FlowCam®

Using VisualSpreadsheet to Create Metadata Tags and Export Data to EcoTaxa

INTRODUCTION

EcoTaxa is a powerful web-based tool designed for the exploration, annotation, and classification of plankton images from many instruments, including FlowCam. VisualSpreadsheet® 6.1 introduces a feature that allows users to directly export images and metadata from FlowCam runs in the file formats EcoTaxa requires. This is especially useful for researchers who can't use Zooprocess because they don't have raw images, and/or researchers who seek a streamlined data pipeline that doesn't require coding experience.

Additionally, VisualSpreadsheet 6.1 offers FlowCam users the option to add their own metadata tags to runs. Metadata tags enable users to associate details related to a sample's origin, collection, processing, and experimental conditions with each sample run. These metadata tags can also be used to filter, sort, and organize data.

This technical note outlines how to create metadata tags and how to export FlowCam data for EcoTaxa. The complete process is illustrated in the workflow diagram to the right (Figure 1). For more detailed instructions, please refer to the VisualSpreadsheet 6.1 User Guide (see Section 6.9 for metadata tags or Appendix A for EcoTaxa).

STEP 1
Customize Metadata Tags for FlowCam Runs

VisualSpreadsheet 6.1 allows users to add additional metadata to their FlowCam runs. The VisualSpreadsheet "Metadata Manager" provides a set of pre-loaded metadata tags commonly used in plankton analysis, including some offered in EcoTaxa, such as Latitude and Longitude. Users may also define custom metadata tags to capture additional sample-specific information they wish to upload to EcoTaxa.

To access and modify metadata tags:

1. Open the "Metadata Manager" (Figure 2) in VisualSpreadsheet (Preferences > Metadata).

2. View and edit the available pre-loaded metadata tags and assign default values where appropriate.

3. Add custom metadata tags as needed to accurately reflect your sampling methodology and delete any unnecessary metadata tags.

ECOTAXA IMPORT WORKFLOW

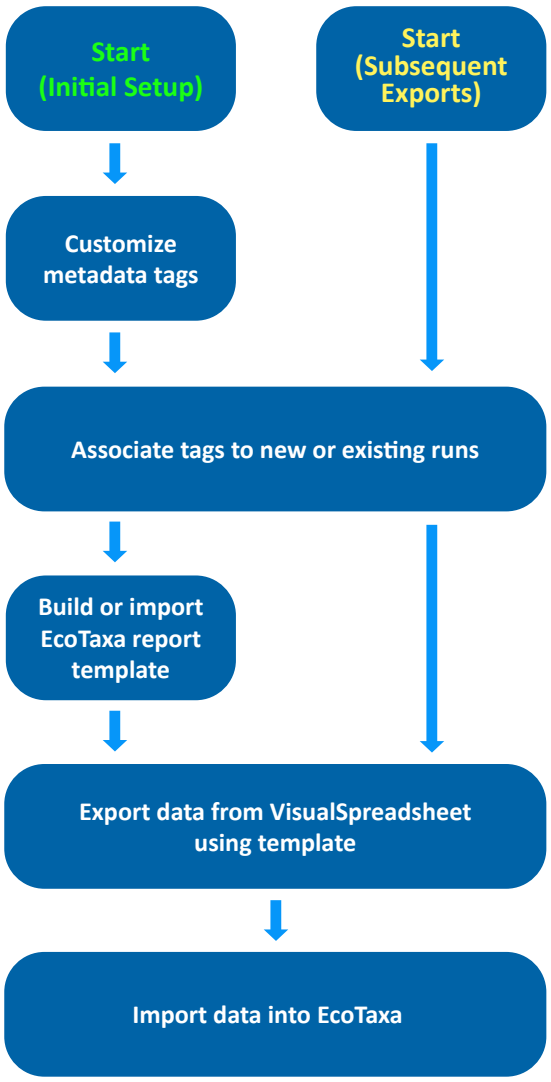

Figure 1. This figure illustrates the basic workflow for preparing FlowCam images and data for import into EcoTaxa. The initial setup workflow (starting point shown in green), includes customizing metadata (Step 1) and preparing an EcoTaxa Report Template (Step 3). The workflow for subsequent data exports (starting point shown in yellow) indicates how to repeatedly export FlowCam data into EcoTaxa once metadata and report templates have been customized.

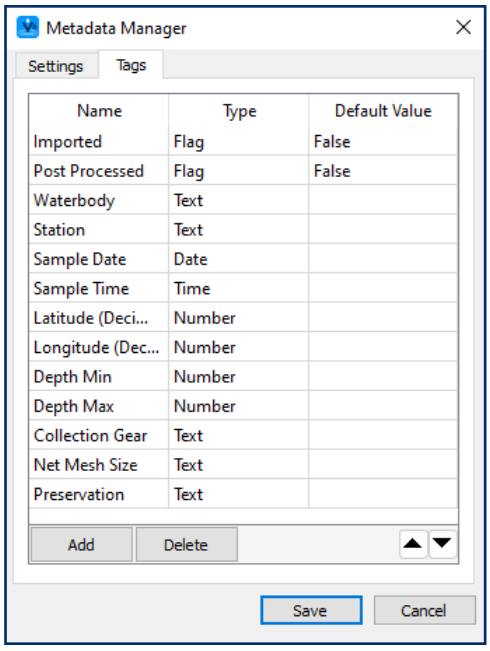

Figure 2. This figure shows the pre-loaded metadata tags included in the "Metadata Manager" window. The default tags may be modified or deleted, and custom metadata tags can also be added in this window.

STEP 2
Associate Metadata Tags to FlowCam Runs

Metadata tag values can be assigned at the beginning of a new sampling event or to existing runs within the VisualSpreadsheet database.

To add metadata tag values to *new* runs:

When a new sample run is initiated in either AutoImage, Trigger, or LO mode, the "Run Information" window will appear, showing a list of available metadata tags (Figure 3). To add a metadata tag to the run, click in the cell in the "Value" column associated with the tag, and add your data.

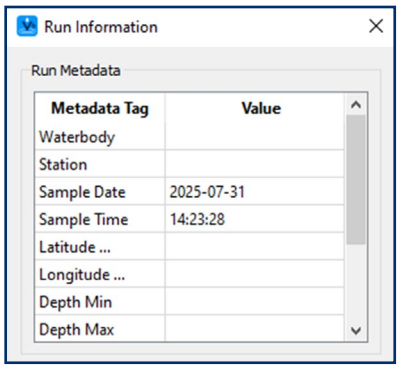

Figure 3. The "Run Information" window appears after initiating a sampling run. Users can input relevant values for any metadata tags they wish to save along with the run.

To add metadata tag values to *existing* runs:

To add metadata values to an existing run, open the “Edit Run Metadata” window (File > Edit Metadata) (Figure 4). Click on the desired run and then click "Edit". The “Edit Metadata” window will appear, allowing you to add or edit data in the "Value" fields for your desired metadata tags.

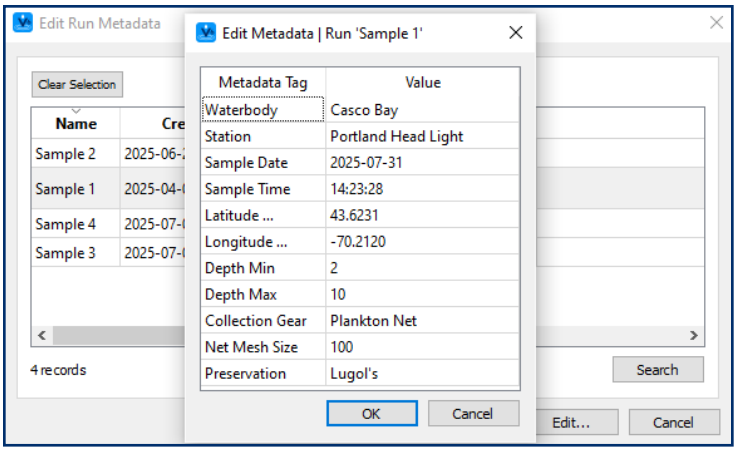

Figure 4. Metadata values can be added or modified for existing runs within the "Edit Metadata" window.

STEP 3
Build or Import an EcoTaxa Report Template

Before exporting data for EcoTaxa, an EcoTaxa Report Template must be created to specify which particle data, summary information, context settings, and metadata tags should be included. Users can create their own report template or download one of two example report templates available on the FlowCam Customer Support Center: the EcoTaxa Example Report for new users, or the FlowProcess Report for users who have used FlowProcess to upload FlowCam data to EcoTaxa in the past.

To create an EcoTaxa Report Template:

1. In VisualSpreadsheet, open the "Report Template" window (Preferences > Ecotaxa Reports) and choose to open an existing report template or create a new report template.

2. Select the data you want to include in your EcoTaxa Report from the tabs on the right-hand side of the "Edit Report Template" window (tabs: Particle Data, Summary, Context, Metadata), using the arrows to add or remove types of data from the template (Figure 5). If you are creating a custom template, you will start from scratch and need to select all data points desired. If you’re starting with an example report template, suggested data points have already been populated, however you can still add or remove types of data in addition to the suggestions provided. The tab options include:

   a. **Particle Data:** Particle-level information (i.e. VisualSpreadsheet particle properties)

   b. **Summary:** Run-level summary data specific to each sampling event

   c. **Context:** Context Settings related to image capture (e.g. segmentation), sample settings (e.g. sample volume and flow rate), and capture filters

   d. **Metadata:** User-defined metadata fields created and applied to runs in Steps 1 and 2

3. After using the left and right-facing arrows to add or remove types of data to the report, make sure to click “Save” to preserve your changes. Your EcoTaxa Report Template is now ready.

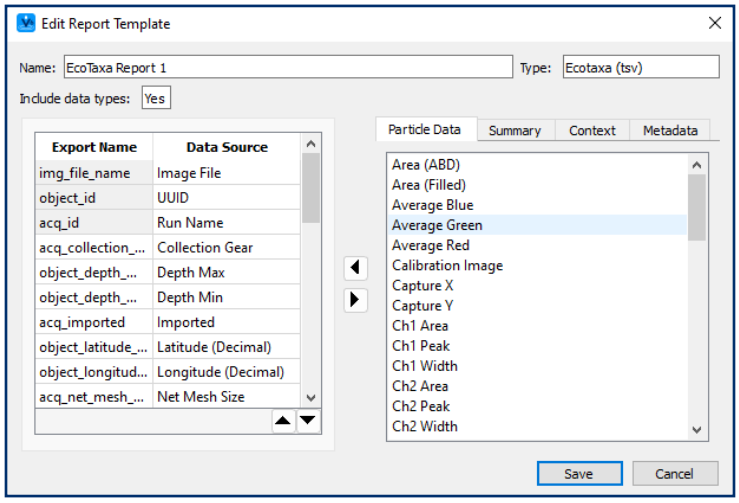

Figure 5. The "Edit Report Template" window allows users to choose the specific data to include when exporting VisualSpreadsheet data for EcoTaxa.

STEP 4
Export EcoTaxa Data from VisualSpreadsheet

Once you have finalized the EcoTaxa Report Template, it can be used to export data that is compatible with EcoTaxa.

1. Open the "Report Export" window (File > Export > EcoTaxa Data, Figure 6).

2. Enable "Zip Export" by checking the box at the top right of the window.*

3. Choose the previously created report template via the dropdown menu at the top of the window.

4. Select at least one run for the export from the list. Multiple runs can be selected by holding down the CTRL button.

5. Click "Export" and choose a directory location to save your new zip file.

*EcoTaxa requires data to be stored in a zip folder. However, some organizations may have software installed on computers that interferes with the creation of zip files. This may affect people using VisualSpreadsheet on an external computer. If Zip Export is enabled but the zip file is not created, you may need to use a third-party zip tool and manually create the zip folder after exporting your data.

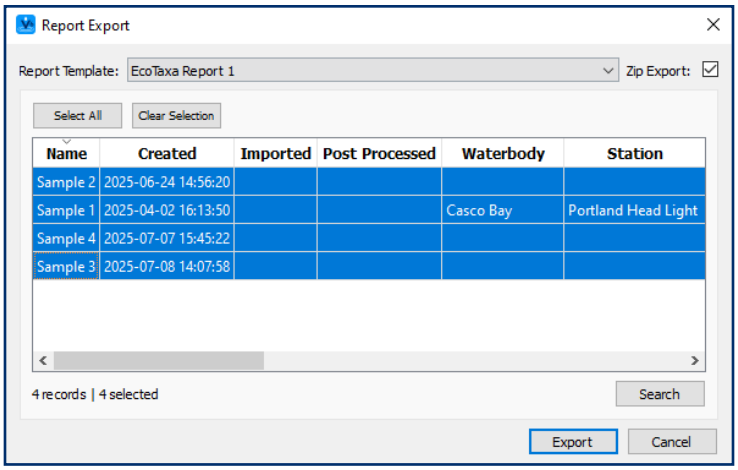

Figure 6. Select the report template you want to use and the runs for which you want to export images and data in the "Report Export" window. Multiple runs can be chosen using CTRL + click.

STEP 5
Import VisualSpreadsheet Data into EcoTaxa

Before importing the zip file created in Step 4 into EcoTaxa, you must first create or log in to your EcoTaxa account. You will then need to find or create a project to contribute to. Once you are within an EcoTaxa project:

1. Go to the project annotation page and select "Import images and metadata" from the Project drop-down list (Figure 7).

2. Under "General Import", select "Upload or select from my files" and follow the instructions to complete the import.

3. A progress bar will indicate % completion of the import, followed by a confirmation of successful import.

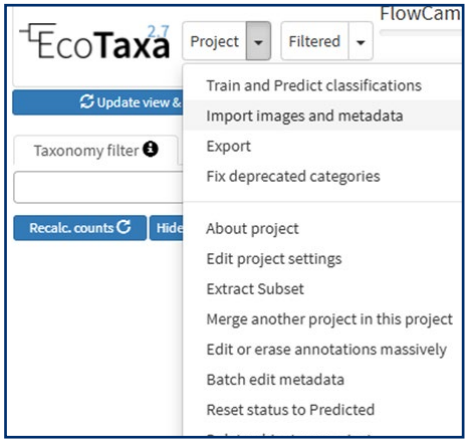

Figure 7. The Import images and metadata option within an EcoTaxa project annotation page.

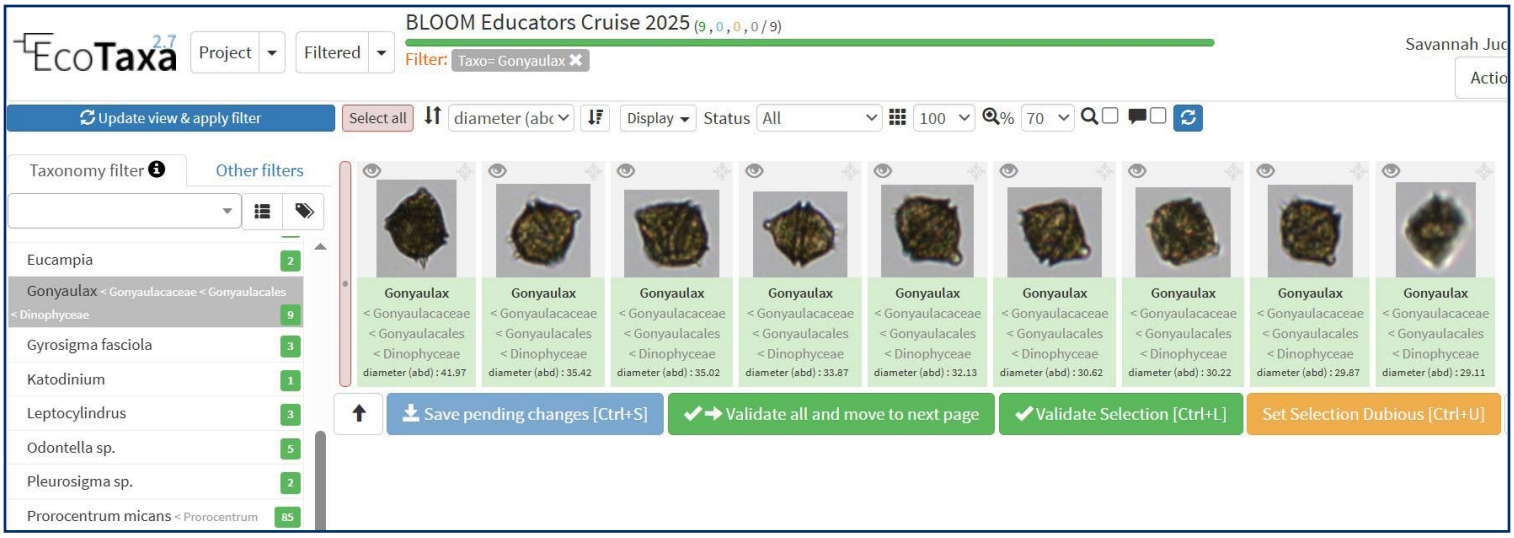

Figure 8. Example FlowCam project in EcoTaxa featuring *Gonyaulax*, a dinoflagellate.

SUMMARY

Due to its ease of use, EcoTaxa has become a vital resource for many FlowCam researchers seeking to classify phytoplankton and zooplankton in freshwater and marine systems. By enabling streamlined metadata tagging, customizable report templates, and direct export of EcoTaxa-ready datasets, VisualSpreadsheet 6.1 simplifies the process of importing FlowCam data into EcoTaxa. Whether users are new to EcoTaxa or seeking a more efficient workflow, VisualSpreadsheet 6.1 offers a user-friendly and flexible solution for preparing and importing high-quality plankton image data into EcoTaxa projects. For additional documentation related to EcoTaxa, visit the PIQv website.

Have questions or need support?

Contact us at support@fluidimaging.com

1 Get in touch
Tell us about your needs and how we can support you

2 We'll assist you
We will get back to you to answer your questions or schedule support or services