

Timelapse Template Guide

A reference guide to Timelapse templates, and how to create them with the Timelapse Template Editor

The screenshot shows the Timelapse Template Editor window. It features a menu bar (File, Edit, View, Help) and a tabbed interface with 'Brief Instructions', 'Image data fields', and 'Folder data fields'. The main area contains a table of data fields with columns for Type, Default Value, Label, Data Label, Tooltip, List, Width, Copyable, Visible, and Export. To the right is a 'Add a data field' panel with options like Text, Number, Choices, Dates/Times, Flag, and Remove field.

Type	Default Value	Label	Data Label	Tooltip	List	Width	Copyable	Visible	Export
File		File	File	The file name		90	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
RelativePath		RelativePath	RelativePath	Path from the root folder containing the template and image		135	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
DateTime	2024-01-01 12:00:00	DateTime	DateTime	Date and time taken (Time_ in 24 hour format)		160	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FixedChoice		Species	img_species	The species seen in the image.	Define List	115	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Counter		Count	img_individual_count	The number of unique individuals of that species captured in		30	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Note		Sequence	img_sequence	Use Edit Populate a field with episode data... to automaticlaly		50	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Note		Temperature	img_temperature	Use Edit Populate one or more fields with metadata... to find		40	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FixedChoice		Problem	img_problem	A condition that makes it difficult to evaluate the image.	Define List	100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
MultiLine		Comment	img_comment	Any comment you wish to add		100	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Note		Analyst	img_analyst	The name of the person who analyzed these images		100	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Flag	false	Publicity?	img_publicity	If this is a really good image useful for publicity purposes		20	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Flag	false	Dark?	img_dark	Use Edit Populate a field with Dark Classifications ... to auto		20	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Flag	false	Empty?	img_empty	Is the image empty i.e., no people or wildlife? (see image rec		20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Flag	false	People?	img_people	Are people present in the image? (see image recognition wo		20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Flag	false	Wildlife?	img_wildlife	Is wildlife present in the image? (see image recognition work		20	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
DeleteFlag	false	Delete?	DeleteFlag	Mark a file as one to be deleted. You can then confirm deleti		20	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

What the interface will (roughly) look like. Drag and drop controls by their labels to re-arrange their order

File RelativePath DateTime Species Count Sequence

Temperature Problem Comment Analyst Publicity? Dark? Empty? People? Wildlife?

Delete?

The spreadsheet column order. Drag and drop columns to re-arrange their order.
Note: Select Timelapse menu Option|Preferences|Exporting CSV Files to export DateTime as one column or as separate Date_ and Time_ columns.

File | RelativePath | DateTime | img_species | img_individual_count | img_sequence | img_temperature | img_problem | img_comment | img_analyst | img_publicity | img_dark | img_empty | img_people | img_wil...

Saul Greenberg
 Greenberg Consulting Inc. / University of Calgary
 saul@ucalgary.ca

Timelapse Template Guide

*A reference guide to Timelapse templates, and how to create them with the Timelapse Template Editor*¹

This guide assumes that you have first gone through the [Timelapse QuickStart Guide](#), which is Part I of this series. That guide provides basic information on how to use Timelapse, the role of templates, and the Timelapse Template Editor. This guide builds upon that, where it adds details. A later section on Folder-level metadata also assumes that you have gone through the [Timelapse Metadata Guide](#) (Part 4 of this series), as that guide explains what folder-level metadata is, what it is used for, and how it is used.

The Timelapse Template Guide explains how to use the *Timelapse Template Editor* (included with the Timelapse Software). The Template Editor allows you to create a template (a file with the *.tdb* suffix) that specifies the data field tags you want to fill in when analyzing your images, and (optionally) a folder-based *information hierarchy* that associates metadata field tags with each one of your folders. *Timelapse* then uses that template to:

- specify the data fields that appear within Timelapse, which the analyst will fill in with tagging data as images are reviewed,
- (optional) specify folder-specific hierarchy and data fields within the *folder data tab*, which the analyst will fill in with metadata while navigating images,
- structure the database columns that will hold your image and folder tag data, and
- decide what fields to export to a CSV file

Creating and modifying templates is easy, as its mostly a matter of form filling once you decide upon the relevant image tags, and folder structure if you are using folder metadata) your project.

Finally, we recommend watching [Video Companion: The Timelapse Template Editor](#), which illustrates many of the functions described in this guide.

¹What you see when you run Timelapse software may not exactly match the screen images in this guide, due to updates made in the software after these screen images were taken. These differences should not affect your general understanding.

Table of Contents

Introduction	3
Creating the right template for your needs	3
How to deploy templates	3
The Template Menu	4
» <i>File</i> menu	4
» <i>Edit</i> menu	4
» <i>View</i> menu	4
» <i>Help</i> menu	4
The minimal template	5
Creating the minimal template	5
Editor and minimal template explained	6
The Template Editor interface	6
Mandatory fields	6
Data field attributes	6
Customizing the template: Image data fields	8
Customizing the template: Folder data fields	10
Defining your folder levels	11
Creating your folder levels	11
Templates and existing metadata standards	13
Modifying templates after they are used	13
Modifying a data field's appearance and order	13
Adding and deleting rows or renaming data labels	14
Deleting and renaming items in a Choice list	14
Changing a data field's type	14
Renaming and modifying folder levels	16

Credits. Camera trap images used in this manual are used with permission or obtained from public repositories. *Sources:* Parks Canada; Lila Science- Idaho Fish and Game data set; Lana M. Ciarniello, Aklak Wildlife Consulting ; UTC – French Guiana – French Agency for Biodiversity. Everything else ©Saul Greenberg, 2022 to present.

License terms. As the practice image and video files were provided by other agencies, their use beyond this tutorial must adhere to the license terms listed in *Description.LicenseTerms.Credits.pdf*, as found in the *PracticeImageSet* folder.

Introduction

The kinds of information that you or your organization want to track from camera trap images will be specific to your domain, your project and its goals and purposes, the kinds of images you want to analyze, and even the particular data you want to get out of it. Across domains, data requirements will certainly differ. For example, a wildlife oriented ecology domain may want data tags such as *Species* and *Count*, while a fisheries domain may want tags such as *#Anglers* and *#Boats*. Tags may even differ within a domain. One wildlife project may only be concerned with the presence of certain predacious species. Another wildlife project may want a broader set of tags specifying all species in the area, the sex and age of each entity, the presence of vehicles and people, and other factors such as weather and ground cover.

This is where the *Timelapse Template Editor* and the *template file* (a file with a *.tdb* suffix) come in. A project manager uses the Template Editor to specify the data fields the analysts will use to tag each image, which is saved as a template file. The project manager can optionally specify the folder hierarchy and associate data fields with folders, which the analyst would fill in while navigating through different image folders. That template file is then deployed (copied) to the root folder of an image set. When Timelapse loads that template and image set, it uses the specification contained within the template to create the look and feel of the fill-in data fields that appear in the Timelapse window's interface, and to structure how tag data will be stored in the Timelapse database (*.ddb* file).

The Template Editor defines a few mandatory data fields that must be included in all templates. Beyond that, any data field can be defined by selecting and configuring the various data types the Editor makes available: text, numbers, checkboxes, menus, and dates. This means that Timelapse can be customized to a broad variety of domains and purposes. It also explains why Timelapse has been used for many different purposes: wildlife ecology, fisheries management, social studies, instrument monitoring, etc.

Internally, the template *.tdb* file is actually an SQLite database, where your specifications is saved in database tables. However, you don't have to know anything about SQL or databases, as the Template Editor takes care of all the grotty technical details.

While there is some overlap between this guide and the Timelapse QuickStart Guide, this document goes into much more detail about the template and how the Template Editor works.

Creating the right template for your needs

You should give considerable thought to the information you want to capture as tags and how it is structured as data fields. When you craft a template, you are essentially creating a standard that specifies:

- what analysts should look for and tag when inspecting the images;
- how data fields are displayed in Timelapse, where the data field is given a label and tooltip that helps the analyst understand what it is for;
- how the tags entered by analysts are named and recorded in the Timelapse database (*.ddb*) file as data;
- how a folder/sub-folder hierarchy adds structure to how images are stored and how meaningful data can be associated with those folders;
- which data should be exported to a *.CSV* file;
- the expected format of the data;
- what data will be available for statistical analysis;
- the expected number of tags the analyst must consider: the fewer the data fields for the analyst to fill in, the faster the tagging task.

Doing it right requires planning. We recommend talking others in your organization to understand their needs. Test your templates, ideally with experienced analysts who can give you feedback, before deploying them widely. Tag a sample image set to collect some data, and see how amenable that collected data is to later analysis (e.g., statistics).

How to deploy templates

A project manager, or whoever is in charge, usually creates a master template, which is just the template *.tdb* file produced using the Template Editor. That template normally serves as the standard for how all images (and optionally folders) in that project should be analyzed and tagged.

A template file can be deployed in various ways. A common approach simply copies the template into the root folder of one or more image sets: how you decide to divide your images into images is up to you. When Timelapse loads the template in that image set, it will use the template found in the root folder to construct the Timelapse interface and to create a Timelapse Data database *.ddb* file, which in turn will hold the tagging data for that image set.

There are many variations to the above, as it depends on how you plan to deploy Timelapse. The [Timelapse FAQ web page](#) includes an entry discussing various other deployment strategies.

The Template Menu

Before diving into details, let's quickly discuss the offerings of the template editor's menu bar.

File menu

The *File* menu is mostly self-explanatory. Unlike other applications, there is no 'Save...' menu item as all edits are automatically saved to the template *.tdb* file as you edit.

- **New template...** create a new template file in a folder of your choosing.
- **New template based on a standard...** create a new template file in a folder of your choosing, where that template is pre-configured to match the selected metadata standard (see the [Timelapse Metadata Guide](#) for an explanation of metadata standards).
- **Open template...** open an existing template file.
- **Recent templates...** open a template from a list of recently edited templates.
- **Upgrade Timelapse files to latest version...** upgrade old selected Timelapse files (i.e., pre version 2.3) to the current version. Alternately, Timelapse will inform you if you are attempting to open an old file, and will raise the appropriate dialog to let you upgrade it. This menu item will disappear in the future.
- **Close** the current template file.
- **Exit** the template editor

Edit menu

The *Edit* menu is operational only when editing a template.

- **New folder level...** creates a new level in the metadata information hierarchy. This is described later in this tutorial, and in more detail in the [Timelapse Metadata Guide](#) for an explanation

View menu

The *View* menu is operational when editing a template.

- **Inspect File Metadata...** raises a dialog that allows you select a typical image set file, and inspect the metadata that file contains. Its purpose is to let you see if any file metadata is worth recording. If so, you can create a **Note** data field, where you can later have Timelapse automatically load each file's metadata value into that field. For example, if the file contained metadata for Ambient Temperature, you could create a data field called Temperature, where Timelapse will populate that field with each file's Ambient Temperature value.
- **Show all columns...** displays other non-editable data columns used by Timelapse. While useful for debugging, they are likely of little interest to most people.
 - » **ID:** The internal database ID of each row
 - » **Control order:** the sort order for displaying controls in the Timelapse user interface
 - » **Spreadsheet order:** the sort order for the columns in the .CSV file.

Help menu

The *Help* menu should be self-explanatory. You can use it to:

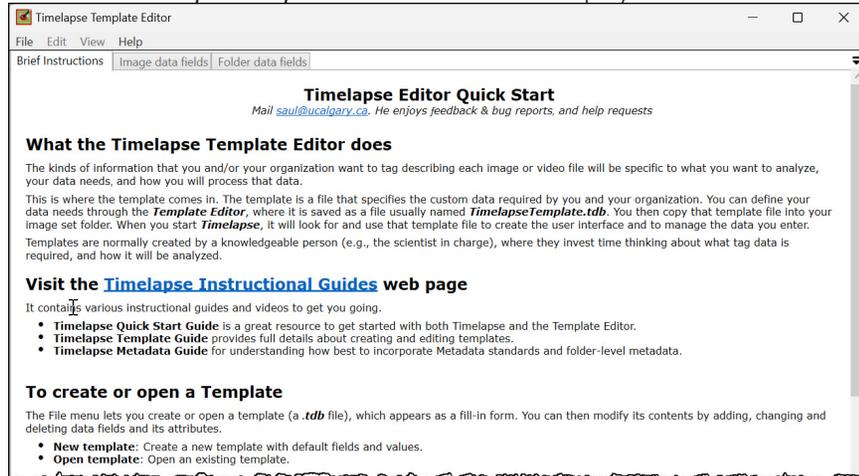
- quickly navigate to various pages on the Timelapse web site,
- view various video tutorials,
- join or send email to the Timelapse mailing list,
- find more about the Timelapse version you are running, including the ability to update to the latest version

The minimal template

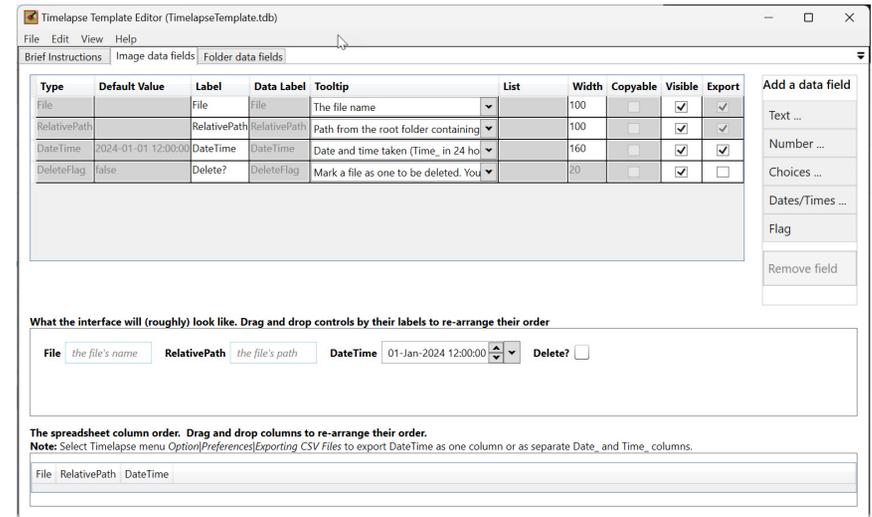
This section explains several Template Editor fundamentals. You will create and deploy the minimum template required to use Timelapse. To follow along, create a folder called *TemplatePractice*. Copy the *Station2* folder and its contents from your *PracticeImageSet* folder into it. *TemplatePractice* is now your image set folder for this tutorial.

Creating the minimal template

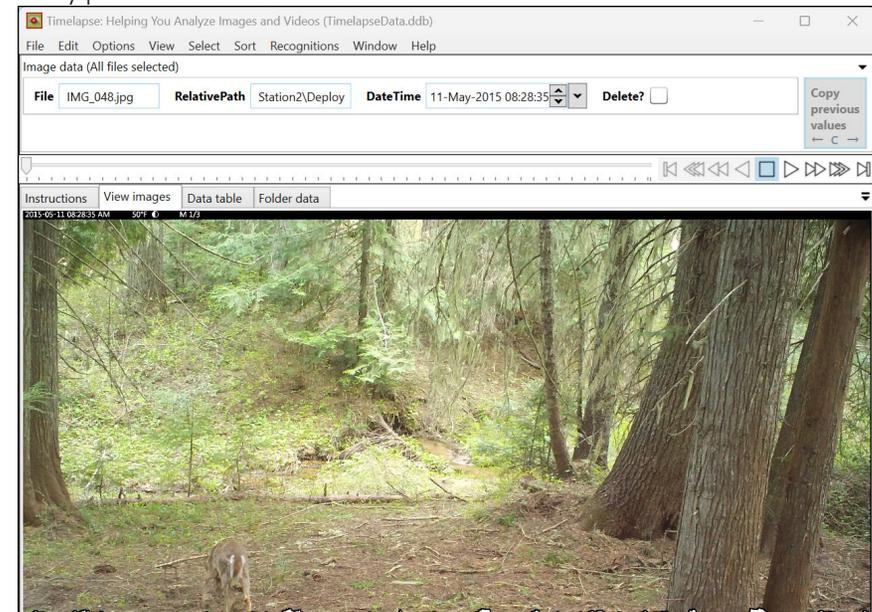
1. Start the *TimelapseTemplateEditor*. A window displays brief instructions.



2. Create a new template. Select *File | New template...*, navigate to your *TemplatePractice* folder and click *Save*.
 - » The Template Editor window will display the required data fields.
 - » A new file titled *TimelapseTemplate.tdb* should appear in your *TemplatePractice* folder.
3. The template includes the mandatory data fields required by Timelapse along with their default settings. Cells in grey are not editable, while cells in white are editable. These mandatory controls cannot be removed.



4. Quit the editor. Start *Timelapse*. Select *File | Load template, images and video files...* Navigate to the newly created *TimelapseTemplate.tdb* file in the *Station1* folder. This loads the template and all images in that folder.
5. Compare the fields in the Template with the fields in the Timelapse Data Entry panel above. You will see a one to one match.



Editor and minimal template explained

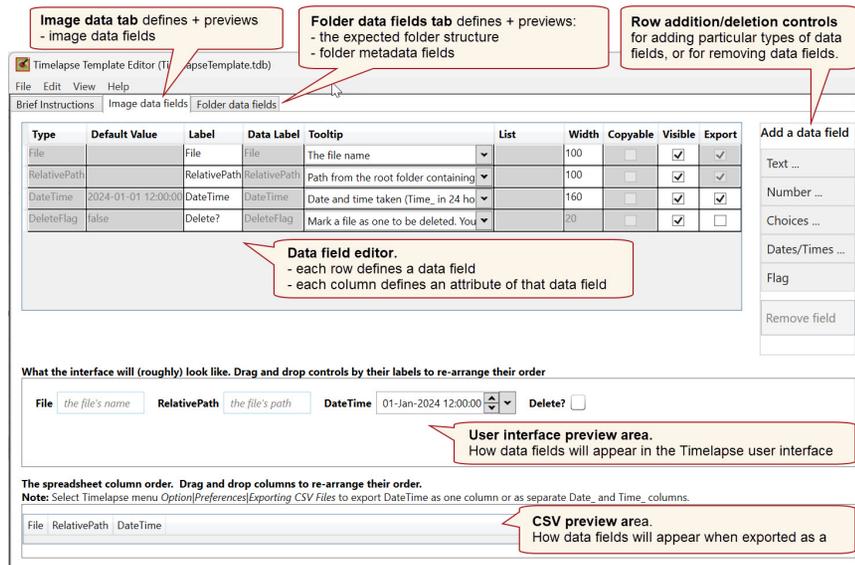
The Template Editor interface

The Timelapse Template Editor interface contains several tabs.

- **Brief instructions** on how to use the editor.
- **Image data fields**: an editor for creating data fields for images.
- **Folder data fields**: an editor for creating data fields for folders (metadata).

Each editor tab is divided into four areas..

- **Data field editor** (top). Each row in this area specifies a single data field item and its attributes.
- **User interface preview area** (lower middle) shows how the data will be displayed as fields in the Timelapse user interface.
- **CSV preview area** (bottom) shows the data column names and their order when data is exported to a .CSV file.
- **Row addition/deletion controls** (right) are buttons that let you add or remove particular types of rows into the table.



Note.
 - White fields are editable.
 - Gray fields are not-editable.

Mandatory fields

Every template includes four mandatory data fields, each displayed as a row in the table. Each row specifies a different data type as detailed in the **Type** column. For the first three mandatory fields below, Timelapse will automatically fill in the data when it loads your images.

- **File**: name of the image file.
- **RelativePath**: path from the image set's root folder to the sub-folder containing the image, if any.
- **DateTime**: date and time the image was taken, extracted from the file's metadata or file creation time.
- **DeleteFlag**: allows the analyst to 'flag' particular images for later deletion.

Other data types are available. A later section will show you how to use these to create custom data fields specific to your project.

Data field attributes

Each data field has several attributes, presented as columns in the data table.

- **Type** is the type of interactive control used to represent the data field. The Type determines the look and feel of the control and constrains what data is entered into it. For example, a *Note* type presents a text field that can accept any textual data, an *IntegerPositive* presents a field with an increment/decrement control that can accept only positive integers, while a *Flag* type presents a clickable checkbox representing true or false. Types are described in greater detail in the Data types section.
- **Default Value** is the initial value of that data when images are first loaded into Timelapse. The value can be empty.
- **Label** is used to label the data field when it is displayed in the Timelapse user interface. Labels can comprise any text, and can be the same or different from the **DataLabel** attribute.
- **DataLabel** names the database column that stores the data in the Timelapse database .ddb file. The DataLabel also appears as the column name in the Timelapse **Data Table** tab, and the exported .CSV file. DataLabels must be unique, and its text can only comprise a mix of alphanumeric letters and '_ '.
- **Tooltip** defines the text displayed in the Timelapse interface when the analyst hovers their mouse over a data field. Its purpose is to serve as a brief help message explaining what that data field is for.

- *List* applies only to *Choice* and *MultiChoice* items. A list defines a textual list, whose values are used to create a drop-down menu associated with each *Choice* or *MultiChoice* data field. This will be demonstrated shortly.

Note. The *DefaultValue* of a *Choice* row must be either empty (if allowed as a List option), or must match an item in the Choice's List. Mismatches will result in a warning dialog.

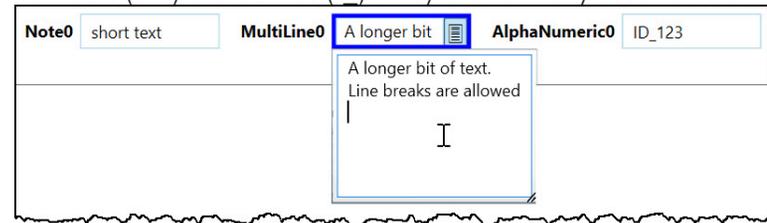
- *Width* defines the width of the text box associated with data field. While the units are somewhat arcane, you can see the result of changing the width in the user interface preview area. Ideally, the width will be just wide enough to display expected values.
- *Copyable* defines whether that field is affected by the *Copy previous values* button in the Timelapse interface. When the *Copy previous values* button is pressed, only those fields marked as copyable will have its data copied from the previous image to the current image.
- *Visible* defines whether the field should be displayed in the Timelapse user interface. If marked as invisible, fields and their default values will still appear in the Timelapse data table and the exported .CSV file. Marking fields as invisible is useful for
 - » hiding fields that are optional,
 - » hiding fields that are unneeded by the analyst for this image set,
 - » reducing unnecessary clutter in the Timelapse data entry panel.
- *Export* defines whether a field and its values should be exported to a .CSV file. This is useful to exclude unneeded fields from the exported data, e.g., fields that help the image analysis process, but which will not be used later. For example:
 - » because the *DeleteFlag* is used internally to tag images that Timelapse should delete, its *Export* attribute is unchecked by default. This is why it is not included as a column in the spreadsheet preview area.
 - » because *File* and *RelativePath* are required by a CSV row to identify the name and location of the image or video file, its *Export* attribute is checked by default and cannot be edited.

You cannot delete mandatory data rows (i.e. those who are colored gray). However, you can edit some of their properties, as will be shown shortly.

Data types

Aside from the mandatory data fields, you can create your own custom data fields specific to your project. The field can be one of following data types, each selectable from the *Row addition / deletion controls* panel.

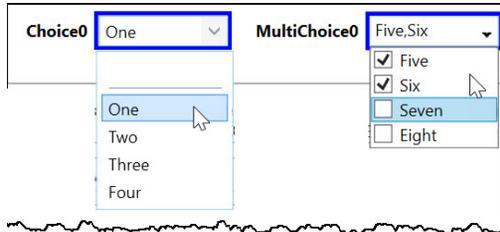
- **Text...** contains three types
 - » *Note* is for entering short text. They can include any text values.
 - » *MultiLine* is for longer text, entered in a drop-down box. They can include any values as well as line breaks.
 - » *Alphanumeric* is similar to a note, except it only accepts letters (A-z), numbers (0-9) and dashes (-). They are normally used for IDs.



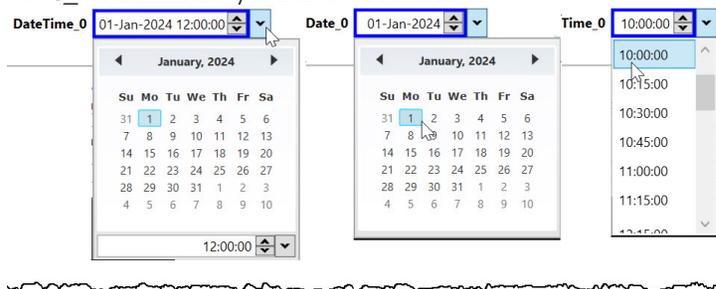
- **Numbers...** contains five types. All restrict text entry to numbers or blanks. All allow direct text editing, and all include up/down toggles to increment or decrement the current value.
 - » *Integer* is restricted to negative or positive integers.
 - » *Integer Positive* is for entering positive integers.
 - » *Decimal* is for entering negative or positive decimal numbers.
 - » *Decimal Positive* is for entering positive decimal numbers.
 - » *Count* is a IntegerPositive specialized as a counter. The analyst can enter a count by selecting the Count control and clicking atop an entity in the image. This both increments the count and leaves a marker atop the image at that location. A Count is normally used for counting and keeping track what has been counted in an image, e.g., number of deer.



- **Choices...** offer a fixed set of textual items (provided by the project manager in the Choice's *List* attribute) presented as a drop-down menu. Choice values are restricted to text matching those items
 - » **Fixed Choice** is for selecting one item from a menu. Depending on the setting in the Choice's *List* attribute, a FixedChoice may also include an empty item.
 - » **MultiChoice** is for selecting multiple items from a menu, where selected items appear as alphabetically ordered comma separated values.



- **Dates/Times...** are restricted to entering a data, a time, or both. They are in addition to the *DateTime* used by Timelapse to store the image's creation date and time.
 - » **DateTime_** is a date + time control that can be set by the user.
 - » **Date_** is a date only control. Time is not included.
 - » **Time_** is a time only. Date is not included.



- **Flags** are for setting true / false values. The checkbox control that appears for flags stores data as *true* when checked, or *false* when unchecked.



Customizing the template: Image data fields

Perhaps one of the best things about Timelapse is that you can design and customize your data fields so they fit your project needs.

We show how you can do this by example, where you will produce a template. This first part describes how you can create a template defining data fields for tagging your images (i.e., using the *image data field* tab).

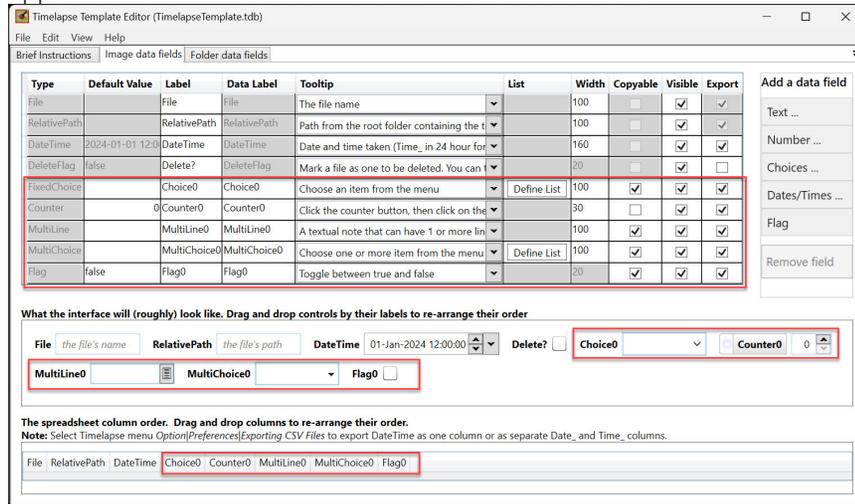
Let's assume you have thought deeply about the data fields you want. You decided your project should include the following five tags.

Label	Type	Default value	Purpose	Choice items
<i>Species</i>	FixedChoice		Identifies wildlife	Bear Bobcat Coyote, Wolf Empty
<i>Number</i>	Count	0	# wildlife present	
<i>Comment</i>	MultiLine		Optional comment by the analyst	
<i>Problem</i>	MultiChoice		Identifies one or more camera problems	Lens dirty Lens wet or snowy Camera misdirected Vegetation obstruction
<i>Publicity?</i>	Flag	false	A great photo	

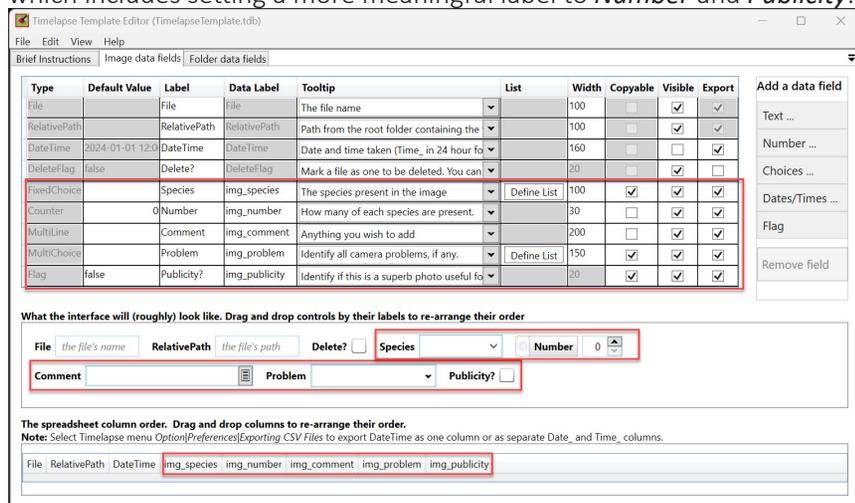
The label that appears in the user interface is the one identified above, but you also want the data base label (which will name the columns in the exported CSV file) to be in lower case and have an *img_* prefix.

1. Open the previously created template, and select the *image data field* tab
2. Create data fields based on the above by first selecting their Types.
 - » *Choices* | Choose one item from a list ,
 - » *Number* | Count,
 - » *Text* | MultiLine,
 - » *Choices* | Choose one item from a list,
 - » *Flag*

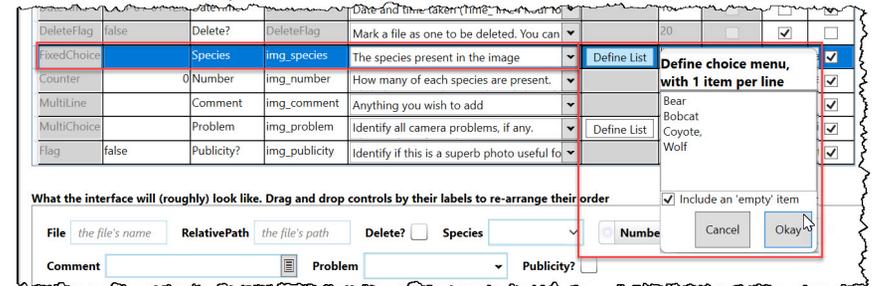
- The template will resemble the following. Each data field's specification is filled in with default values. A preview of how these fields will appear in the Timelapse interface is in the middle, while a preview of how they will appear as column headers in the .csv file is at the bottom.



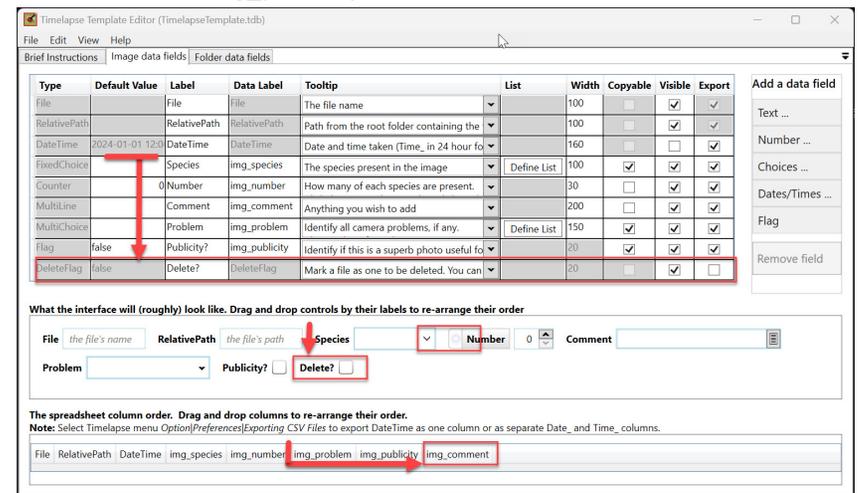
- Edit each row to set each field's attributes. Change their Label and Data Label to meaningful ones, add informative tooltips, and alter the width of the data field if you wish. Turn off the Copyable attribute for Number and Comments, as these are likely image-specific. Turn off DateTime visibility as your analyst will not care about it. While it disappears from the Timelapse preview pane, it is still present in the .csv file headers preview which includes setting a more meaningful label to *Number* and *Publicity*.



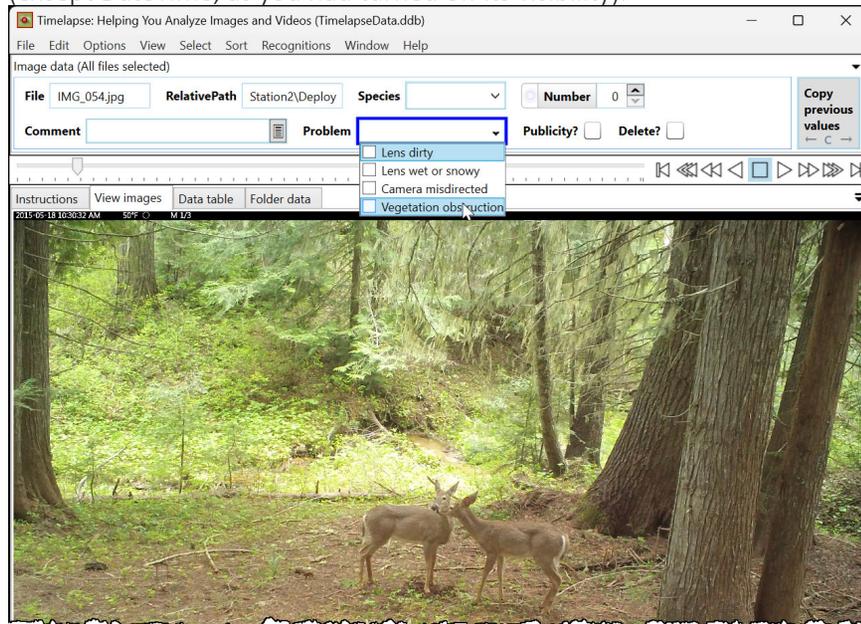
- Add menu items to the *Species Choice List*. Click the *Define List* button, which raises a list editor. Type the species into the list, one per line. Because you also want the option to have this field set to empty, click the option *Include and 'empty' item*. This will add a blank entry to the drop-down menu when it appears in Timelapse. If you want to set a default values for your choice, it must match one of the items in the list.



- Similarly, add items to the *Problem Choice List*. It is similar to what is above, except that there is no option to include an empty item. (There is no need for it, as having all items deselected is an empty item).
- Rearrange the controls in the user interface. Move the *Delete?* field to the end of the user interface by dragging the *Delete?* label in the user interface preview area, and dropping it atop the *Publicity?* label.
- Similarly, rearrange the order of columns as they would be written to a .csv file. In the .csv preview area, drag the *img_comment* field and drop it to just after the *img_publicity* field.



9. Test the results in Timelapse. All the fields you created are no visible (except DateTime, as you had turned off its visibility).



Customizing the template: Folder data fields

Timelapse includes an entirely optional feature that allows you to create data fields for the folders / sub-folders in your image set, which the image set analyzer can fill in as they navigate through different image folders. Folder-level data is also known as metadata (different from image metadata), as it often describes higher level aspects of your data sets rather than image details. See the [Timelapse Metadata Guide](#) for details.

Metadata can be extremely useful, although it does depend upon how you organize your image set folder structure. For example:

- Metadata can describe organizational information about your image set, such as project descriptions, camera station specifics, deployment details, and pretty well anything else.
- It can implement a *metadata standard* shared within and/or between organizations and agencies. If you adhere to that standard, you will be able to share your data with others, and conversely understand the data they may want to share with you.

As with image data fields, folder-level metadata is defined in the Timelapse template *.tdb* file, normally by a project manager. This is illustrated in the next section.

Alternately, standardized templates may be provided by various agencies or government bodies for promoting cross-institutional sharing of ecological data between disparate agencies. These will normally include both folder and image-level data fields.

Important note. The [Timelapse Metadata Guide](#) is required reading if you are thinking about using folder data fields. While it explains its benefits, it also describes why it is important to think deeply about the folder hierarchy you will be defining for your image set. Using folder data also adds several constraints:

- the image set's folder structure must match the folder-level organization for this to work properly;
- future revisions to your folder organization can become difficult to do,
- there are added nuances in dealing with advanced Timelapse aspects such as creating and using master databases.

Defining your folder levels

Using folder levels assumes that analysts will structure their images into a particular hierarchical folder organization, and that each folder level can be associated with meaningful data that would be unwieldy to do at a 'per image' level i.e., metadata. For example (and this is just an example), consider the following folder organization and data fields associated with each folder level.

- **Project** folder (the root folder) contains all images for the current project. Data fields associated with the root folder are listed below. Because the contact person is the same across different project, their email can be supplied as a default.

Label	Type	Default value	Purpose
<i>Project name</i>	Note		Names the project
<i>Purpose</i>	MultiLine		What the project is for
<i>Contact</i>	Note	saul@ucalgary.ca	Email of the person in charge

- **Station folder** are sub-folders within the root (Project) folder. Each folder is associated with a camera station placement. Data fields associated with each station folder are listed below.

Label	Type	Default value	Purpose
<i>Latitude</i>	DecimalPositive	0	Camera location in decimal
<i>Longitude</i>	DecimalPositive	0	Camera location in decimal
<i>Description</i>	MultiLine		Description of this location

- **Deployment folder** are sub-folders within each Station folder. Each folder is associated with an SD card retrieval. Images from that SD card are stored within this folder. Data fields associated with each deployment folder are listed below.

Label	Type	Default value	Purpose
<i>Retrieval date</i>	Date_		Date the SD card was retrieved
<i>Camera ID</i>	Alphanumeric		ID of the camera
<i>Trigger mode</i>	FixedChoice		Whether the camera is in timelapse or motion triggered mode.
<i>Camera state</i>	Multiline		The state of the camera, whether it was replaced, etc.

Consider the implications of the above structure on an image located in (for example) the folder *<Root folder>/Station1/Deployment1a*.

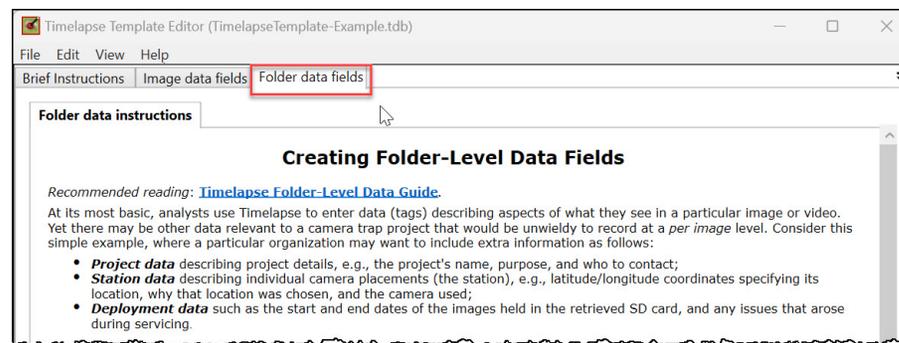
- Because the image is in the *Deployment1a* folder (where its metadata was filled in), we know when it was retrieved, what camera was used and its trigger mode, and the state of the camera.
- Because the *Deployment1a* folder is in the *Station1* folder, we also know the latitude and longitude that defines where that image was taken, as well as a description of that location.
- Because the *Station1* folder is in the root (*Project*) folder, we know identify what project that image belongs to, the project's purpose, and who to contact.

Now consider an image located in *<Root folder>/Station1/Deployment1b*. As its in a different deployment folder, the image would have different deployment metadata associated with it. However, as that deployment folder is under the same *Station1* and root (*Project*) folder as the previous image, it would share the same *Station1* and *Project* metadata.

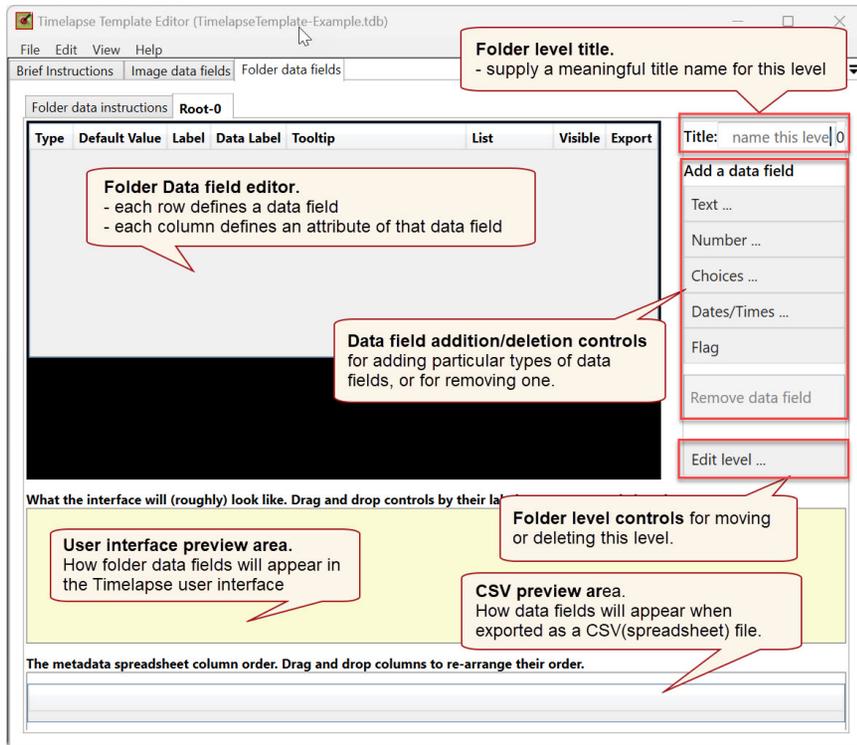
Creating your folder levels

Let's create the above specification in the Template Editor.

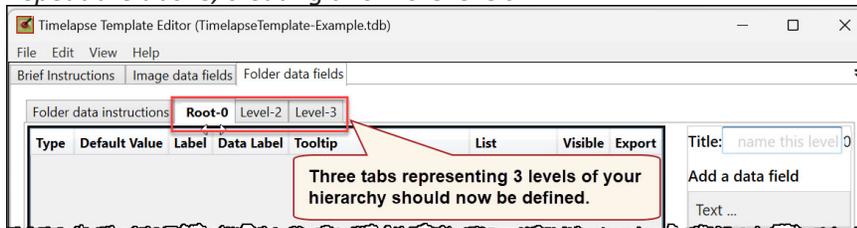
1. **Start the Timelapse Template Editor** and open your previously created template file, where you have previously defined your image-level data
2. **Select the 'Folder data fields' tab.** This tab is used to define folder-level data fields. You should see some brief instructions on creating folder-level data fields, as illustrated below.



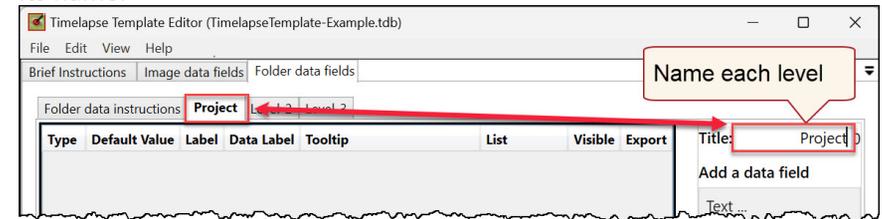
3. *Select Folder levels | Add folder level* from the menu bar. A new tab will appear within the Folder data fields tab, with a default title of Root-0. While similar to the editor seen in the image data field tab, it does have a few differences.



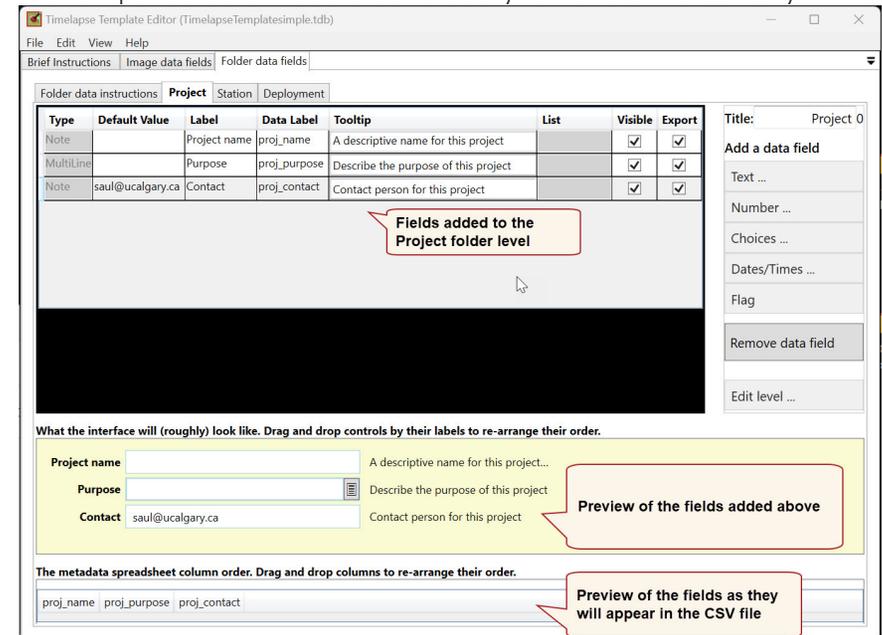
4. *Repeat the above, creating two more levels.*



5. *Name each level: Project, Station, Deployment.* Tab titles will update to its name.



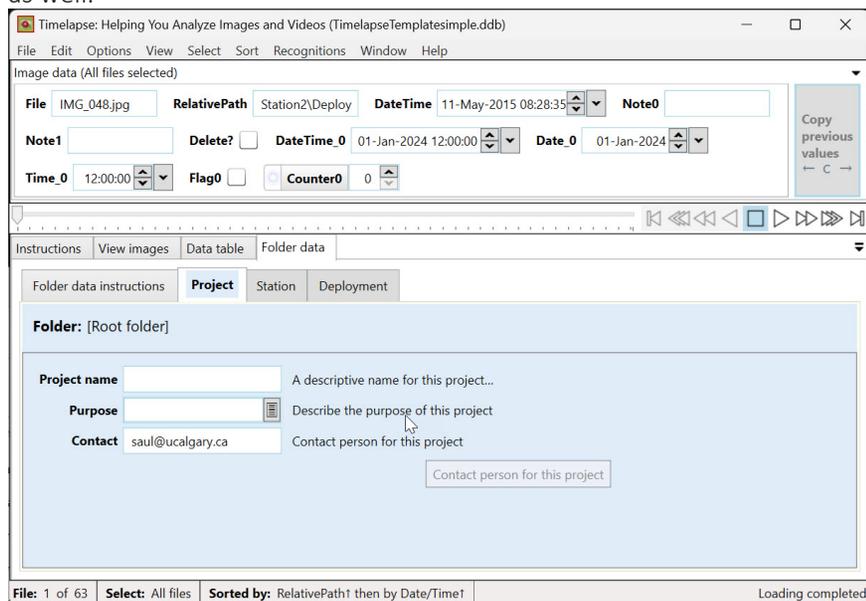
6. *Add data fields to the Project level.* This works in exactly the same way as adding image-level data fields. The only differences are that only your own custom fields are present, there are no *Copyable* attributes, and the Preview pane orders the controls vertically rather than horizontally.



7. *Create data fields for the Station and Deployment levels* using the specifications described earlier (but feel free to add your own).
8. *Using Timelapse, open this template on an image set.* Either:
 - » delete the previously created database (.ddb) file in your *TemplatePractice* folder and create a new one by opening Timelapse on your template, or
 - » open Timelapse on your previously created database (.ddb) file in the *TemplatePractice* folder. You will see a warning that the template has

changed and an option to open it with the new template. Do so

9. Select the *Folder data* tab. You will see three folder tabs equivalent to what you just created. Select the *Project* tab, then *Click to edit data for this folder*. You will see the data fields you just created. Try the other tabs as well.



Templates and existing metadata standards

Several standards exist that define expected image data fields, as well as an information hierarchy and associated data fields similar to Timelapse's folder levels. Their purpose is to facilitate data-sharing between organizations. This, of course, suggests that the problem with standards is that there are so many to choose from!

The Timelapse Template Editor now includes a new menu item that will create a template based on an existing standard:

File | New template based on standard...

Templates constructed from a standard can be edited if desired. For example, one can to hide unwanted fields, elaborate tooltips, and add extra fields particular to your project, etc. The caveat is that such changes may violate the standard, making it more difficult to share data with others.

Modifying templates after they are used

There may be times when you want to change a template after its been deployed and used to tag images in an image set. The revised template may have new, renamed and/or deleted data field, or some of their attributes may have changed. This may seem problematic, as the analyst has already entered data matching the old template.

The good news is that Timelapse tries to accommodate changes to the template, where most modifications are easily managed, albeit with some caveats for changes in folder levels.

Whenever you open an image set, Timelapse compares your template's data field specifications in the template *.tdb* file against the data specifications used in your data *.ddb* file. If it detects significant differences, it will notify you via a dialog box of any implications your modifications may have on your stored data. It also offers choices to carry through or abort the operation.

Note: modifications involving changes to the *DataLabel* attribute require special care, as the *DataLabel* defines how data is stored and retrieved in the Timelapse database.

Modifying a data field's appearance and order

Most modifications to a data field's attributes only alters how that field appears or is ordered as a control in the Timelapse interface. These modifications do not affect how your existing and future data is stored and used. Consequently, changes will be applied automatically when you reload an image set with a template whose fields are modified as follows. No warnings will be issues, as they are not necessary.

- edit and alter the text in any field in a row EXCEPT *Data Label*;
- change a field's *Copyable*, *Export*, *Visibility*, *Width* or *Export* attribute;
- change the position of data fields in the interface;
- change the position of data fields in the *.csv* file;
- add items to the *Choice* menu.

Adding and deleting rows or renaming data labels

Adding data rows is safe, as existing data is unaffected. In contrast, deleting rows or renaming data labels have implications to the data already stored in a previously created image set, as described below.

Adding a new data field defines a new control that will appear in the Timelapse interface, and a new data column in the database and .CSV file. This is a safe operation, as it does not affect any existing data.

Deleting an existing data field indicates that you are no longer interested in that control or the data associated with it. The data field's control will no longer appear in the Timelapse interface and its data will be deleted.

Important note about data field deletion. Lets repeat that to make sure you didn't miss it. When a data field is deleted, any previously entered data associated with that data field will be deleted from the Timelapse database, and consequently not exported to the .CSV file.

If you want to keep the data, then just uncheck the control's visibility field instead of deleting it.

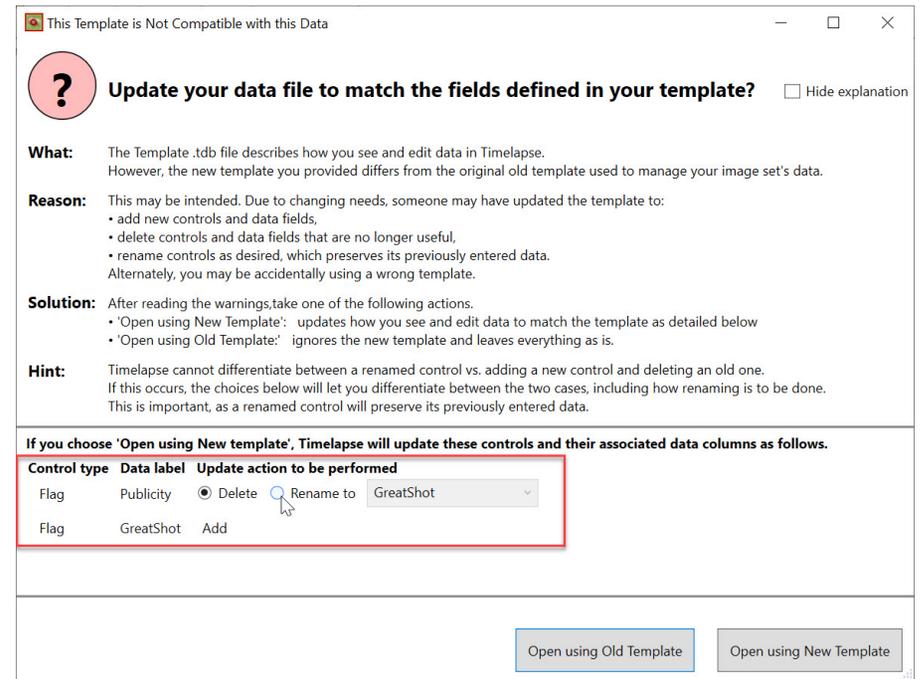
Renaming a control by changing its data label leads to ambiguity when the template is opened in Timelapse. For example, let's say you changed the **DataLabel** of *Publicity* to *GreatShot*. This can be interpreted in one of two ways.

- Delete the *Publicity* data field, and then add a new (different) *GreatShot* data field. In this interpretation, Timelapse would delete the data associated with the original *Publicity* data label;
- Renaming *Publicity* to *GreatShot*. In this interpretation, Timelapse would simply rename the data column, keeping the data but storing it under the new *GreatShot* data label.

Timelapse cannot tell which interpretation it should use.

Consequently, Timelapse will raise a dialog box asking you what it should do whenever ambiguities exists between deletions vs. renaming.

Using the above example, the following dialog would appear. If you wanted to keep the data previously associated with *Publicity*, you would click on **Rename** and select *GreatShot* from the drop-down menu. The



Deleting and renaming items in a Choice list

A **Choice** data field's list is used to display a selectable menu of possible values for that field. Furthermore, **Choice** fields can only display text that match at least one of its menu items. Consequently, if you use the template to delete or change the name of an item in the **Choice** list, Timelapse will detect this and will warn you in a dialog. It will say that it cannot display previously entered data that matches the missing item(s).

Even so, no data is deleted. While Timelapse cannot display that text in the data field if it differs, it still stores the original text in the data base.

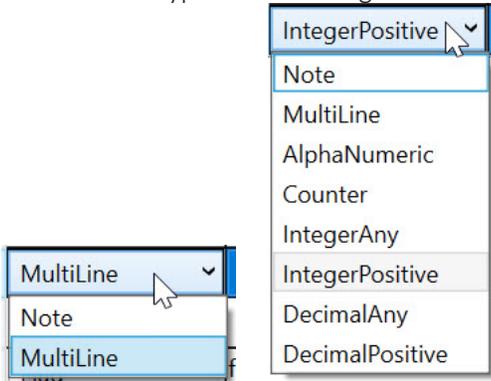
Changing a data field's type

Each Type data field contains a drop-down menu that will allow you to change its type. Type changes demand some thought if the template was previously used to open an image set, where it would be used again to reopen that image set. The issue is that changing a data field's type to any other type can affect the previously entered data if not done carefully, as described below.

Consider type changes and their effects on previously entered data (as in the 2nd point above).

- **Equivalent types** are those where you can convert back and forth between them with no effect on the data. For example, converting back and forth between an *IntegerPositive* and *Counter* is possible as those controls only store positive numbers as data. Similarly, converting between *Note* and *MultiLine* has no data effect as both controls contain arbitrary text.
- **Specialize type to a more general type** should be considered a one-way type change. For example, converting a *PositiveInteger* to a *DecimalAny* works because previously entered data would only contain positive integers, which can also be expressed as a decimal number. The reverse, however, isn't true as it would be an unsafe type change, described next.
- **unsafe type changes** are those where you try to convert from a general type to a more specialized type. For example, converting a *DecimalAny* to a *PositiveInteger* is unsafe, as there is no guarantee that previously entered decimal numbers are constrained to positive integers (e.g., -2.345). Similarly, trying to convert a text field such as *MultiLine* into (say) a *DecimalAny* can fail as previously entered text data may not be constrained to decimal numbers.

To simplify things and lead to safe type conversions, Timelapse will normally display only a subset of type-safe changes in its dropdown menu, i.e., where changing from one type to another won't affect data in a previously opened image set. For example, consider the different dropdown menus shown by the *MultiLine* type and the *IntegerPositive* type.



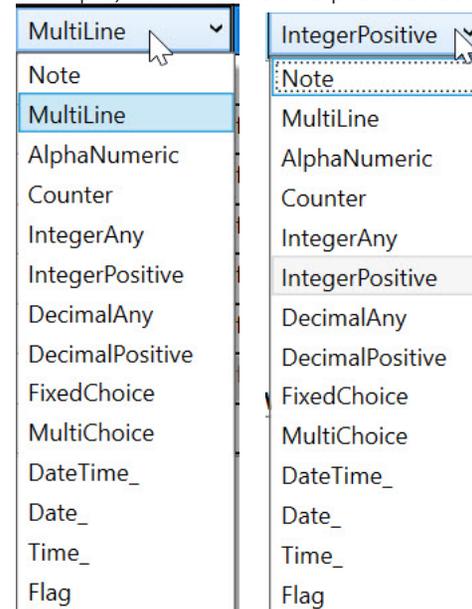
The *MultiLine* control type can only be converted into another control type that can take arbitrary text, in this case a *Note* type. The *IntegerPositive*

control type can be converted to any of the other number controls (as they all accept positive integers) and to any of the other text controls (as a positive integer can be written as text, including alphanumeric text).

However, there are times when you may want to perform an unsafe type change. For example,

- its a new template and you changed your mind on the data type;
- the template has not been used to open an image set;
- there are no plans to apply this modified template to an image set previously opened with the original template;
- you just changed a data type from a specialized to a general type, but want to undo that change before opening any image set with it.

In the above cases, changing a data field's type to any other type can be done safely as it will not be applied to any previously entered data. To permit this, press the **Shift** key while opening the dropdown menu. Timelapse will list all data types and allow you to select one, even unsafe ones. For example, here are the two previous controls when the **Shift** key is pressed.



Renaming and modifying folder levels

While Timelapse is fairly robust in terms of letting you modify your template's data fields, it is less tolerant to changes in your Folder levels. This is because it would be easy to generate an incompatible mismatch between the folder levels defined in your template vs. the folder/subfolder structure you created as part of your image set.

You can still modify the data fields within a folder level as described in the previous section.

Timelapse will warn you when it detects folder level incompatibilities, where it will retain the old folder level structure rather than trying to use the one defined in the template.

What is the problem with changing folder levels?

Imagine you have defined 3 folder levels: *Project*, *Station*, and *Deployment*. Your current folder levels are structured similarly, e.g., subfolders *Station1*, *Station2*... each with subfolders *Deployment1*, *Deployment2*, etc.

While your old stations had just a single camera at each location, you have begun using multiple cameras at some stations. Consequently, you modified the template to add a *Camera* level between *Station* and *Deployment*.

The problem is that your existing subfolders (and the data associated with them) would have to be restructured to match the new folder levels. For the new folder levels to work, you would have to add (say) *Camera1* and *Camera2* subfolders under *Station1*, and move *Station1's Deployment1* folder to the correct *Camera* subfolder. Timelapse would have to know what was moved around, which is difficult. The result would be lost or misplaced data.

Future versions of Timelapse will attempt to mitigate this problem. For now, Timelapse will warn you when it detects folder level incompatibilities, where it will retain the old folder level structure rather than trying to use the one defined in the template.