Publishing Reports via Bookdown/GitHub Pages

S PERRY

CA DEPARTMENT OF WATER RESOURCES

Goal: Meet Reporting Requirements

Licensee/Permittee shall make available to the Board and others interested parties the results of the above monitoring as soon as practicable. Timely posting of this information on the Internet will satisfy this requirement. Licensee/Permittee shall submit to the Executive Director of the SWRCB, by December 1 of each year, annual reports summarizing the previous calendar year's findings and detailing future study plans.

Permittee shall provide annual reports to the Board, DFG and the USFWS that track the ongoing progress of the HMP. The annual reports are due on or before April 15 of each year. The MRP shall continue for a minimum of ten years following the completion of the last mitigation actions identified in the HMP.

Permittee shall develop the POA in consultation with the DWR, SDWA, NMFS, USFWS, and DFG. It shall include a schedule for milestones and due dates for implementation, and identify a funding source(s) for the study. The POA study shall be completed within two years of approval of the POA. Permittee shall submit semi-annual reports to the Executive Director of the SWRCB on study progress and results. A final report summarizing analyses, results, and conclusions shall be submitted to the Executive Director of the SWRCB within six months after the recirculation analysis is completed.

Want a simple, reproducible way to generate and publish reports

Method: Bookdown

R package that facilitates writing and publishing reports with R Markdown

- Can create a website to host your reports
- Can save reports as PDFs, Word Docs, etc.
- Can add figures, tables, Shiny apps, math equations, etc.
- Can customize the format, layout, and design



Method: Bookdown

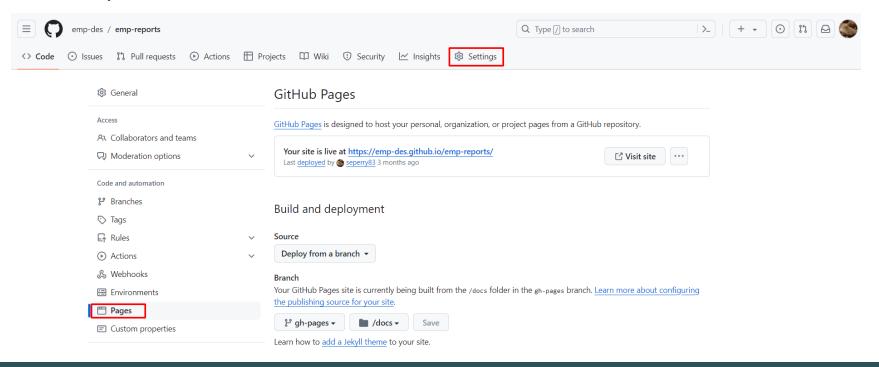
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Publishing: GitHub Pages

- GitHub Pages turns your repository into a website
- free hosting and easy to use
- ability to choose custom domain name



Example: EMP Phytoplankton Report

https://emp-dwr.github.io/emp-website/

ENVIRONMENTAL MONITORING PROGRAM

E Q A i

GENERAL

Program Information

Data Links

ANNUAL REPORTS

Continuous Water Quality

Discrete Water Quality

Benthic Invertebrates

Phytoplankton

Zooplankton

SPECIAL STUDIES

Veliger Monitoring Program









CA Dept of Water Resources - Environmental Monitoring Program



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Program Information

The Environmental Monitoring Program (EMP) is a joint effort by the California Department of Water Resources (DWR) and the United States Bureau of Reclamation (USBR) to characterize the aquatic environment of the Sacramento-San Joaquin Delta, Suisun, and San Pablo Bays. With assistance from the California Department of Water Resources (CDFW), each month EMP scientists visit up to 28 (24 fixed and 4 floating) stations to sample water quality and biological communities (phytoplankton, zooplankton, and benthic invertebrates). EMP also services and maintains a network of 15 continuous water quality stations that provide data in real time through the California Data Exchange Network. Since 1975, these efforts have established an irreplaceable ecological record in the San Francisco estuary that has been used in dozens of peer-review scientific articles and technical reports.

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Archived Reports

Zooplankton

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Veliger Monitoring Program









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Phytoplankton

Background

What are Phytoplankton?

Phytoplankton are small organisms that can be found floating in most water bodies. They occur as unicellular forms (single cell), colonial forms (multiple cells in a clump), filaments (long chains of cells), or flagellates (having flagella that give them some mobility). Like plants, they are primary producers; they convert light energy from the sun and carbon dioxide into the living matter of their cells through photosynthesis. Phytoplankton from the San Francisco Estuary fall into four broad categories: cyanobacteria, diatoms, green algae, and various flagellate groups.

- Cyanobacteria are the only phytoplankton that are true bacteria, meaning their cells' internal
 structures do not have membranes around them. Often called blue-green algae due to their color,
 they have colonized nearly all freshwater, marine, and terrestrial habitats on earth. Some species can
 produce blooms and harmful toxins that degrade water quality.
- Diatoms are unique among phytoplankton because they have a cell wall made of glass, or silicon
 dioxide, called a frustule. They can be unicellular or colonial. There are two main types of diatoms,
 centric and pennate.
- Green algae are a large, diverse group of phytoplankton consisting of unicellular, filamentous, colonial, and flagellated forms. They are found in a wide variety of freshwater, marine, and terrestrial habitats. Some species can form nuisance blooms or surface scums in nutrient-rich water.
- Flagellates include phytoplankton from many different groups, such as cryptophytes, dinoflagellates, chrysophytes, haptophytes, and euglenoids. Some flagellates, like cryptophytes, can be important as food for zooplankton. Some groups of flagellates, such as haptophytes and dinoflagellates, can produce toxic blooms that can kill or poison fish and invertebrates.

Why are phytoplankton important?

Phytoplankton are the foundation of the aquatic food web. They feed a diverse array of organisms,

Methods

Phytoplankton

Phytoplankton samples were collected monthly at 24 monitoring sites throughout the Upper Estuary, which were grouped into regions based on their geographic location (Figure 1; Table 1). Samples were collected 1 meter below the water's surface using a submersible pump and stored in 50 mL amber glass bottles. 200 μ L of Lugol's solution was added to each sample as a stain and preservative. All samples were kept at room temperature and away from direct sunlight until they were analyzed.

Phytoplankton identification and enumeration were performed by BSA Environmental, Inc. according to the Utermöhl microscopic method (Utermöhl, 1958) and modified Standard Methods (APHA, 2012). An aliquot of sample was placed into a counting chamber and allowed to settle for a minimum of 12 hours. The aliquot volume, normally 10-20 mL, was adjusted according to the algal population density and the turbidity of the sample. Phytoplankton taxa were enumerated in randomly chosen transects for each settled aliquot. This process was performed at 800x magnification using a Leica DMIL inverted microscope. For each aliquot, a minimum of 400 total algal units were counted, with the dominant taxon accounting for a minimum of 100 algal units. For filamentous or colonial taxa, the number of cells per filament or colony was recorded.

Raw organism counts were normalized to the sample volume using the following formula:

$$organisms/mL = \mathit{CA}_{c}rac{\mathit{V}}{\mathit{A}_{f}}\mathit{F}$$

where C is the organism count, A_c is the area of the cell bottom (mm²), A_f is the area of each grid field (mm²), F is the number of fields examined, and V is the settled volume (mL). This simplifies to:

$$organisms/mL = rac{C}{cV}$$

The 10 most common genera collected in 2022 were, in order:

- Eucapsis (cyanobacteria)
- · Cyclotella (centric diatoms)
- · Plagioselmis (cryptophytes)
- · Nitzschia (pennate diatoms)
- · Chlorella (green algae)
- · Cocconeis (cyanobacteria)
- · Teleaulax (centric diatoms)
- · Cryptomonas (cryptophytes)
- Monoraphidium (pennate diatoms)
- · Navicula (green algae)

Of the 10 groups identified, cryptophytes, cyanobacteria, diatoms, and green algae constituted the vast majority (97.7%) of the organisms collected.

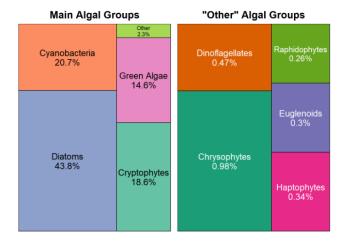
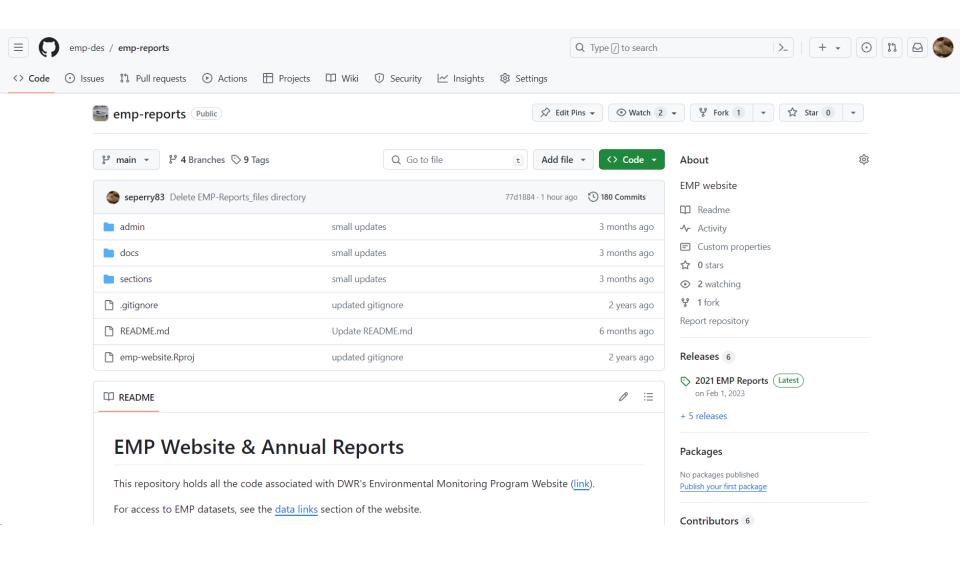


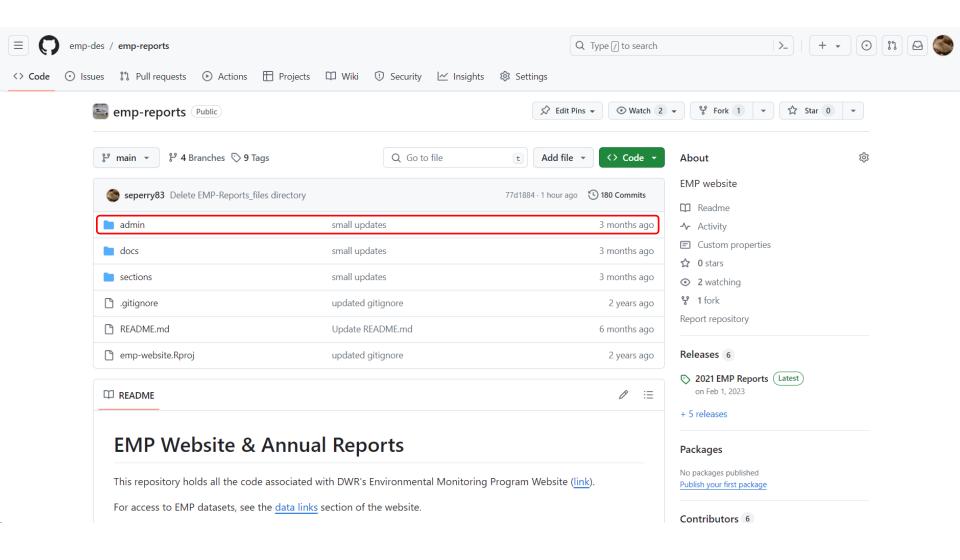
Figure 2: Phytoplankton composition by algal group

How to Publish via Bookdown/GitHub Pages

- 1. Create a GitHub Repository
- 2. Create YAML file
- 3. Specify additional YAML in .Rmd file
 - different ways to do this
- 4. Create reports in R Markdown files
- 5. Run R file to render reports (and publish to GitHub Pages)
- 6. Check that deployment was successful

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         chapter_name: ''
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metadata

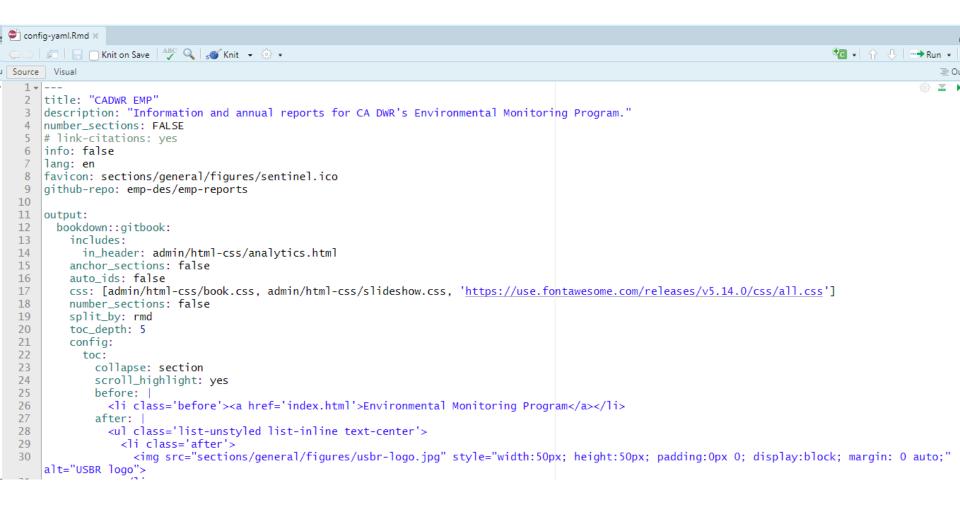
markdown files containing the reports

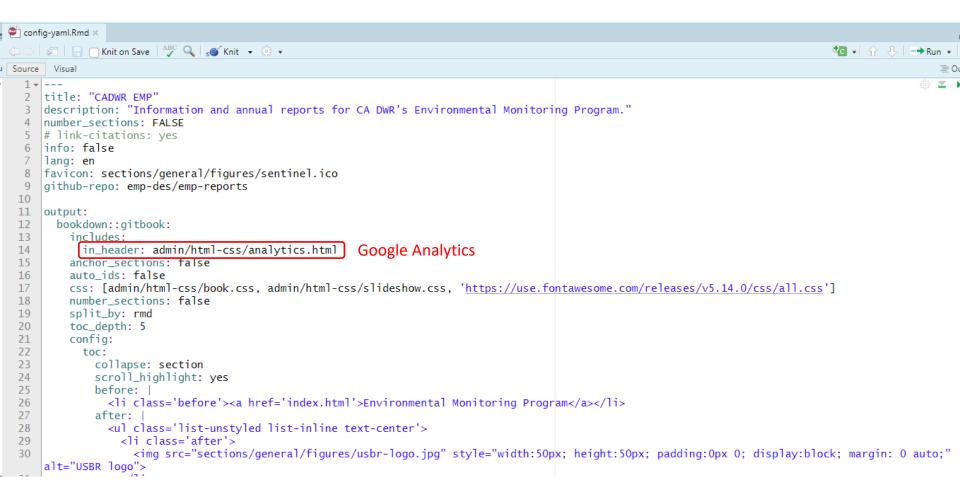
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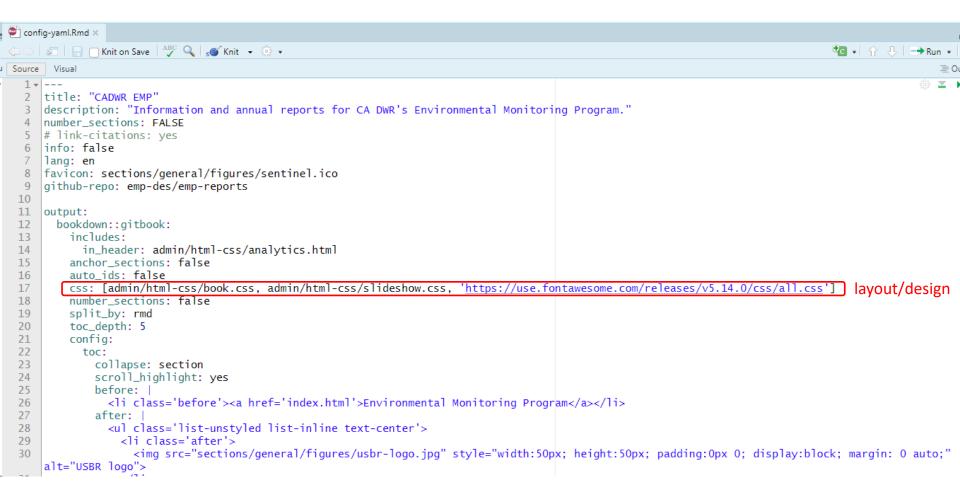
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metadata

markdown files containing the reports







```
book.css ×
(=> | = | = | Q
   1 |@import url('https://fonts.googleapis.com/css?family=Oswald|Arimo');
      /* title page */
   4 - .book .book-body .page-wrapper .page-inner section.normal .title {
        font-size: 250%;
        font-family: 'Oswald', sans-serif;
       font-style: normal;
   8
        font-weight: 100;
   9 . }
  10
  11 - .book .book-body .page-wrapper .page-inner section.normal .author .noem {
  12
        display: block:
  13
        margin: 0 0 10px 0;
  14
       font-size: 125%;
       font-style: normal;
  15
       font-variant: small-caps;
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  22 - .book .book-body .page-wrapper .page-inner section.normal .uri {
  23
       display: block;
  24
        margin: 0 0 10px 0;
  25
       font-size: 75%;
  26
       font-variant: small-caps;
  27
        font-family: 'Arimo';
  28 4 }
  29
  30 - .book .book-body .page-wrapper .page-inner section.normal .date {
       font-style: normal;
  31
  32
        font-size: 100%:
  33
        font-family: 'Open Sans', sans;
  34 🔺 }
  35
  36 /* main */
  37 ▼ .book {
  38
        background-color: #ffffff;
  39 4 }
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Feel free to use as a template:

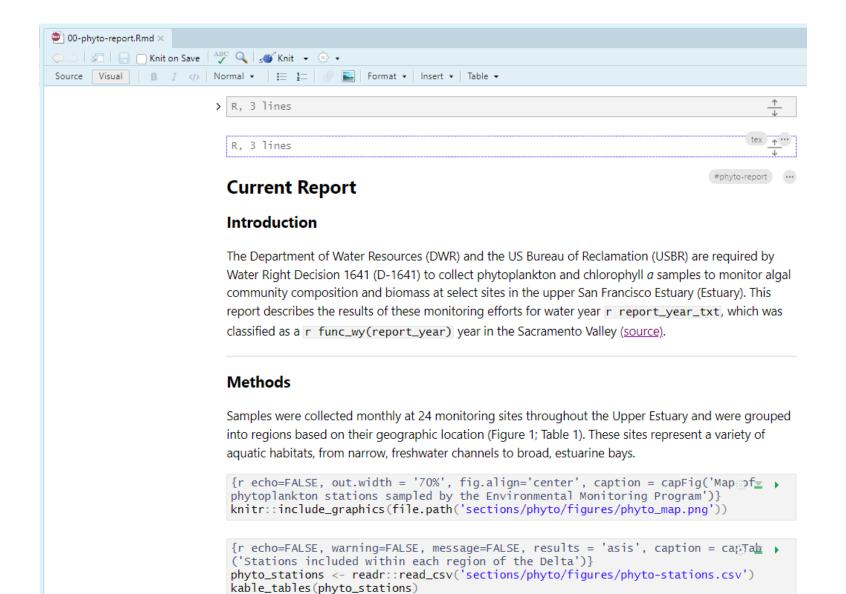
https://github.com/emp-des/emp-reports/blob/main/admin/html-css/book.css

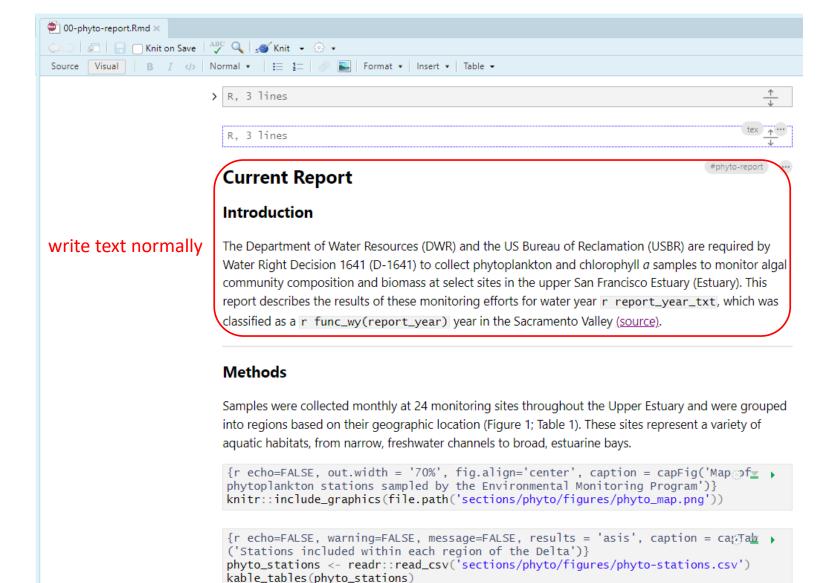
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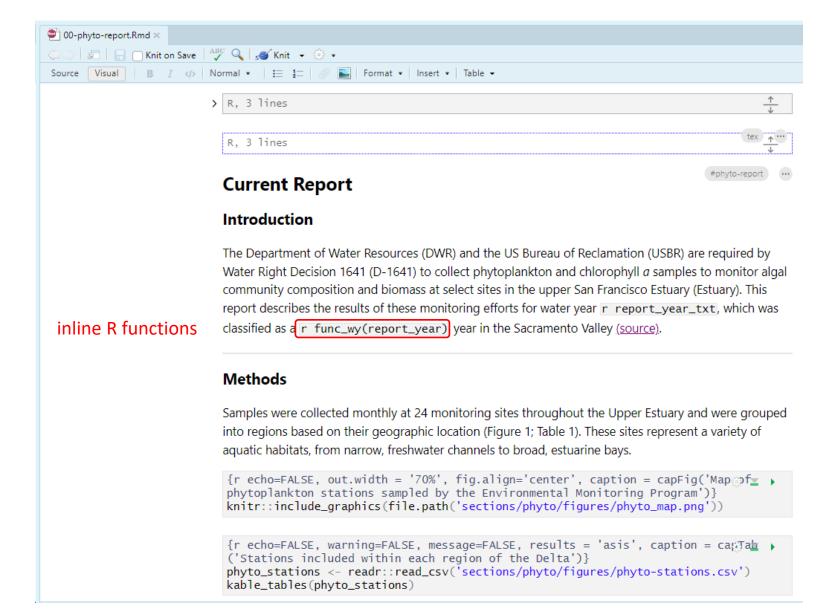
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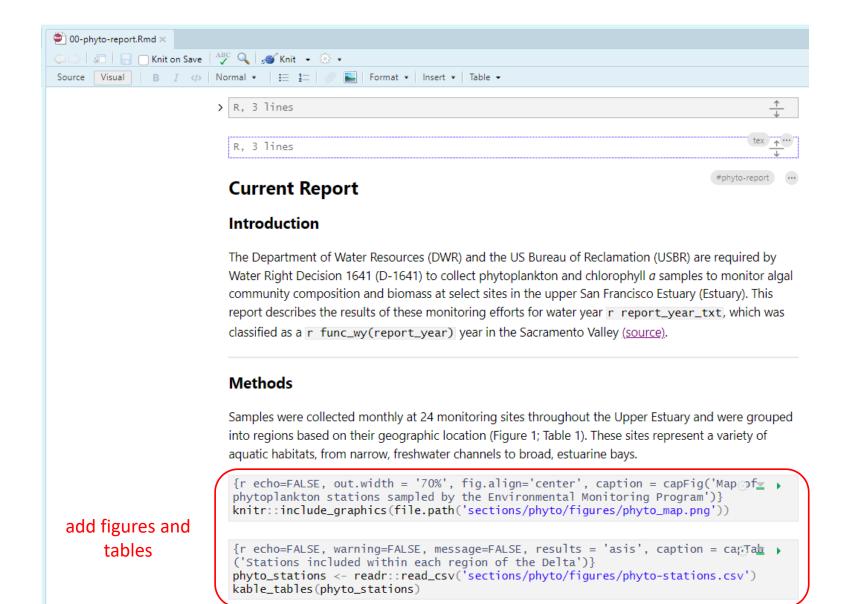
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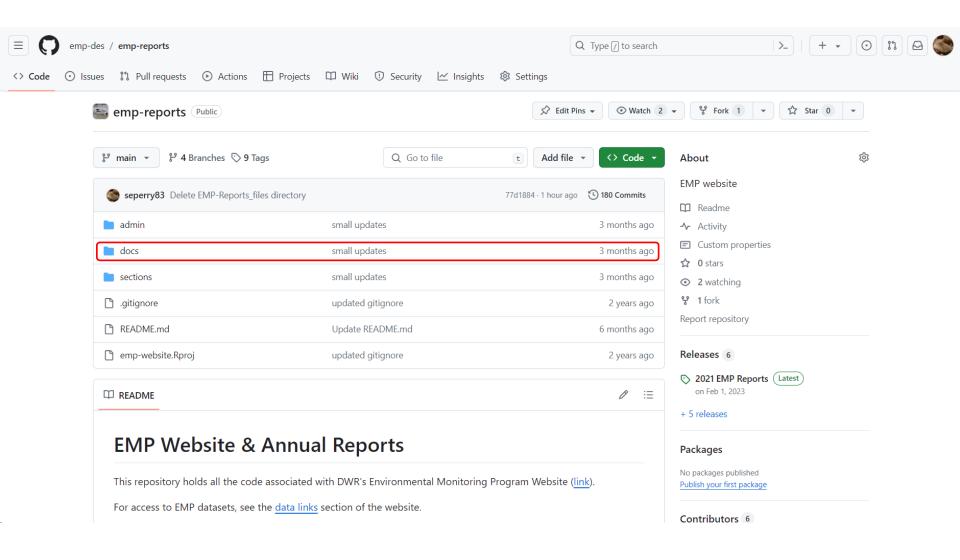


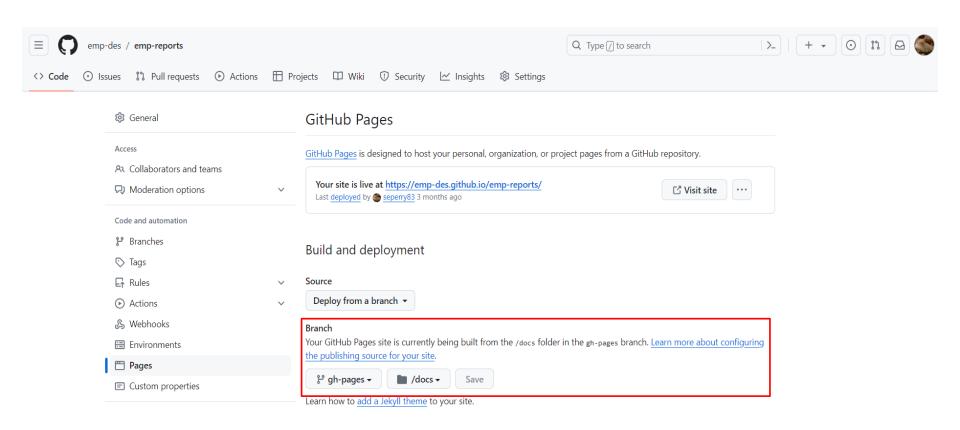
General Layout

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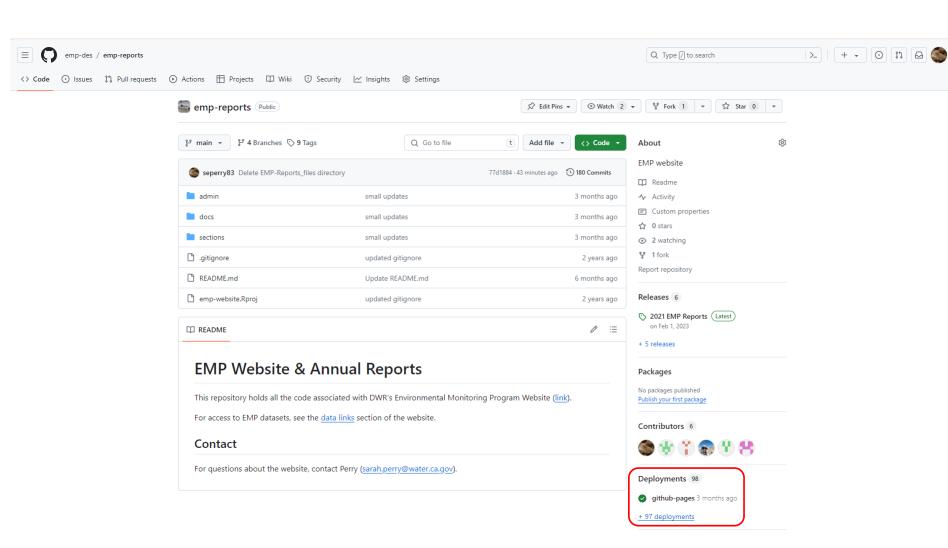
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update-website.R ×
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    # WARNING: after running, once pushed to GitHub "gh-pages" branch, website will be updated
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    sapply(file_sources, source, .GlobalEnv)
  6
    |bookdown::render_book(
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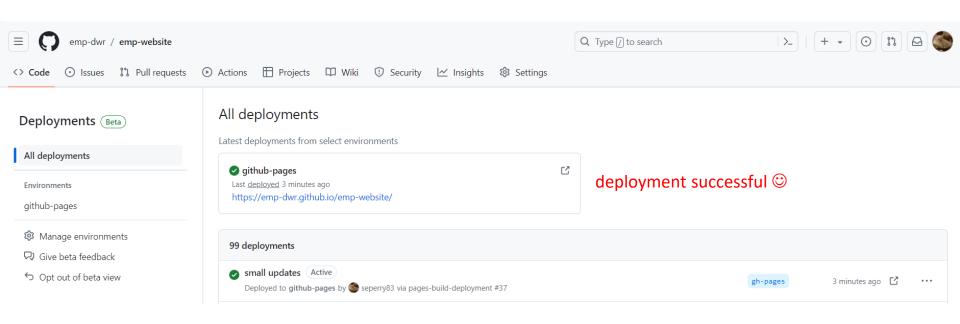
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Thank You!

Additional Resources:

• Bookdown Reference:

https://bookdown.org/

• CSS Template:

https://github.com/emp-dwr/emp-website/blob/main/admin/html-css/book.css

Contact:

sarah.perry@water.ca.gov





