WQDas

Water Quality Data Acquisition Solution

User Manual

Draft

Created By
TechZone MD LLC
www.techzonemd.com
www.wqdas.com

Contents

Table of Figures:

Introduction

The Water Quality Data Acquisition Solution (WQDas) is an all-encompassing platform tailored for water quality monitoring initiatives. It streamlines the management of diverse elements, including water chemistry, physical attributes, chemical properties, habitat evaluations, biological assessments, and fish tissue studies, among others. As a centralized hub, WQDas empowers organizations to oversee their projects from start to finish within a single, integrated platform.

Key Features of WQDas:

WQDas boasts an array of essential features, such as project tracking, activities tracking, land owner's permission to enter the location tracking, staff training management, and equipment monitoring for each project. Its dashboard aggregates organizational data into a secure repository, ensuring easy access and data integrity. With data visualization tools like charts and graphs, the dashboard delivers a comprehensive overview of project performance.

By presenting all project information on a single screen accessible to team members, WQDas enhances transparency and collaboration throughout the project lifecycle. It effectively monitors activities to ensure smooth operations from inception to completion.

Centralizing data improves accessibility, accuracy, and reliability by creating a single source of truth. This approach supports data portability and standardizes storage and formatting practices across the organization, reducing redundancy and minimizing errors. Real-time access to a unified dataset guarantees that all stakeholders work with consistent information and adhere to standardized protocols.

Moreover, WQDas streamlines the management and design of reporting and analysis protocols, promoting consistency in naming conventions and methodologies across all projects. This adherence to standardized practices aligns with organizational preferences and boosts efficiency in data management and analysis.

Login to WQDas

Please log in to the WQDas platform at www.wqdas.com using the credentials provided by your organization's admin. If you experience any issues, reach out to your admin or email Admin@techzonemd.com. First-time users should use the reset option to obtain a new password after confirming their account creation with the project manager for their organization.

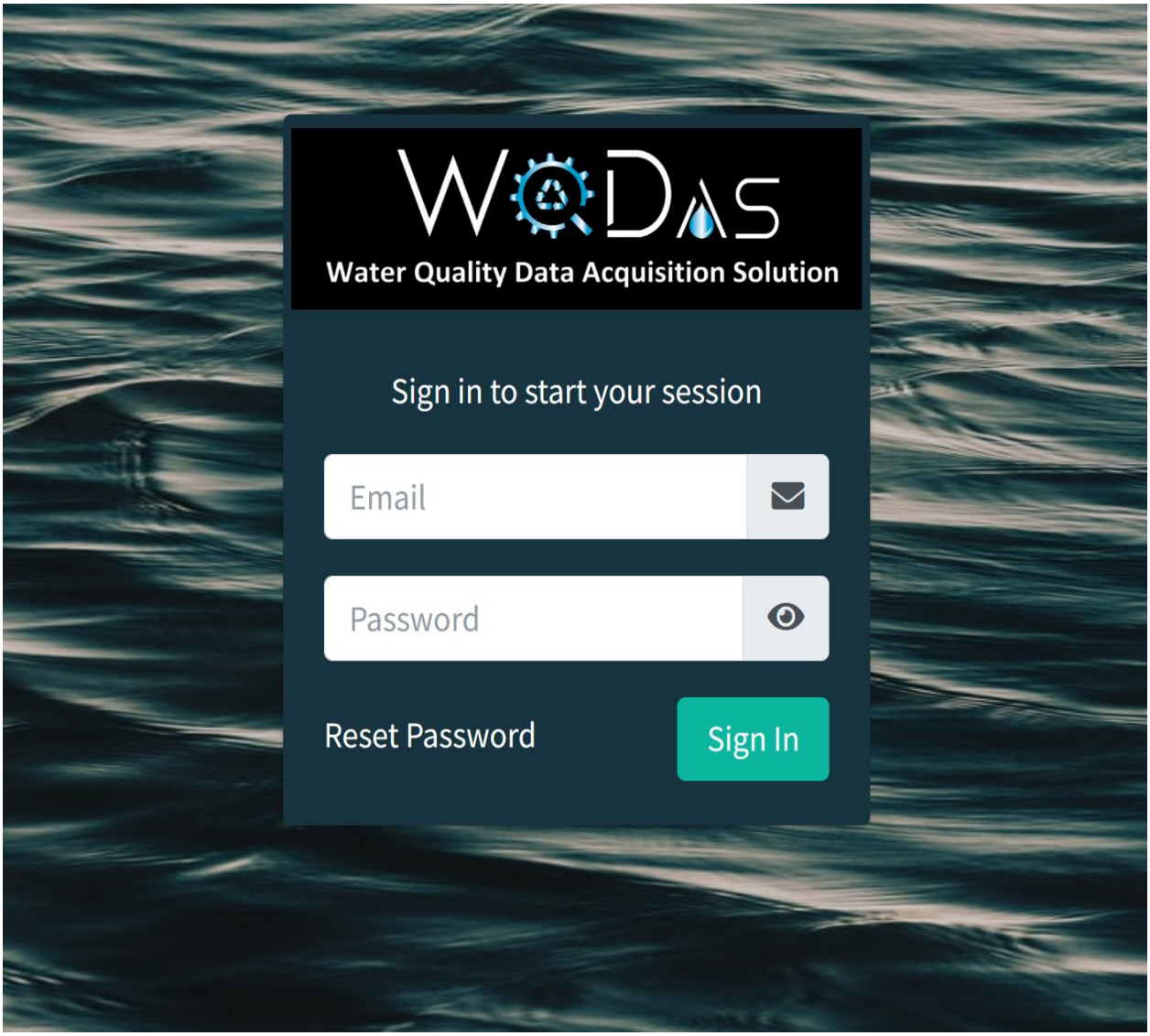

Figure 1 Login screen

Project Catalog View

Click on the "Projects" tab in the main menu to access a centralized list of all projects conducted by your organization. This overview helps keep track of important details, including QAPP status, project manager, project duration, funding sources and the grants associated with each project. Users can quickly review metadata such as the availability of SOPs for team members, ensuring everyone has access to necessary documentation.

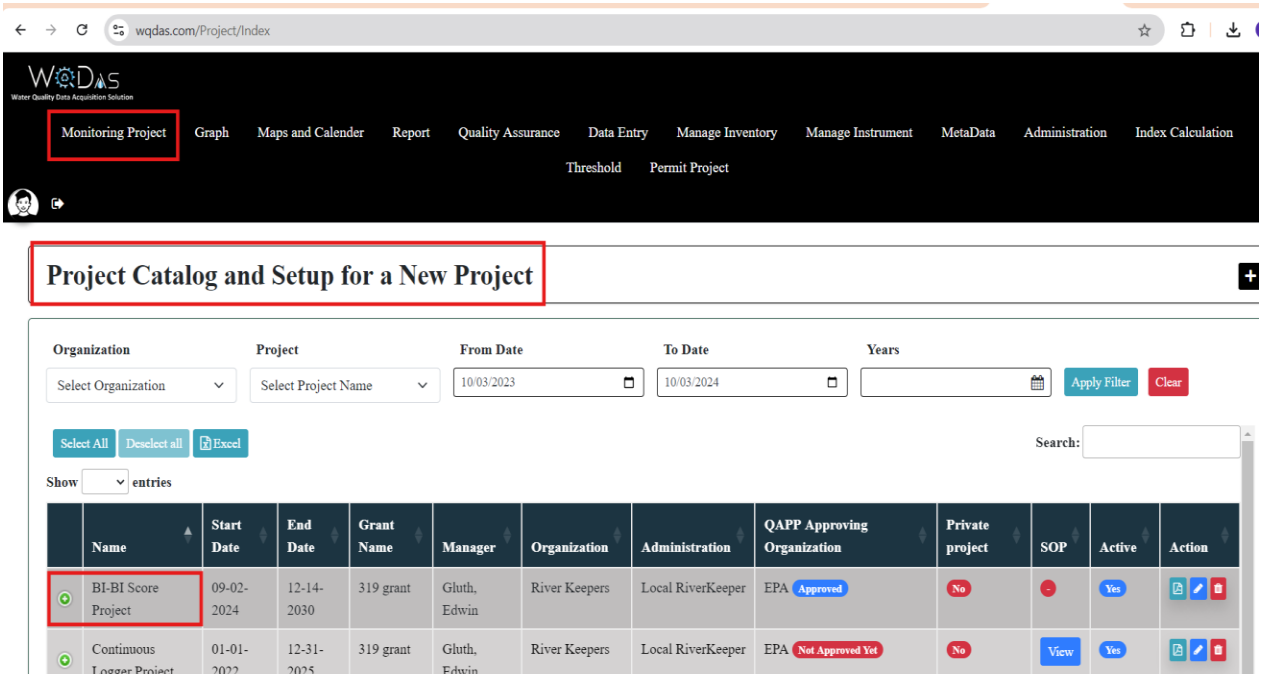

Figure 2 Project Catalog

To view project details, click the green "+" sign at the beginning of each row in the Projects Catalog.

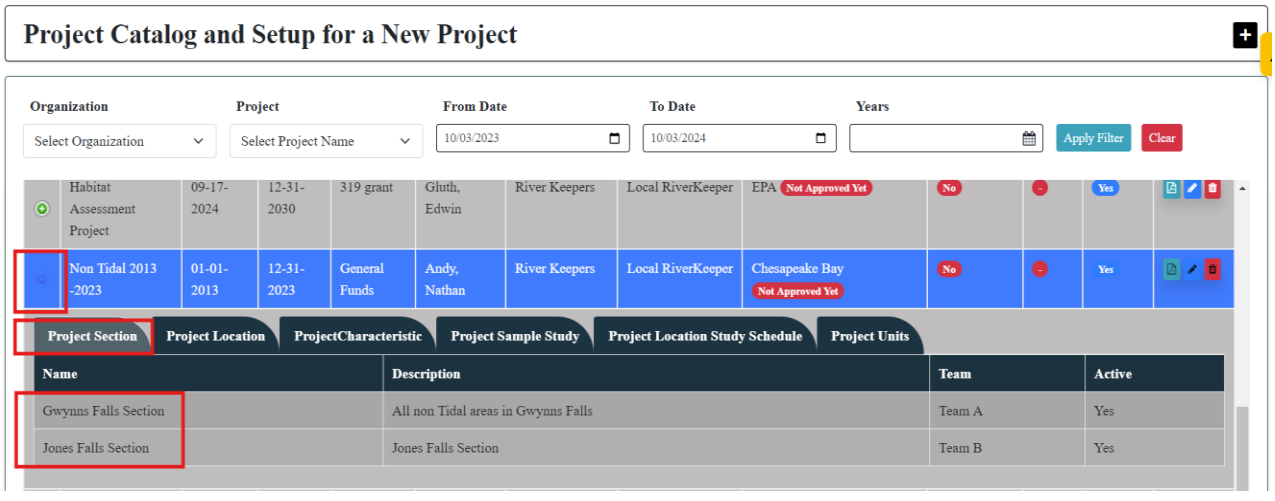

Figure 3 Project Details

Users can view all details about the project, including sections, sampling locations, sampling plans, monitoring characteristics, and the schedule in one centralized solution.

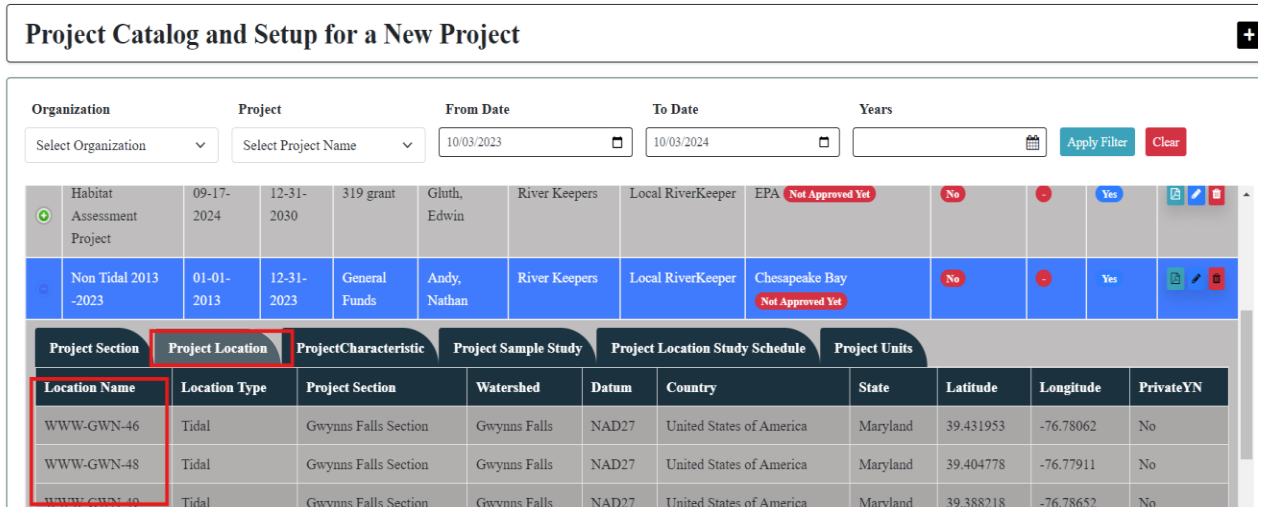

Figure 4 Project Location

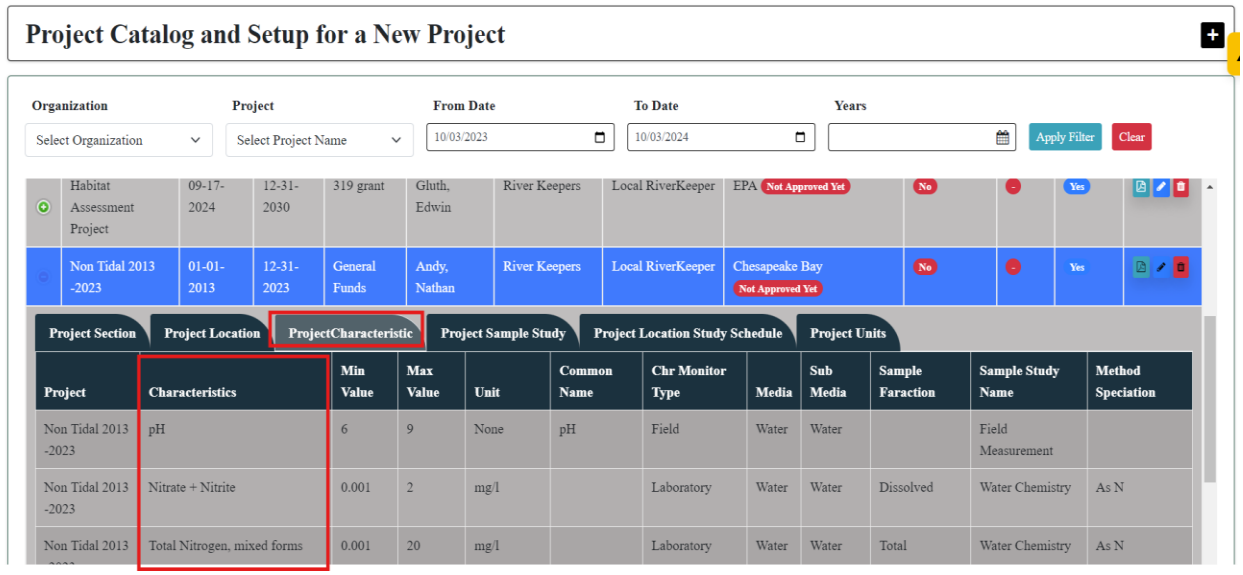

Figure 5 Project Characteristic

Users can view the "Sample Study" details on this tab, including the type of sampling method and the containers that will be used for the project.

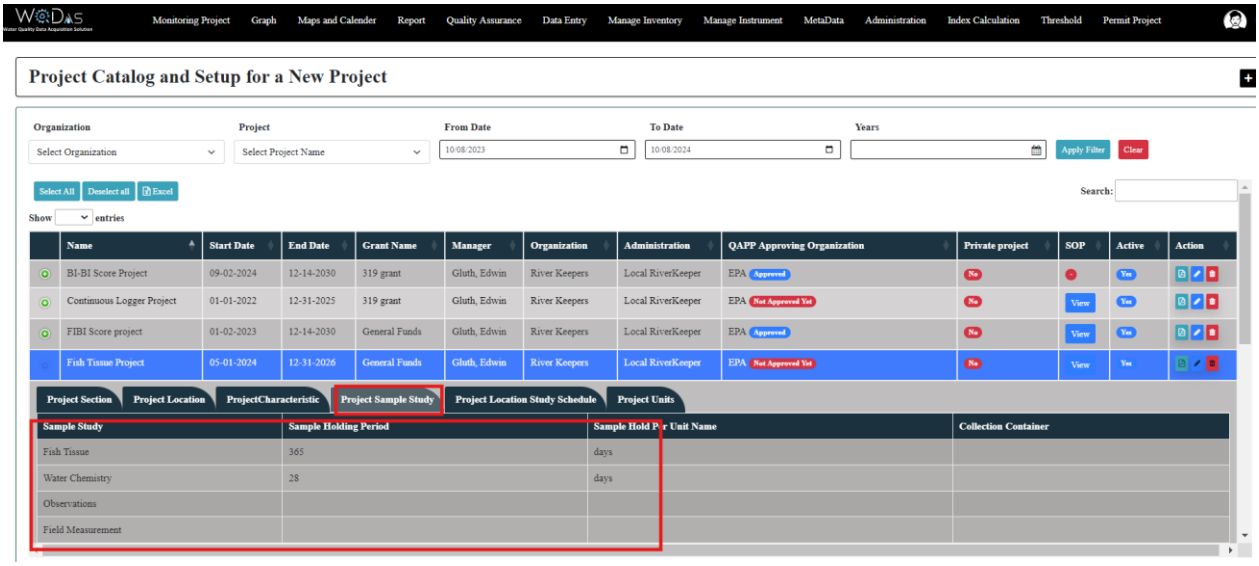

Figure 6 Project Sample Study

Users can view the sampling frequency for each site within the sample study, along with the equipment used at each location during the sampling process for the project.

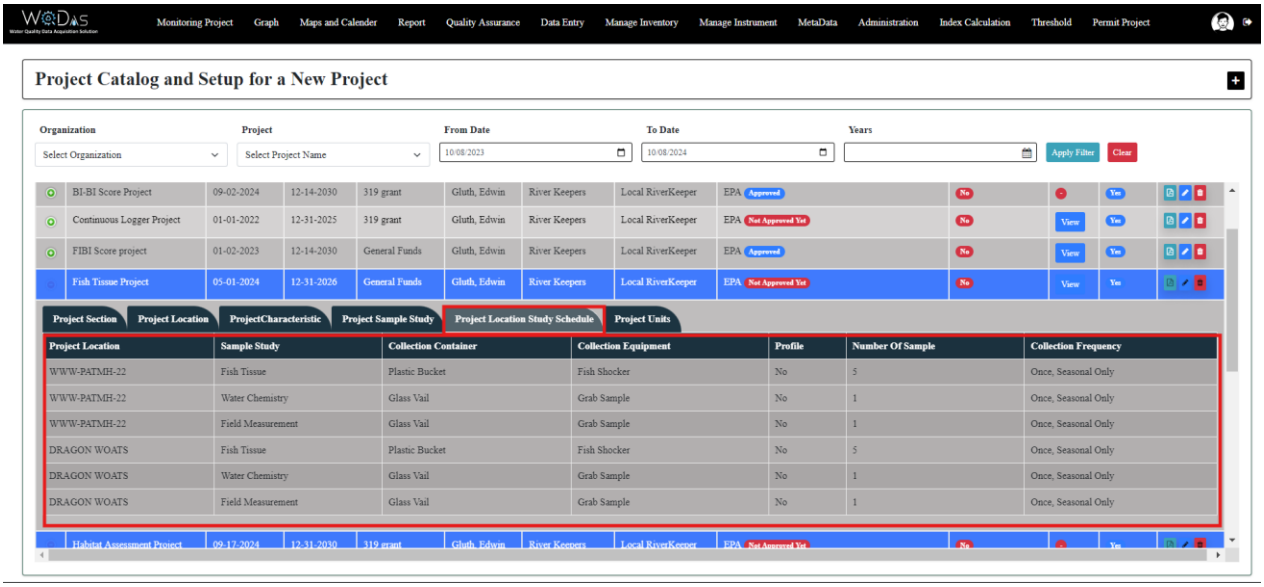

Figure 7 Project Sampling Schedule

Users can view the measuring units associated with each sample study for a project.

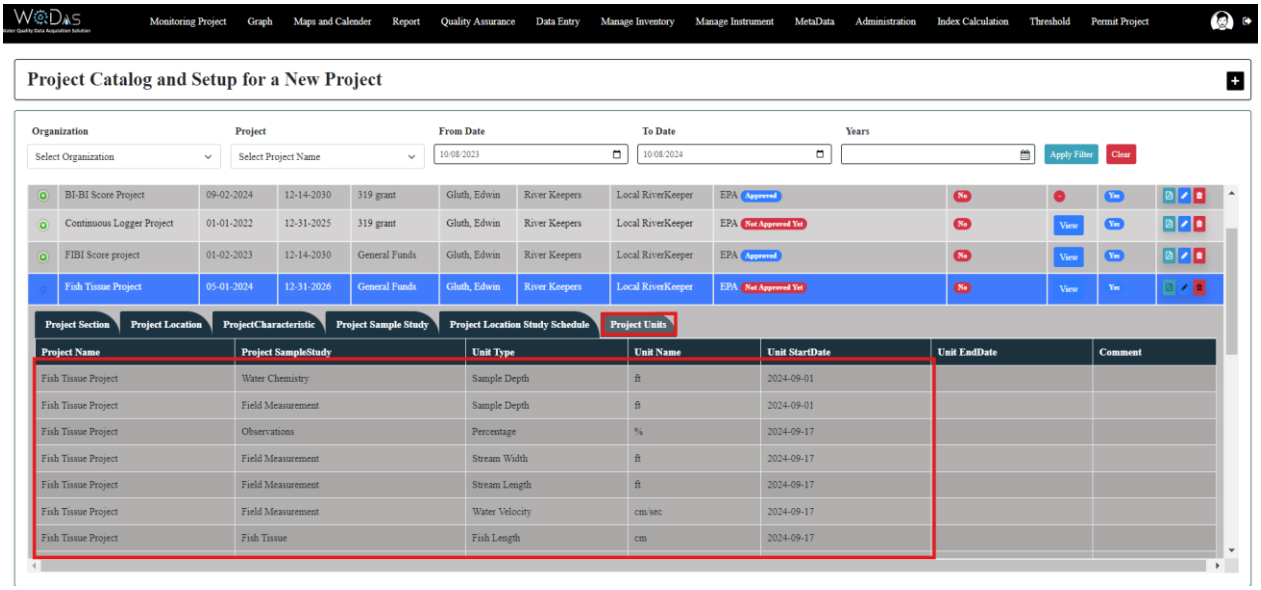

Figure 8 Project Units

The WQDas will generate a Quality Assurance Project Plan (QAPP) for each individual project during the “Project” setup process. For each individual project there is an option to upload Standard Operating Procedures (SOP) as documents, which can be included in the QAPP.
To generate the QAPP, click the “PDF” action button, which allows you to save the document. This will open in a new window for your convenience.

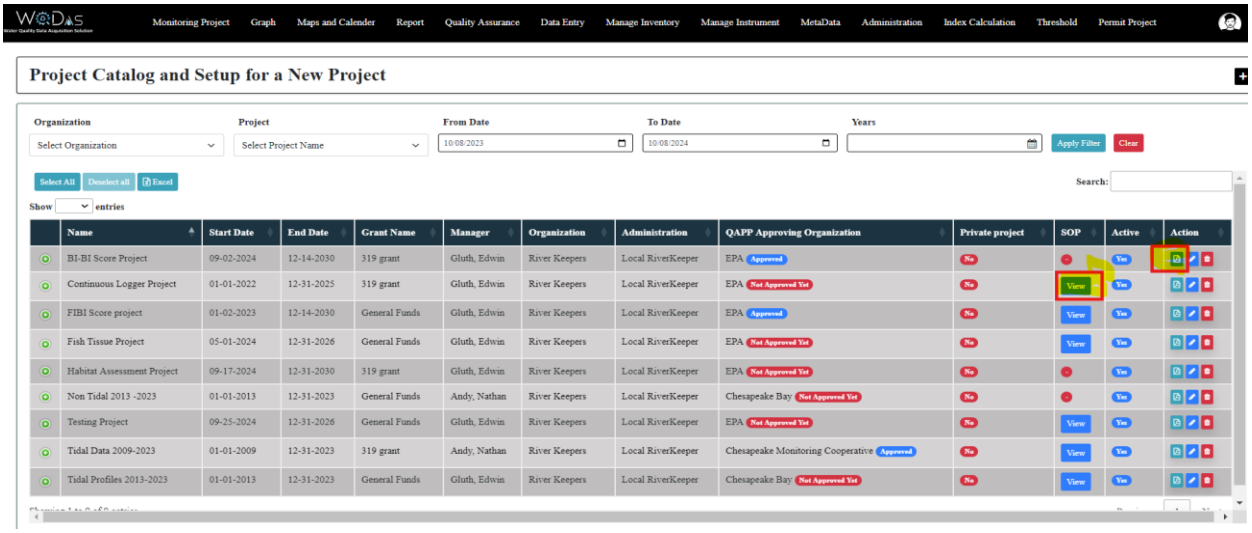

Figure 9 How to create a QAPP, Click on PDF button

Starting a New Project:

For any projects, all Create, Update, and Delete (CUD) options are restricted to the Organization Admin and Administration Lead, while all other roles have Read-Only access.

Requirements Before Starting a New Project:

Add Location Information: Ensure all location details are entered into the “Master Location” table under the “Metadata” menu.

Assign Inventories: Make sure that all necessary equipment and inventories are assigned to field staff.

Prepare Parameters/Characteristics List: Have a ready list of parameters and characteristics, including Units, Minimum and maximum acceptable values, Indication of whether values are collected in the field or received from lab analyses.

Before creating a new project, it is essential to populate the “Location Master” tab with all relevant location information to assign these locations to the project. This allows for reusing locations across multiple projects, as the same location can be assigned to many projects. Users can add new data by clicking the “+” sign in the upper right corner.

Create a Location in Location Master table

Ensure that all details for each location are included in the master table. Key information should encompass: Location Type, watershed, Latitude, Longitude, state etc. Additional relevant attributes such as land use, access points, and any specific notes regarding environmental conditions or restrictions.

This comprehensive data will facilitate effective project planning and management.

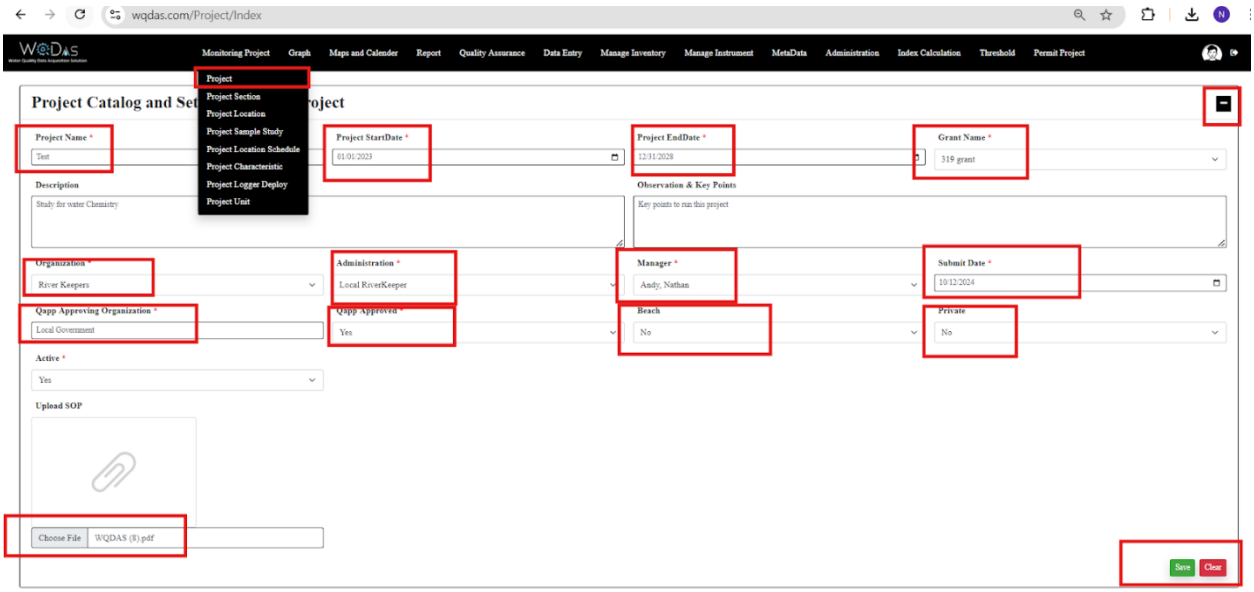

Figure 10 Add a new Location into Location Master table.

Users can view a comprehensive list of all locations utilized across various projects. This serves as the master list of all sampling locations used by the organization at any given time.

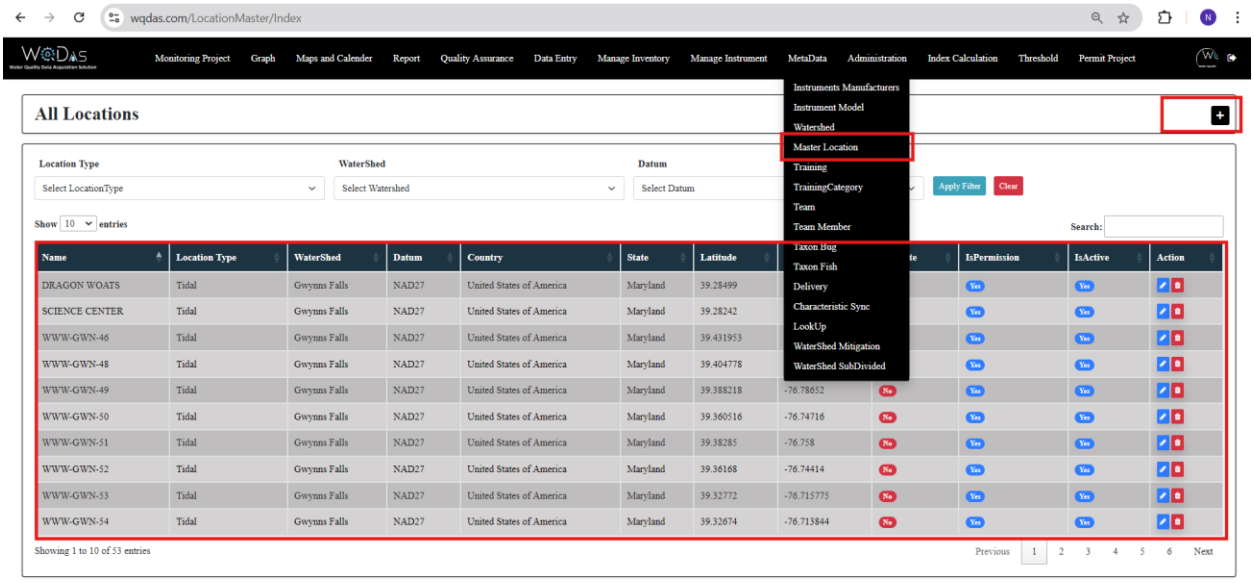

Figure 11 List of al the locations in "Master Location"

Landowner's Permission Tracking

Coming soon:

Project managers can monitor the landowner's permission status for each location by clicking on the "Permission" tab in the Location table. If a location is on private land requiring permission, users can check whether the landowner has granted access to the team.

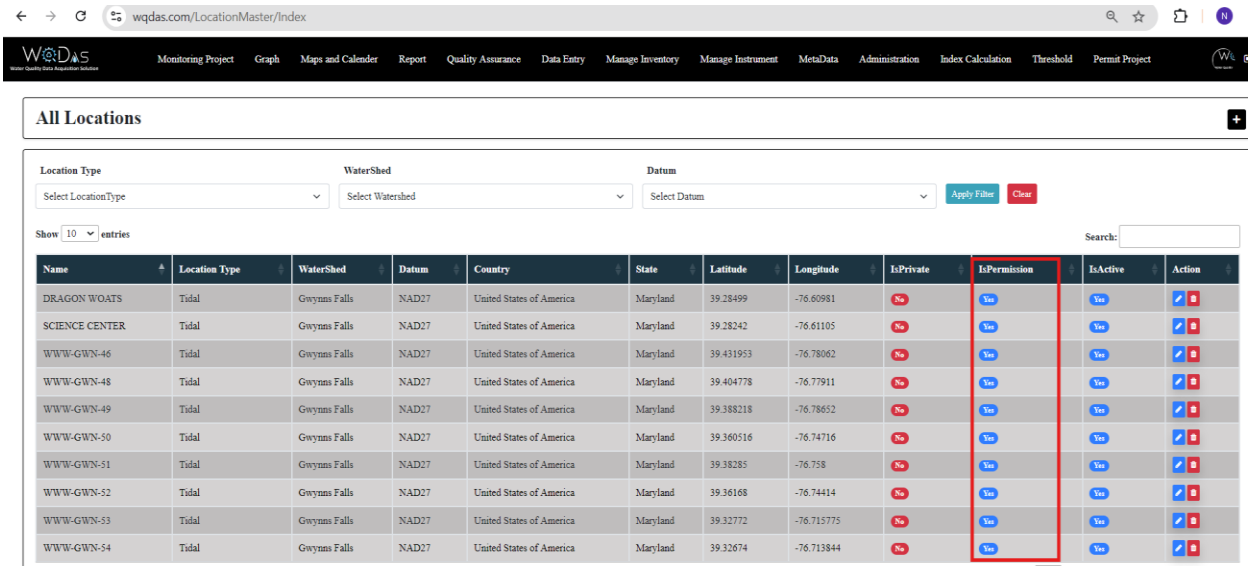

Figure 12 Checking to see if you have permission to access this location.

All Locations on the Map

Users can view all locations on the map, presented as clusters for easier navigation and analysis.

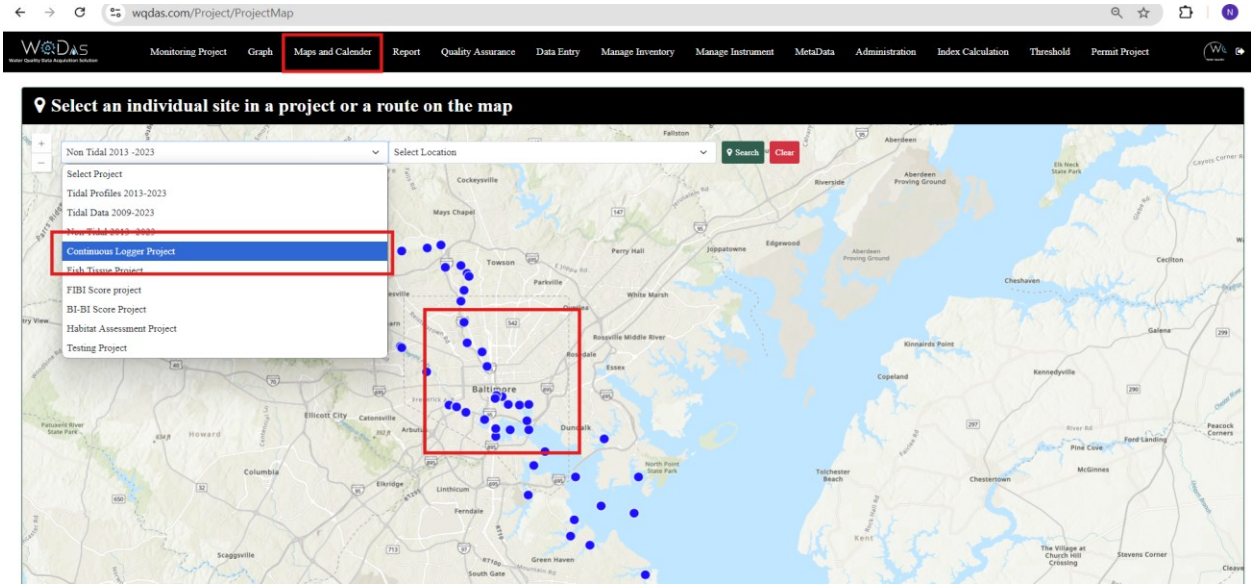

Figure 13 Map with All the locations

Creating a New Project

Before initiating a new project, the Project Manager must verify that all locations are included in the "Location Master" table. Additionally, field staff or those responsible for data collection should have the necessary equipment assigned for the process. Each team member must also be assigned an appropriate role to ensure the project's organizational structure is maintained. After that the project manager can start filling all the fields in this screen.

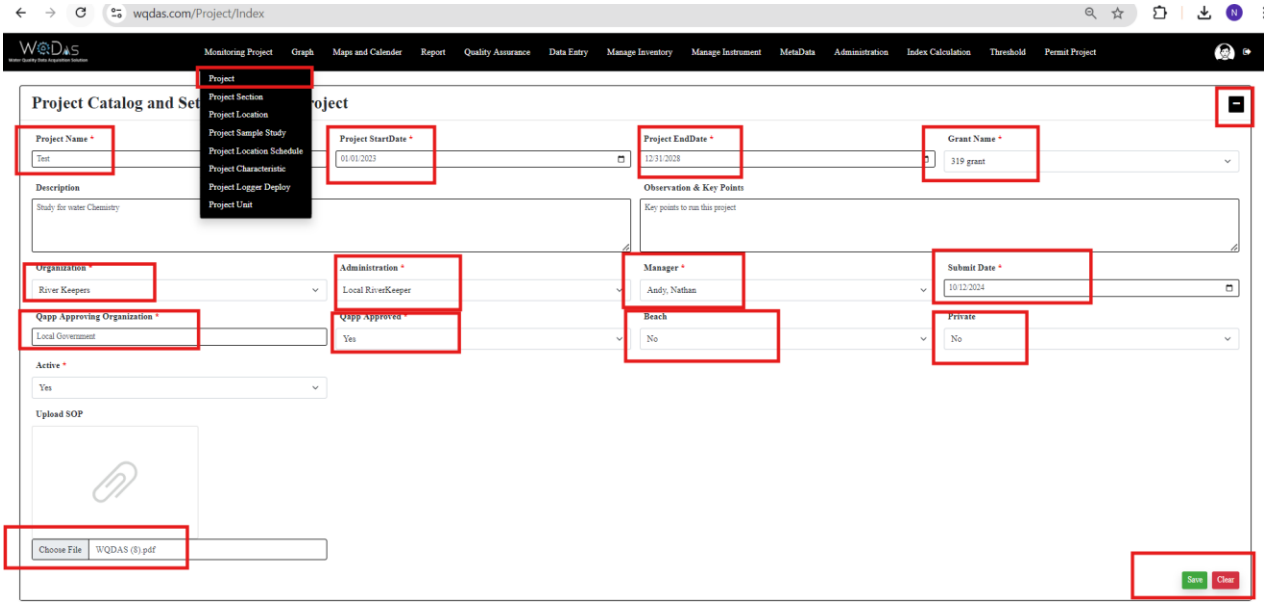

Figure 14 Create a new project

Create Project Sections

For each project, the Project Manager will outline all sections corresponding to various monitoring locations. This structure enables project managers to assign each section to a specific team. Sections consist of a group of locations within a designated area. These sections can help to run a few reports and see trends in a specific section. To add new entries, use the “+” sign in the top right corner.

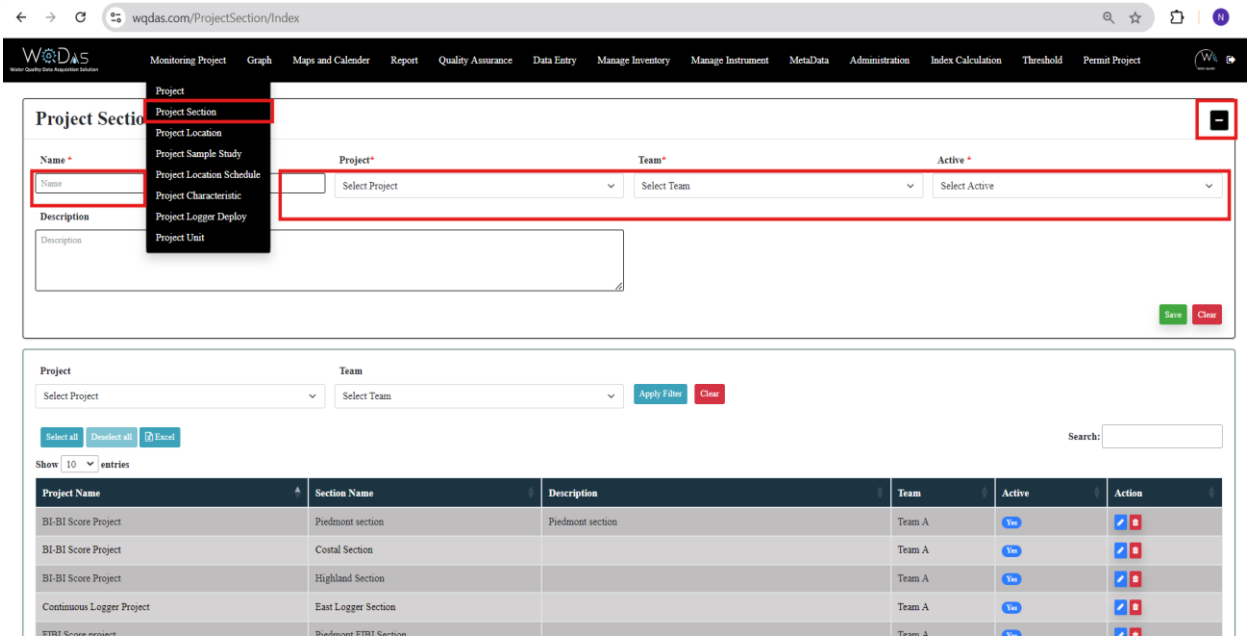

Figure 15 Project Section

Create Project Location Group

The project manager will designate sampling locations for each project, utilizing metadata already available in the "Location Master Table," which contains all essential details. In this section, the project manager will outline how team members can access these locations and specify the types of samples to be collected.

Team members can collect either a “Simple” sample, taken from a specific location, or a “Composite” sample, which combines samples gathered from multiple locations. For more information on additional locations for composite samples, click the “i” in the Detail column.

To add new entries, use the “+” sign in the top right corner.

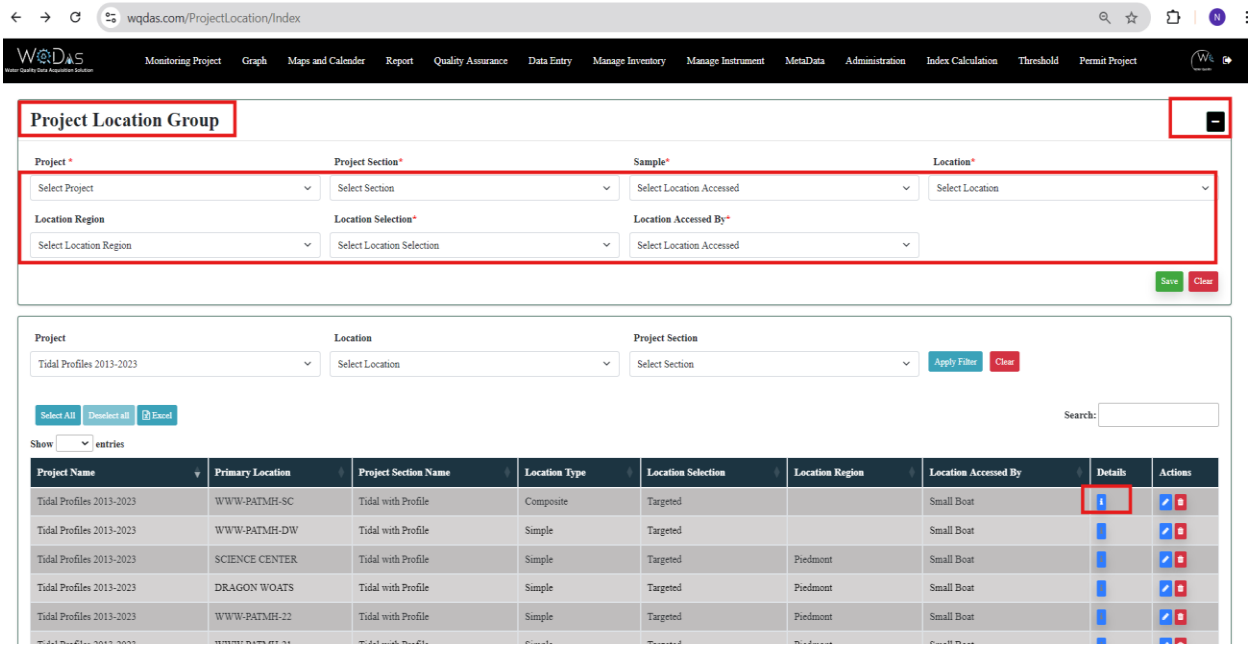

Figure 16 Project Location setup

Designing a Sample Study Plan

The project manager will define the sample study design by selecting options from a dropdown list for samples collected during fieldwork or various project activities. This section will outline all sampling plans necessary for populating the relevant field sheets. Examples of these plans include Observations, Field Measurements, Water Chemistry, Chlorophyll, Bacteria, Sediment, Fish Tissue, Metals, Ion Matrix, Nutrients, BIBI Scores, FIBI Scores, Continuous Logger, Stream Flow, Habitat Assessment, Spring Index Period, Faunal Data, Vernal Pool, and Salamander Data.

For any plan involving field staff collecting samples for lab analysis, it's essential to add holding times to track each sample. Specifically, for Water Chemistry, Chlorophyll, Bacteria, Sediment, Fish Tissue, Metals, Ion Matrix, and Nutrients sampling, establishing a holding time allows the project manager to generate reports assessing whether all data was analyzed within the required timeframe.

**This section must be completed before adding "Project Characteristics" to any project.*

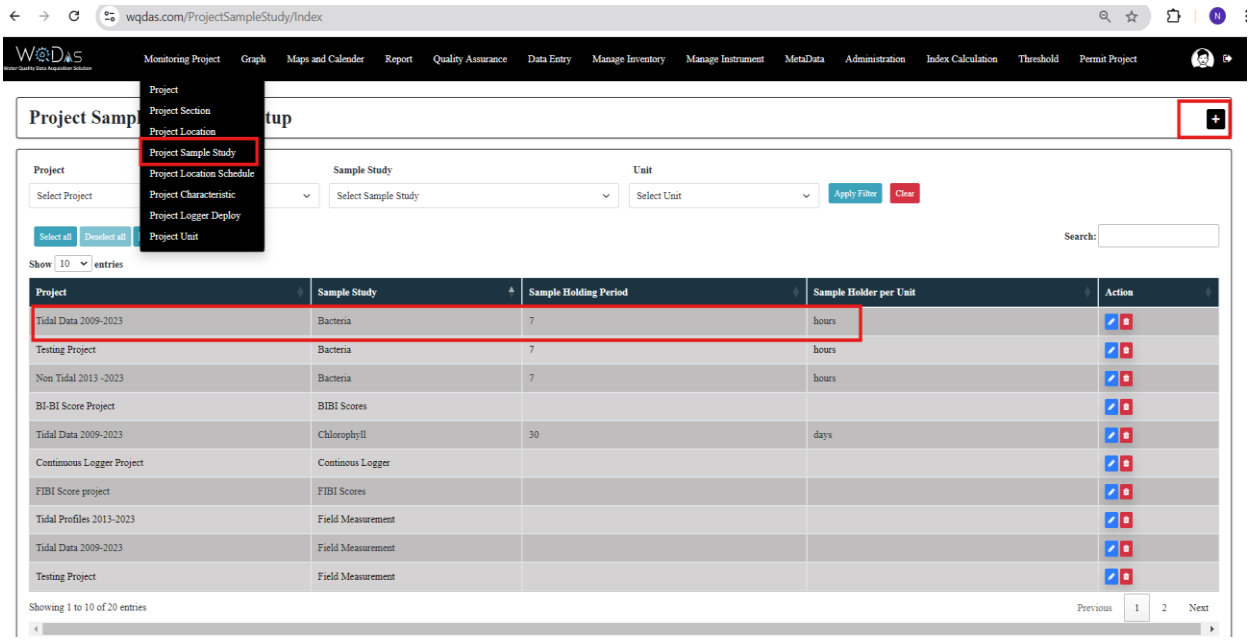

Figure 17 Define Sample study design

Create Location Schedule for Monitoring

The project manager will create a sampling schedule for each location within the project by selecting specific locations and their corresponding sample study design options. This schedule will outline how many samples will be collected at each location, with or without a profile.

To add new entries, users can click the “+” sign in the top right corner.

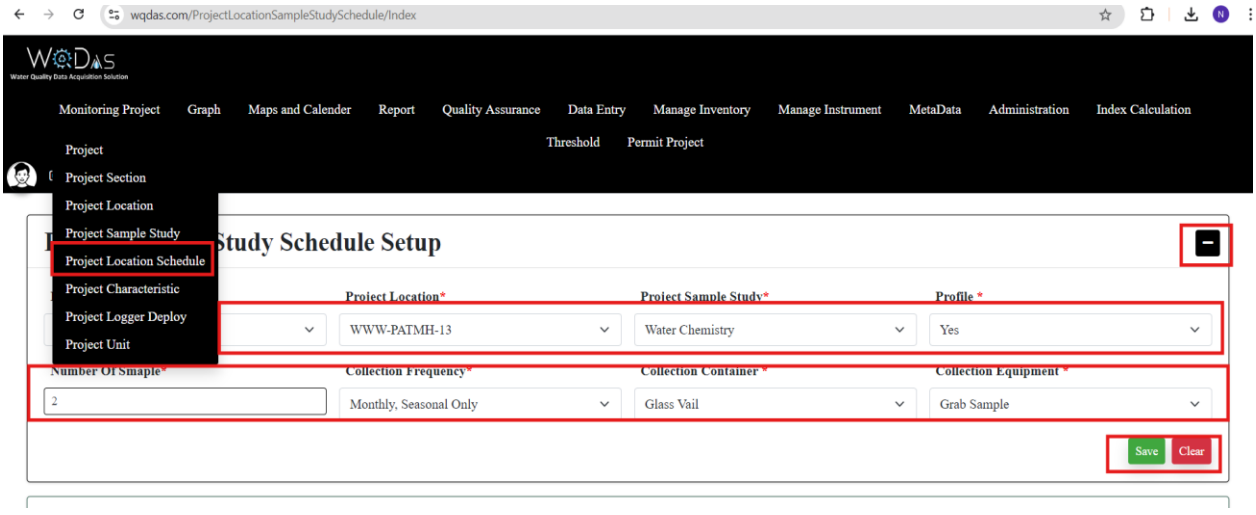

Figure 18 Define all the schedules for each individual location

Add Monitoring Parameters to the Project

The project manager will outline all relevant parameters, specifying each with reporting units, methods, sample fractions, and acceptable ranges for basic validation. The characteristic monitoring type will help team members manage data from various sources, including Field, Laboratory, and Continuous Logger. The Sample Study design will facilitate the assignment of parameters to specific categories such as Field Measurement, Water Chemistry, Chlorophyll, Bacteria, Sediment, Fish Tissue, Metals, Ion Matrix, Nutrients, BIBI Scores, Continuous Logger, Stream Flow, FIBI Scores, Habitat Assessment, Spring Index Period, Faunal Data, Vernal Pool, and Salamander Data.

Parameters collected in the field will be classified as “Field” under the “Characteristic Monitoring Type” and labeled as “Field Measurement” in the Sample Study. In contrast, parameters where field staff collect water samples for laboratory analysis will be identified as “Laboratory” and categorized as “Water Chemistry.” This classification also applies to “Bacteria” samples, which will be labeled as “Laboratory” and “Bacteria.” Continuous monitoring parameters from loggers will be classified as “Logger” under “Characteristic Monitoring Type” and labeled as “Continuous Logger.”

The project manager can assign a “Common Name” to any parameter, while the “Characteristic” name will adhere to the EPA’s WQX schema, ensuring compatibility solely with WQX. For continuous monitoring loggers, the common name may reflect what is in the export file from the instrument.

These classifications will aid in generating field sheets for staff. Additionally, defined maximum and minimum values will support the QA/QC process by indicating whether values fall within acceptable ranges, with any out-of-range values highlighted in red. Users can use the “+” sign in the top right corner to add new entries.

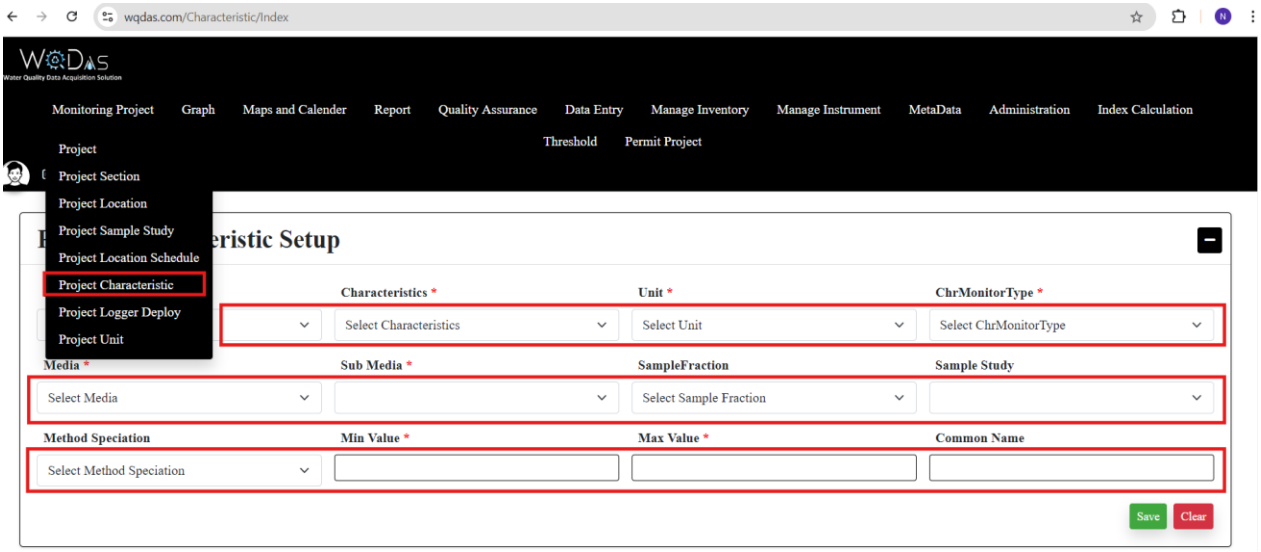

Figure 19 Characteristic setup for a project

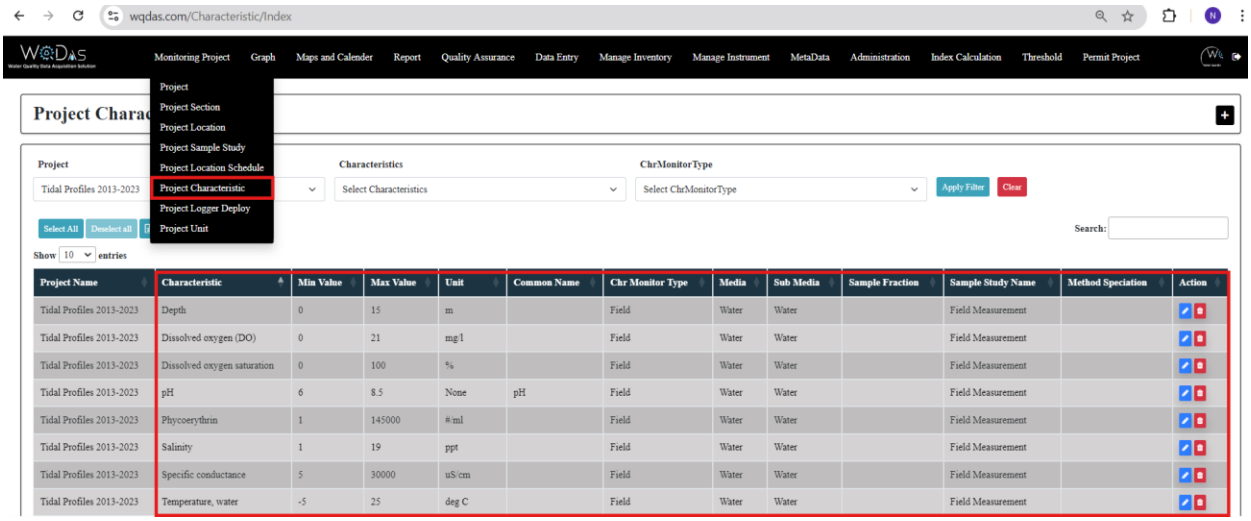

Figure 20 Assign all characteristics to a project with all metadata

Deploy Continuous Logger

If a project manager needs to deploy a continuous logger for temperature, turbidity, or other parameters, they can set up the logger and monitor all continuous data collected. For new logger deployments, it's crucial that the logger is listed on the inventory table with all necessary information. If the logger is not already in the inventory, it must be added first. The "+" sign in the top right corner is always used for creating new entries.

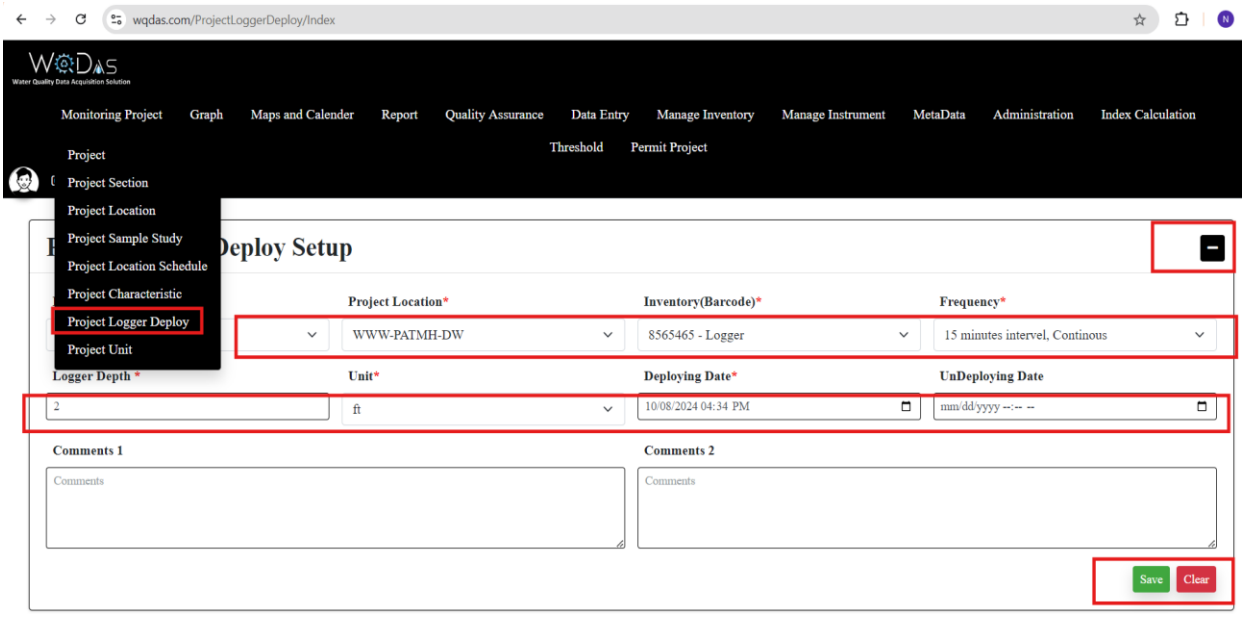

Figure 21 Logger deployment for continuous monitoring

Assigning Different Units

The project manager ensures that all required units for various measurements are included. Team members should be well-versed in the measurement units used for each sampling depth, whether in meters, feet, or yards. This applies equally to flow measurements.

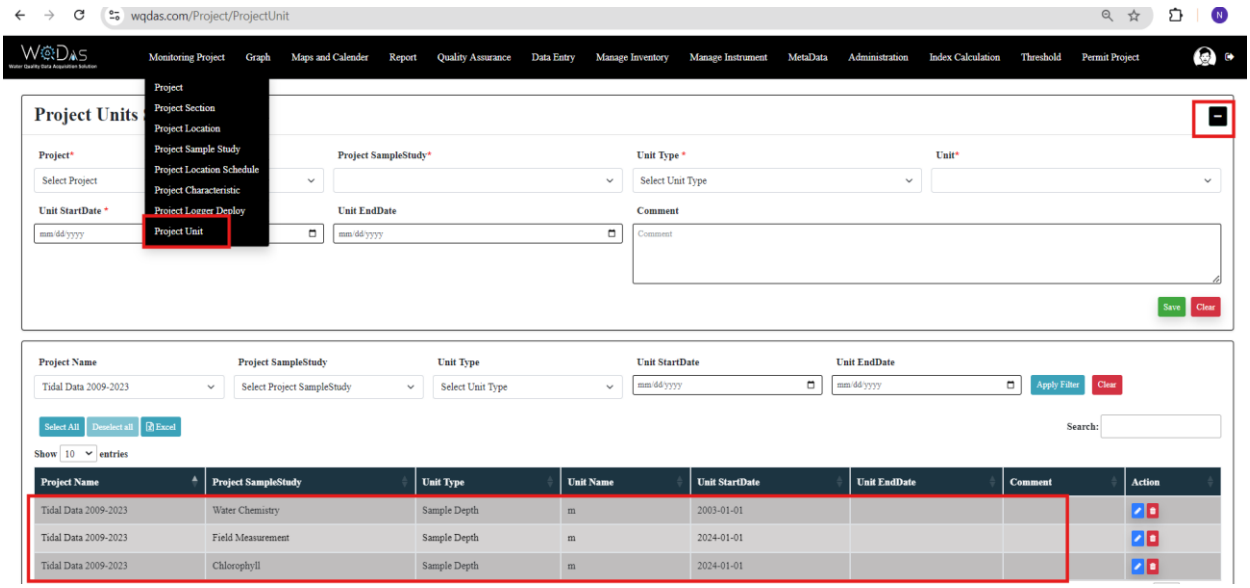

Figure 22 Assigning different units

Assigning Instruments to Staff

Project managers need to assign instruments to field staff to enable them to carry out their responsibilities effectively. Before assigning any instrument, it must be included in the inventory table with all relevant metadata. For guidance on how to add an instrument to the table, please see the section on “Instrument Inventory Management.”

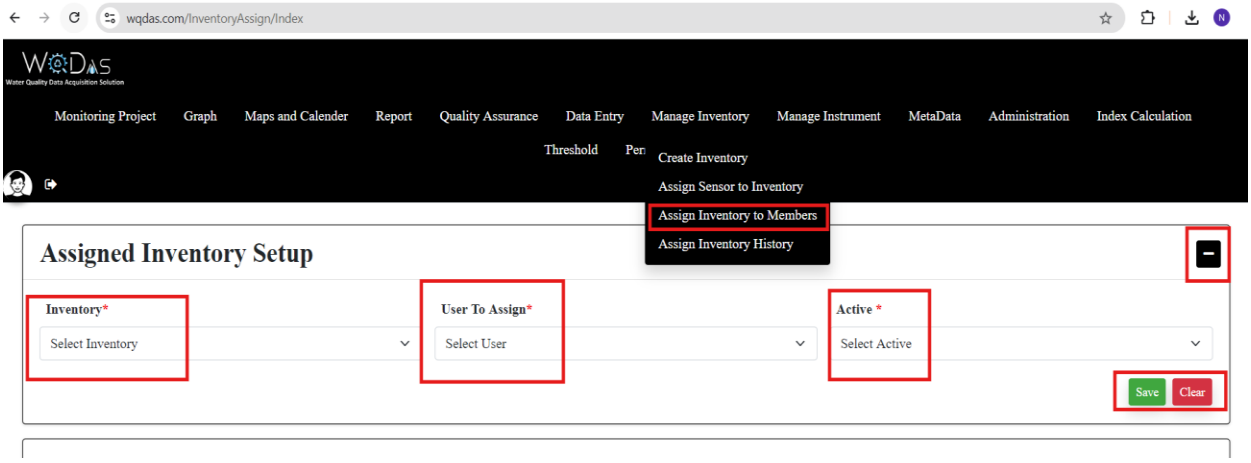

Figure 23 Assign instruments to staff

Data Entry:

All field sheets will be populated based on the project's definition, Sample Study design, and the instruments assigned to staff. For instance, if a project includes "Observations," "Water Flow," "Field Measurements," and "Water Chemistry," the field sheets will display only these four sections. Conversely, if a project consists solely of "Field Measurements" and "Water Chemistry," only those two sections will appear. Similarly, if a project includes only BIBI or FIBI Score options, the sheets will populate with just the BIBI and FIBI score sections. This logic applies to all other Sample Study options as well. Please refer to the explanation below for details on each individual sample study option.

Data From the Field

Starting an Activity in the Field

Field staff will initiate an activity by selecting a project name, location, and date using a data entry screen. They can start by clicking the "+" sign in the top corner to expand the screen, while the "-" sign will minimize it.

Once the project name is selected, all related sheets will populate according to the Sample Study Plan for that specific project. The screen will first prompt users to validate which instruments they plan to use during this visit. This list will only display the instruments assigned to the user. If no instruments have been assigned, an error message will indicate that required fields are missing.

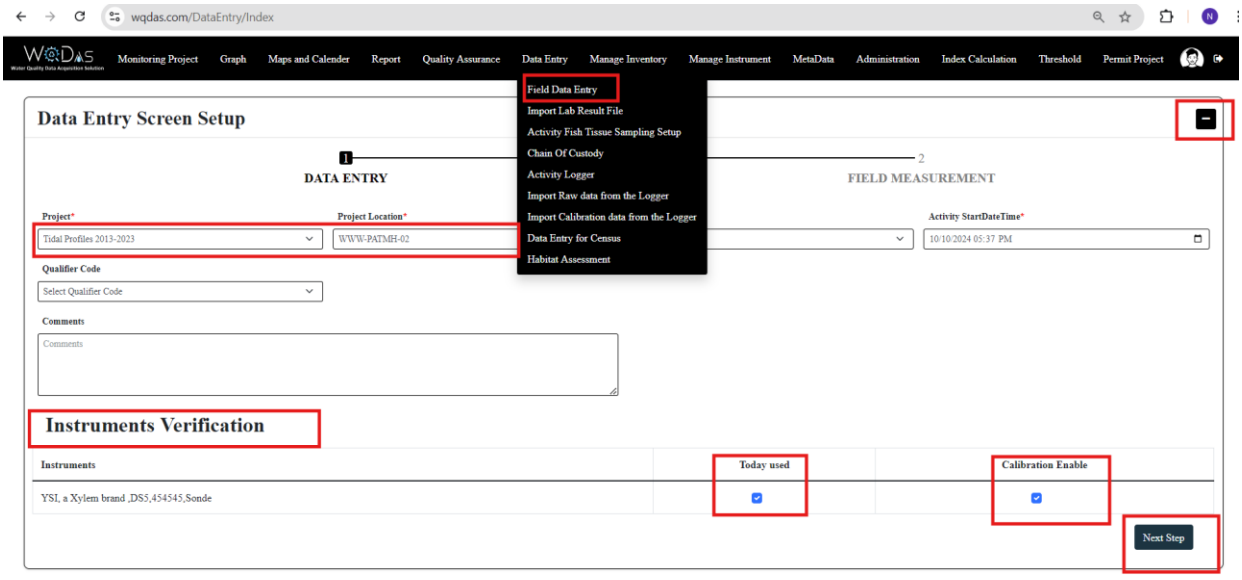

Figure 24 Data entry setup Instrument verification

Collecting Observations in the Field

If the project manager includes “Observations” in the Project Sample Study section, the “Observation” section will be available for data entry. This value is recorded as a percentage; for example, if there are 10% clouds today, that will be reflected in the data entry. The same applies to “Tides,” which is also recorded as a percentage.

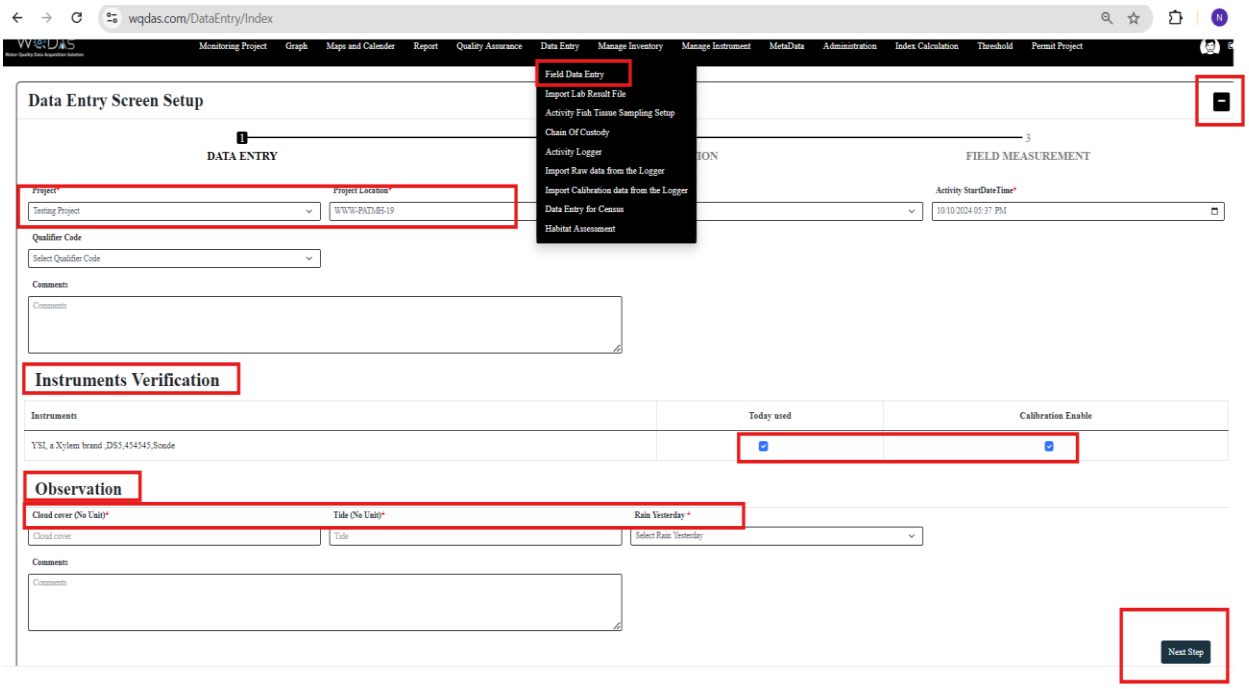

Figure 25 Activities tracking with observations used during this activity

Collecting Water Flow Reading

Field staff should enter all required metadata first and then add flow values for each segment of the stream's width. WQDas will automatically calculate the average flow based on the values entered by the field staff.

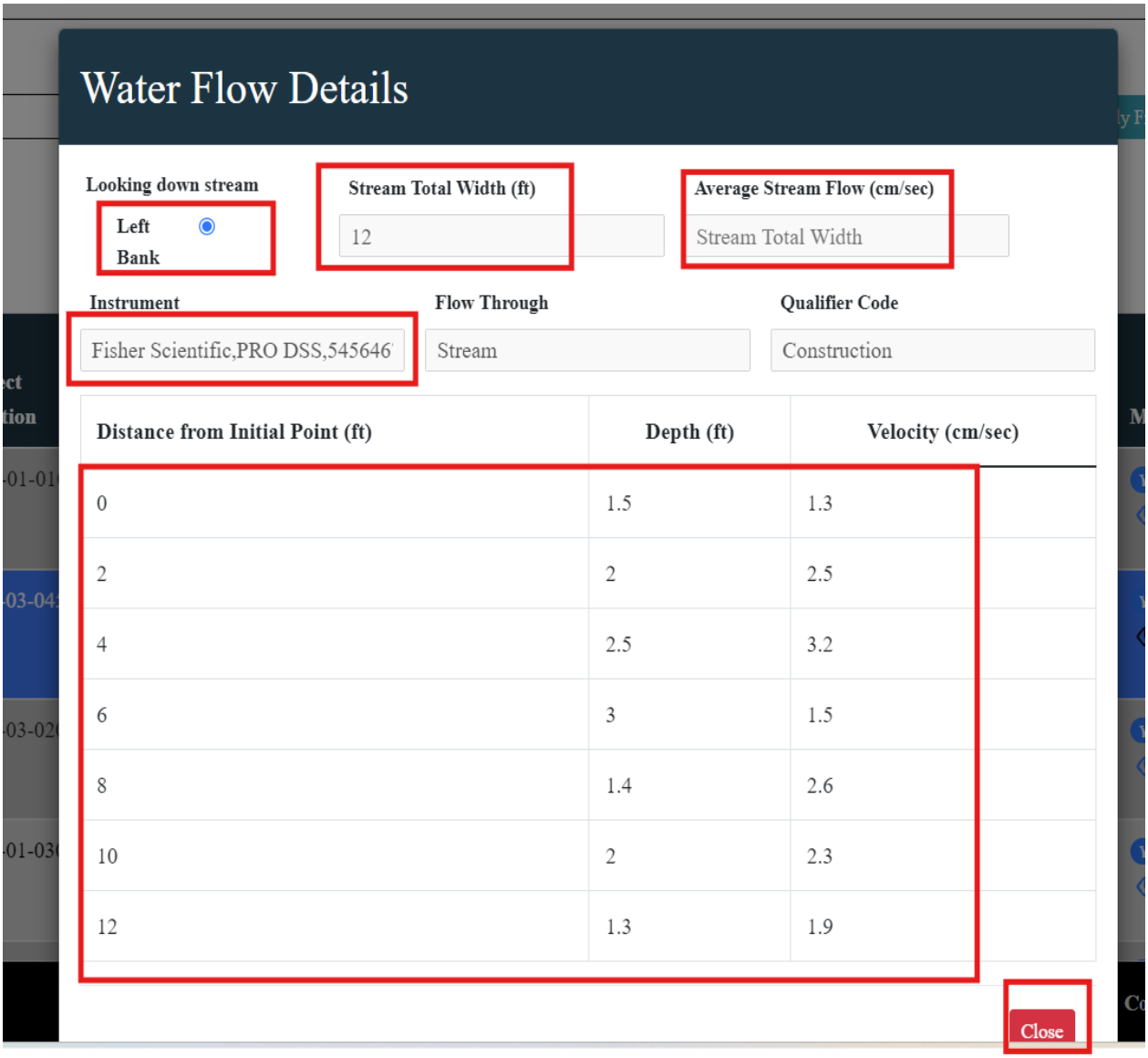

Figure 26 Water flow measurements

For Water Chemistry Samples

If the project manager has defined water chemistry samples for collection, the screen will automatically generate barcodes for each individual sample. Field staff can print and attach these barcodes to each sampling container or bottle. This screen will display all metadata related to each collected sample, ensuring that field staff understands all requirements. Additionally, field staff can add comments or select flags as needed.

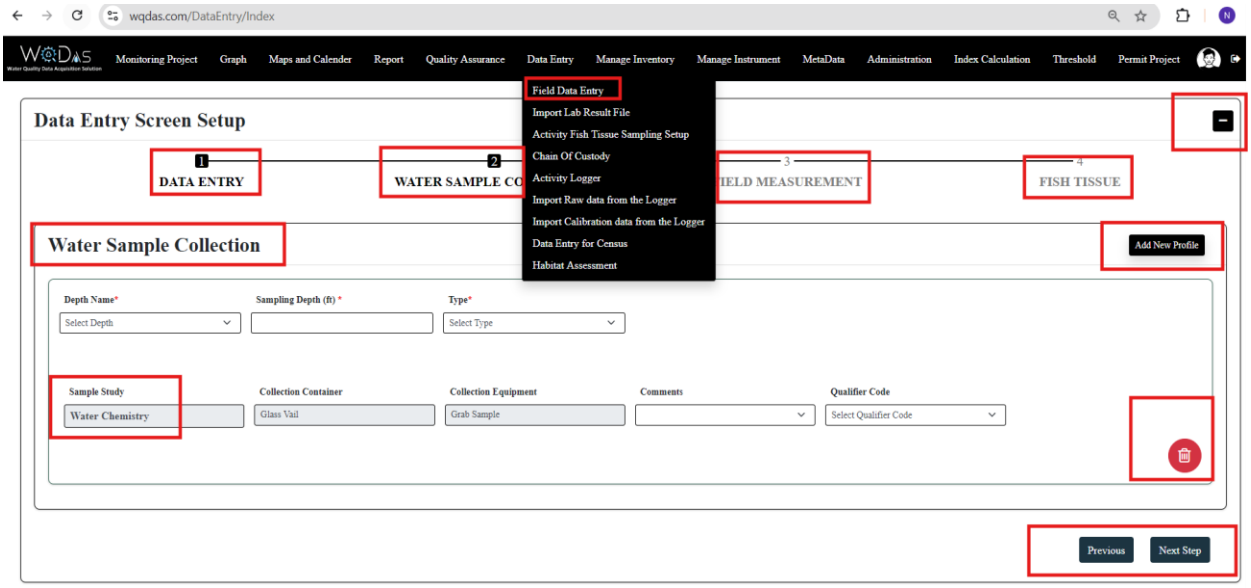

Figure 27 Water sample collection

For Field Measurement

This screen will display all parameters defined by the project manager in the "Project Characteristics" section for "Field," along with all associated metadata. Analytical method codes will be automatically generated based on the instruments used by the staff that day.

To minimize typing errors, users are required to enter the same value three times. Additionally, users can create multiple profiles by clicking the "Add New Profile" button. For each profile, it is necessary to select both "Activity Type" and "Depth."

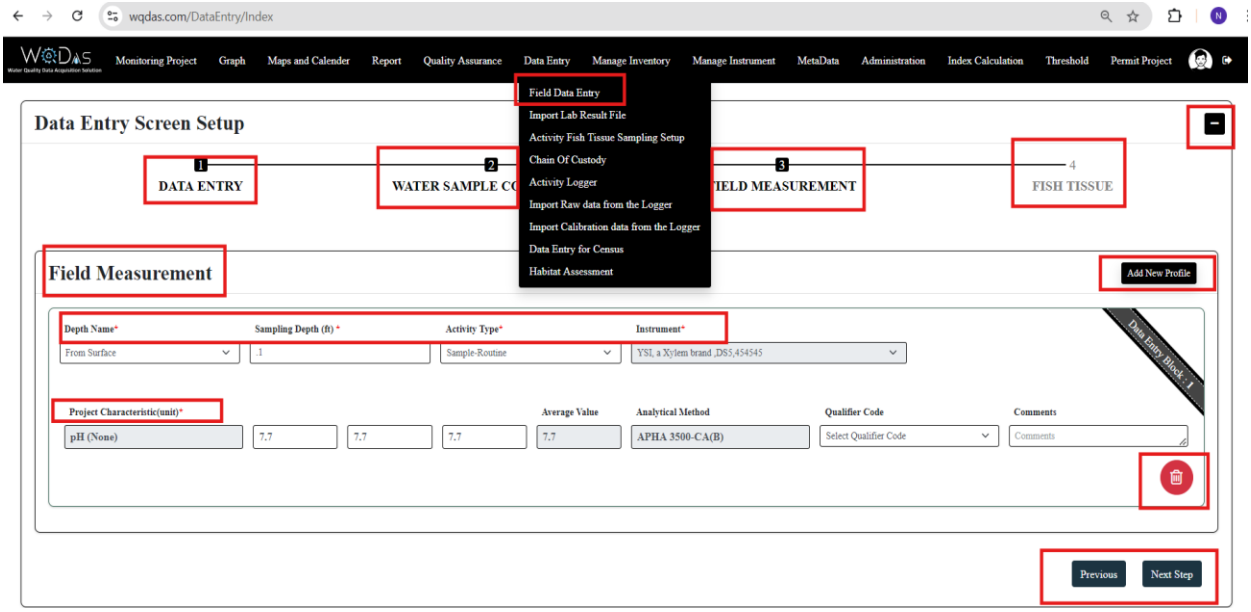

Figure 28 Data entry for Field Measurement

For Fish Tissue Samples

Field staff can enter basic metadata on this screen, including details such as the type of ramp, ramp condition, ramp access, survey method, and site width and depth, as well as the type of shocker used.

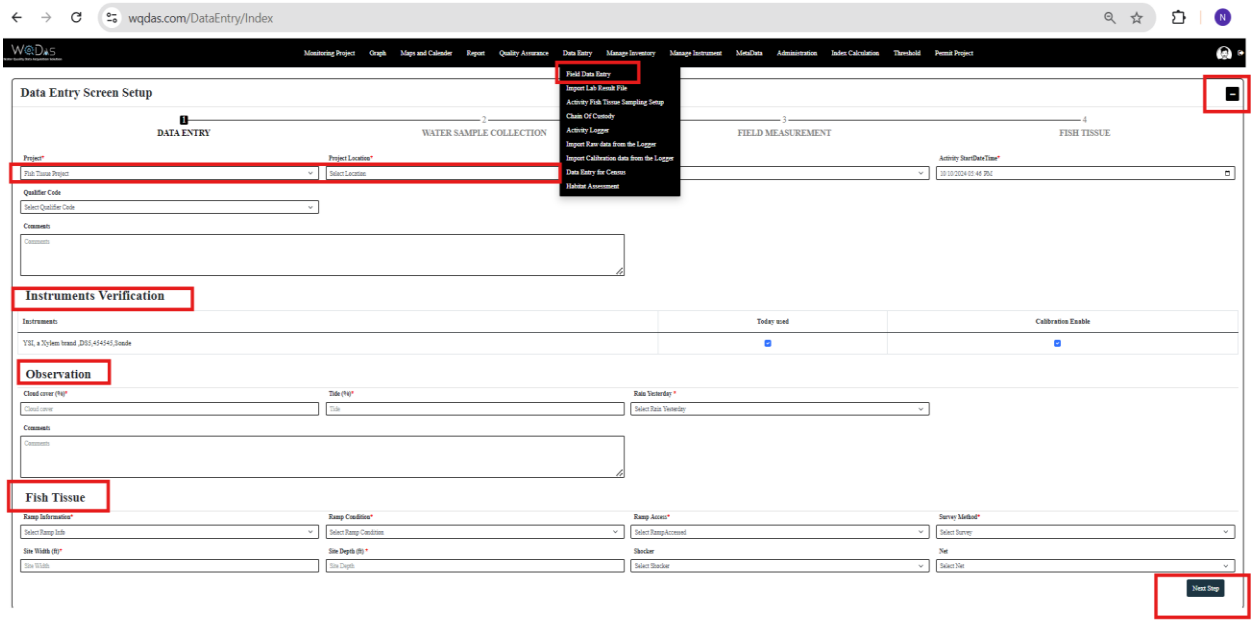

Figure 29 Data entry for Fish tissue samples

After entering all the metadata, field staff will begin adding fish information, including the fish name, length, weight, gender (if known), and any anomalies for each set of composite samples. The system will automatically generate barcodes for each composite sample and calculate averages for each set. While the recommended number of fish is five, it is also acceptable to have fewer than five samples.

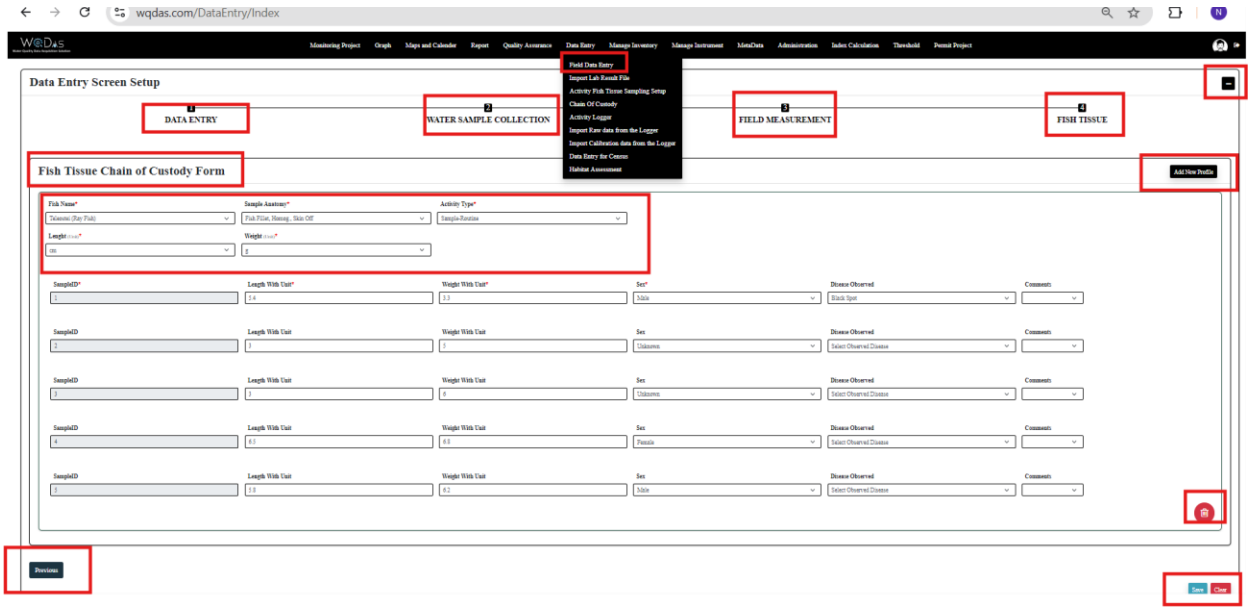

Figure 30 Fish sample details

Users can view details about fish tissue composite samples by clicking on “Activity Fish Tissue Sampling.”

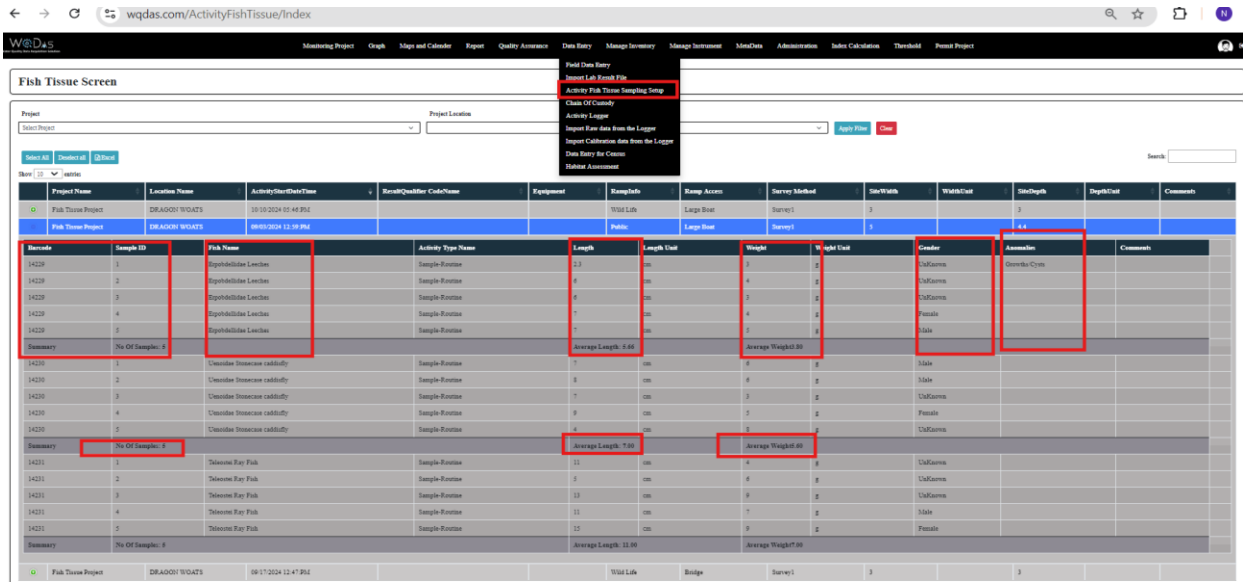

Figure 31 Fish sample calculations for composite sample

For Water Bacteria or Chlorophyll Samples

This screen is quite similar to the water chemistry screen, allowing users to add multiple profiles for each set.

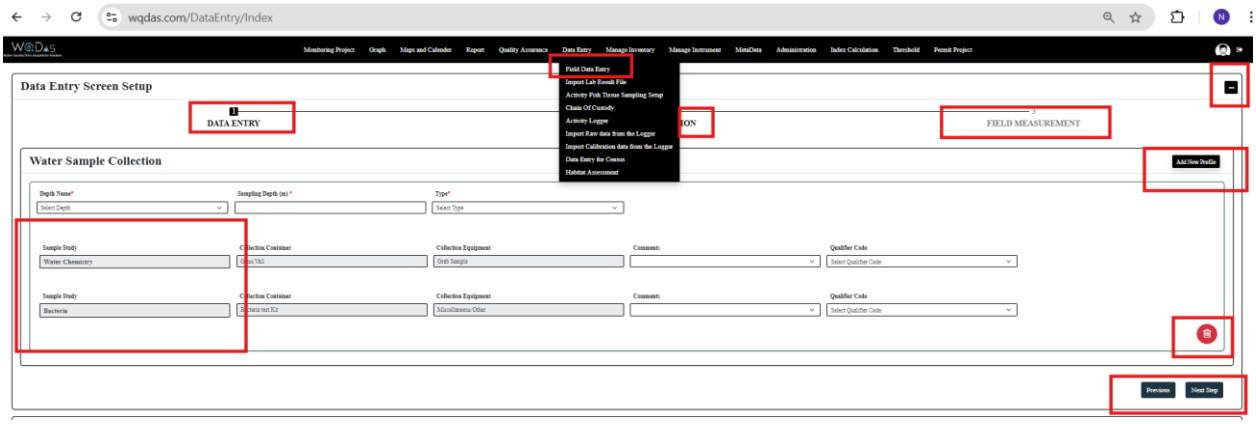

Figure 32 Chlorophyll sample and Bacteria sample auto generated barcodes

For Census Projects

For BIBI or FIBI score calculator projects, field staff can select the project name from the dropdown and start adding the metadata. The subsequent screen will populate according to the chosen BIBI or FIBI project, enabling staff to enter all necessary metadata before they begin counting macroinvertebrates or fish.

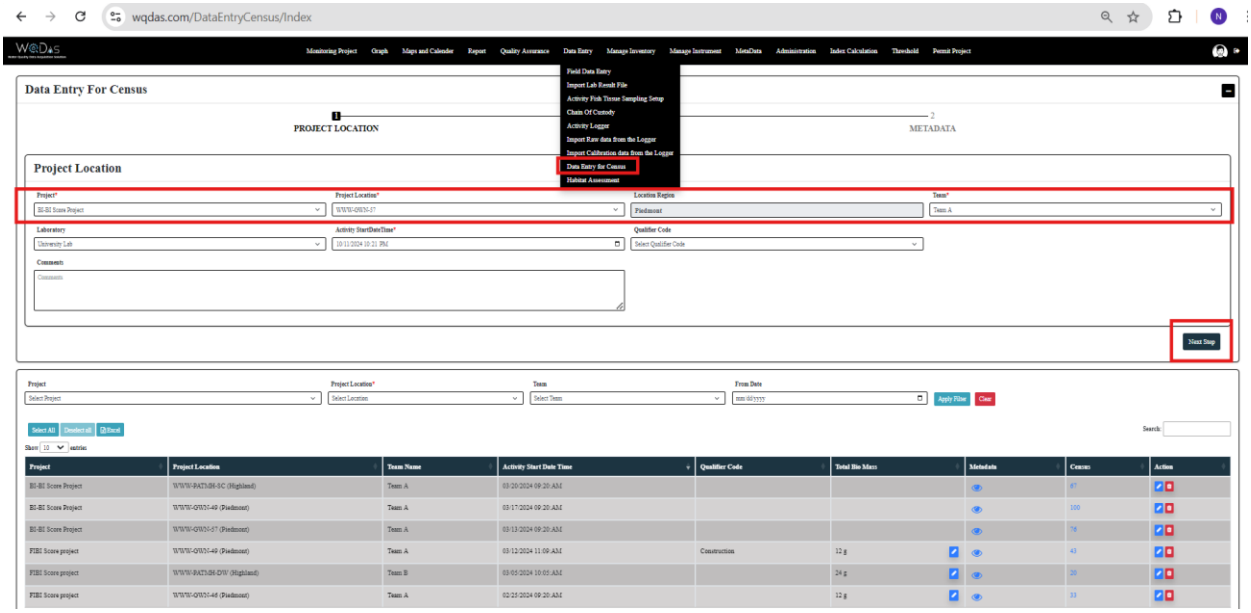

Figure 33 Census data entry for BIBI or FIBI projects

The next screen focuses on the remaining metadata, including details such as the type of nets used for today's activity and the equipment being utilized.

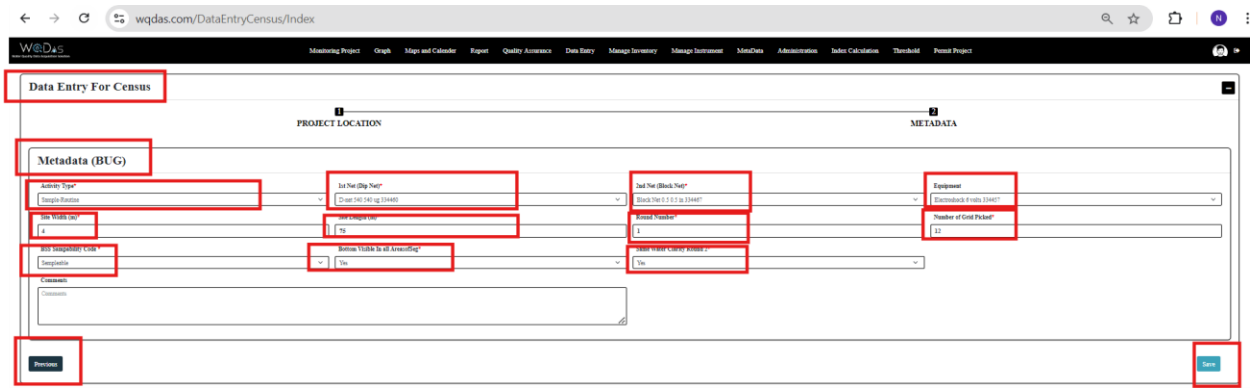

Figure 34 Data entry for BIBI and FIBI metadata

After saving the metadata, field staff can add counts for the bugs or fish. They can select names from a dropdown menu and specify the number of individuals caught. Additionally, they have the option to include or exclude certain entries from the calculations. Field staff can also take pictures or preserve samples for later reidentification. To view previously entered information for all activities, they can click on the “eye” icon.

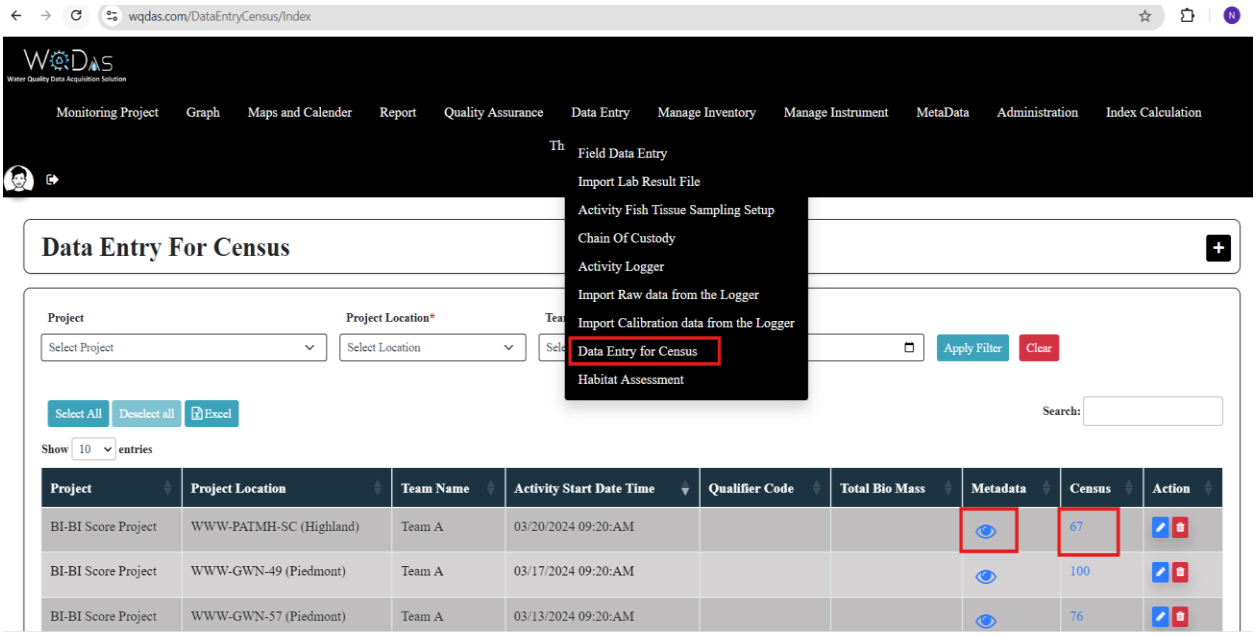

Figure 35 Detail for BIBI and FIBI data

Field staff can enter information for any bug or fish by clicking on the census number and selecting a new entry from the dropdown list.

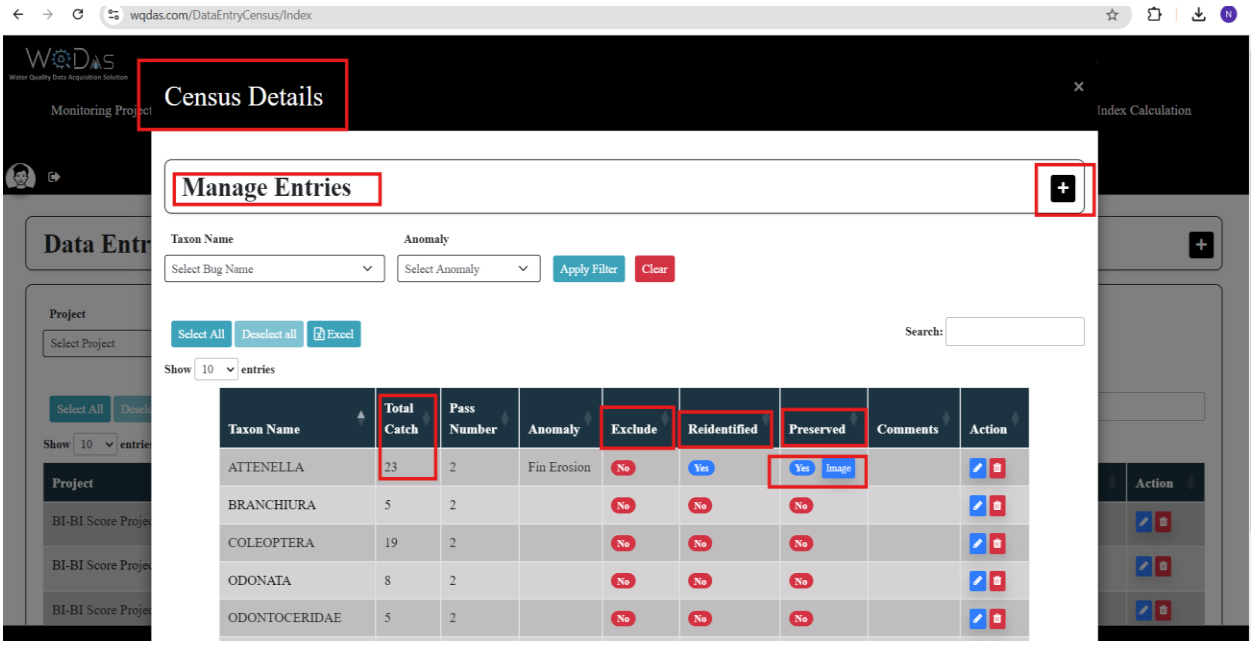

Figure 36 BIBI or FIBI individual entry

For more details, please refer to this screen.

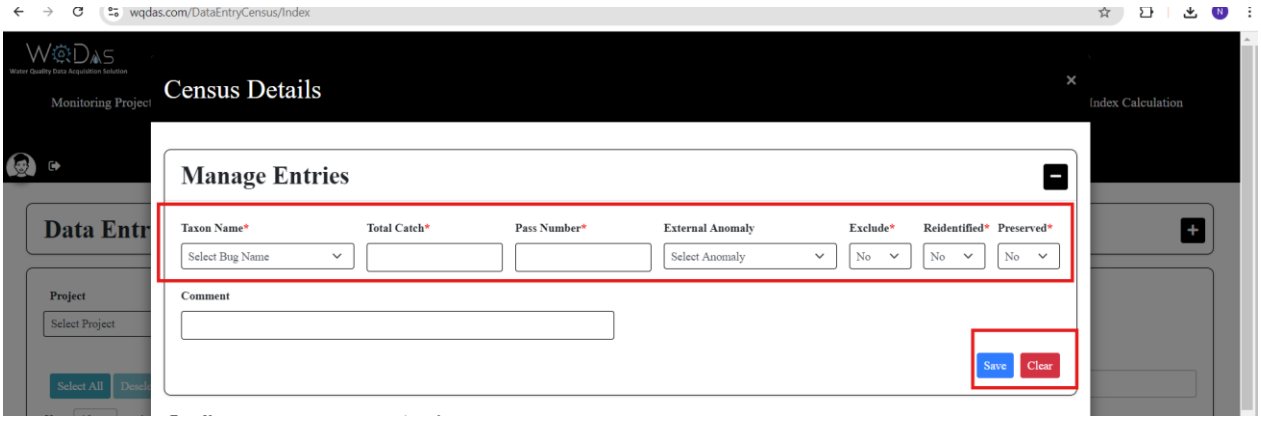

Figure 37 New entry for bug or fish

Habitat Assessment

Field staff can enter the habitat assessment data by selecting the project name from the dropdown menu.

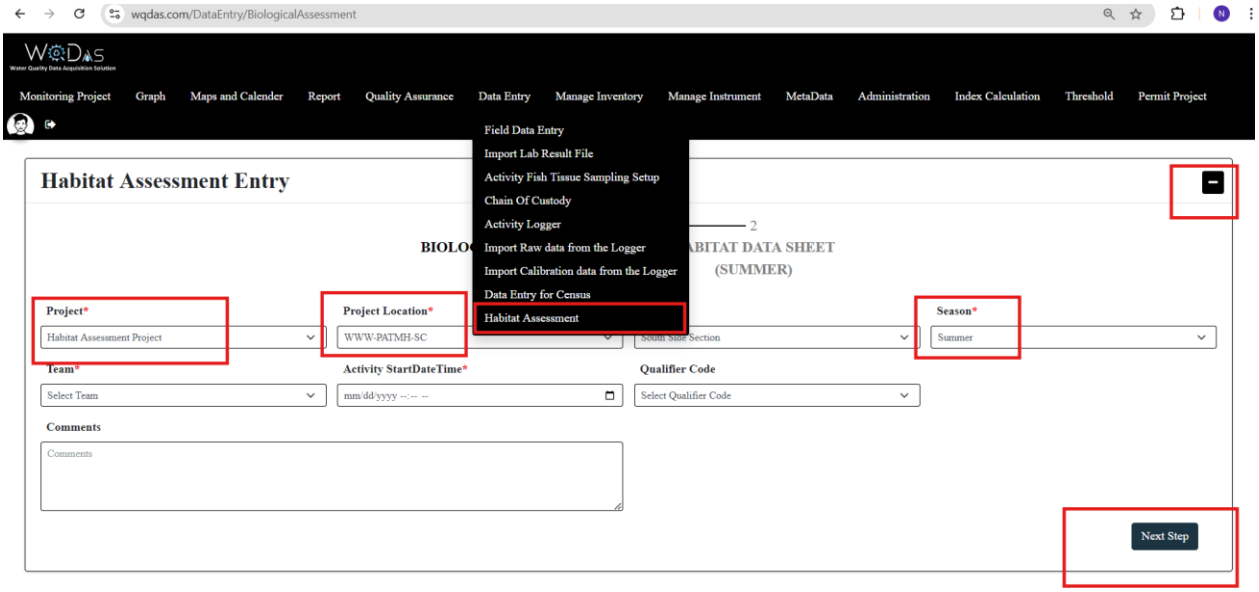

Figure 38 Habitat project data entry

After entering all metadata, field staff will begin inputting values for the left or right side of the stream bank and documenting all stream conditions in the sheet. Guidance for the criteria can be accessed by clicking the “?” icon next to each row label. Staff can also add water flow readings and depth for different segments by clicking the “Add New” button in the bottom section.

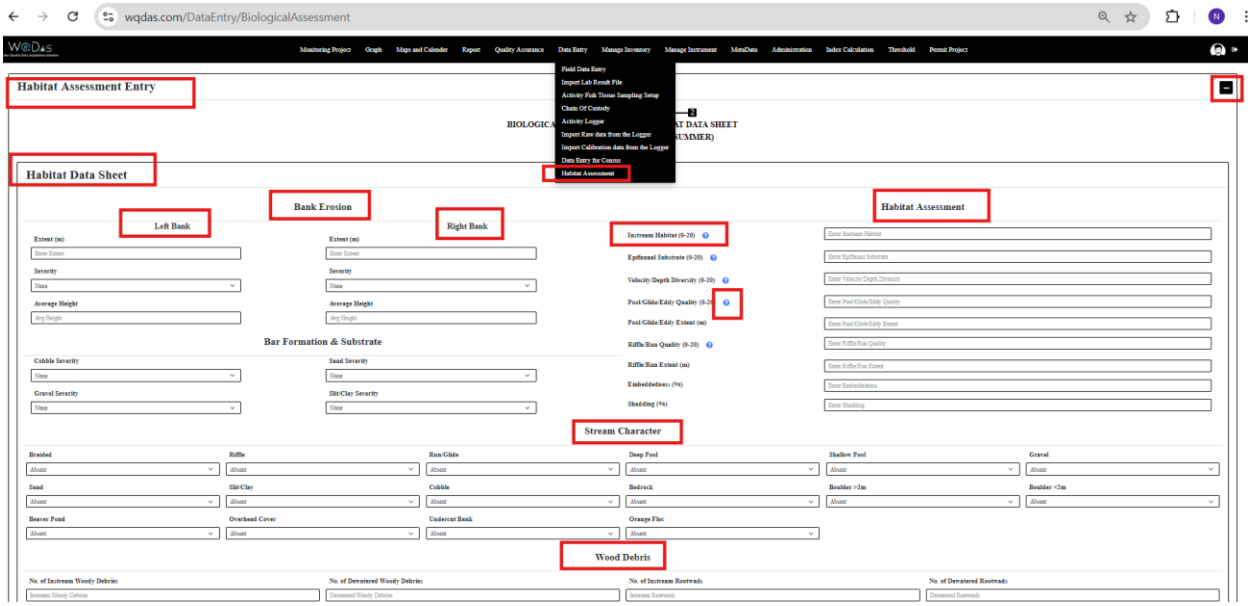

Figure 39 Habitat project metadata entry

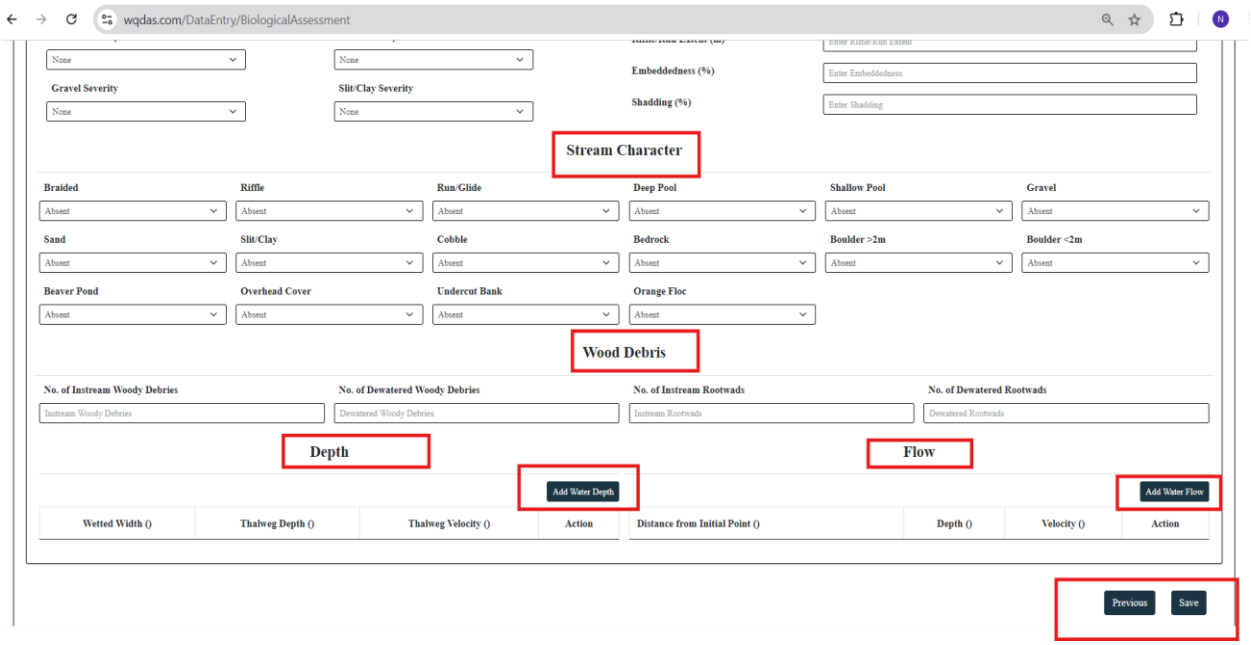

Figure 40 Habitat data entry for each section including Depth and flow

Import Lab Results

Staff can import Excel sheet results into WQDas using a downloadable template from the import screen. After formatting the lab results in this template, users can upload it to WQDas by clicking the "+" sign and selecting "Save the Excel" file. WQDas will validate all metadata before saving the file. If any errors are detected, the affected row will turn red, while valid rows will turn green. Users will only be able to save the file when all rows are green. The system will validate the location name, sampling date, and barcode generated during the field data entry process. If the data is verified, it will be saved; if not, a message will prompt the user to reconfirm the information. The lab manager can upload files using their credentials.

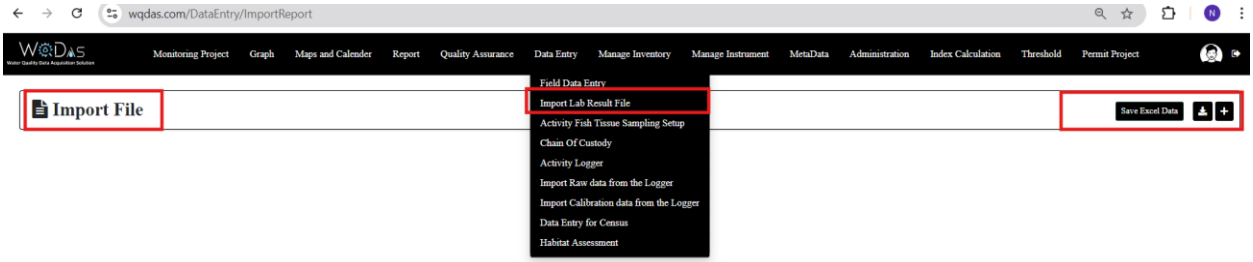

Figure 41 Importing lab results from excel sheet

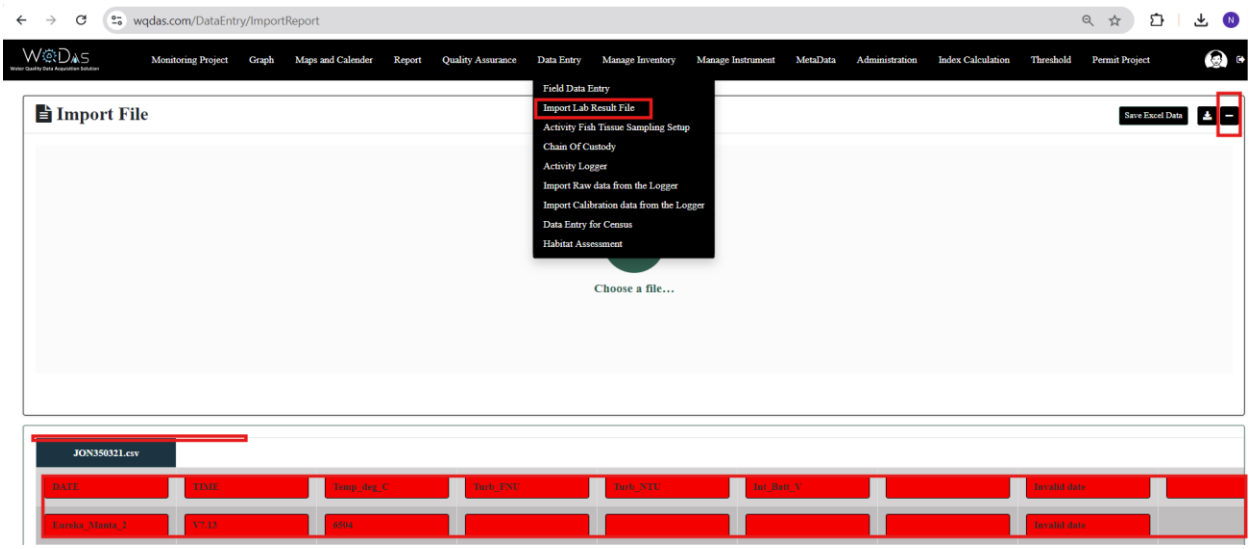

Figure 42 How to import lab results from excel sheets with validation

Import Continuous Logger Raw Data

On this screen, the user can upload a file extracted from the instrument containing all the Raw data.

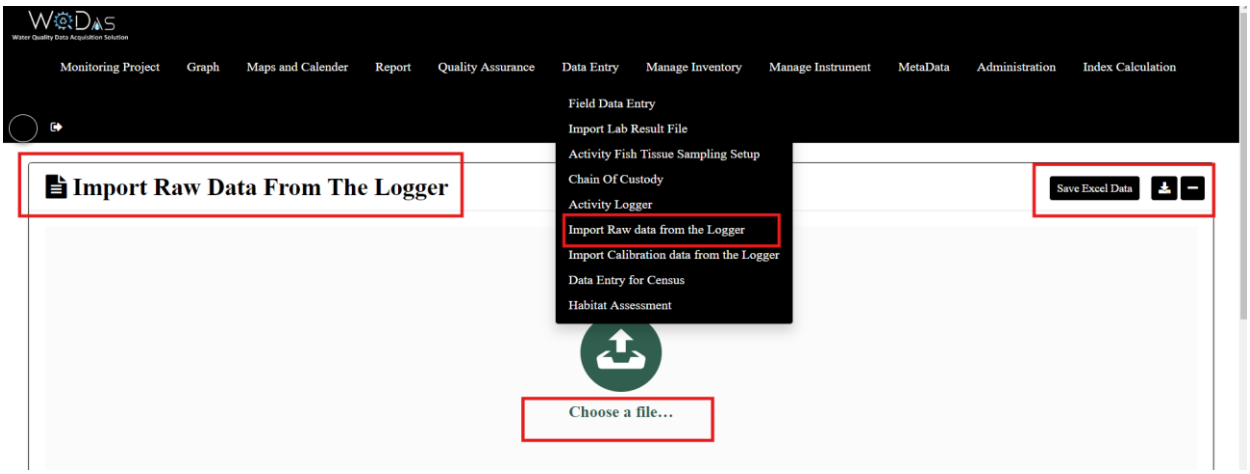

Figure 43 Importing Logger raw data

Import Continuous Logger Calibration Data

On this screen, the user can upload a file extracted from the instrument containing all the calibration data.

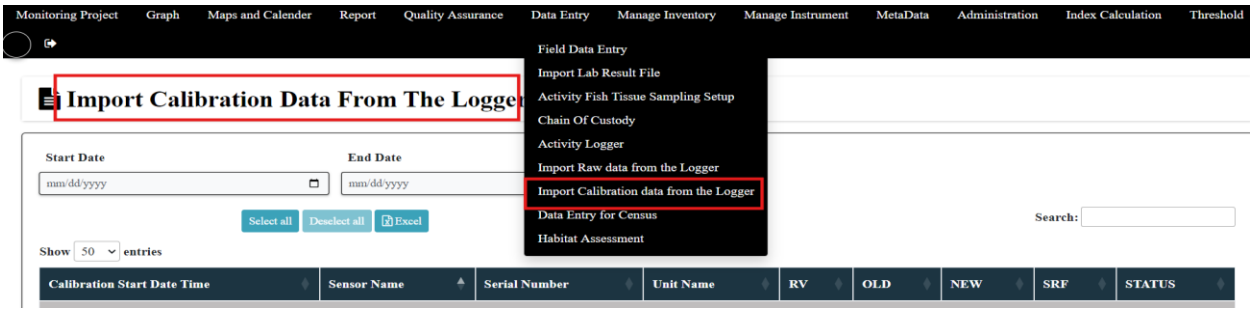

Figure 44 Importing continuous Logger calibration data

On this screen, users can view the details of the calibration file imported into WQDas from the logger.

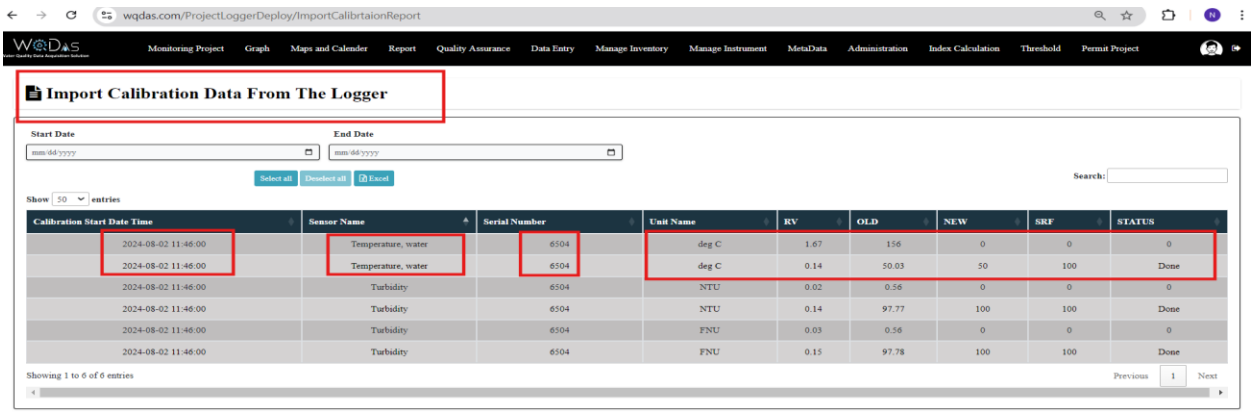

Figure 45 Details about Logger calibration data

Activities List

Each row represents a site visit, containing all the information collected on that specific date. To view details about any activity at a particular location, users can click the “eye” icon. This will open a popup that displays additional information, allowing users to review each item one by one.

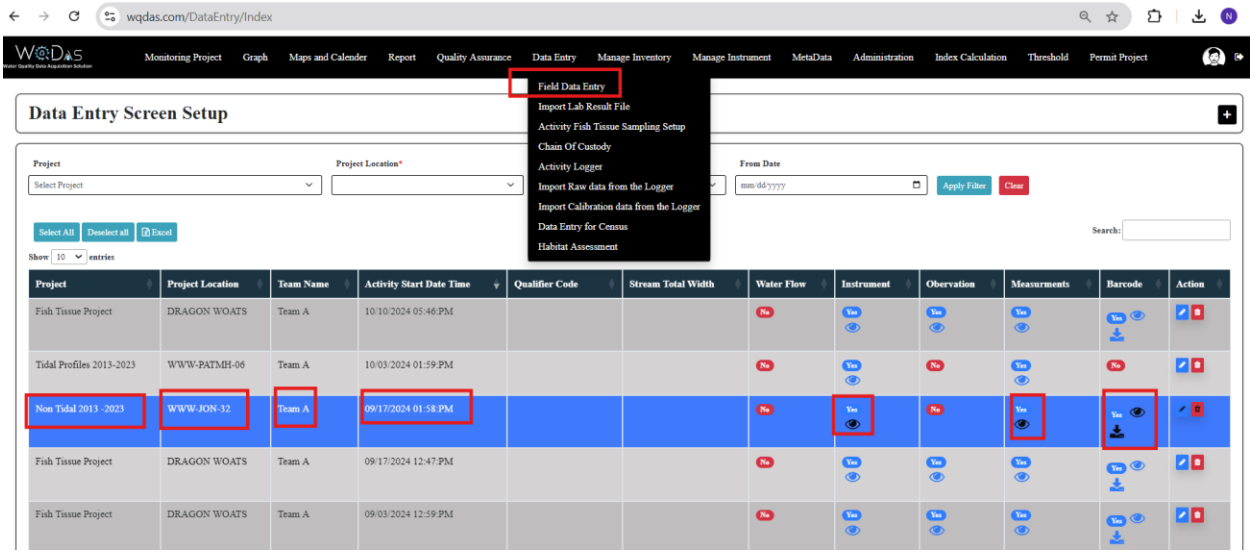

Figure 46 Activities tracking

For Instruments Used

For instruments used during this activity

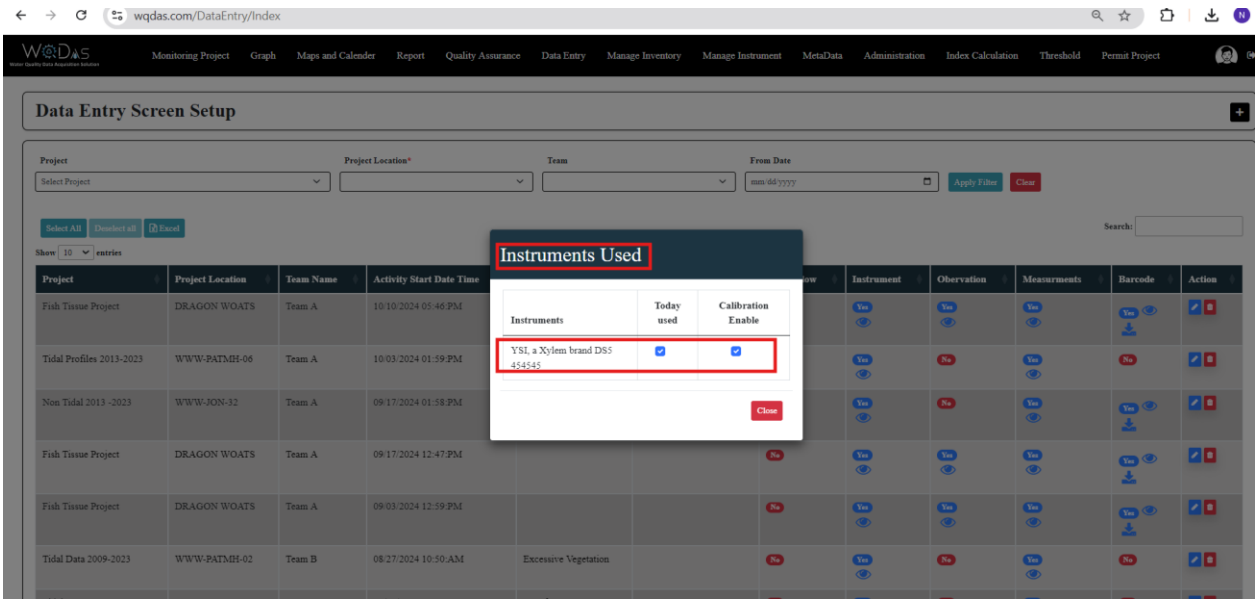

Figure 47 Activities tracking with instruments used during this activity

For Observations Screen

Users can click the eye icon to view the popup for this date.

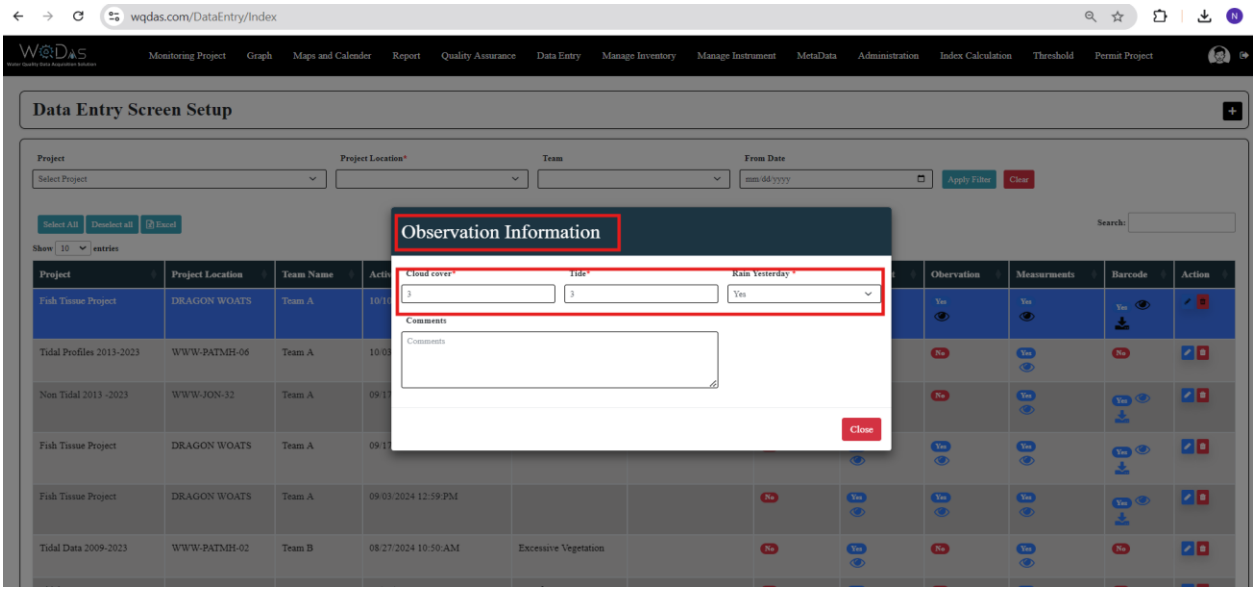

Figure 48 Data entry for Observations

For Field Measurements

Users can click the “eye” icon to view the popup for this date.

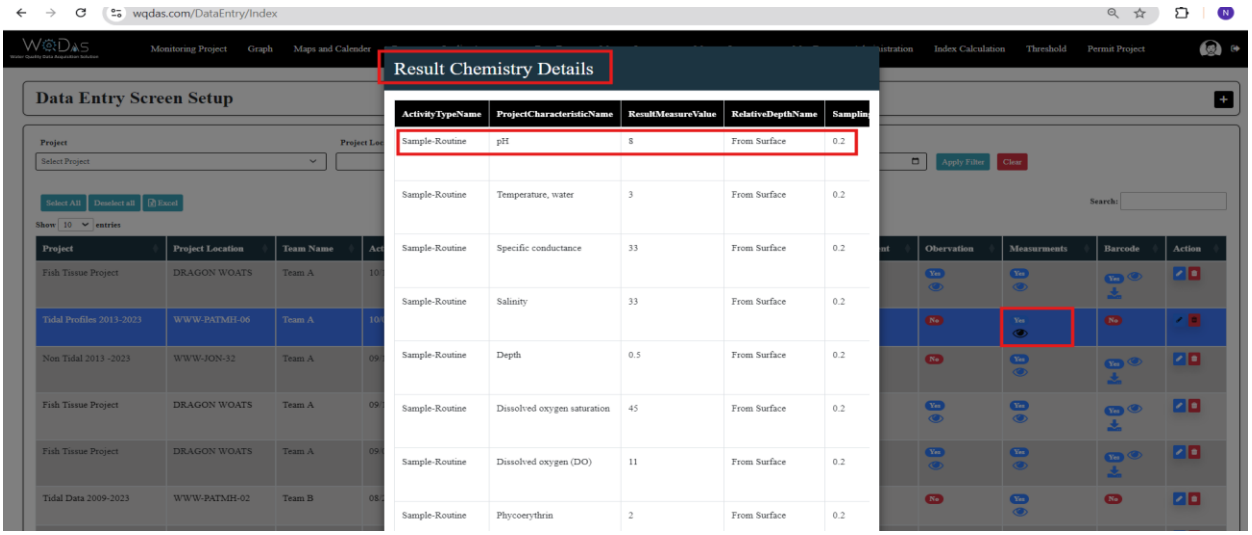

Figure 49 Details of data entry for field measurements

For all the sampling bottles or containers used for this activity.

For Sampling Container

For detailed results from the lab for each sampling bottle

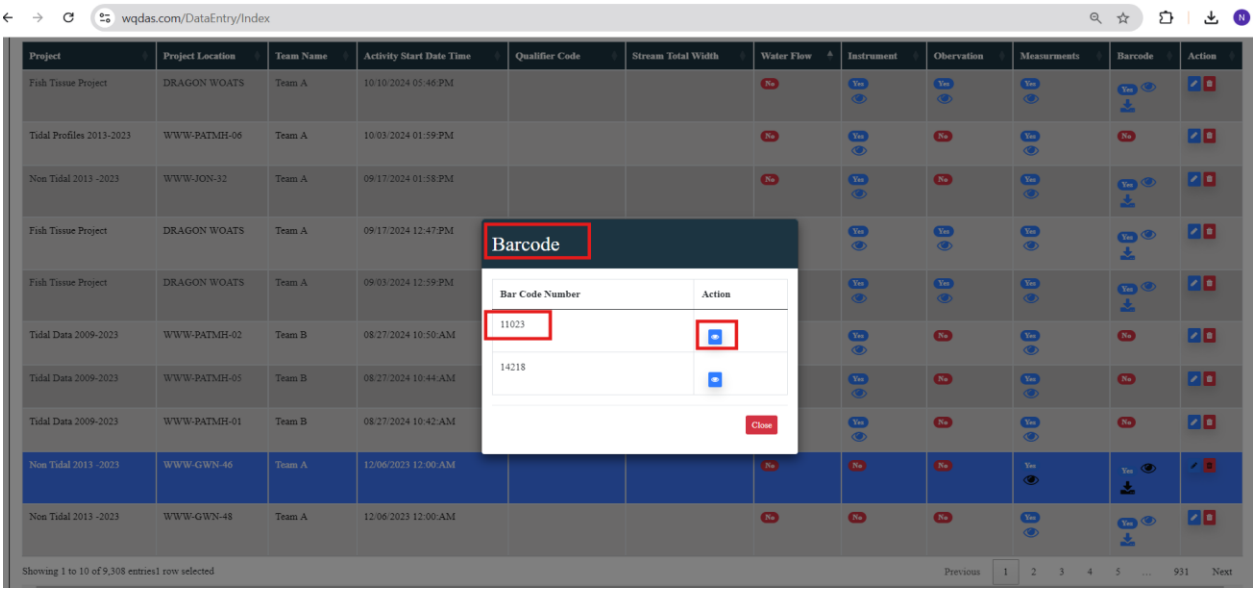

Figure 50 Activities tracking with all barcodes generated during this activity

Results From the Lab

If a blue “eye” icon is displayed, it indicates that lab results are available for this sample; otherwise, the results are still pending from the lab.

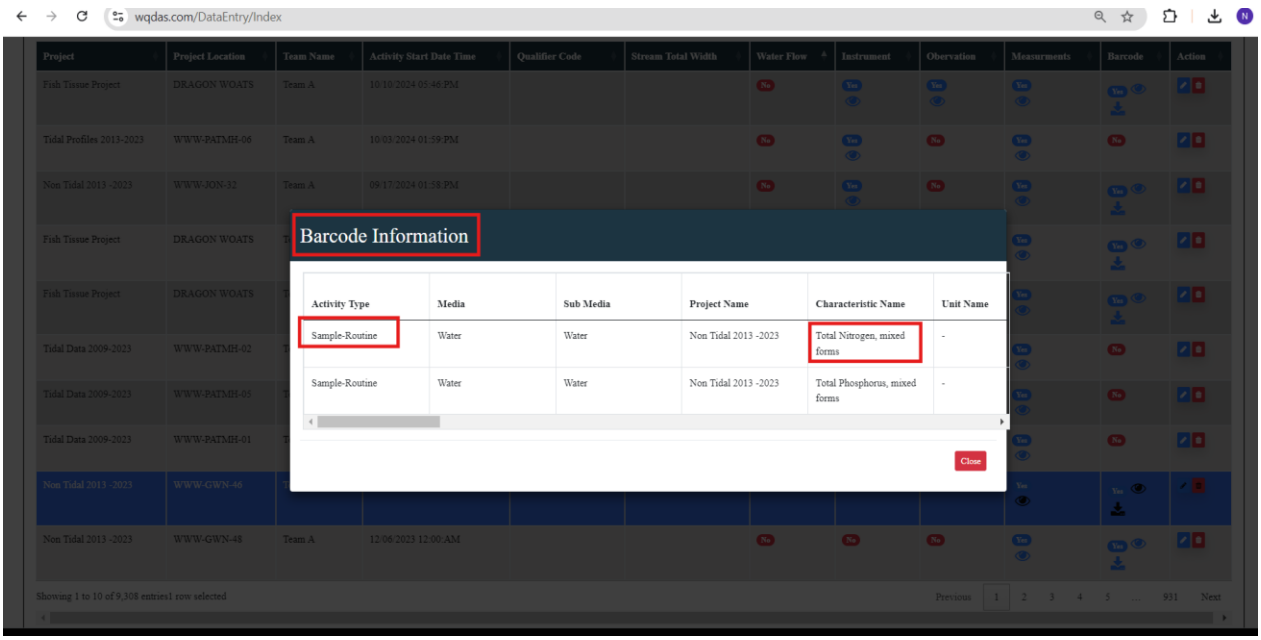

Figure 51 Details about barcodes

Results are not received from the lab yet.

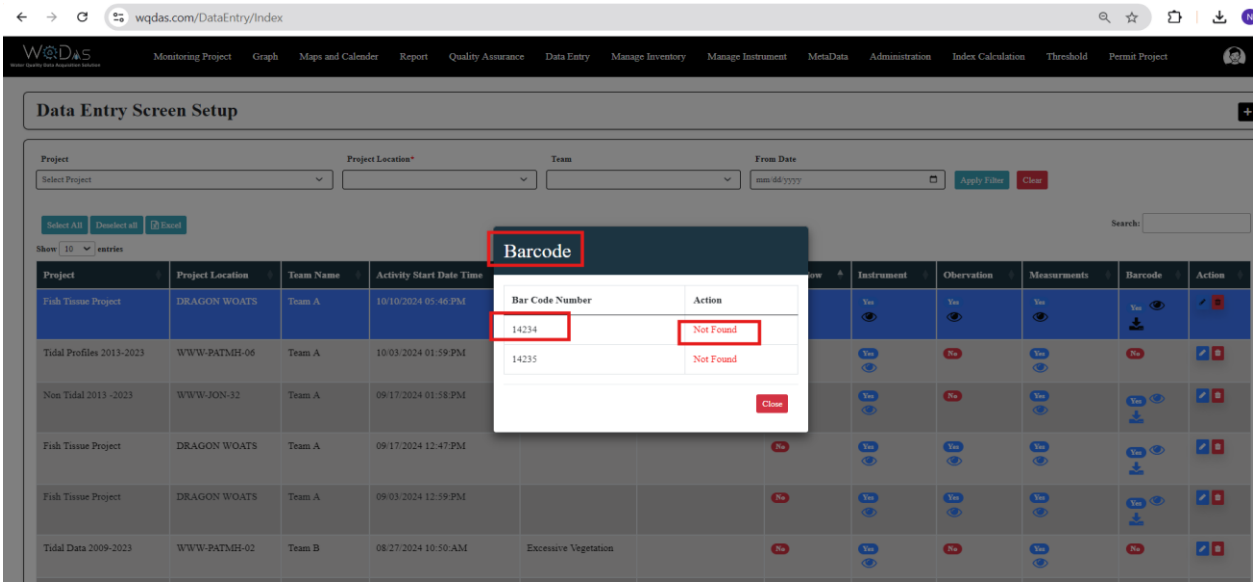

Figure 52 Activities tracking with details about barcodes generated during this activity

Quality Assurance of the Data

Data Quality Checks

Quality assurance officers can verify data accuracy by running various reports. The first report is based on limits established by the project manager for each characteristic in the “Project Characteristics.” If a sampling value falls outside the specified range for these characteristics, it will turn red.

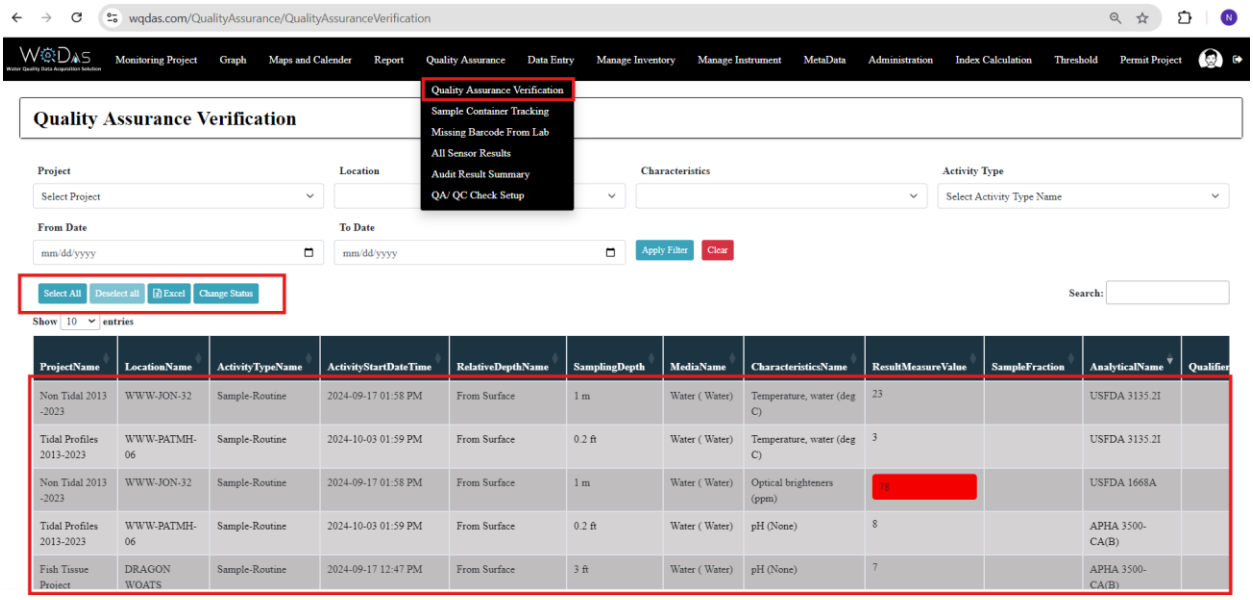

Figure 53 Quality assurance of sampling data

The quality assurance officer can then update the record's status with a qualifier code, changing it from “Preliminary” to “Final.” If the status is marked as “Invalid,” a qualifier code is required to provide a reason for the invalidation. All users can export all or selected rows to an Excel file for further analysis.

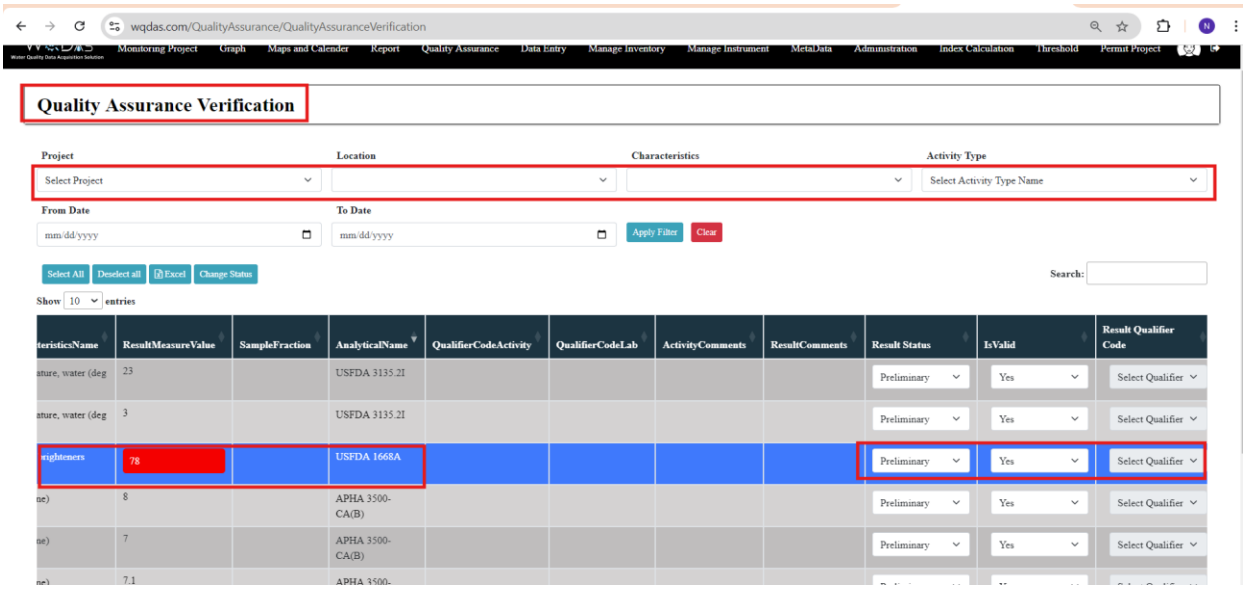

Figure 54 Quality assurance of data

Logger Activity Tracking

Field staff can use this screen to log all activities related to any continuous logger. All team members can view the activities occurring at this location for the logger. Field staff can also track maintenance tasks, such as whether the logger was cleaned today, calibrated, or what file name was uploaded for the raw data from the logger.

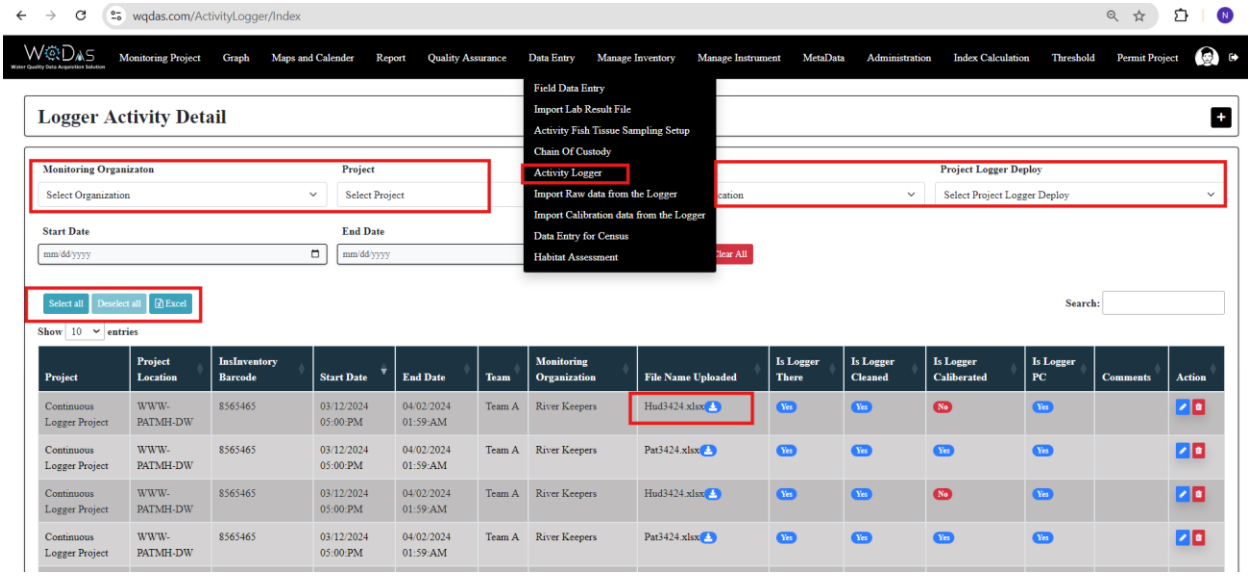

Figure 55 Activities for logger for maintenance and data download

Calibration and Precision Data

Managers can track the maintenance of all instruments used within the organization. A field staff can enter Precision check criteria and then start adding the standard and actual value to see if

instruments pass or fail the test. Users can see details about any test by clicking on the summary button.

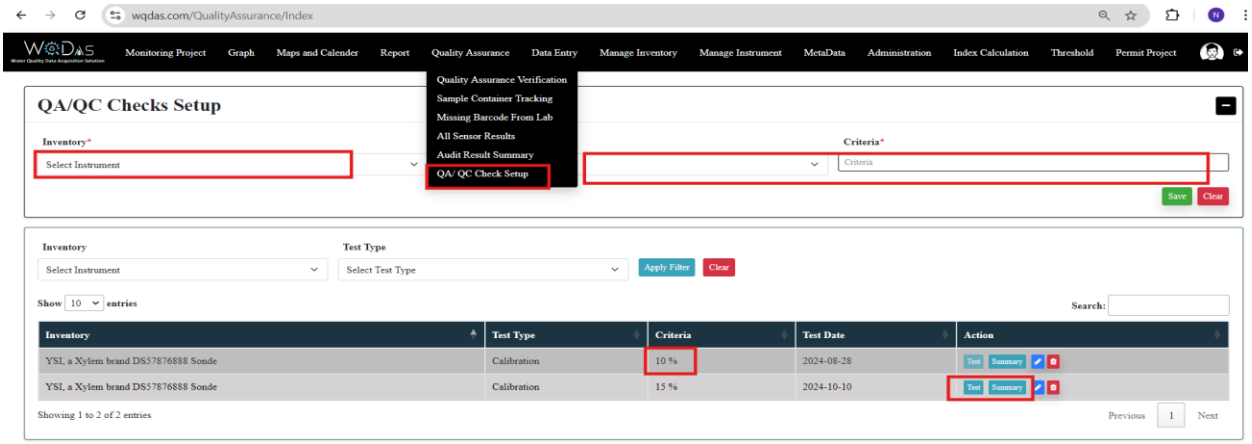

Figure 56 Instruments maintenance record tracking

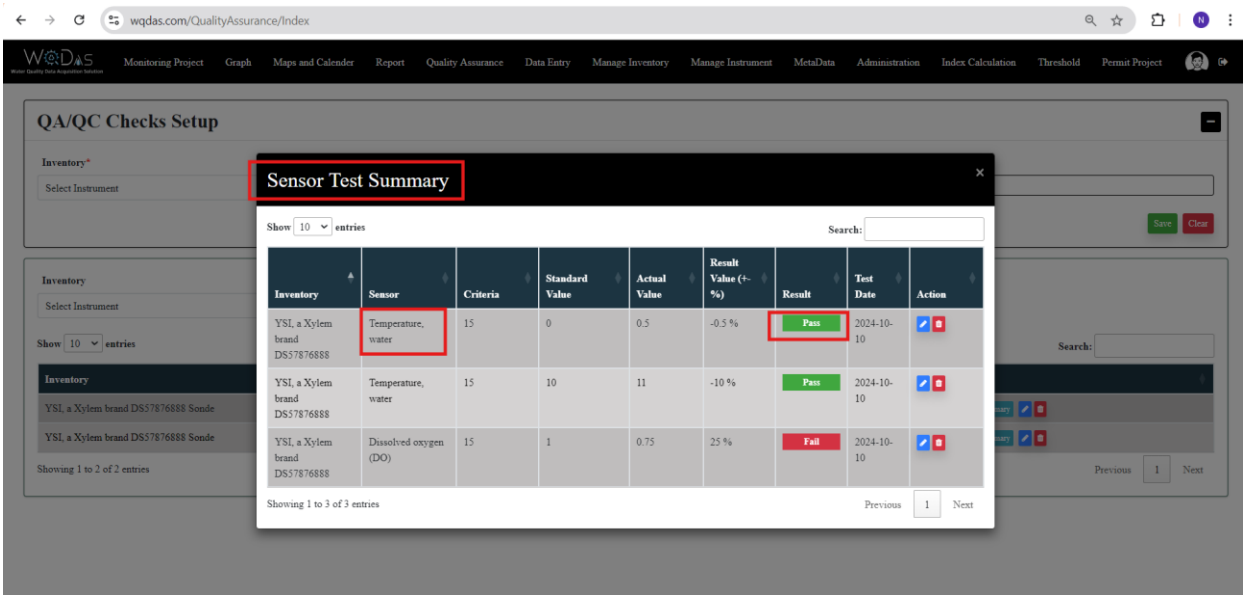

Figure 57 Instruments Precision check and calibration tracking

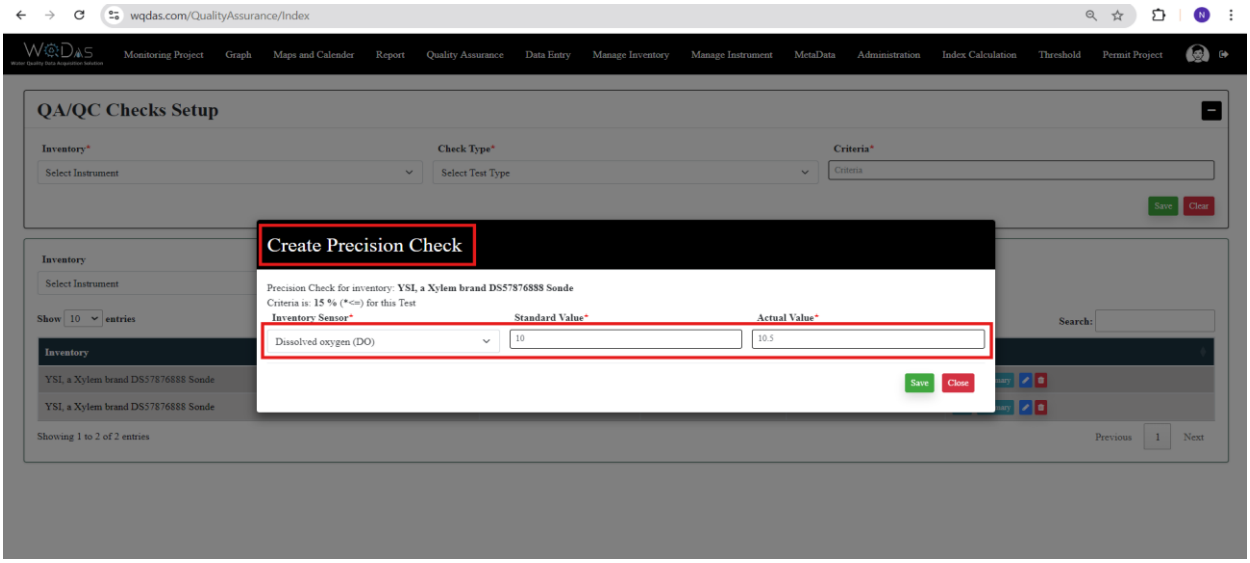

Figure 58 Precision Check data entry

Graphs

Long Term Analysis

Graph one parameter and multiple locations

In this graph, users can select a single parameter and compare it across multiple locations. They can choose any date range for the comparison. Users can also select or deselect any parameter by clicking on the parameter name in the legend.

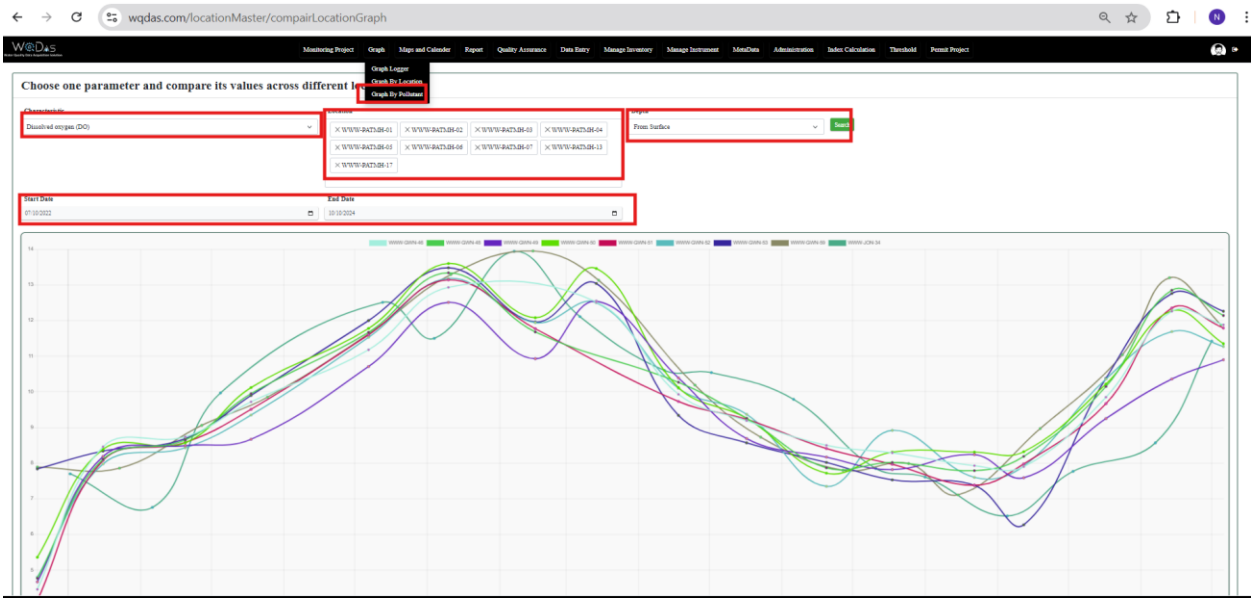

Figure 59 Long term analysis graph for one parameter at different locations

Long Term Analysis

Graph one Location and multiple parameter

In this graph, users can create a visual representation for a specific location to observe how different parameters interact with one another and how one parameter affects another. They can select or deselect any parameter by clicking on the parameter name in the legend.

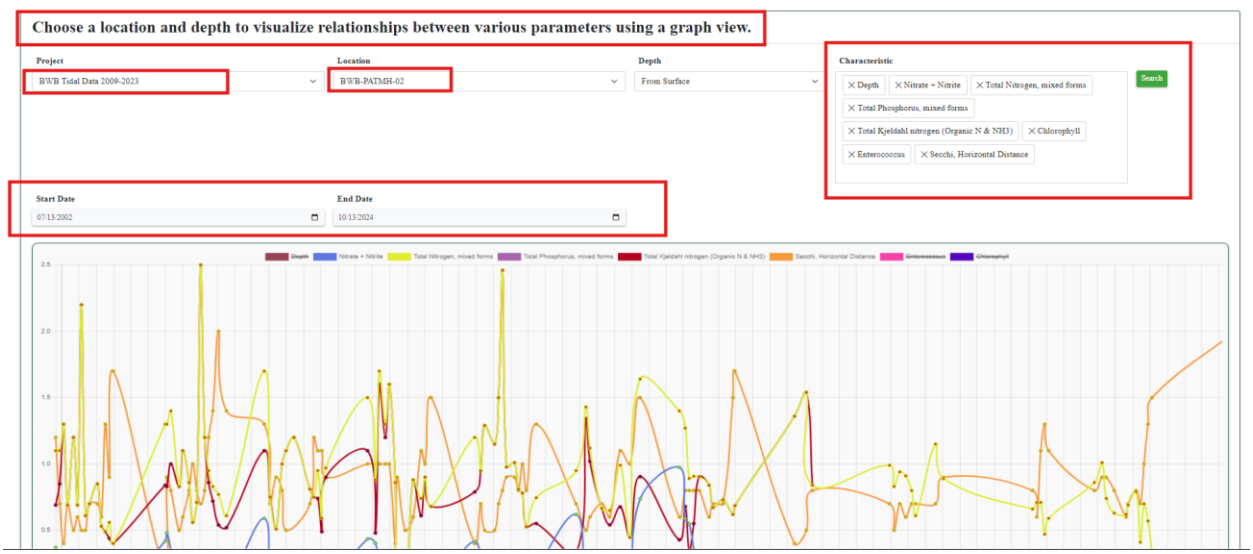

Figure 60 Long term analysis for one location for all the parameters

Continuous Logger Comparison of All the Parameters at One Location

In this graph, users can create time series for continuous data at a specific location. They can select or deselect any parameter by clicking on the parameter name in the legend.

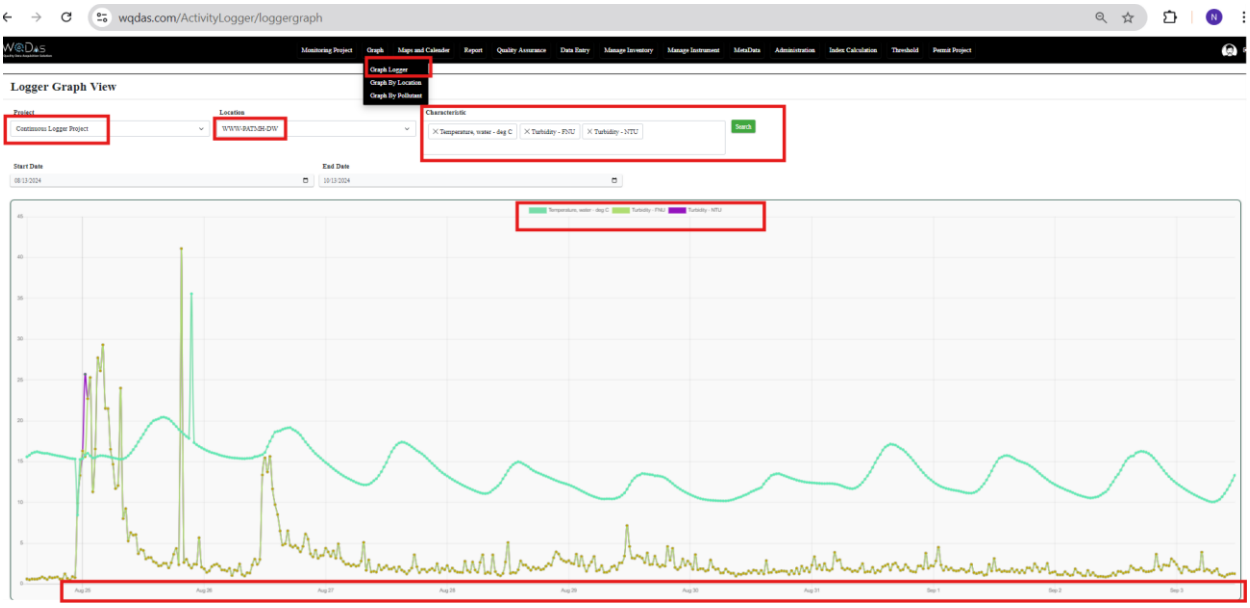

Figure 61 Continuous Logger time series for one location with all the parameters

Reports

Users can run different reports to run different statistics.

Project Activity Report

In this report, users can view the number of samples collected as “Routine” and “Quality Control Sample Duplicate” for any given year across multiple locations. This report assists in assessing whether the quality control criteria for duplicates are being met.

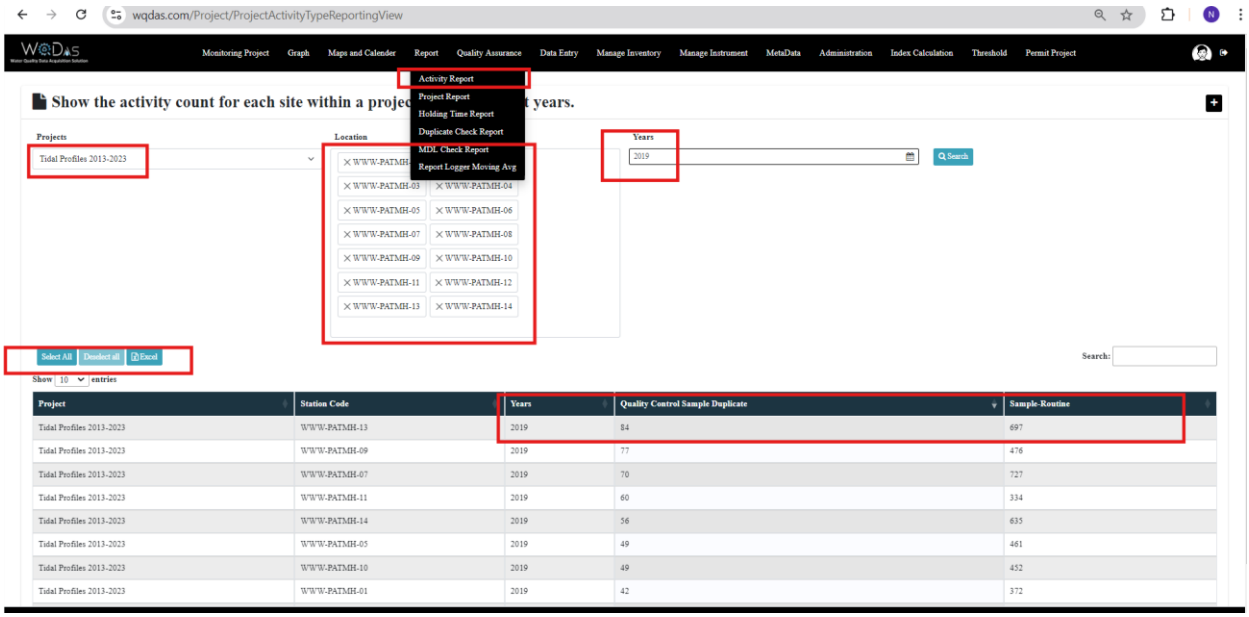

Figure 62 Report on activities at each location for one year

Project Exceedance Report

Users can run this report to obtain the total count of data points for one year, along with the counts of low and high values based on percentage criteria. If the ± percentage falls outside the specified criteria, it will be highlighted. For example, for pH, if the acceptable low value is 6 and the high value is 8, with a ±15% criterion, any value outside this range will be highlighted. In other cases, users can specify one value (either high or low) as required, while the other remains optional.

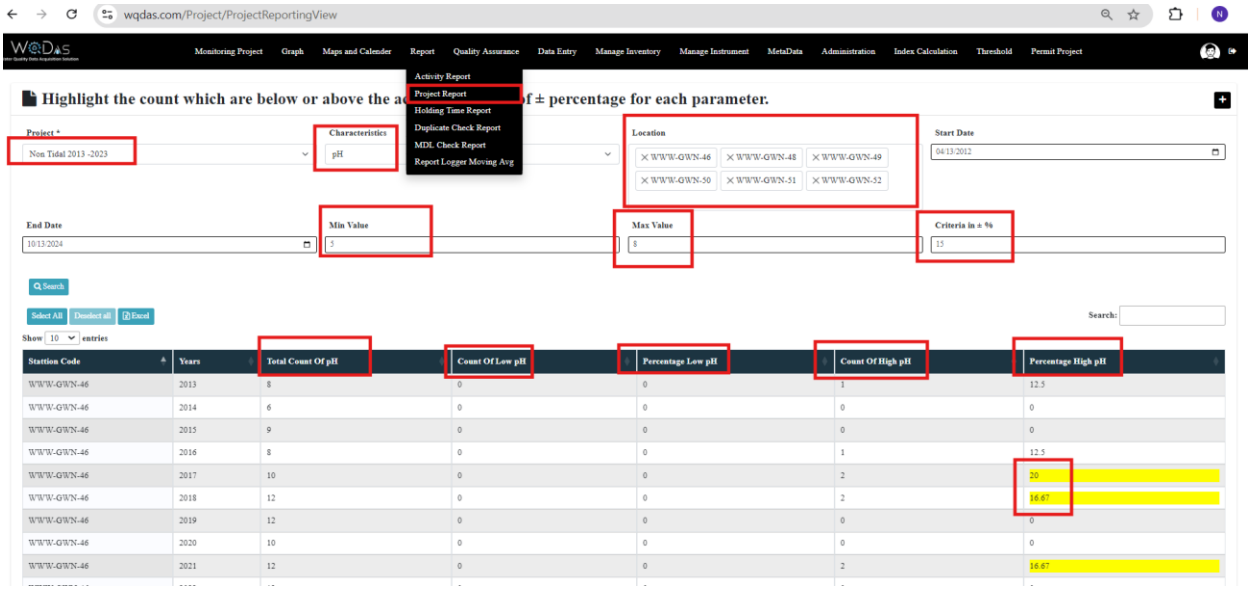

Figure 63 Report for counts for exceedance for each individual parameter over the time

Holding Time Report

In this report, users can view the number of samples that exceed the holding time criteria set by the project manager in the “Project Sample Study Plan.” The report calculates the difference between the sample collection date and time and the analysis start date and time. If this difference exceeds the holding time criteria, it will be highlighted.

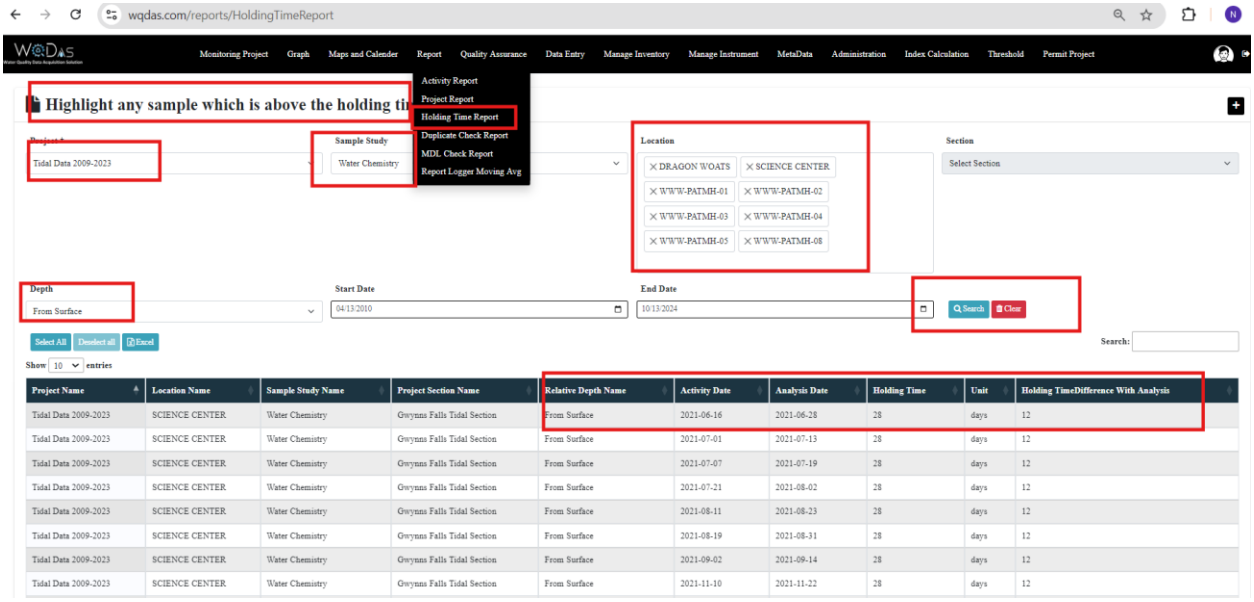

Figure 64 Holding time report

Duplicate Check Report

In this report, users can compare duplicate samples with routine sample results. Results that fall within the specified range are deemed acceptable; otherwise, they will be highlighted. Users must input acceptable low and high range values.

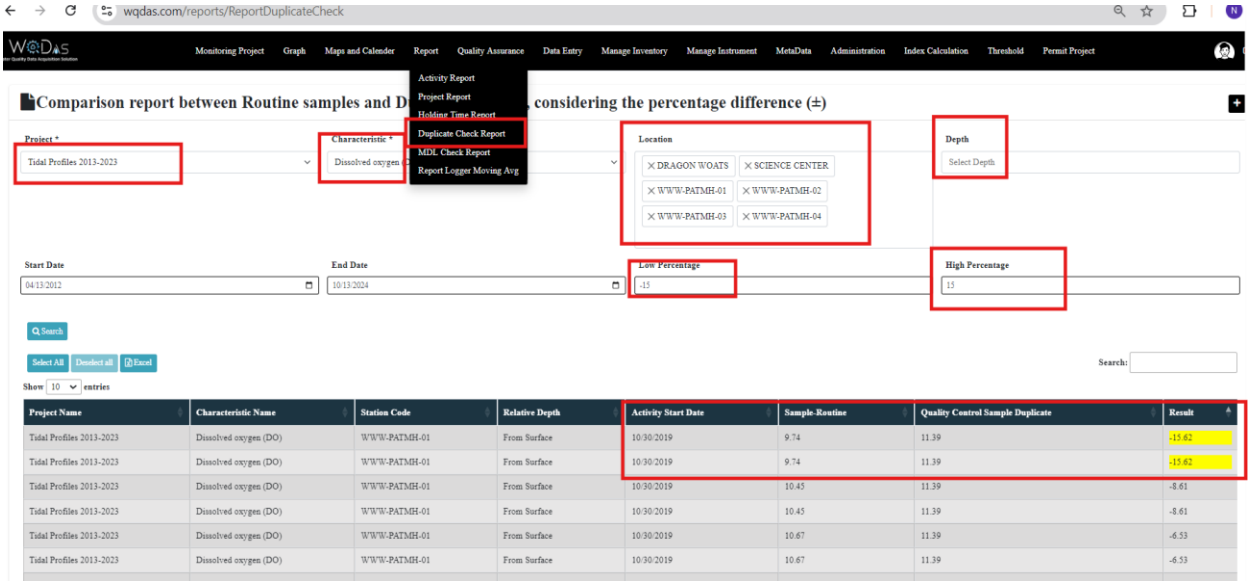

Figure 65 Duplicate Check Report

MDL Check Report

If the laboratory provides the Minimum Detection Limit (MDL) value for each parameter along with the results, you can run this report to check if any result values meet the ± criteria for comparison. Results that fall above or below the criteria will be highlighted.

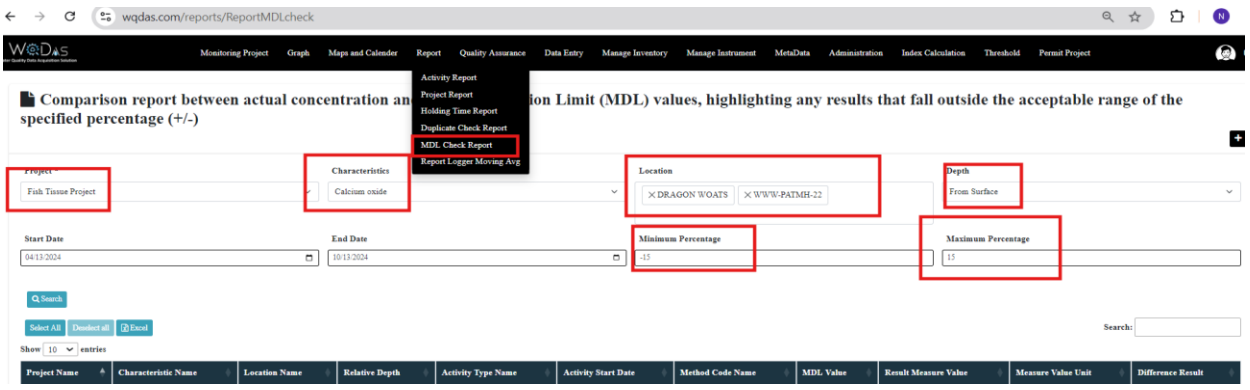

Figure 66 MDL Checks Report

Logger Moving Average Report

In this report, users can generate hourly averages, as well as 8- and 12-hour running averages, for a specific parameter at a designated location.

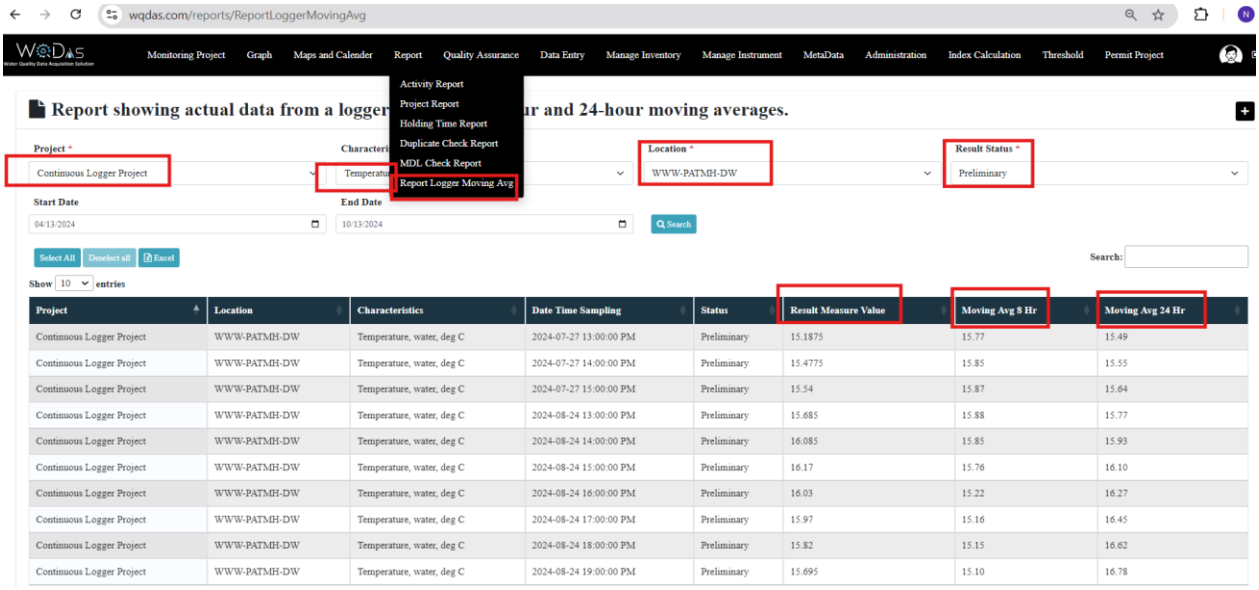

Figure 67 Logger Averages

Index Auto Calculation

WQDas does auto calculations after entering the data for census for macroinvertebrates or fish. All the metadata for auto calculation is already fed into the threshold table.

BIBI Scores

WQDas automatically performs calculations after field staff enter data for the macroinvertebrate census. It is the responsibility of the field staff to accurately identify the bugs and mention about include or exclude them from the calculations.

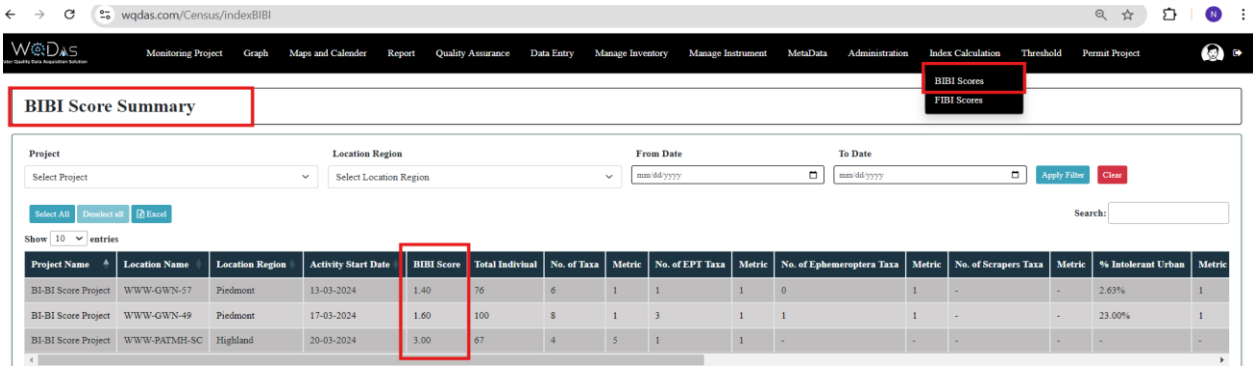

Figure 68 BIBI scores

FIBI Scores

WQDas automatically performs calculations after field staff enter data for the fish census. It is the responsibility of the field staff to accurately identify the fish and provide any additional information on the data entry sheets.
If it needs to include or exclude from the calculations

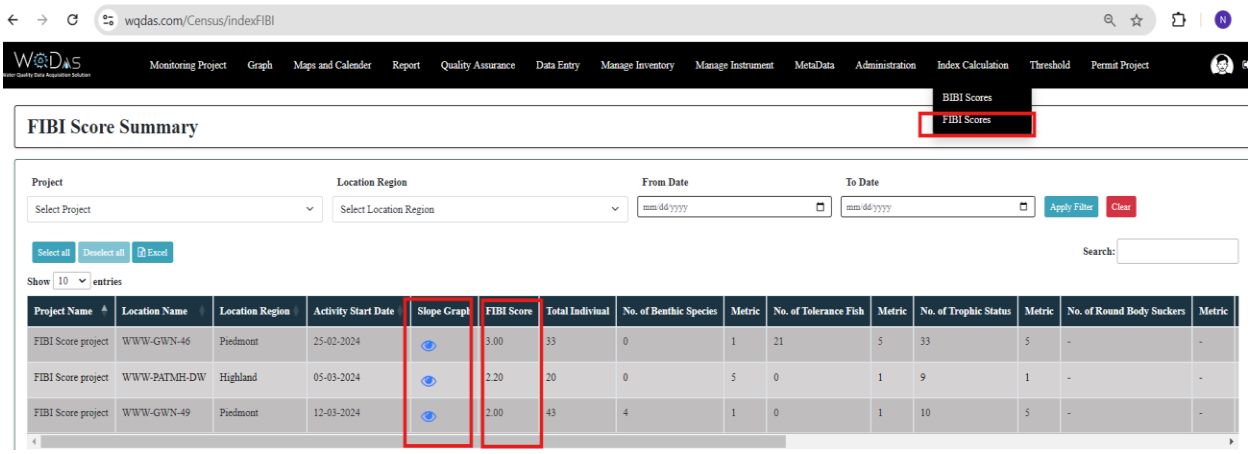

Figure 69 FIBI scores

Stream width graph for slope and intercept .

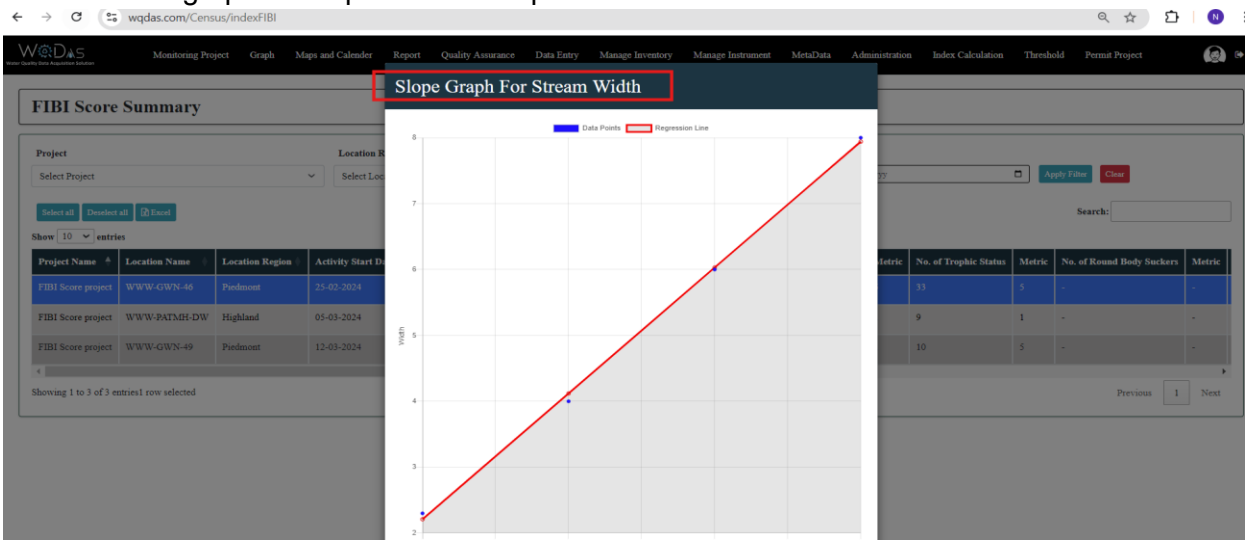

Figure 70 Slope graph for stream width for FIBI calculations

Threshold Criteria for BIBI or FIBI Scores

Project managers need to set the threshold criteria for BIBI and FIBI scores only once. After this initial setup, WQDas will automatically populate all FIBI and BIBI indices whenever field staff enter census data, based on the established criteria.

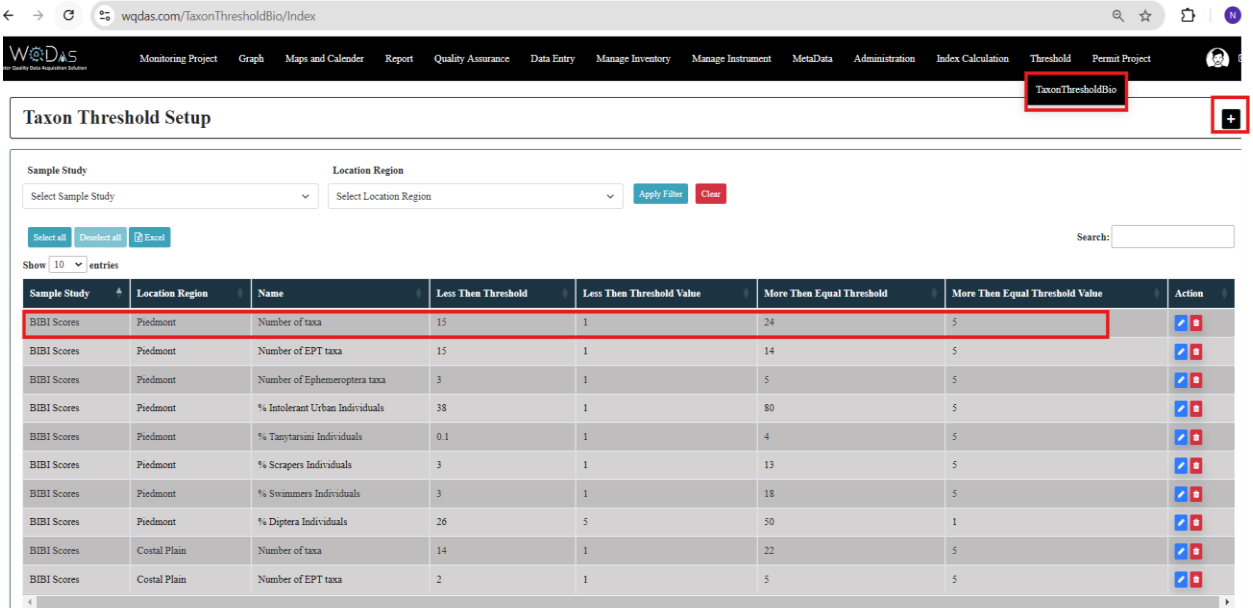

Figure 71 Threshold Criteria for BIBI or FIBI Scores

Instrument Inventory Management

This module enables users to manage all instruments used within the organization. It tracks each instrument's certification status and identifies the individual responsible for its custody.

Adding a New Instrument to Inventory Management System

In this module, each instrument is tracked along with its sensors and certification status. To add a new instrument, users must provide the manufacturer name, model number, and serial number. Additionally, users need to indicate whether the instrument is multi-sensor or single-sensor and confirm its active status in the inventory.

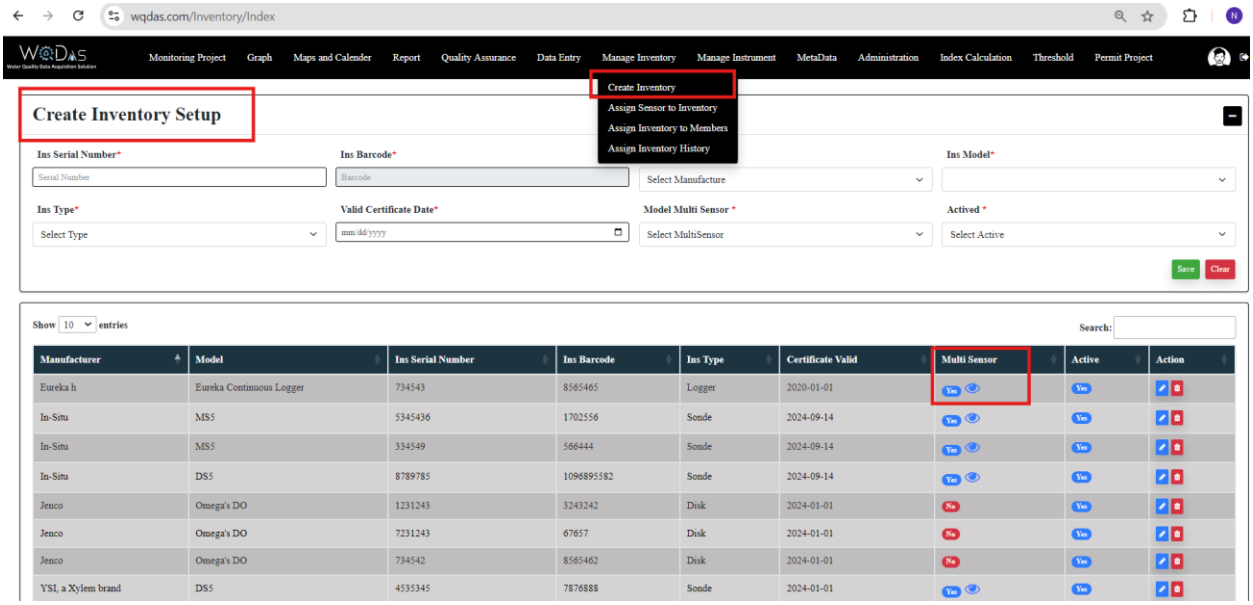

Figure 72 How to add new inventory for tracking

If the instrument is multi-sensor, the user can click on the “eye” icon to view the details in a popup.

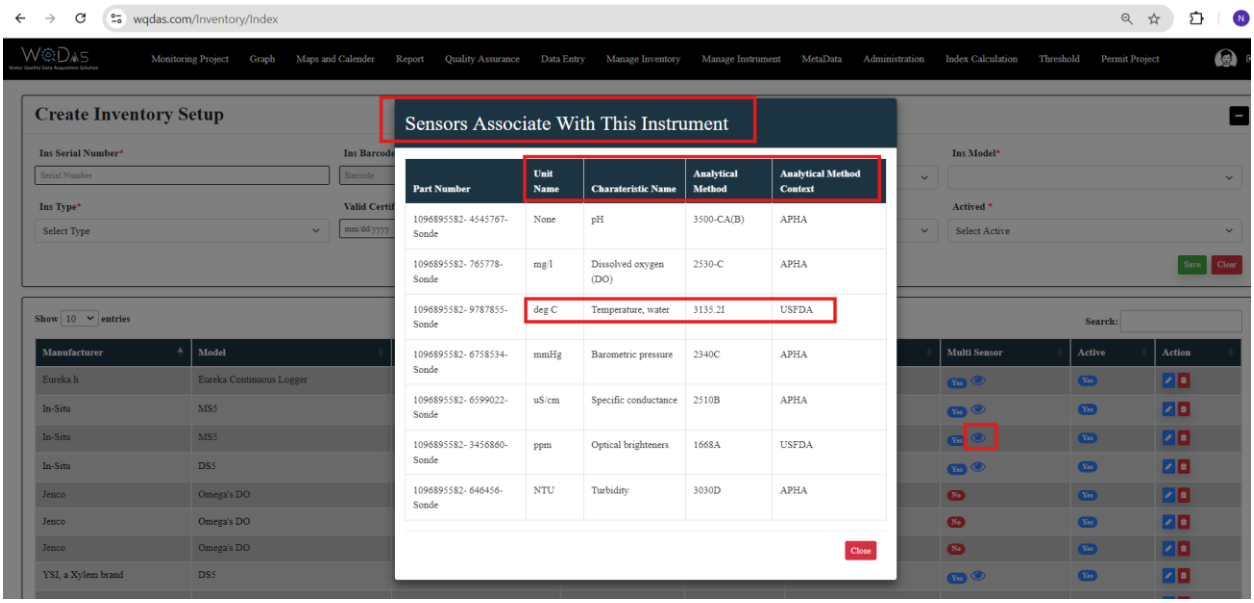

Figure 73 Instruments Sensor's details

Inventory Assigned to a Team Members

On this screen, the project manager can assign instruments to team members. If the project manager later needs to unassign an instrument and reassign it to someone else, this can also be done on the same screen.

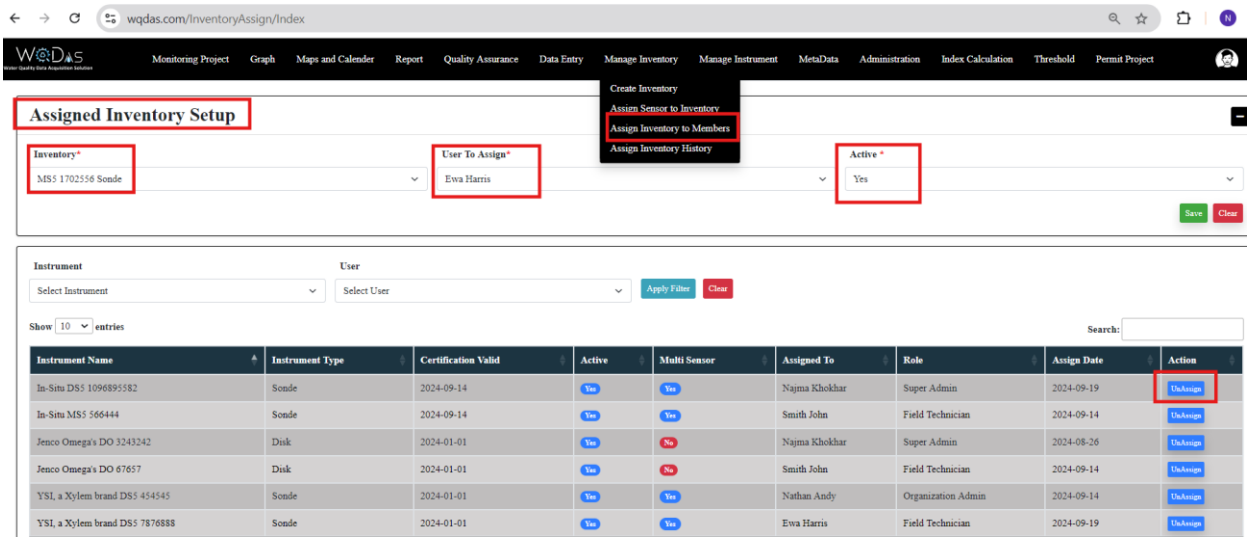

Figure 74 How to assign each instrument to individual users or team members

History for Instruments Assignments

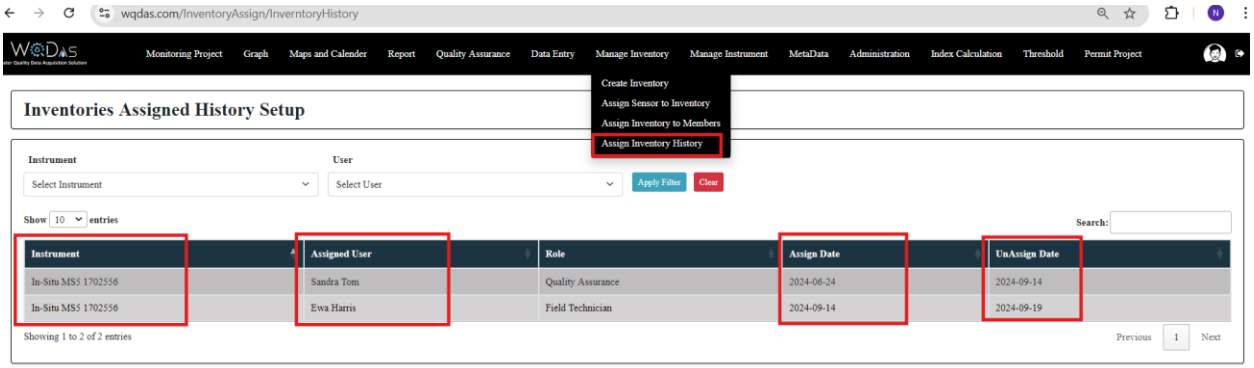

Figure 75 Inventory tracking for user assignments

User Management

The organization's administrator will manage all user rights and privileges. This system is role-based, with each user assigned a specific role. The primary roles include "Super Admin," "Organization Admin," "Project Manager," "Field Staff," "Auditor," "Quality Assurance Officer," and "Standard User." Each role has its own dashboard, tailored to their specific responsibilities and privileges.

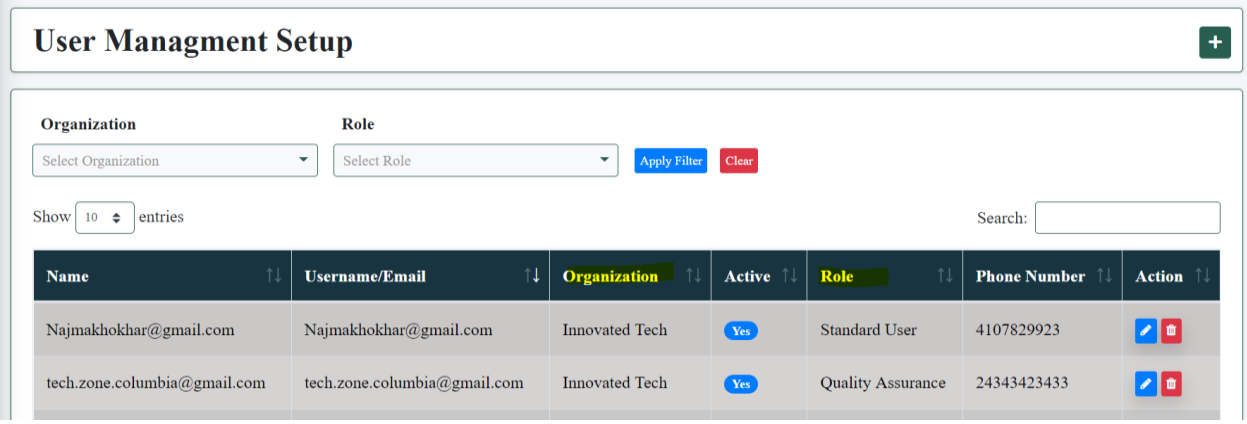

Figure 76 User management system for the organization

Role Based System

This is the list of roles recommended for an organization to have for each project.

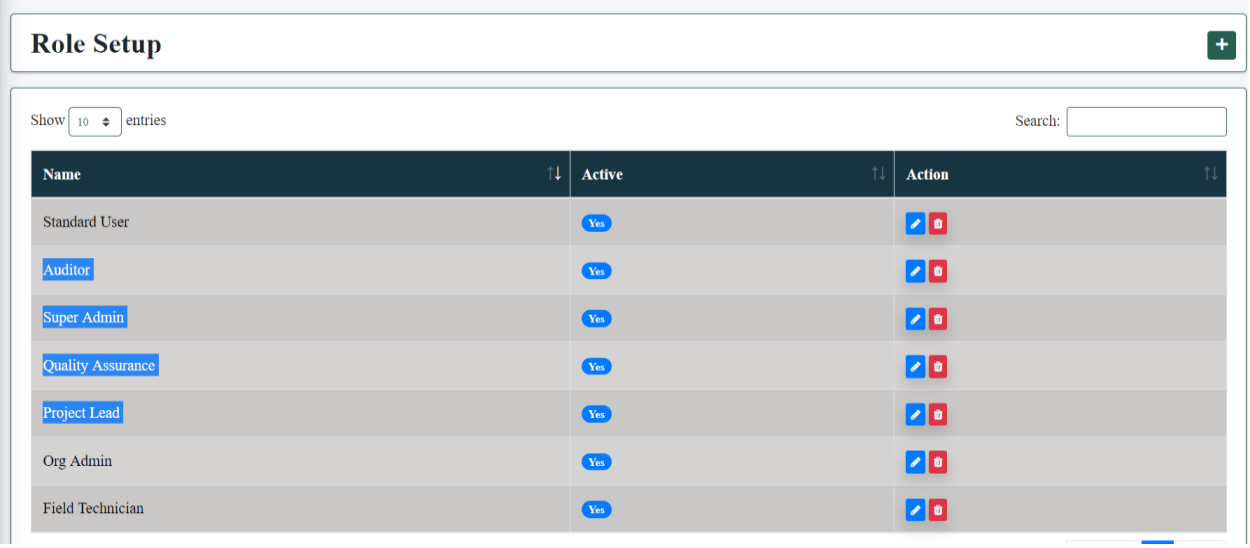

Figure 77 All users have an assigned role in the organization

Screen Permission for Different Roles

Only the super admin has the authority to assign different permissions to various roles.

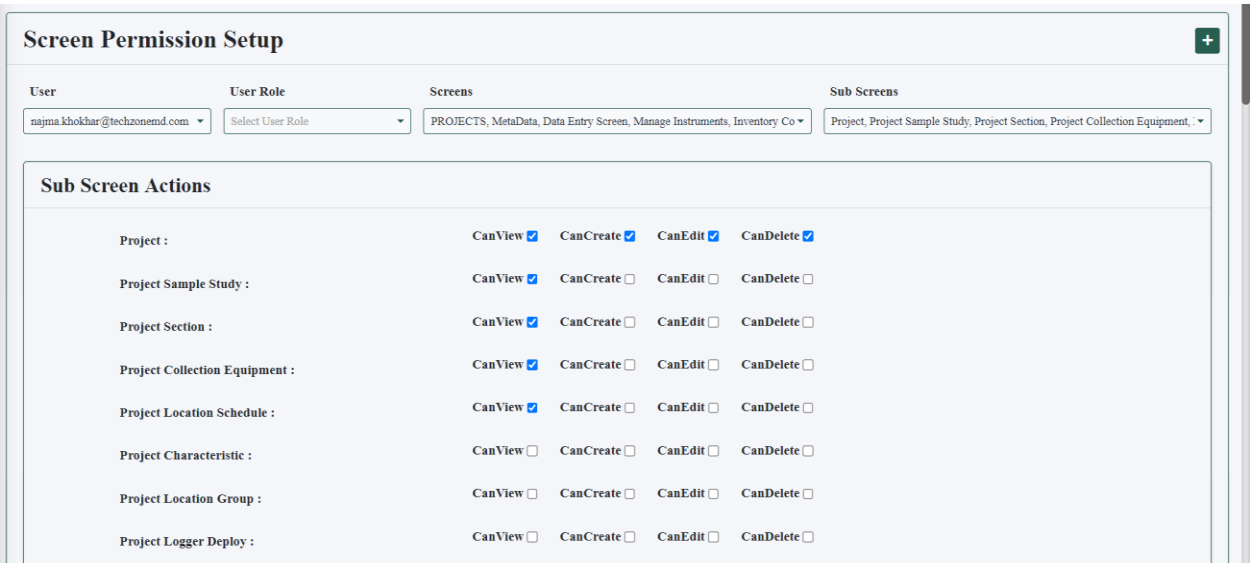

Figure 78 Each role has assigned privileges to access different pages in the WQDas

Teams

Project managers can create various teams and assign them to different sections of a project. They can also monitor each team's performance and track their responsibilities.

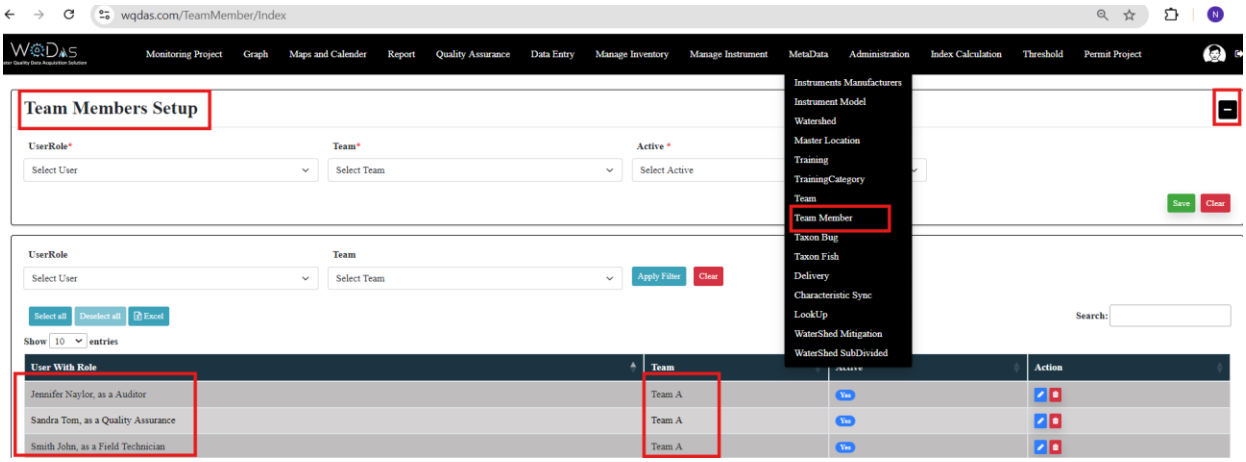

Figure 79 Each Team has different member assign to different project sections

Training Tracking for Members

The project manager can track the training status of all team members. If anyone requires retraining, they can request additional training.

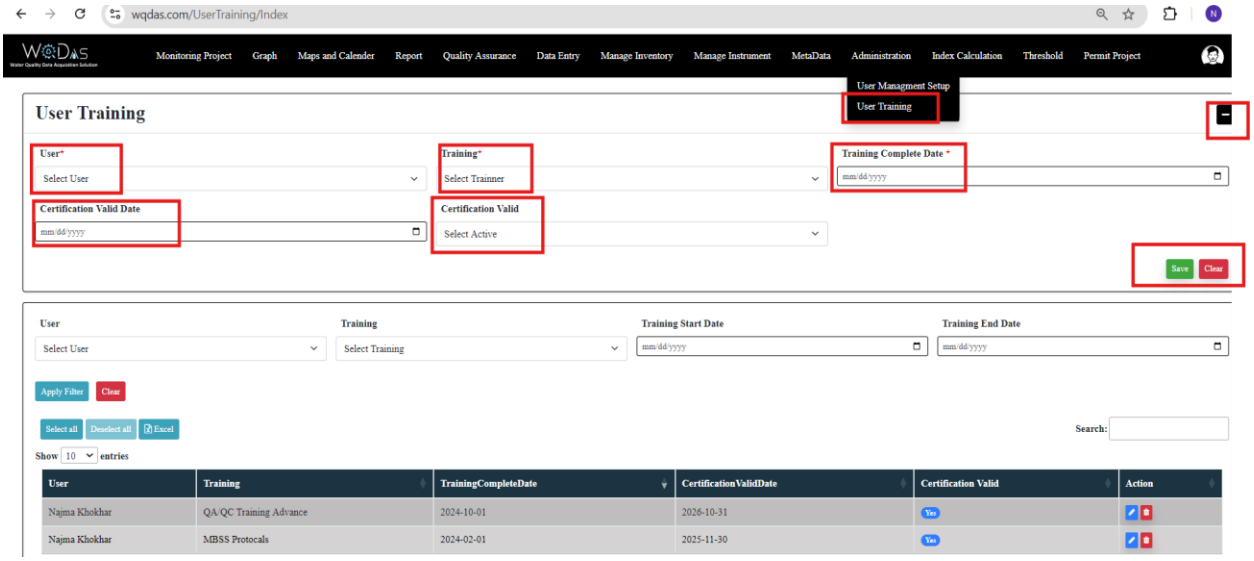

Figure 80 Training tracking for employees

Project Time Tracking for Employees

The project manager can track the time of each employee spending on different activities for any project to get billable hours.

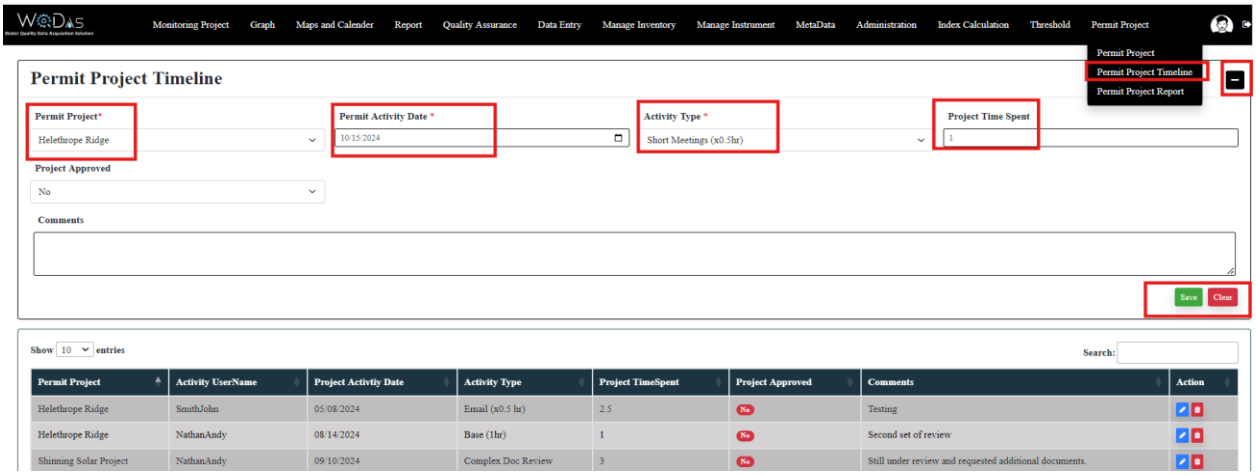

Figure 81 Project Time Tracking