Bringing the Fish Restoration Program's Continuous Water Quality Data to Life
Data Pipeline, Processing & Visualization

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BACKGROUND

Continuous monitoring programs require extensive staff time, equipment, and commitment from programs and departments. Often, the cost and effort to install, maintain, and manage a monitoring program and its resulting data are greatly underestimated. Collaboration across departments and organizations can enable teams to meet the need for expanded monitoring networks and parameters despite constrained budgets, equipment, and staff.

In 2023, Fish Restoration Program (FRP) continuous water quality teams, made up of CDFW and DWR staff that monitor over 10 stations in Restored Tidal Wetlands, began to investigate:
1. How to best combine data that is collected and stored separately to ensure data quality,
2. Improvements for reducing data request response time, and
3. Publication of data
4. Enhancements to data visualizations.

DATA PIPELINE - BEFORE
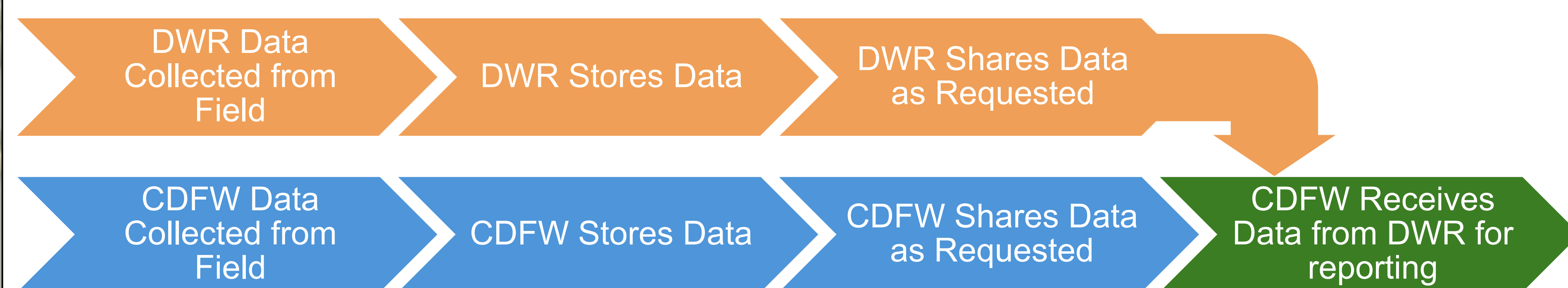
HURDLES EXPERIENCED

⚠ **Tedious data processing procedure** →
   Data left in its raw format for long periods
⚠ **Uncoordinated Data Sharing** →
   Inefficient processing occurs if entire suite of data is not shared between department teams
⚠ **Inconsistent Data Request Responses** →
   The level of quality checks applied to data varied by person responding to data requests
⚠ **Difficulty in compilation of FRP data** →
   Data frames varied between departments due to formatting, quality checks, organization

SOLUTIONS APPLIED

✓ **Interdepartmental OneDrive Data Folders** →
   Quick access to compiled data
✓ **Development of Shared R Script** →
   Matching quality checks, formatting, and organization across departments
✓ **Introduction of GitHub Repository** →
   Allows each department to share generalized processing pipeline while also sharing separate script for individual needs
✓ **Routine Meetings** →
   Creates faster response to issues and ideas
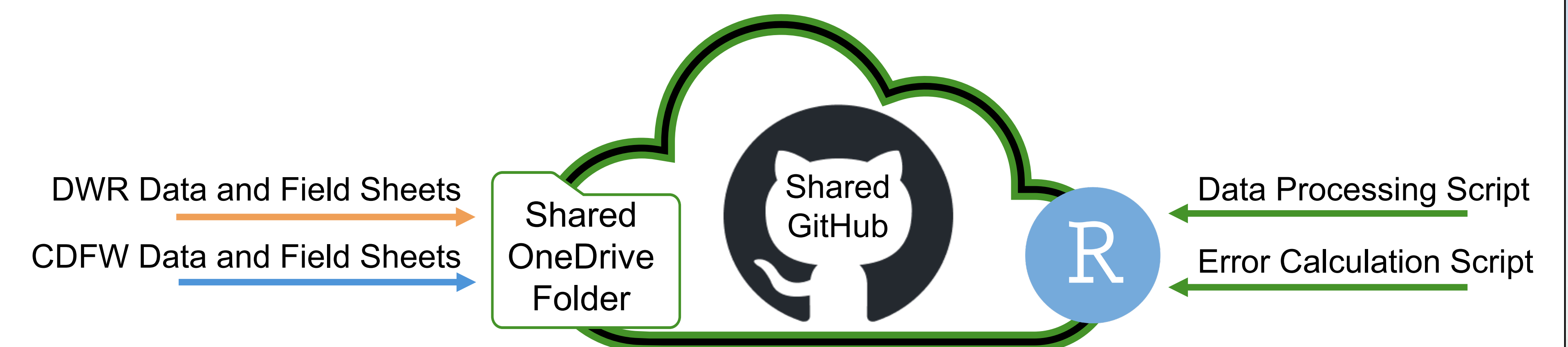
COLLABORATION TOOLS

Goals of FRP Continuous Monitoring Teams –
   Enhanced collaboration, More efficient field runs, and Open data management
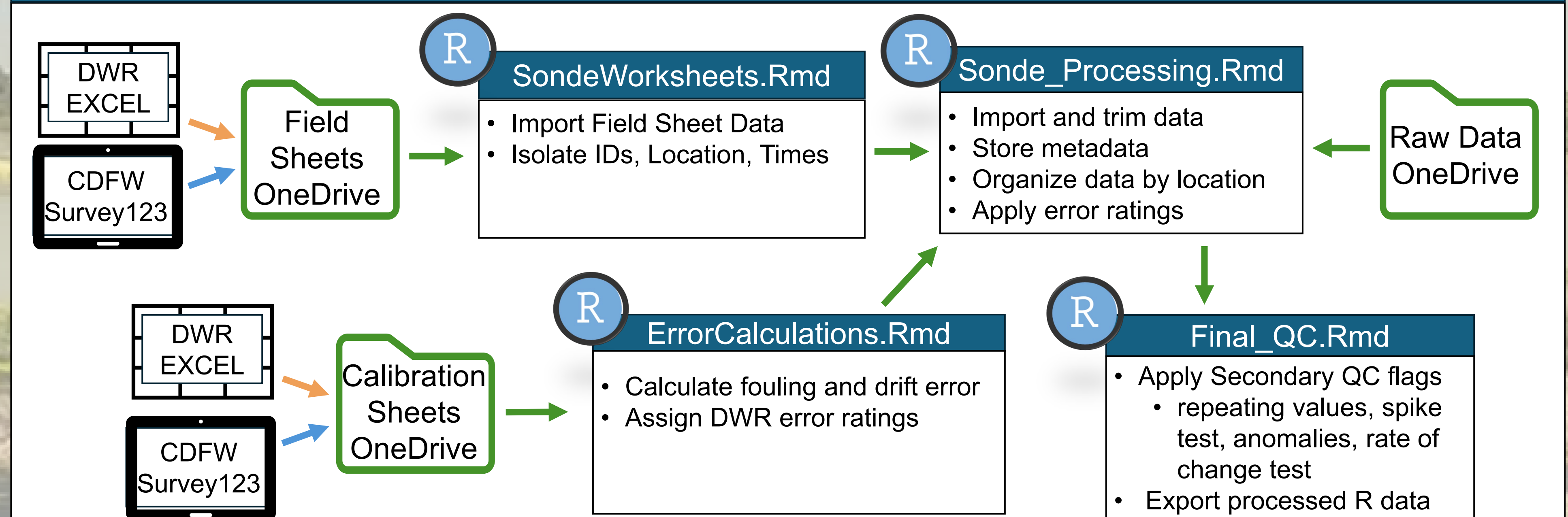
To achieve this, the following tools are used:
- **Bi-weekly meetings** – quick updates on stations, processes, and needs
- **Electronic field sheets** (ESRI Survey123) and/or field sheet data transcribed to Excel
- **OneDrive** – all team members have access to the same raw data at the same time
- **GitHub** – a hub for teams to collaborate on data processing and analysis
- **RStudio** – a tool to work independently on code and sync with GitHub
- **Excel** – readable by R, relied on to transcribe paper/PDF data
- **iPads** with Survey123 – Excel output allows for easy incorporation into code. No paper field sheet delays or errors in transcription.

DATA PIPELINE - UPDATE

DATA PROCESSING DETAILS

NEXT STEPS: VISUALIZATIONS, EXPORT, & PUBLICATION

Internal Dashboard for Field Staff and Managers

Easy Data Download Portal for Staff

Publish data on Environmental Data Initiative. Includes metadata, QA checks, contact information