

CalCOFI.io Docs

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1 Process

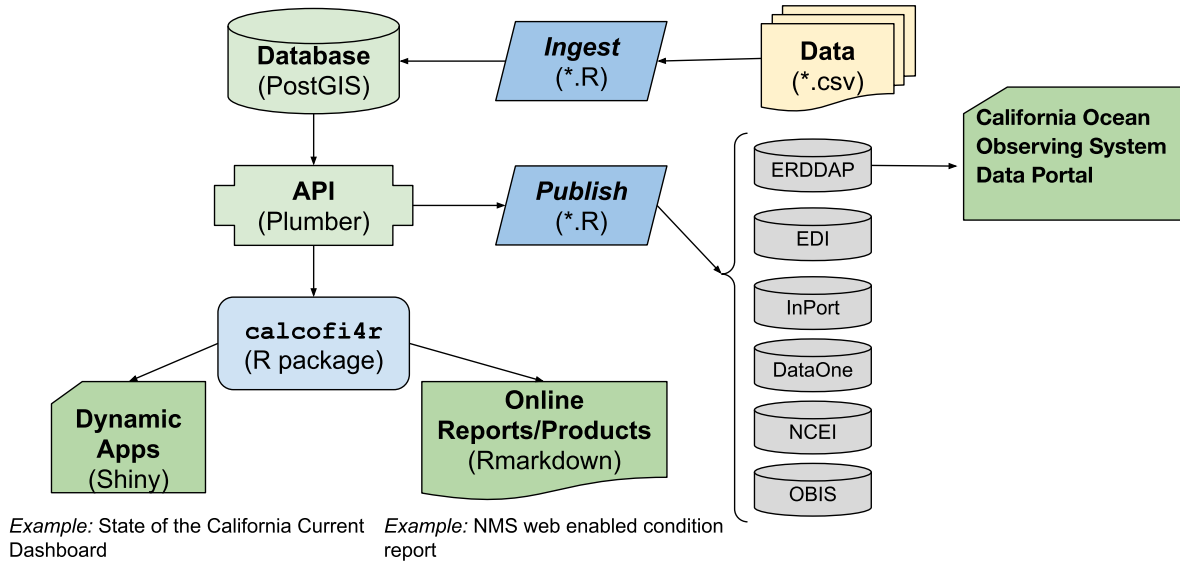


Figure 1.1: CalCOFI data workflow.

The original raw **data**, most often in tabular format [e.g., comma-separated value (*.csv)], gets **ingested** into the **database** by R **scripts** that use functions and lookup data tables in the R package **calcofi4r** where functions are organized into *Read*, *Analyze* and *Visualize* concepts. The application programming interface (**API**) provides a program-language-agnostic public interface for rendering subsets of data and custom visualizations given a set of documented input parameters for feeding interactive applications (**Apps**) using Shiny (or any other web application framework) and **reports** using Rmarkdown (or any other report templating framework). Finally, R scripts will **publish** metadata (as [Ecological Metadata Language](#)) and data packages (e.g., in Darwin format) for discovery on a variety of data **portals** oriented around slicing the tabular or gridded data ([ERDDAP](#)), biogeographic analysis ([OBIS](#)), long-term archive ([DataOne](#), [NCEI](#)) or metadata discovery ([InPort](#)). The **database** will be spatially enabled by PostGIS for summarizing any and all data by **Areas of Interest** (AoIs), whether pre-defined (e.g., sanctuaries, MPAs, counties, etc.) or arbitrary new areas. (Figure 1.1)

- ERDDAP: great for gridded or tabular data, but does not aggregate on the server or clip to a specific area of interest

2 Reports

2.1 Sanctuaries

- [Channel Islands WebCR](#)
web-enabled Condition Report
 - [Forage Fish](#)
example of using calcofi4r functions that pull from the API
- [UCSB Student Capstone](#)

3 Applications

- [CalCOFI Oceanography](#)
oceanographic summarization by arbitrary area of interest and sampling period
- [UCSB Student Capstone](#)

4 API

The raw interface to the Application Programming Interface (API) is available at:

- api.calcofi.io

Here we will provide more guidance on how to use the API functions with documented input arguments, output results and examples of use.

4.1 `/variables`: get list of variables for timeseries

Get list of variables for use in `/timeseries`

4.2 `/species_groups`: get species groups for larvae

Not yet working. Get list of species groups for use with variables `larvae_counts.count` in `/timeseries`

4.3 `/timeseries`: get time series data

4.4 `/cruises`: get list of cruises

Get list of cruises with summary stats as CSV table for time (`date_beg`)

4.5 `/raster`: get raster map of variable

Get raster of variable

4.6 /cruise_lines: get station lines from cruises

Get station lines from cruises (with more than one cast)

4.7 /cruise_line_profile

Get profile at depths for given variable of casts along line of stations

5 Database

5.1 Database naming conventions

- [Learn SQL: Naming Conventions](#)
- [Best Practices for Database Naming Conventions - Drygast.NET](#)

5.1.1 Name tables

- Table names are plural and use all lower case.

5.1.2 Name columns

- To name columns, use **snake-case** (i.e., lower-case with underscores) so as to prevent the need to quote SQL statements. (TIP: Use `janitor::clean_names()` to convert a table.)
- Unique **identifiers** are suffixed with:
 - `*_id` for unique integer keys;
 - `*_key` for unique string keys;
 - `*_seq` for auto-incrementing sequence integer keys.
- Suffix with **units** where applicable (e.g., `*_m` for meters, `*_km` for kilometers, `degc` for degrees Celsius). See [units vignette](#).
- Set geometry column to **geom** (used by [PostGIS](#) spatial extension). If the table has multiple geometry columns, use **geom** for the default geometry column and `geom_{type}` for additional geometry columns (e.g., `geom_point`, `geom_line`, `geom_polygon`).

5.2 Describe tables and columns

- Use the `COMMENT` clause to add descriptions to tables and columns, either through the GUI pgadmin.calcofi.io (by right-clicking on the table or column and selecting **Properties**) or with SQL. For example:

```
COMMENT ON TABLE public.aoi_fed_sanctuaries IS 'areas of interest (`aoi`) polygons for f
```

- Note the use of **markdown** for including links and formatting (e.g., bold, code, italics), such that the above SQL will render like so:

areas of interest (aoi) polygons for federal **National Marine Sanctuaries**;
loaded by *workflow* [load_sanctuaries](#)

- It is especially helpful to link to any *workflows* that are responsible for the ingesting or updating of the input data.
- These descriptions can be viewed in the CalCOFI **API** api.calcofi.io as CSV tables (see code in [calcofi/api: plumber.R](#)):

- api.calcofi.io/db_tables
fields:

- * `schema`: (only “public” so far)
- * `table_type`: “table”, “view”, or “materialized view” (none yet)
- * `table`: name of table
- * `table_description`: description of table (possibly in markdown)

- api.calcofi.io/db_columns
fields:

- * `schema`: (only “public” so far)
- * `table_type`: “table”, “view”, or “materialized view” (none yet)
- * `table`: name of table
- * `column`: name of column
- * `column_type`: data type of column
- * `column_description`: description of column (possibly in markdown)

- Fetch and display these descriptions into an interactive table with `calcofi4r::cc_db_catalog()`.

5.3 Relationships between tables

- See [calcofi/workflows: clean_db](#)

- TODO: add calcofi/apps: db to show latest tables, columns and relationships

5.4 Spatial Tips

- Use `ST_Subdivide()` when running spatial joins on large polygons.

6 References

6.1 R packages

- API: plumber (Schloerke and Allen 2024)
- docs: Quarto (Allaire and Dervieux 2024)
- apps: Shiny (Chang et al. 2024)

Allaire, JJ, and Christophe Dervieux. 2024. *Quarto: R Interface to Quarto Markdown Publishing System*. <https://github.com/quarto-dev/quarto-r>.

Chang, Winston, Joe Cheng, JJ Allaire, Carson Sievert, Barret Schloerke, Yihui Xie, Jeff Allen, Jonathan McPherson, Alan Dipert, and Barbara Borges. 2024. *Shiny: Web Application Framework for r*. <https://shiny.posit.co/>.

Schloerke, Barret, and Jeff Allen. 2024. *Plumber: An API Generator for r*. <https://www.rplumber.io>.