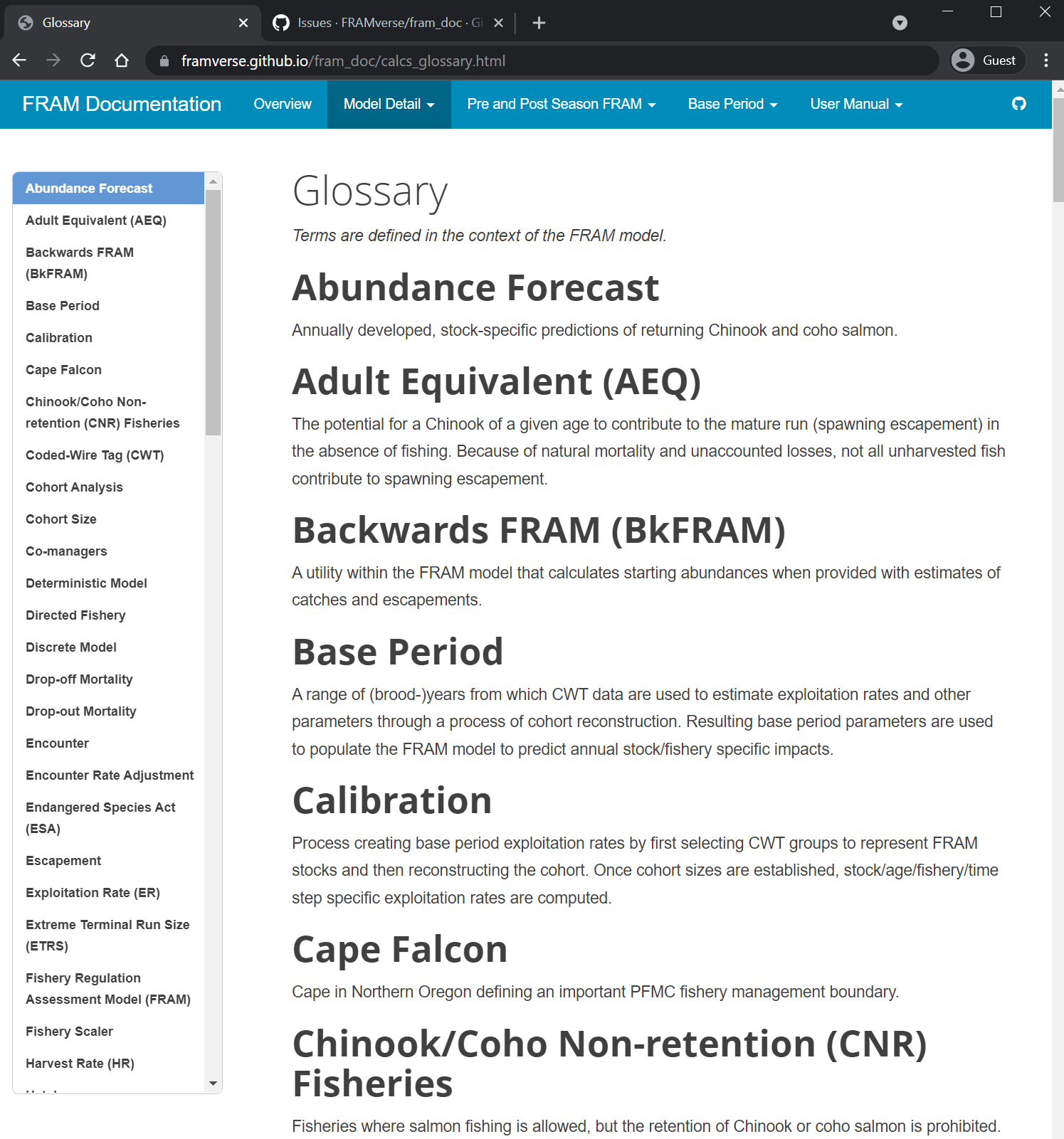


Figure 3 A glossary of specialized terminology is linked to usage throughout the site.

1. While the 2019 version of the User Manual remains available at time of writing, that content has been migrated and integrated into the new site. Staff do not anticipate maintaining the content at <https://wdfw-fp.github.io/framvs_doc/>, and will likely retire this url when the community of practice has gained familiarity with the new, broader documentation site. [↑](#footnote-ref-2)
2. <https://rmarkdown.rstudio.com/index.html> [↑](#footnote-ref-3)
3. Base period documentation is still incomplete. [↑](#footnote-ref-4)