

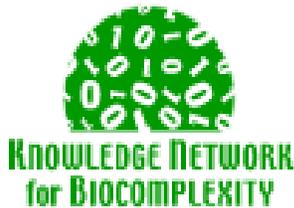


# Morpho User Guide

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## Introduction

The "Morpho User Guide" is provided to assist with the use of the Morpho application. Morpho can be used to create ecological metadata, and store and query ecological metadata housed on one's local system, or from the distributed Metacat servers.

### Knowledge Network for Biocomplexity (KNB)

The KNB is a national network intended to facilitate ecological and environmental research on biocomplexity. It enables the efficient discovery, access, interpretation, integration, and analysis of complex ecological data from a highly distributed set of field stations, laboratories, research sites, and individual researchers.

Three main components of the KNB are a data management tool, Morpho; a framework for storing and serving data and metadata, Metacat; and a formal specification for ecological metadata, EML (Ecological Metadata Language). Source code for all the products developed under the KNB are available for downloading at "<http://knb.ecoinformatics.org/software/>"

### Morpho

Morpho is a data management tool for ecologists. It was created to provide an easy-to-use, cross-platform application for accessing and manipulating metadata (e.g. documentation) and data (both locally and on the network). Morpho allows ecologists to create metadata, (*i. e. describe their data in a standardized format*), and create a catalog of data & metadata upon which to query, edit and view data collections. In addition, Morpho provides the means to access network servers, in order to query, view and retrieve relevant, public ecological data!

The basic operations that can be carried out using Morpho are:

- Create and Edit Metadata

- Search and Query Metadata Collections
- View Data and Data Collections
- Verify and Edit Data
- Provide Access Control

Many types of "data" can be used with Morpho, including data tables and images.

## Metacat

Metacat stands for "Metadata Catalog". Metacat servers allow ecologists to share their data and metadata via the Internet. A Metacat is essentially a server from which ecologists, through using Morpho-- can upload, download, store, query and view relevant metadata and data on the KNB (Knowledge Network for Biocomplexity). Metacat servers can also be accessed independently of Morpho, such as via a Web browser, or calls from a database, but this requires some specialized programming. Morpho is the easiest way for most ecologists to immediately access and store metadata and data on a Metacat. Among other things, the KNB supports a network of Metacat servers.

## Ecological Metadata Language (EML)

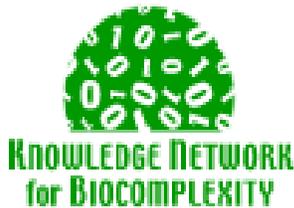
Ecological Metadata Language (EML) is a metadata specification developed by and for the ecology discipline. It is based on prior work done by the Ecological Society of America and associated efforts (Michener et al., 1997, Ecological Applications). EML is implemented as a series of XML schema and document types, that can be used in a modular and extensible manner to document ecological data. Each EML module is designed to describe one logical part of the total metadata that should be included with any ecological data set.

Read more about EML in the EML Handbook

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## Getting Started

### Download Morpho

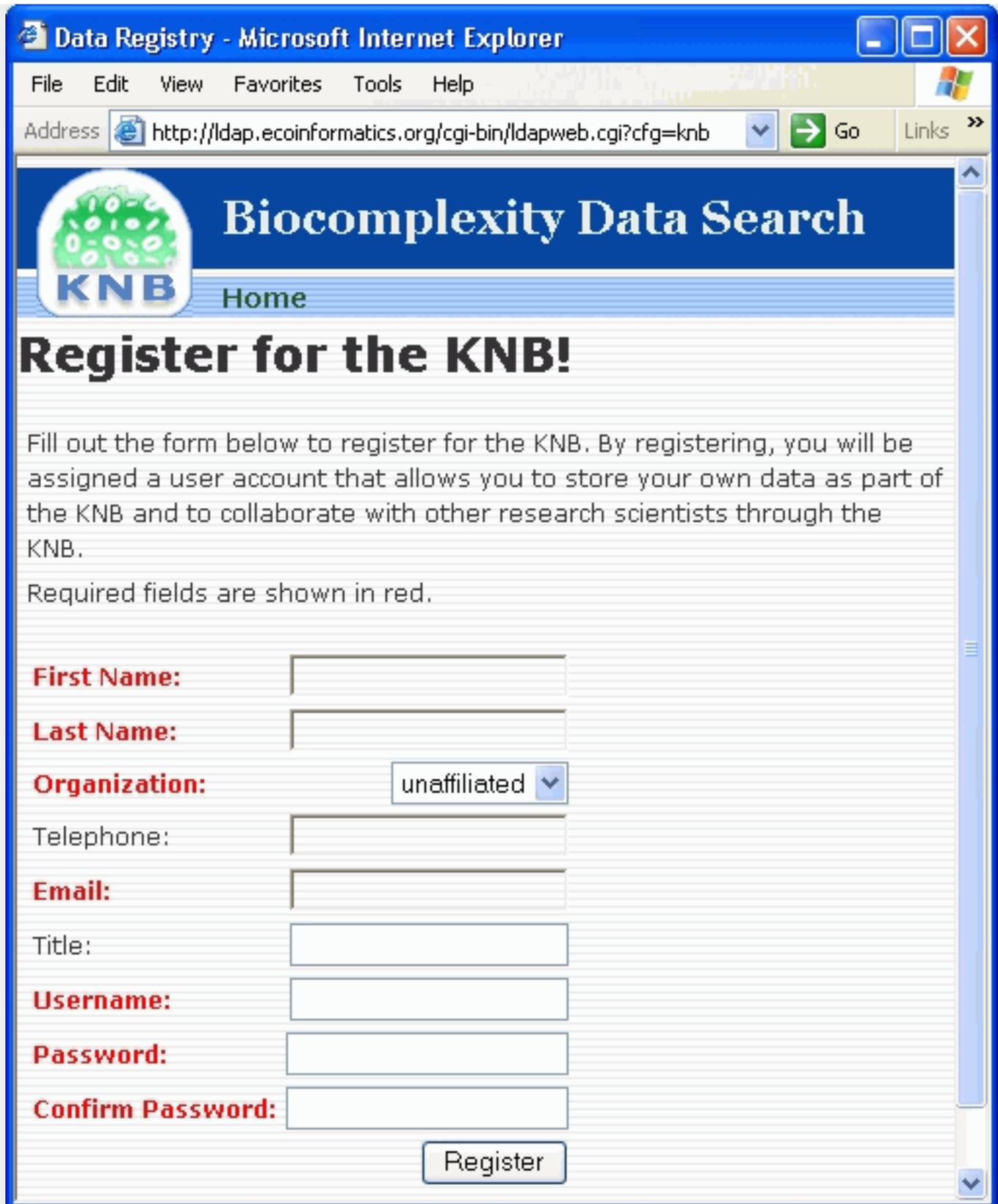
The first thing you should do is install the Morpho software. Go to "<http://knb.ecoinformatics.org/morphoportal.jsp>" and choose the appropriate link. You will have the option of downloading Java along with Morpho if you do not already have it. Follow the directions in the installer.

N.B. We recommend that you download the full version of Morpho with Java, since there are some minor incompatibilities with Morpho if you do not have the correct version of Java 1.4.2 or higher. Morpho's installation of Java will only be used by Morpho, and will not disrupt any earlier versions of Java which you have already installed.

Morpho 1.5 is a Java application that runs on Mac OSX and Windows 2000, XP, and higher. It also runs on Linux, but as of this version there are some minor display problems. We recommend installing Morpho on a newer, more powerful system, ideally a fast G4 Mac or Pentium 4 PC or higher, with 256MB of RAM or more. Morpho 1.5 is compatible with Ecological Metadata Language 2.0.0.

### Register for the KNB Network

After installing Morpho (but before using Morpho), register yourself on the KNB web site. Go to "<http://ldap.ecoinformatics.org/cgi-bin/ldapweb.cgi>" and fill out the form pictured below. Write down your name and password somewhere secure. Registering with the KNB Network will provide you with access to some advanced metadata and data services from the KNB, and does not install any networked spyware on your system, nor does it require that you be on a network in order to use Morpho.



Data Registry - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address  http://ldap.ecoinformatics.org/cgi-bin/ldapweb.cgi?cfg=knb  Go Links >>

 **Biocomplexity Data Search**  
Home

## Register for the KNB!

Fill out the form below to register for the KNB. By registering, you will be assigned a user account that allows you to store your own data as part of the KNB and to collaborate with other research scientists through the KNB.

Required fields are shown in red.

**First Name:**

**Last Name:**

**Organization:**  

Telephone:

**Email:**

Title:

**Username:**

**Password:**

**Confirm Password:**

### Open Morpho and Create a Morpho Profile

Open Morpho by double-clicking on its icon, or the file called "Morpho.bat".

The first time you execute Morpho, you will be asked to create a new profile. This profile allows you to use Morpho locally on your personal computer and, once registered for the

KNB network (see preceding "[Register for the KNB](#)" section), will allow you to create, access, edit and search for data sets on the KNB network.

If you are upgrading Morpho from a previous version, you will still be prompted to create a new profile. If you want to continue using your old profile(s) (so that your locally-stored data continues to be visible), simply enter a "new profile" with the same name as the old one, and you will be prompted if you would like to use the existing profile. For example, if your old profile is named "jdoe", then enter "jdoe" as the name of the new profile, and when you finish the profile wizard, Morpho will ask if you want to keep your existing profile -- click "Yes". This will only work if you logged into your computer with the same account under which your old profile existed.

Enter your profile name, and your first and last names, under "Basic Information" in the New Profile screen, pictured below. Your profile name does not have to be the same as your Metacat (KNB) network username.

**New Profile**



**Enter the name for this profile and your first and last name.**

**New Profile**

Basic Information

Name of profile:

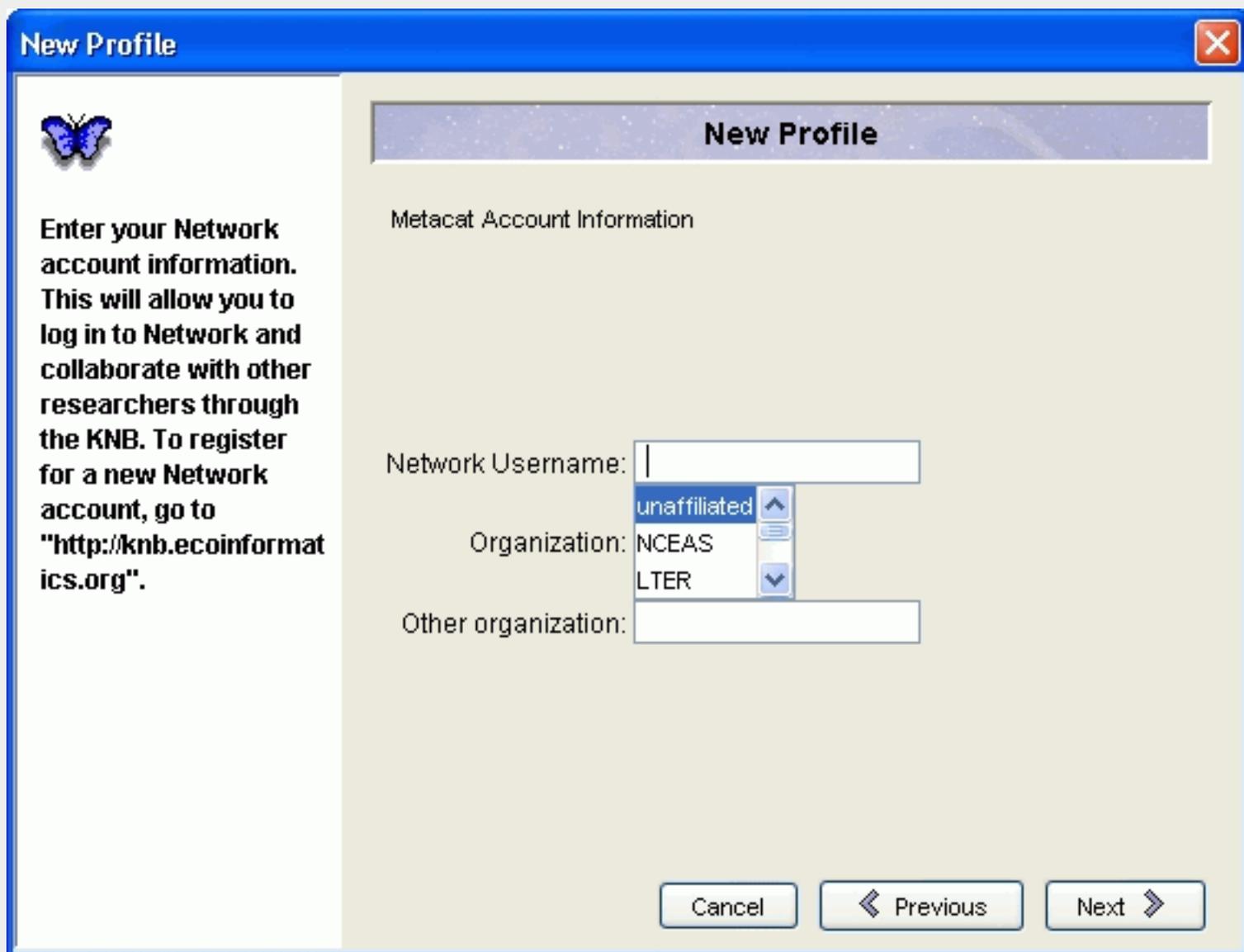
First name:

Last name:

Cancel Previous Next

Click "Next" to move on to the "Metacat Account Information" screen, pictured below. Here

you should enter the Metacat username and the organization name which you registered on the "http://knb.ecoinformatics.org/index.jsp" site. If you are not on the Internet, or you do not want to register with the KNB, you can enter any username here and Morpho will still work. But if you do not reference a valid KNB account here, and associate it with this profile, you will only be able to store your metadata files locally, and not be able to login to the KNB to take advantage of the advanced storage, access, and querying capabilities provided by Metacats.



**New Profile**



**Enter your Network account information. This will allow you to log in to Network and collaborate with other researchers through the KNB. To register for a new Network account, go to "http://knb.ecoinformatics.org".**

**New Profile**

Metacat Account Information

Network Username:

Organization:   
unaffiliated  
NCEAS  
LTER

Other organization:

Cancel Previous Next

Click "Next" to move to the "Miscellaneous Information" screen, pictured below. The identifier prefix that you enter will become the prefix of your stored metadata file names. For example, jdoe.xml.

**New Profile**



**Enter miscellaneous profile options. This includes the prefix you wish to use to construct data identifiers for your data.**

**New Profile**

Miscellaneous Information

Identifier prefix:

Cancel Previous Finished

Click "Finished" to move on to the "Metacat Login" screen, pictured below, where you should enter your Metacat password. Alternatively, you can login on the [main welcome screen](#) of Morpho, described in the next section.



A screenshot of a Windows-style dialog box titled "Metacat Login". The dialog has a blue title bar with a close button. The main text reads "Enter your Metacat password in order to log in." Below this, the "Name" field is populated with "uid=jdoe,o=NCEAS,dc=ecoinformatics,dc=org". The "Password" field is an empty text box. At the bottom right, there is a small blue butterfly icon. At the bottom, there are three buttons: "Login", "Logout", and "Skip Login".

**!** By entering your password and clicking the "Login" button you will be able to create, edit, search, access and manage data that is stored both locally (on your computer) and on the KNB network. By selecting "Skip Login" you will be able to do all the previous operations locally, and may search for data sets on the KNB network. However, you will not be allowed to create or edit data sets on the KNB network unless you are logged in via a valid KNB account.

The next screen you will see after logging in is [The Main Welcome Screen](#). Read about it in the next section.

[Help Index](#)

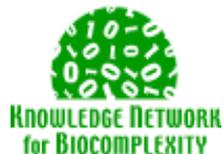


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### The Main Welcome Screen

After you have opened Morpho and created a profile, you will see the "Welcome to Morpho!" screen.

**Morpho**

File Edit Search Documentation Data Window Help

Current profile: **Andrea**  
 (uid=chadden,o=NCEAS,dc=ecoinformatics,dc=org)  
 Change profile: Andrea  
 Create a new profile...

Network Status: **NOT Logged In**  
 If you do not choose to login, you will be able to access only "public" network files as a Guest User  
 Login to network using current profile:  
 Password:  login

Work with your data...

- Create a **new** data package...
- Open an **existing** data package...
- Search** for an existing data package...

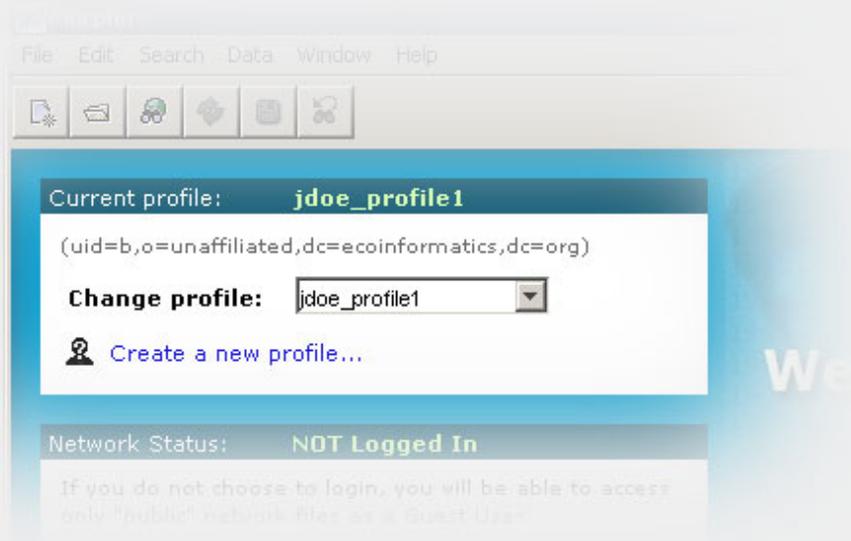
**Welcome to Morpho!**

## Welcome Screen Panels

Notice that there are three panels on the left side of the screen - the "Current Profile" panel at the top, the "Network Status" panel in the middle, and the "Work with your data..." panel at the bottom. Each of these is described below.

- Current Profile Panel

The top of the panel shows the current profile setting. You can use the drop-down list to change profiles, or you can click on the link to create a new profile.



- Network Status Panel

The top of the panel shows your login status for the KNB. If your status is "NOT Logged In", you can type your password in the "Password" field and click the "Login" button to login to the KNB network. You will be logged in with the username associated with the current profile, shown in the "Current Profile" panel. Note that this KNB username is not necessarily the same as your profile name. Your KNB username is the name appearing after the "uid=" just below the title bar of the "Current Profile" panel.

Change profile:

 [Create a new profile...](#)

**Network Status:** **NOT Logged In**

If you do not choose to login, you will be able to access only "public" network files as a Guest User

**Login to network using current profile:**

Password:

Work with your data...

 [Create a new data package...](#)

After you are logged in, you will see the following:

Change profile:

 [Create a new profile...](#)

**Network Status:** **Logged In**

You are logged into the network, and may work with all files for which you have access privileges

 [Logout from network...](#)

Work with your data...

 [Create a new data package...](#)

Clicking on the "Logout from network" link will log you out of the KNB network.

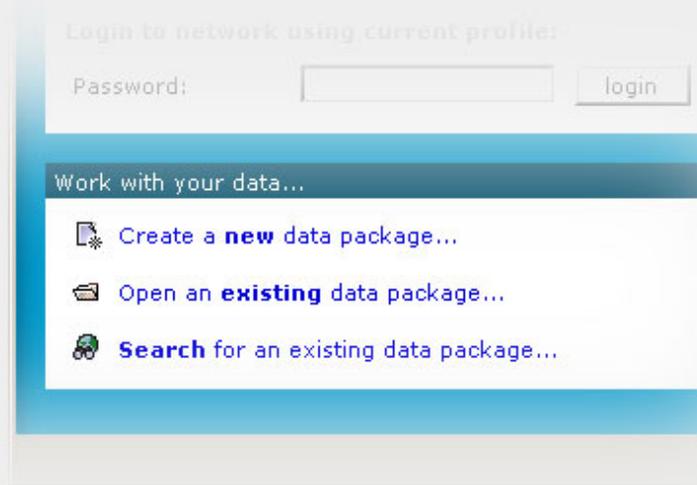
- Work with your data... Panel

This panel contains click-able links which allow you to:

- [Create a new data package,](#)

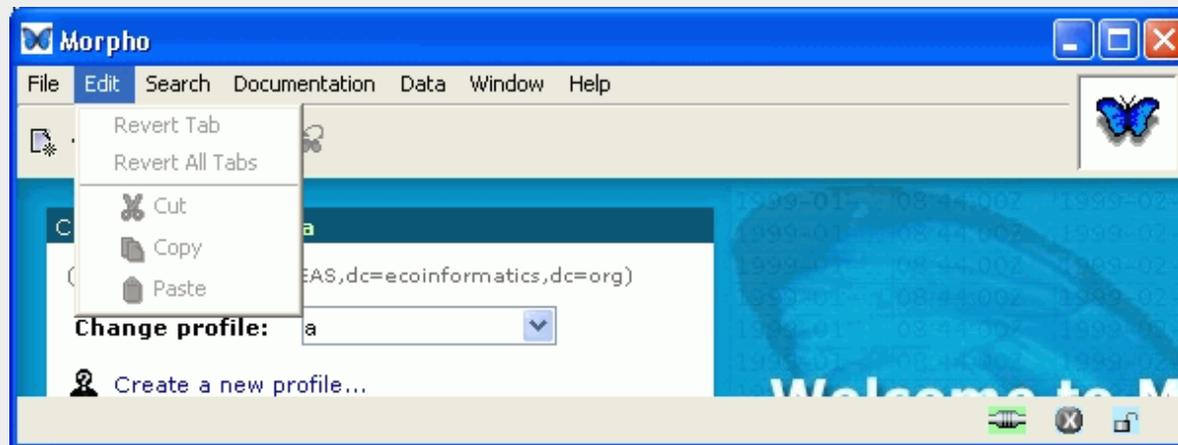
- [Open an existing data package](#), or
- [Search for an existing data package](#) (both locally and on the KNB network)

A description of what each of these links does is provided later in this guide (click on the links above to skip to one of these sections).



## Menus

The menus at the top of each Morpho screen allow you to access all the operations that are available in Morpho.

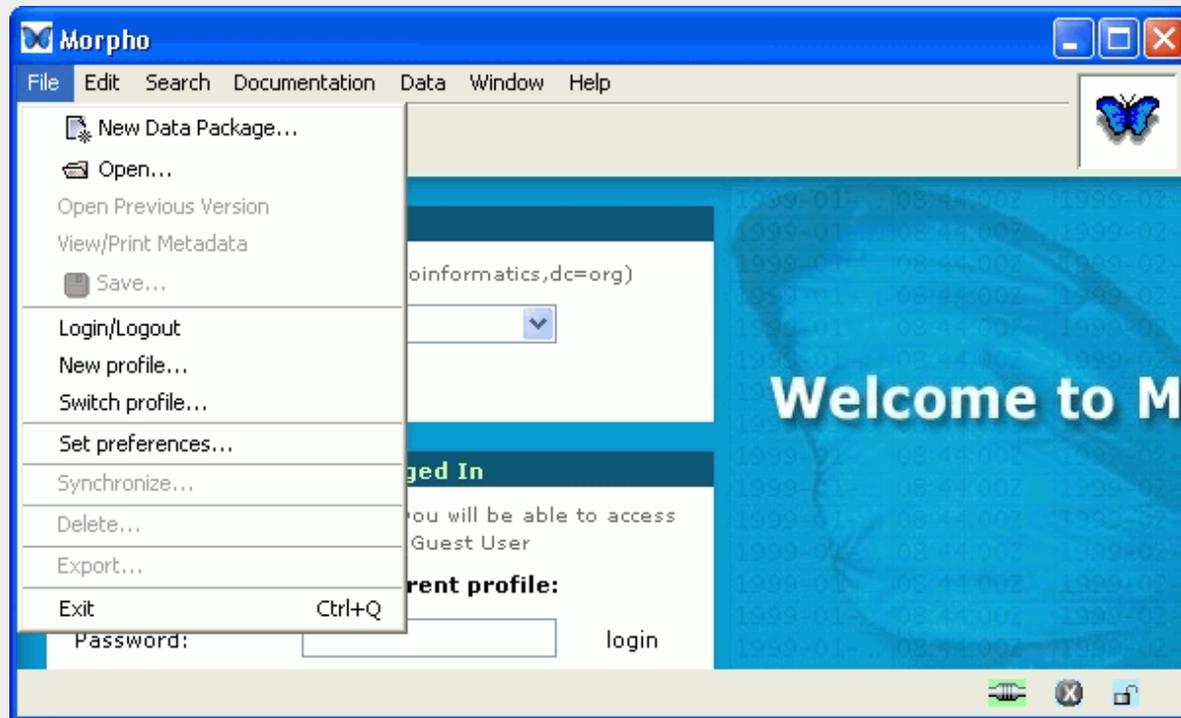


Items will sometimes appear grayed out, meaning these are not available for use with the current data package. For example, "copy" and "cut" will be disabled on the "Edit" menu if you do not currently have any item selected.

It is a good idea to take a moment and familiarize yourself with the contents of each of the menus.

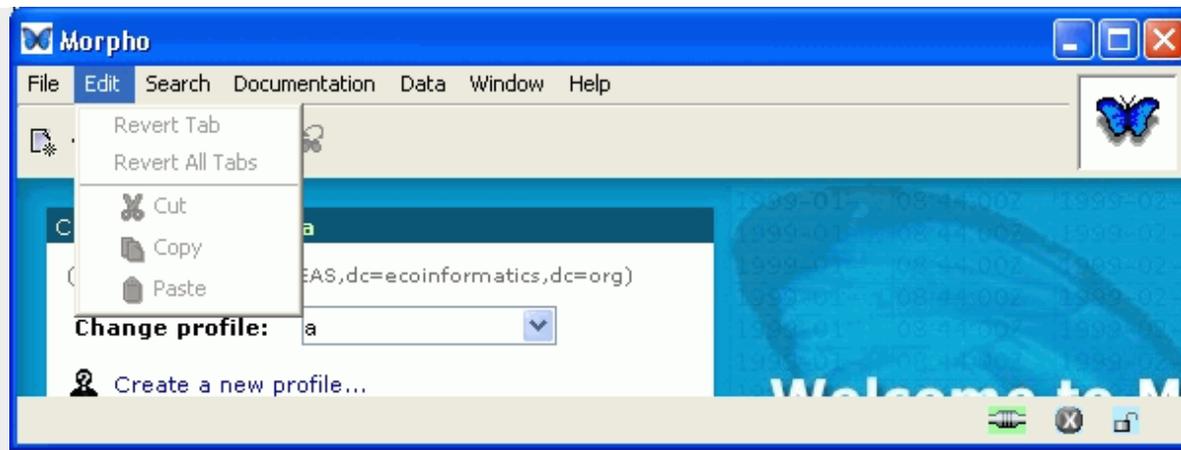
- File menu

Under this menu, you'll find prompts (pictured below) for creating a new data package, opening an existing data package, logging in and out of the KNB network, creating a new user profile, saving a data package, deleting a data package, printing documentation, setting preferences, exiting Morpho, and other options.



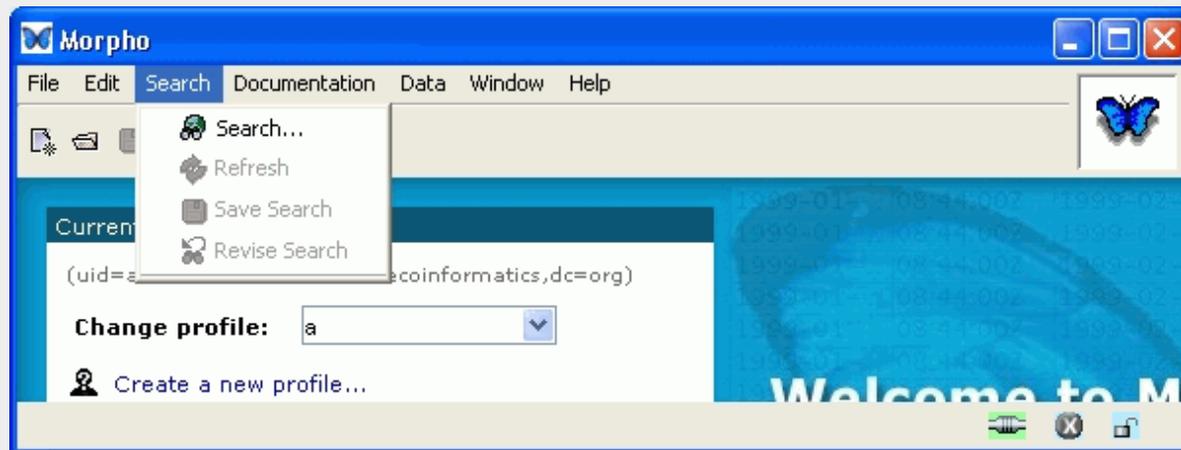
- Edit menu

In this menu (pictured below), you can cut, copy or paste items, as well as reverse changes you have made to a data table or to a set of data tables.



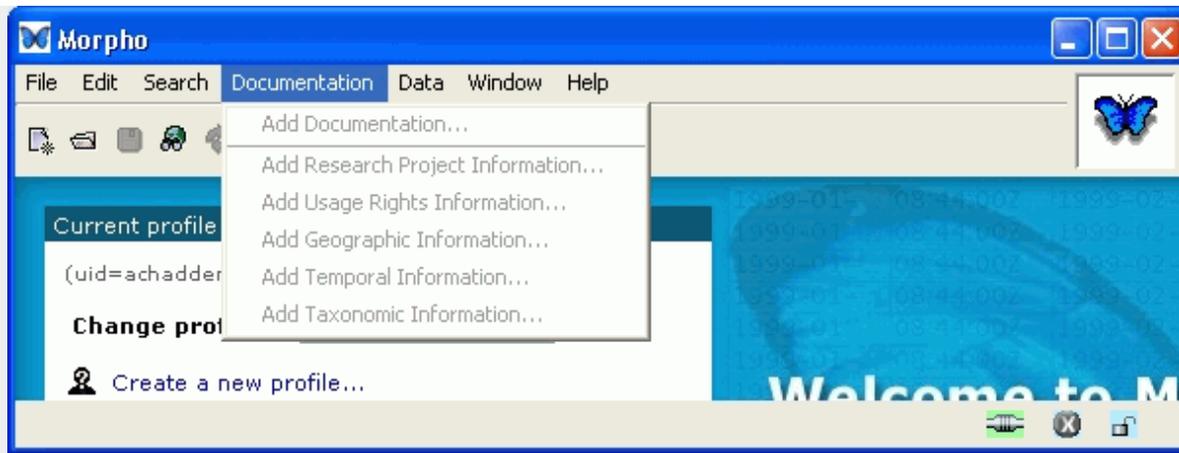
- Search menu

Under this menu (pictured below), you have the options of searching for data packages, saving a search for future use, refining a search by changing search parameters, or refreshing the current search.



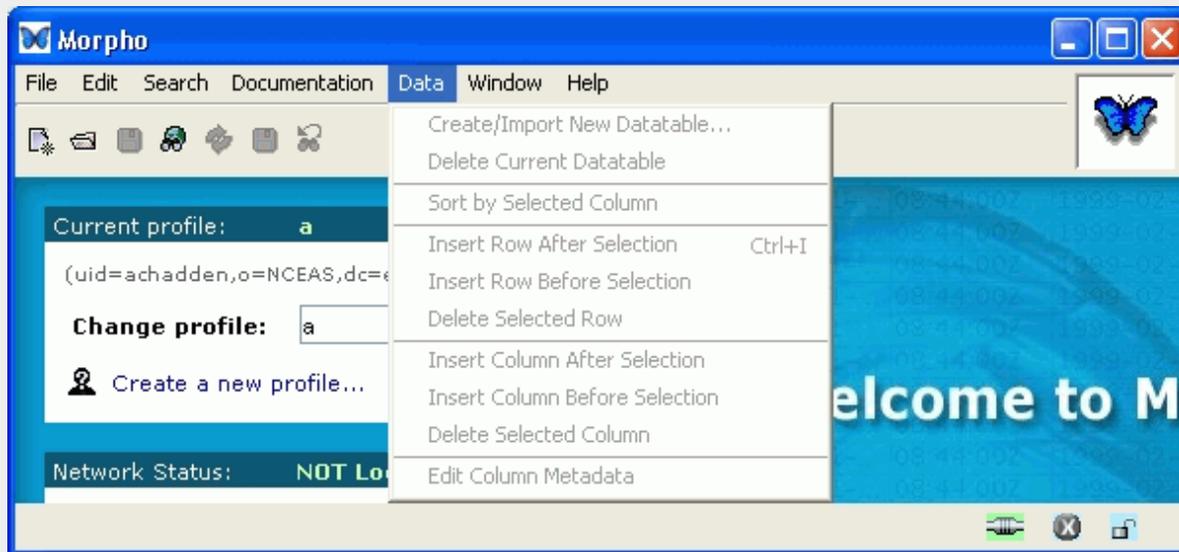
- Documentation menu

This menu, pictured below, allows you to add, delete, or change a variety of different types of documentation (metadata) for your data package. You may add or edit general documentation for the data package, or more specifically add or edit information on the research project and usage rights related to the data package, as well as the geographic, taxonomic, and temporal coverage of the data.



- Data menu

This menu (below) is where you will find tools that allow you to import a data object (such as a table or an image), or create a data table. Also, you may edit and manipulate the data in a data table using commands found under this menu. Finally, you may also add or edit the documentation for your data columns under this menu.

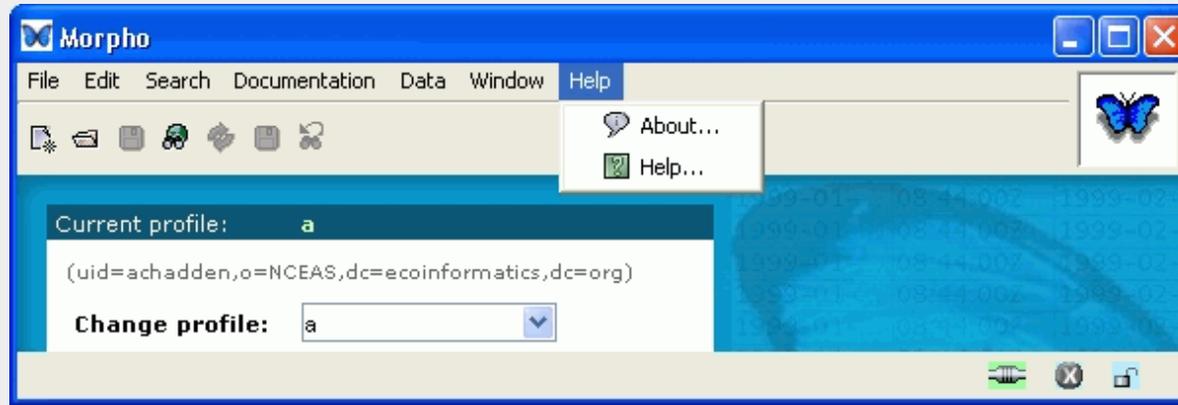


- Window menu

Under this menu you can view different windows that are open in Morpho.

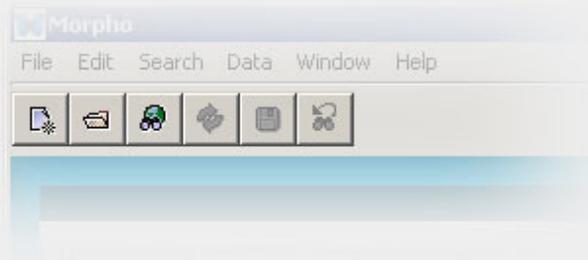
- Help menu

This is where you can access the Morpho User Guide, which contains help on all Morpho features. There is also an "About" item where you can read general information about Morpho.



## Toolbar

The toolbar contains shortcut buttons to the more commonly-used commands found in the menus. The purpose of each button is described below. If you ever forget what a button is for, simply place your mouse cursor over the button and a small pop-up reminder will display the purpose of the button.



The "new data package" button starts a wizard that will guide you through the process of creating a new data package of your own.



The "open package" button allows you to open an existing data package (provided you have adequate access permissions).



The "search button" begins the data package search process. If logged in to the KNB, you will be able to search both locally and on the KNB network.



The next three buttons are enabled only when the frame contains the results of a search. They allow you to refresh the search, save the search for future use, or revise the search by changing the search parameters.

## Status Bar

The status bar at the bottom of the Morpho window contains information about the current status of various Morpho settings and parameters. For example, when search results are displayed, the number of "hits" is shown on the left end of the status bar.



The three icons located at the right end of the status bar indicate the following:

- |              |   |                                   |
|--------------|---|-----------------------------------|
| Network      |  | Network connection available      |
| Status       |  | Network connection not available  |
| Login Status |  | Logged into network               |
|              |  | Not logged into network           |
| Security     |  | Using secure (SSL) connection*    |
|              |  | Not using secure (SSL) connection |

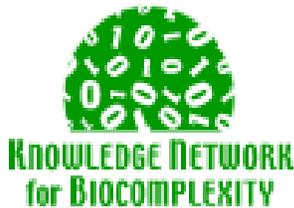
\* Note that Morpho does not currently support SSL connections.

Read an [Introduction to Data Packages](#) on the next screen to learn more about what data packages are, and what they look like.

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## Introduction to Data Packages

### What is a Data Package?

Data packages are the logical units that Morpho creates to represent your data files and their descriptions (e.g. documentation, or metadata). Morpho provides an easy interface for you to access your data and its documentation via these data packages.

There are two main components of Morpho that deal with data packages:

- Data Package Wizard, which guides you through steps to create a new data package, and
- Morpho Editor, which helps you manipulate, edit, and add documentation to existing data packages.

The [Data Package Wizard](#) and [Morpho Editor](#) are described later in this document. Below is an introduction to data packages, and what these look like.

### Data Package Panels

Morpho uses the term "Data Package" to describe a set of documentation and /or the associated data. A "Data Package" consists of either metadata alone, or metadata along with the associated data.

After [creating a new data package](#), or [opening an existing data package](#), you will see the contents of the data package represented by a "Data Package" screen, shown below for a sample data package.

The screenshot shows the Morpho software interface for a data package named 'tao.9045.4'. The window title is 'Data Package: tao.9045.4'. The menu bar includes 'File', 'Edit', 'Search', 'Data', 'Window', and 'Help'. The toolbar contains icons for file operations and a butterfly logo. The package documentation panel shows the user 'Mike Thompson', the title 'Species Distribution', the accession number 'tao.9045.4', and keywords 'Species diversity distribution'. The data table panel displays a table with columns: Date, Site, Transect, Plot, Community, Species, 20, and 64. The table documentation panel shows the entity name '1.1', case 'no', sensitive? 'no', number of records '1163', and orientation 'Column-major'. The status bar at the bottom shows 'DataFile: tao.9157.1' and buttons for 'Cancel' and 'Update'.

date	string	string	integer	string	string	integer	inte:
Date	Site	Transect	Plot	Community	Species	20	64
7/24/96	Toolik	Alkaline 1	1	D	DRYOCT	1	
7/24/96	Toolik	Alkaline 1	1	D	UD1		1
7/24/96	Toolik	Alkaline 1	1	D	ANTFRI		1
7/24/96	Toolik	Alkaline 1	1	D	CARSP		
7/24/96	Toolik	Alkaline 1	2	D	DRYOCT	1	
7/24/96	Toolik	Alkaline 1	2	D	UM2	1	
7/24/96	Toolik	Alkaline 1	2	D	UD1	1	
7/24/96	Toolik	Alkaline 1	2	D	UM1	1	
7/24/96	Toolik	Alkaline 1	2	D	ARNSP		
7/24/96	Toolik	Alkaline 1	2	D	UD4		
7/24/96	Toolik	Alkaline 1	2	D	ANTFRI		
7/24/96	Toolik	Alkaline 1	2	D	ANESP		
7/24/96	Toolik	Alkaline 1	2	D	CALCAN		
7/24/96	Toolik	Alkaline 1	2	D	FERN		
7/24/96	Toolik	Alkaline 1	3	D	DRYOCT	1	
7/24/96	Toolik	Alkaline 1	3	D	HEALP	1	
7/24/96	Toolik	Alkaline 1	3	D	SALPHL	1	
7/24/96	Toolik	Alkaline 1	3	D	CERSP		1
7/24/96	Toolik	Alkaline 1	3	D	ARNSP		1
7/24/96	Toolik	Alkaline 1	3	D	ASTALP		1
7/24/96	Toolik	Alkaline 1	3	D	POAARC		

This screen consists of several parts. The standard Morpho menu and toolbar are at the top of the screen. Below these are three panels: the package documentation panel, the data table panel, and the table documentation panel. Each of these panels are described below

- Package Documentation Panel

The top panel contains a brief "citation-style" summary of the data package. It includes icons to the right that indicate whether the package is located on the local machine, on the network, or both.

**Data Package: tao.9045.4**

File Edit Search Data Window Help

Mike Thompson, **Species Distribution**  
**Accession Number tao.9045.4** Keywords: Species devisity distribution  
[more](#)

local  
net

1.1

Summary of package info

Drag bar to resize frame

Clicking this link will expand the documentation view to reveal more detail, as shown below:

Icons indicate whether data package saved on local machine and/or on network

The top panel can be expanded to reveal additional documentation, either by dragging the divider bar, or by clicking the "more" link. The additional documentation is shown below.

**Data Package: tao.9045.4**

File Edit Search Data Window Help

Mike Thompson, **Species Distribution**  
**Accession Number tao.9045.4** Keywords: Species deivity distribution  
[less](#)

[back](#) **Data Package Documentation** [hide X](#)  
[edit](#)

Keywords:

- Species deivity distribution

Additional Information:

License and Usage Rights:

Related Metadata and Data Files:

- [tao.9046.1](#) isDataFileFor(Species\_plot\_data.txt) [tao.9045.4](#)
- [tao.9047.1](#) provides table-entity information for DATAFILE [tao.9046.1](#)
- [tao.9049.1](#) provides eml-physical information for Table [tao.9047.1](#)
- [tao.9044.1](#) provides access control rules for [tao.9045.4](#)

The blue links in this documentation window link to files that contain the documentation, displayed in EML format, or data. Clicking on one of these links will cause the relevant part of the documentation to be displayed in the current panel. For example, clicking the "tao.9049.1" link in the above screen would cause the eml-physical documentation to be displayed. After navigating to different documentation pages, you can use the "back" button near the top right corner of the panel to navigate back to the initial view (this works in a similar way to a web-browser's "back" button).

The Package Documentation Panel may be collapsed to its original size in one of several ways:

1. by clicking the "less" link;
2. by clicking the "hide" button, located to the right beneath the net and/or local icons;
3. by using the mouse to drag the divider bar, which is at the bottom of the screen, up or;
4. by clicking the small arrow icons located on the left side of the lower divider bar.

The documentation may be edited by clicking the "edit" button that is located beneath the "hide" button. This will take you to the Morpho Editor, described later in this User Guide.

- Data Table Panel

The data table panel, displayed below for a sample data package, either shows the data in spreadsheet form, or for several formats of image entities, displays the image. The tabs along the bottom of the data table panel may be used to select and view different tables or image entities within the package.

Using the drag bar on the right side of the panel, you can collapse, expand, or change the size of the data table panel.

Mike Thompson, Species Distribution  
 Accession Number tao.9045.4 Keywords: Species diversity distribution  
[more](#)

1.1

date	string	string	integer	string	
Date	Site	Transect	Plot	Community	
7/24/96	Toolik	Alkaline 1	1	D	D
7/24/96	Toolik	Alkaline 1	1	D	L
7/24/96	Toolik	Alkaline 1	1	D	A
7/24/96	Toolik	Alkaline 1	1	D	C
7/24/96	Toolik	Alkaline 1	2	D	D
7/24/96	Toolik	Alkaline 1	2	D	L
7/24/96	Toolik	Alkaline 1	2	D	L
7/24/96	Toolik	Alkaline 1	2	D	A
7/24/96	Toolik	Alkaline 1	2	D	L
7/24/96	Toolik	Alkaline 1	2	D	A
7/24/96	Toolik	Alkaline 1	2	D	A
7/24/96	Toolik	Alkaline 1	2	D	C
7/24/96	Toolik	Alkaline 1	2	D	F
7/24/96	Toolik	Alkaline 1	3	D	D
7/24/96	Toolik	Alkaline 1	3	D	H
7/24/96	Toolik	Alkaline 1	3	D	C

DataFile: tao.9157.1

1.1 96lgtrans.txt

Entity (Ta  
(Identifier  
Name:  
Case Sensi  
Number Of  
Records:  
Orientator

< back

Tabs to select data tables or other entities within a package

button saves changes and updates data package

Drag bar to resize frame

You can click and edit data directly within the table cells. After editing the data, click the "update" button to save the changes, or "cancel" to undo the changes. "Cancel" and "update" only apply to the changes made on the tab that is selected. To cancel changes that have been made to ALL data panels, you can select "Revert all tabs" under the "Data" menu at the top of the window.

You can right-click on the data table to bring up a menu which allows you to:

- sort columns
- insert and delete rows
- insert and delete columns
- add new tables
- add/edit documentation

These same options are also available under the "Data" menu at the top of the window. Read more about using these tools [here](#).

- Table Documentation Panel

The table documentation panel (located to the right of the data table) displays documentation for the table that is currently being viewed. Note that tables are also referred to as "entities" in Morpho, using terminology consistent with database management systems. Similarly, "attribute" refers to the variables or columns contained within a table.

Species Distribution  
 Identifier: tao.9045.4 Keywords: Species diversity distribution

1.1

string	string	
Site	Transect	
Toolik	Alkaline 1	1
Toolik	Alkaline 1	2

< back Entity/Attribute hide X

edit

Entity (Table) Description  
 (Identifier: tao.9047.1 )

Name: 1.1

Case Sensitive?: no

Number Of Records: 1163

Orientation: Column-major

File: tao.9157.1 Cancel Update

Clicking on any of the column headers in the table will cause the documentation panel to show more specific information about the selected column (or "attribute"). An example of this more detailed information about a sample column of data is shown below.

Species Distribution  
 tao.9045.4 Keywords: Species diversity distribution

1.1

string	string	
Site	Transect	
taolik	Alkaline 1	1
taolik	Alkaline 1	2

Entity/Attribute

Attribute structure description  
 (Identifier: tao.9048.1)

Attribute Name	Transect
Label	Transect
Definition	transect
Unit	
Type	string
Missing	

tao.9157.1 Cancel Update

You can return to the table (entity) documentation either by using the "back" button (located at the top left corner of the panel), or by clicking on the data table tab at the bottom of the data table panel.

You can edit the currently displayed documentation by clicking the "edit" button (located beneath the "hide" button). Doing so will open the [Morpho Editor](#), described in a later section.

As with the other panels, this panel can be resized by dragging the dividing bars, and can be hidden or expanded fully by clicking the arrows on the divider bars, or by clicking the "hide" button at the top-right corner.

The [next section](#) describes how to open an existing data package.

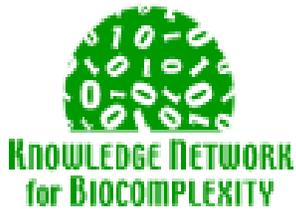
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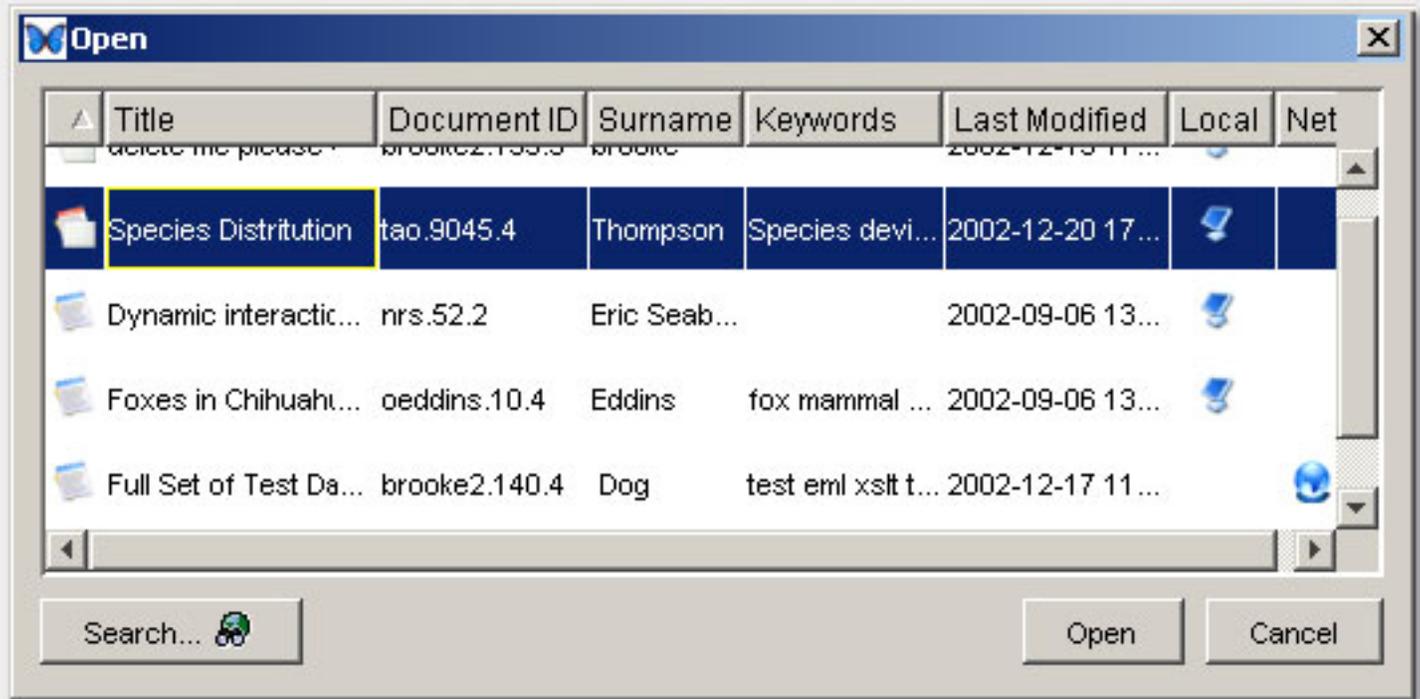
[Searching for](#)

## Opening an Existing Data Package

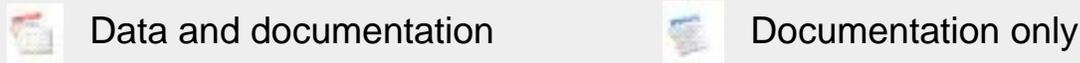
There are three equivalent ways to open an existing data package. Do one of the following:

- Click the open button  found on the toolbar of the [Main Welcome Screen](#).
- From the File menu, choose "open".
- Click on "Open an existing data package" on the Main Welcome Screen.

You will then see a listing of the available data packages. The data packages listed are those which you have previously created using this profile and/or under the particular KNB username, along with a fictitious sample data package that comes with Morpho-- "Population sampling data for zooplankton in the Great Lakes, 2000".



The icons in the first column of the "open" screen tell you if the package contains:



Icons in the last two columns indicate whether the package is located on the local machine or on the network (or both).

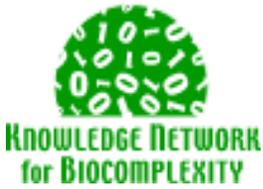
Select a data package to open (or open the fictitious sample package "Population sampling data for zooplankton in the Great Lakes, 2000"). Click the "open" button located at the bottom right of the window, or double-click the selected data package, or right click on the data package and select "open".

To locate and view data packages other than those you have created, use the [Search](#) feature, which is described further in the next section.

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## Searching for Data Packages

There are three different ways to search for a data package. These are the subject search, the taxonomic search, and the spatial search. Each allows you to use different criteria in your search. You may combine features from one or more of these three types of searches into one search.

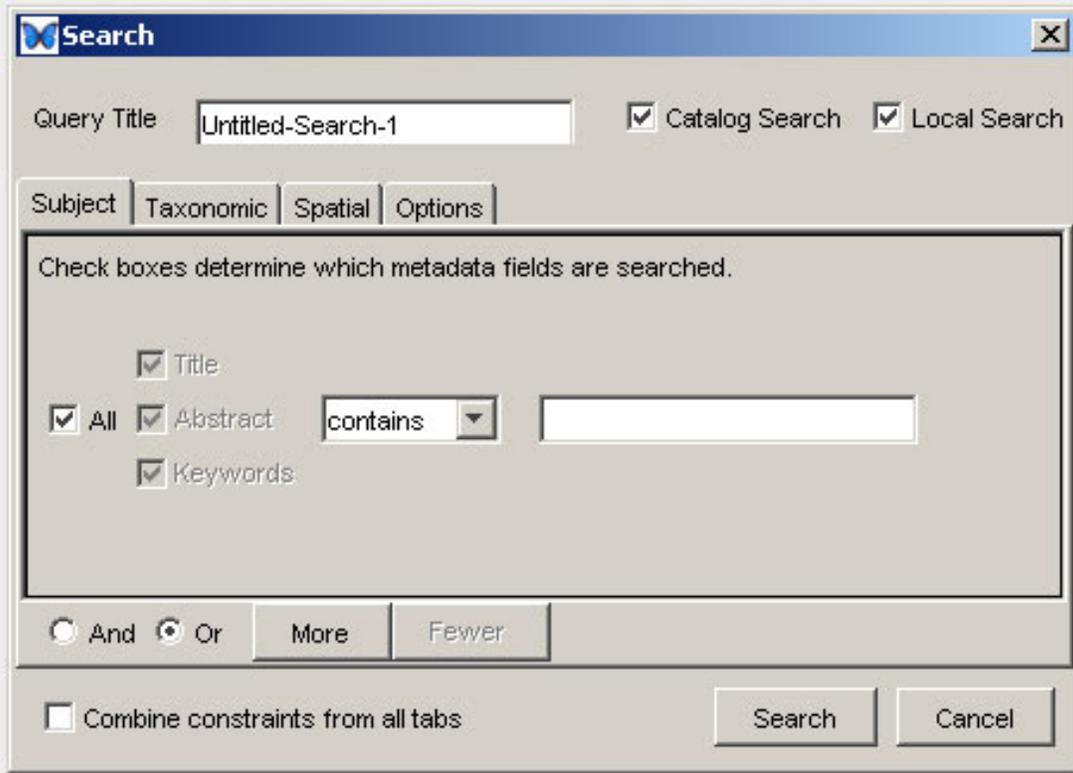
To begin a search for data packages, do one of the following:

- Click the search button  found on the toolbar on the [Main Welcome Screen](#).
- Click on "Search for an existing data package" on the Main Welcome Screen.
- Go to the "Search" menu at the top of the Main Welcome Screen, and select "Search".

**! NOTE:** if you are not logged in but have network access, the only network data packages that will show up in your search are those which have "public" access privileges. To view additional data sets from the KNB network, log in on the Main Welcome Screen.

### Search Interface

Next, you will see the search interface, pictured below.



You can name the search by typing in the field next to "Query Title", and then save the search and its parameters for later use. Save the search by clicking the "save search" button in the toolbar at the top of the screen, or selecting "Save Search" under the "Search" menu at the top of the screen. After you save the search, you can access it directly from the "Search" menu on the main menu bar at the top of each window.

Check the appropriate boxes at the top right of the search interface to specify where you would like to search. You may choose whether you want the search to occur only locally (i.e. on your computer), in the catalog (i.e. on the KNB network), or both.

The four tabs (Subject, Taxonomic, Spatial, Options) provide more detailed search criteria. After entering your search criteria in one or more of these tabs, you have the option of combining all of the search criteria from all tabs to constrain your search further than if you were only to use the constraints from one tab. This can be accomplished by checking the "Combine constraints from all tabs" box at the lower left of the search interface. Each of the four tabs are described below.

### Subject Tab

The first tab that is displayed is the Subject tab. This tab allows you to search for specific text in the documentation of the data packages.

You begin by choosing which data package documentation field or fields will be searched. Next, you choose whether the selected documentation field(s) either contains, starts with, ends with, or equals what you type in the blank field to the right of the window.

By clicking the "More" button located at the lower middle of the window, you can create additional search panels for other terms in the documentation fields. Clicking "Fewer" will take away the extra fields.

You then choose "And" or "Or". Choosing "And" makes the search return data packages that contain matches for EVERY ONE of the terms you specified in the fields. Choosing "Or" makes the search return data packages that contain matches for ONE OR MORE of the terms you specified in the fields.

As an example, examine the screen below. Here, the "More" button has been used to create two 'Subject' search criteria. The top search criteria will look for items where the "Title" "starts-with" the phrase "NCEAS", while the lower region indicates the "Abstract" should "contain" the word "fish". These two search criteria are to be logically "OR"ed as indicated by the button near the bottom of the screen. Click "Cancel" to exit the search interface.

The screenshot shows a 'Search' window with the following elements:

- Query Title:** Untitled-Search-1
- Search Options:**  Catalog Search,  Local Search
- Search Criteria:**
  - Subject Tab:**
    - Check boxes determine which metadata fields are searched.
      - Title
      - All  Abstract starts-with NCEAS
      - Keywords
    - Check boxes determine which metadata fields are searched.
      - Title
      - All  Abstract contains fish
      - Keywords
  - Logical Operator:**  And  Or
  - Buttons:** More, Fewer
  - Footer:**  Combine constraints from all tabs, Search, Cancel

### Taxonomic Tab

The next tab is the Taxonomic tab, which allows you to search for data packages associated with a certain taxonomic rank and value.

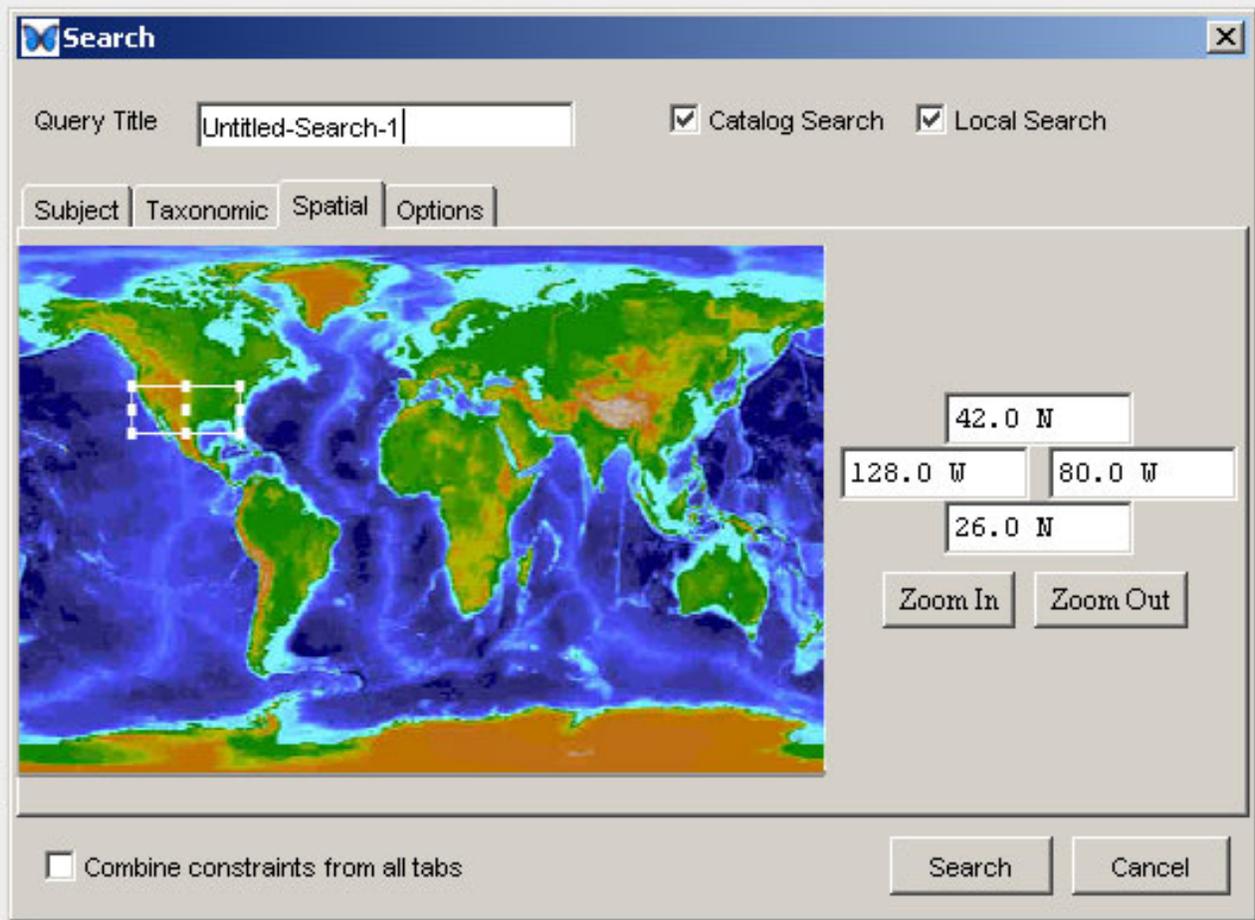
You choose whether your selected taxon rank either contains, starts with, ends with, or equals what you type in the blank field to the right of the window. For example, you may search for the taxon rank "Species", and specify that the species name contains "Neotoma".

By clicking the "More" button located at the lower middle of the window, you can search for additional taxa in the documentation fields. Clicking "Fewer" will take away the extra fields.

As with the Subject tab, you can choose "And" or "Or" criteria if searching for more than one taxa. Choosing "And" makes the search return only data packages that match EVERY ONE of the taxa you specified. Choosing "Or" makes the search return any data packages that match ONE OR MORE of the taxa you specified. Click "Cancel" to exit the search interface.

### Spatial Tab

The next tab is the Spatial tab, where you search for data packages based on a geographic area you specify.



You may search for data packages with a spatial coverage within a spatial area by drawing a bounding box on the map with your mouse. You can create a "bounding box" like the one shown over the United States by clicking somewhere on the map and then dragging with the mouse still pressed. Releasing the mouse will then complete the action and create a white rectangle like that shown. The latitude and longitude values indicated by the sides of the box are shown in the text boxes on the right. The box can be resized by dragging one of the white squares on the corners, or repositioned by dragging the white square in the center.

To draw a more precise bounding box, you can zoom into an area of the map to see more detail using the "Zoom In" button. Return to the previous views using the "Zoom Out" button.

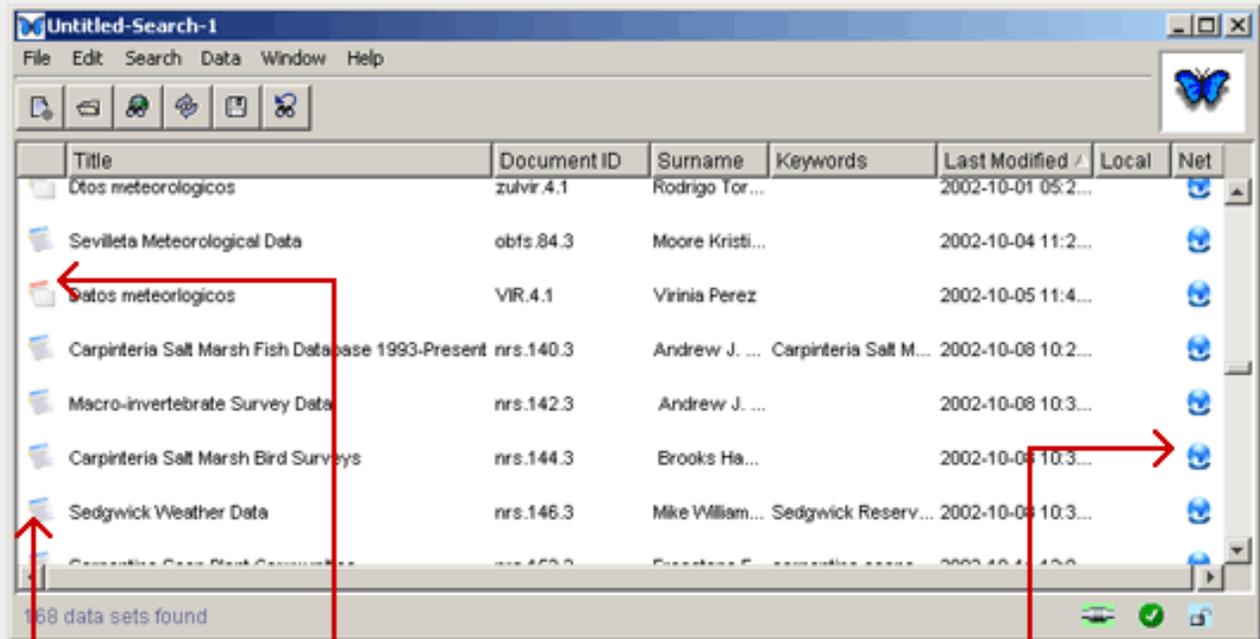
When the "Search" button is clicked, data packages will be queried to find those packages that contain geographic latitude/longitude coordinates inside (and overlapping) the indicated bounding box. Click "Cancel" to exit the search interface.

### Additional Options Tab

The final tab, "Options", allows you to specify whether the search should be case sensitive (meaning only data packages containing the exact case for which you typed in the search fields will be returned). Also, on this tab you may specify if you would like to include taxon synonyms from the Integrated Taxonomic Information System (ITIS) in the search.

## Search Results

After entering your search criteria, choosing any additional options, and clicking "Search", your results are displayed as a set of data packages which met your search criteria. An example is shown below. Open the data package you would like to view either by double-clicking on it, right-clicking and selecting "Open", or selecting the desired data package, and then clicking the "Open" button in the main toolbar at the top of the window.

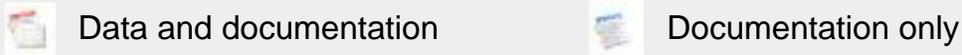


blue icon means package does not include data (documentation only)

red icon means package includes data

icons denote whether package is local or on network

The icons in the first column of the search result screen tell you if the package contains:



Icons in the last two columns indicate whether the package is located on the local machine or on the network (or both).



Three buttons are now active in the main Morpho toolbar, and allow you to refresh the search, save the search for future use, or revise the search by changing the search parameters. These options are also available from the main "Search" menu located at the top of each window.

Learn how to create a data package of your own on the [next screen](#).

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[Package](#)



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## Creating a New Data Package

This chapter will describe the important task of creating a new data package, which is necessary if you want to document (create metadata for) your own data.

There are three equivalent ways you can begin to create your own, new data package. Begin by doing one of the following:

- Click the new data package icon  in the [main toolbar](#).
- Click on "Create a New Data Package..." on the [Main Welcome Screen](#).
- Under "File", choose "New Data Package".

You will then be presented with the Data Package Wizard, a handy and powerful utility which enables you to collect the general information and basic descriptions about your data. Morpho uses the resulting documentation to generate your data package.

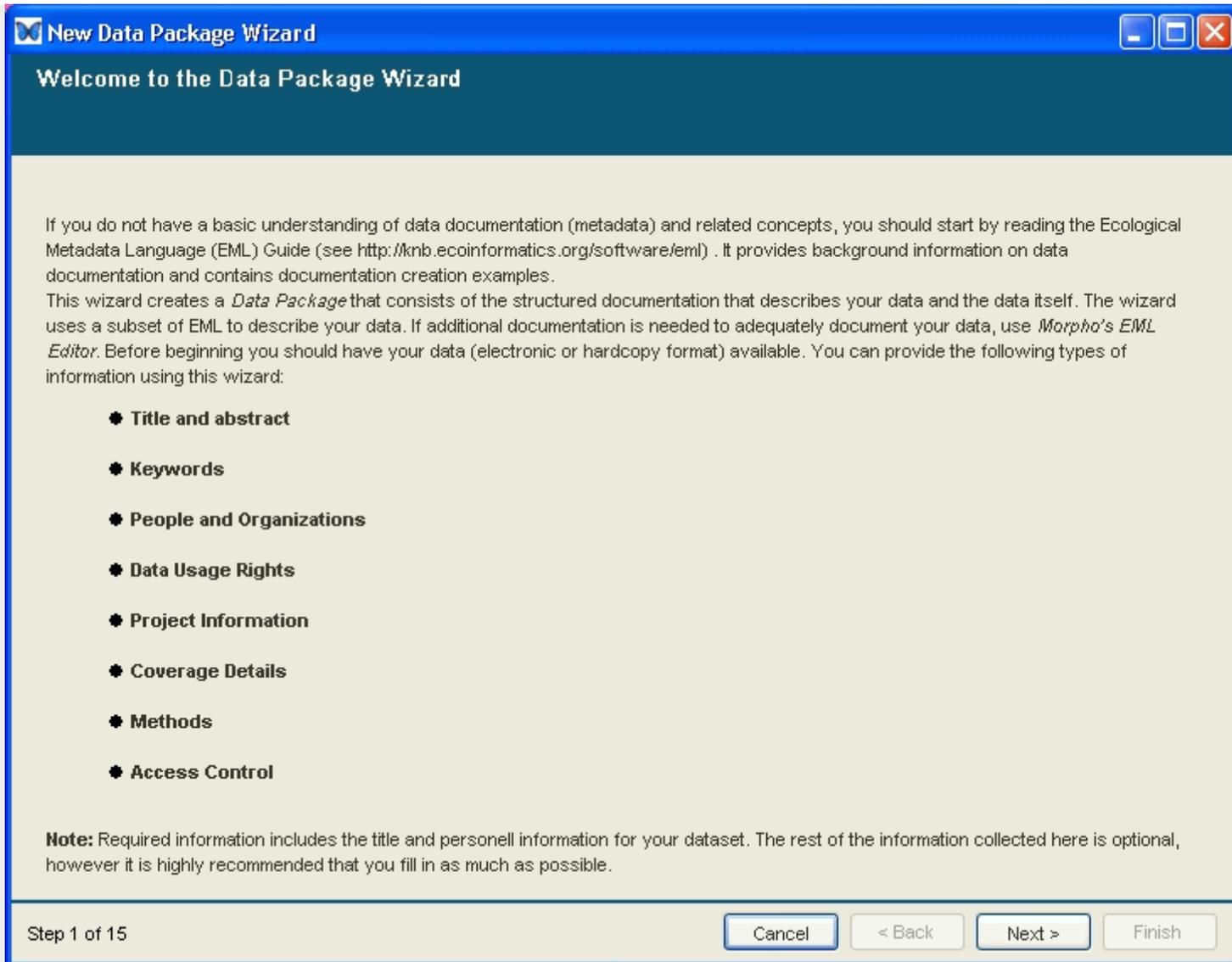
### Data Package Wizard

The Data Package Wizard will help you create the minimum amount of documentation necessary for a Data Package. This process consists of 14 simple steps, each involving a separate screen. The Package Wizard alerts you to fields that are required by coloring their label **red**. However, the more documentation (i.e., metadata) you provide, the easier it will be for scientists (including you!) and the KNB network to understand and utilize your data package. If you do not fill in a field whose label is colored red, you will receive a reminder message and will not be allowed to continue. Remember, you can always change the required or any other information at a later time using the Morpho Editor. See the later section, [Editing a Data Package](#), for details on this.

Throughout the Data Package Wizard, instructions for filling out fields on each screen will be shown. It is recommended that you read the explanatory text of any Morpho screen.

Each of the Data Package Wizard screens are displayed and explained below. You go from one screen to the next, or back to a previous screen, using the "Next" and "Back" buttons. Hit "Cancel" to cancel the creation of the new data package.

The first screen of the data package wizard lists the types of information you should gather (or have in mind) before beginning to create a new data package. This screen is pictured below.



You enter the title and an abstract for the data package on the next screen. The data set title is required. The abstract is optional, but is one of the most useful portions of the data documentation for those who may view the documentation in the future, and therefore it is highly recommended that an abstract be included. You may type the abstract directly into the field, or paste it in after creating it elsewhere.

**New Data Package Wizard**

### Title and Abstract

**Enter the title of the data package.** The title field provides a description of the data that is long enough to differentiate it from other similar data. e.g. Vernal Pool Amphibian Density Data, Isla Vista, CA USA, 1990-1996

Title:

**Enter an abstract that describes the data package.** This abstract is a paragraph or more that describes the particular data that are being documented. You may want to describe the objectives, key aspects, design or methods of the study.

Abstract:

Step 2 of 15

Cancel < Back Next > Finish

Clicking "Next" brings you to the Keywords screen. One or many keywords can be entered by clicking "Add".

**New Data Package Wizard**

### Keywords

**Enter the keywords.** A data package may have multiple keywords associated with it to enable easy searching and categorization. In addition, one or more keywords may be associated with a "keyword thesaurus", which allows the association of a data package with an authoritative definition. Thesauri may also be used for internal categorization.

Keywords | Thesaurus

Add  
Edit  
Delete  
Move Up  
Move Do...

Step 3 of 15

Cancel < Back Next > Finish

Clicking "Add" brings you to the screen pictured below. Click "Add" to add a keyword. Click "Add" again to add another keyword. You may delete a keyword you have entered by selecting it and clicking "Delete". You can also alter the order of the keywords by using the "Move Up" and "Move Down" buttons while the keyword you wish to move is selected.

If the keywords are taken from a predefined list, such as a thesaurus, then click on the circle next to "These keywords are chosen from a predefined list", and type the name of the source in the box that appears. Otherwise, click "OK" when you are done adding keywords. You will then be shown the list of keywords you have created in the screen that is pictured above. To add another, entirely separate list of keywords, click "Add" and repeat the steps described above to create another keyword list. You can also use the "Edit", "Delete", "Move Up", and "Move Down" buttons to edit, delete or change the order of the keyword lists. When you are finished adding keywords and keyword lists, click "Next" at the bottom of the screen.

**Define Keyword Set:**

Keyword

Keywords:

These keywords are not chosen from a predefined list:  
 These keywords are chosen from a predefined list:

Add  
Delete  
Move Up  
Move Do...

OK Cancel

You will then see the screen pictured below which lists the information that can be entered in the next few screens. Read the screen, and click "Next".

**New Data Package Wizard**

### People and Organizations

Identify the people and organizations responsible for the data. In the next few screens you will need to provide the following information:

- **Owner:** The person or organization who is credited with creating the data.
- **Contact:** The primary person or organization to contact with questions regarding the use or interpretation of the data package.
- **Associated parties:** These are people or organizations that are in some way responsible for the data. They may have assisted in collection of or maintenance of the data or they may have created documentation for the data.

Step 4 of 15

Cancel < Back Next > Finish

Click "Add" on the next screen (pictured below) to add information about the data set owners.

**New Data Package Wizard**

### People or Organizations Associated With This Data Package

Owners

**Enter information about the Owners:** This is information about the persons or organizations certified as data owners (e.g. the principal investigator(s) of the project). The list of data owners should include all people and organizations who should be cited for the data. Select Add to add an owner.

One or more Owners must be defined:

Party	Role	Address
-------	------	---------

Add Edit Delete Move Up Move Do...

Step 5 of 15

Cancel < Back Next > Finish

The "Owner Details" screen, pictured below, is where you can enter name, address, contact, and other information about the owner of the data set. Alternatively, you can choose an entry that you have already made previously by choosing it from the drop-down list at the top of the screen. This drop-down list includes an option to choose a previous entry made in a different data package, where you will be presented with a list of data packages and their owners, and you can select one from the list. One of the three fields shown in red must have information entered into it to proceed. Click "OK" when done.

**Owner Details**

You can pick from one of the earlier entries that you have made.

Salutation:

First Name:

One of the three required { Last Name:

Organization:

Position Name:

Address 1:

Address 2:

City:  State:

Postal Code:  Country:

Phone:  Fax:

Email:  Online URL:

OK Cancel

You will then be presented with a screen which will display the information you have entered. You may add additional owners, delete owners that are listed, edit entries, or change the order of the owners using the buttons on the right of the screen. Click "Next" when you are finished entering the owner or owners' information.

Next, a screen similar to the one used for entering information about the data set owner will appear, except that this screen is used to enter information about the contact for the data set. This person or organization may be the same as the owner, in which case you can choose the appropriate owner from the drop-down list at the top of the screen. Otherwise, enter the information for the contact into the fields, and click "OK". Just as before, you will then be shown the contact person you entered, and have the ability to add additional contacts, delete contacts listed, edit entries, or change the order in which the contacts appear in the list. Click "Next" when you are finished entering the contact(s) for the data set.

The next screen, pictured below, allows you to enter information for associated parties (people, organizations, etc.) associated with the data set. Clicking "Add" will bring you to a screen where the information about the associated party can be entered. It is similar to that used to enter information about the data set owner and contact. Similarly, after clicking "OK", you may add additional associated parties, edit entries, delete entries, and change the order of entries in the list. Click "Next" at the bottom of the screen when you are finished adding associated party information.

**New Data Package Wizard**

**People or Organizations Associated With This Data Package**

Associated Parties

**Enter associated parties information.** These are persons or organizations functionally associated with the dataset. Enter the nature of the relationship in the role field. For example, the person who maintains the database is an associated party with the role of 'custodian'.

Party	Role	Address
-------	------	---------

Add  
Edit  
Delete  
Move Up  
Move Do...

Step 7 of 15

Cancel < Back Next > Finish

You will then be presented with the following screen. Click the box if the project associated with the data set is part of a larger project. Leave the box unchecked otherwise. If it is associated with a larger project and you click in the box, you will be prompted to enter the name of the larger project, its funding source, and one or more personnel associated with the larger project. Click "Next".

**New Data Package Wizard**

### Research Project Information

**Is your project part of a larger umbrella research project?** Data may be collected as part of a large research program with many sub-projects or they may be associated with a single, independent investigation. For example, a large NSF grant may provide funds for several primary investigators to collect data at various locations.

This project is part of a larger umbrella research project.

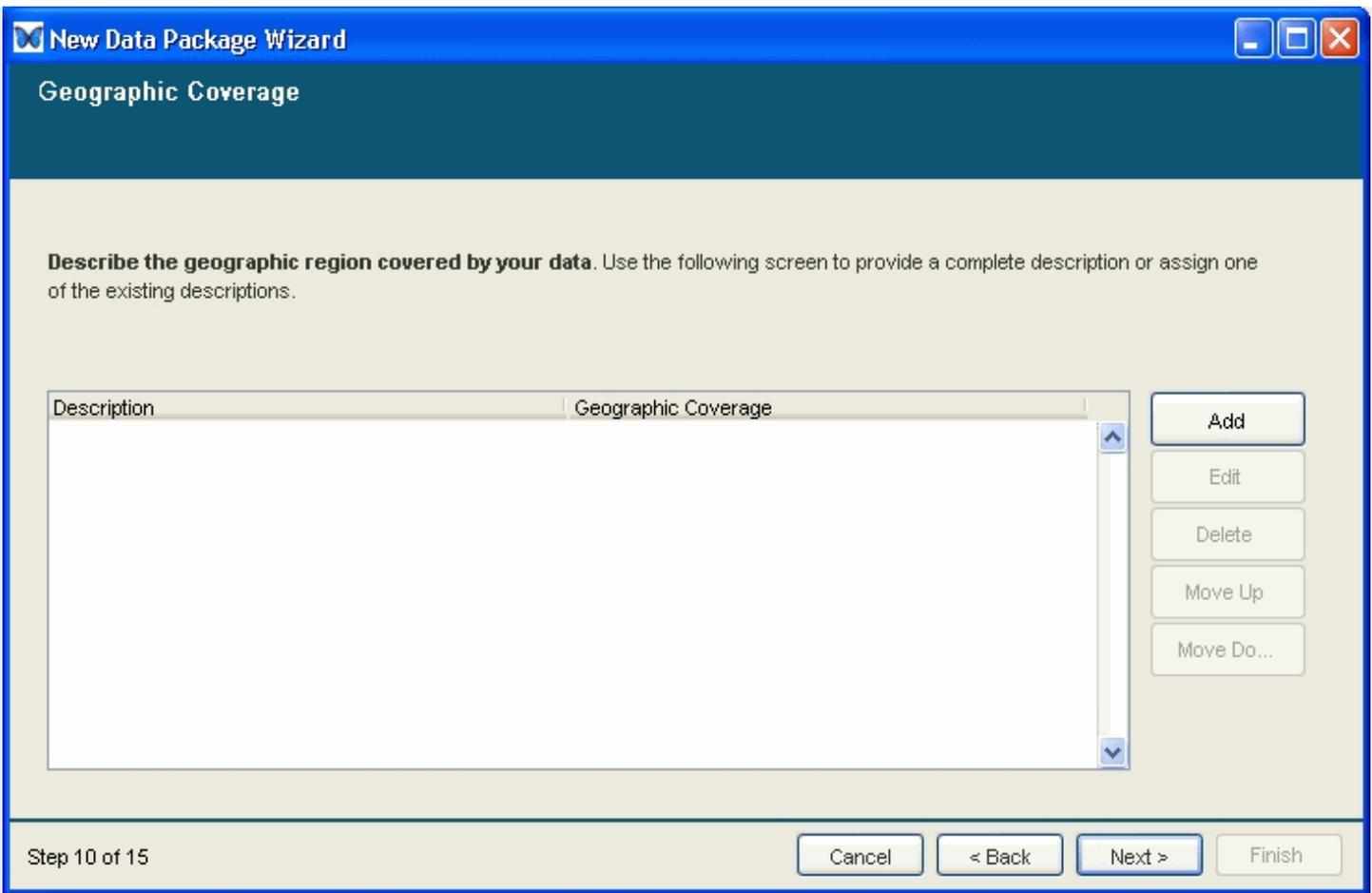
Step 8 of 15

Cancel < Back Next > Finish

The next screen allows you to enter a description of the usage rights of the data package. You may type directly in the field, or paste in a paragraph of text created elsewhere. Click "Next" when finished with this screen.

The screenshot shows a Windows-style dialog box titled "New Data Package Wizard" with a blue header bar. Below the header, the title "Usage Rights" is displayed in a dark blue bar. The main area is light beige and contains the following text: "Enter a paragraph that describes the intended usage rights of the data package. Specifically, include any restrictions (scientific, technical, ethical) to sharing your data within the public scientific domain." Below this text is a large, empty text area with a vertical scrollbar on the right side. To the left of the text area, the label "Usage Rights:" is visible. At the bottom of the dialog, there is a status bar that says "Step 9 of 15" and four buttons: "Cancel", "< Back", "Next >", and "Finish".

In the next step of the Data Package Wizard (pictured below), you have the ability to enter information about the geographic coverage of the data. Click "Add" to add a geographic coverage documentation.



You will then be presented with the screen pictured below. You may type a textual description of the spatial coverage of the data in the first field (or paste a description in from elsewhere). In addition, you can specify the geographic coordinates of the coverage. There are three options for choosing the geographic coordinates. For any of these options, click "Zoom In" or "Zoom Out" to change the view of the map. Do one of the following:

- Create a bounding box by selecting "Box Tool" and dragging the mouse on the map. You can then adjust the edges of the box by selecting and dragging the white squares located on the edges of the bounding box.
- Select a point on the map by selecting "Point Tool" and clicking on the map.
- Select a predefined region or point by selecting one of the choices in the list of Named Regions at the bottom of the screen. To add a named region so that in the future it will appear in this list, select the region or point on the map, and click "Add". To remove a named region from the list, select the region and click "Delete". You can also "Sort" the items in the list.

After doing any of these options, the coordinates for the bounding box or for the point will be displayed on the right of the screen. Click "OK" when finished adding the documentation or selecting the coordinates for the geographic coverage. You will then be returned to the screen pictured above, and your documentation will be listed.

You may add additional geographic coverage documentation by clicking "Add" again on the screen pictured above. As before, you can edit, delete, or change the order of the geographic descriptions you have entered.

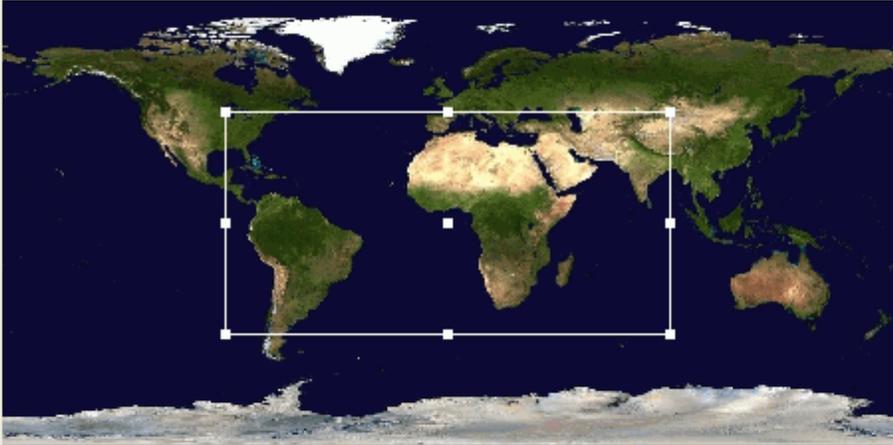

✕

**Enter a description of the geographic coverage.** Enter a general description of the geographic area in which the data were collected. This can be a simple place name (e.g., Santa Barbara) or a fuller description.

Description:

**Set the geographic coordinates which bound the coverage:** Latitude and longitude values are used to create a 'bounding box' containing the region of interest. Drag or click on the map and then edit the text boxes if necessary. [Default entries are in fractional degrees. To enter in degrees/minutes/seconds, simply type a space between the degrees, minutes, and seconds values]

Bounding Box:



Box Tool
  Point Tool

Named Regions:

Click to add current selection to list.

Click to remove selected region from list.

Click to sort the list of locations.

You will next be prompted to describe the temporal coverage of the data set. Click "Add" to add a temporal coverage description.

**New Data Package Wizard**

**Temporal Coverage**

Enter information about temporal coverage. Temporal coverage can be specified as a single point in time, multiple points in time, or a range thereof.

Time Coverages

Add  
Edit  
Delete  
Move Up  
Move Do...

Step 11 of 15

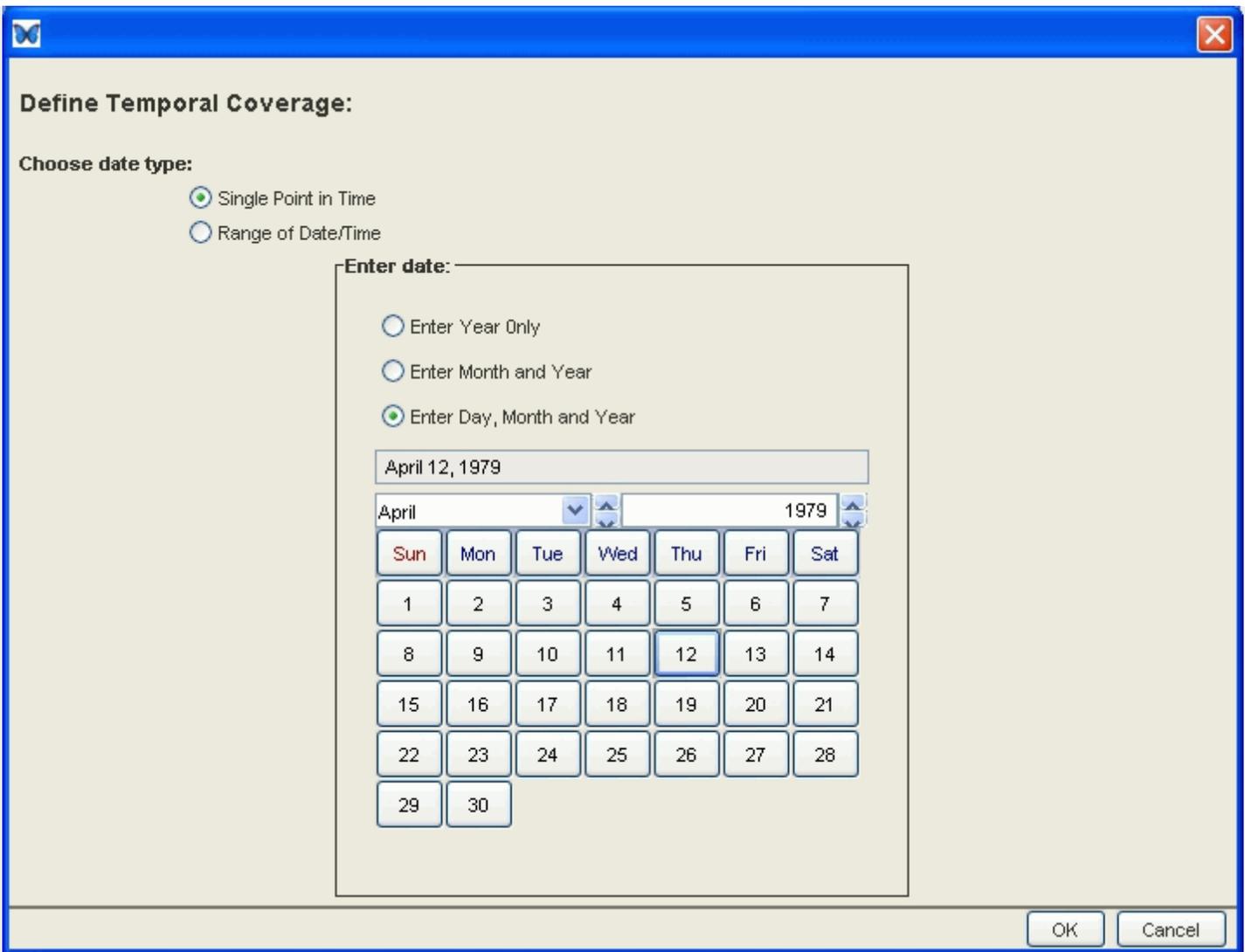
Cancel < Back Next > Finish

You will then see the screen below. There are two options for selecting a temporal coverage for your data. Do one of the following:

- Select "Single Point in Time" for a temporal coverage of a single year, month, or day.
- Select "Range of Date/Time" to specify a starting and ending of the temporal coverage of the data.

After choosing either of these options, select whether you want to specify the year only, the month and the year, or the day, month and year. Next, choose the appropriate temporal coverage in the calendar displayed. You may use the arrows to select the month and year, or you can type the month or year into the appropriate fields. To select a day, click on that day in the calendar pictured. When selecting a date/time range, make sure to select the start date/time on the left calendar, and the ending date/time on the right calendar. If the data is still being collected or added to, and therefore there is no end date/ time for the data set, then leave the right hand calendar blank.

Click "OK" at the bottom of the screen when finished. You will be shown your temporal coverage entry on the screen pictured above. You may add another temporal coverage for the data set, or edit, delete, and change the order of existing entries in the list. Click "Next" when finished adding temporal coverage information.



**Define Temporal Coverage:**

**Choose date type:**

- Single Point in Time
- Range of Date/Time

**Enter date:**

- Enter Year Only
- Enter Month and Year
- Enter Day, Month and Year

April 12, 1979

April 1979

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

OK Cancel

You will then see the screen pictured below which is where taxonomic coverage documentation can be entered.

**New Data Package Wizard**

### Taxonomic Coverage

**Enter information about the Taxonomic Coverage.** By default, you may enter information on Genus and Species. If you would like to enter information at another classification rank or would like to change the default classification rank, click the edit button. Note that the field 'Higher Level Taxa' is dynamically generated from your entries and is not manually editable.

[Import Taxon Information from Data table...](#)

Higher Level Taxa	Rank	Name	Rank	Name	Common Name(s)
	Genus		Species		

Add Edit Delete

**Classification System** If the list of taxa belong to one or more different classification systems, list the citations for those systems.

Citation Title	Creator	Citation Type

Add Edit Delete

Step 12 of 15

Cancel < Back Next > Finish

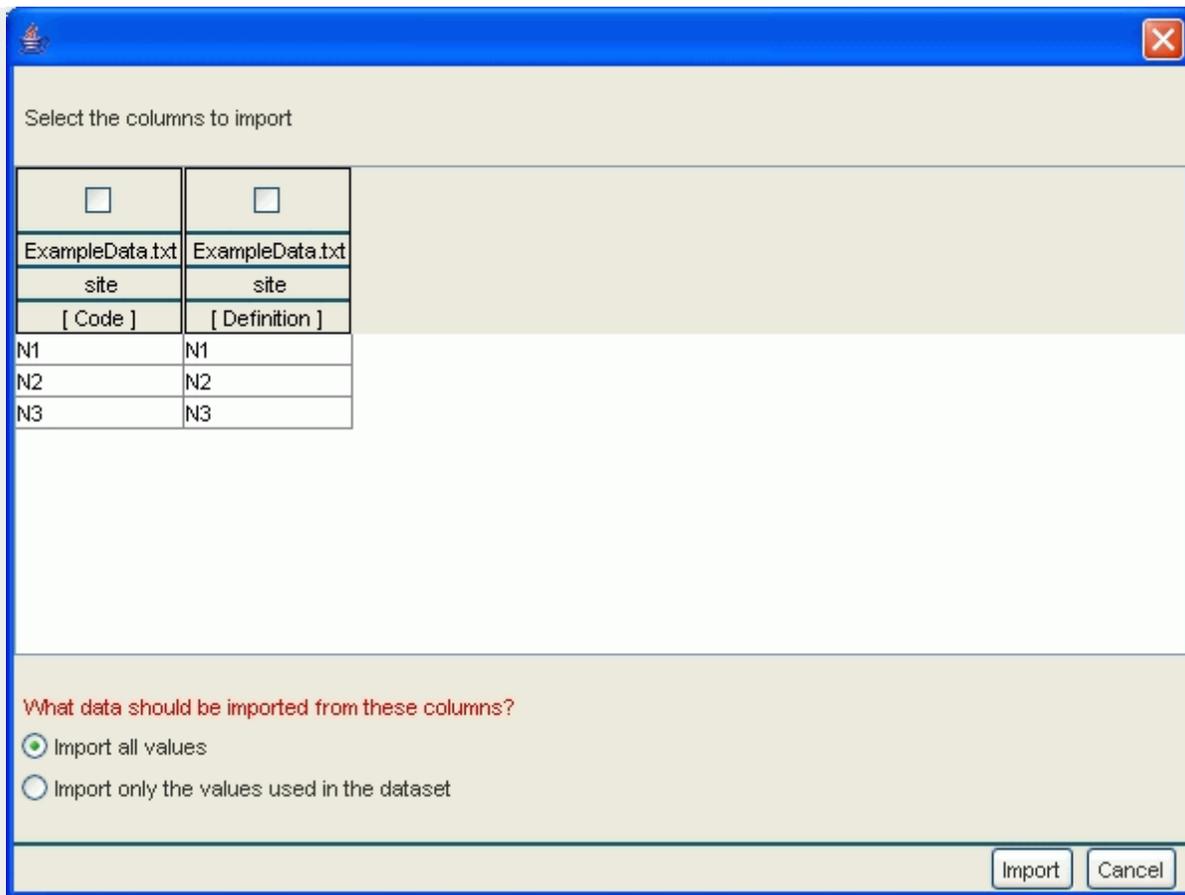
There are two ways to add taxonomic information to the documentation. One is to type in the fields shown in the screen above to add taxonomic coverage for one or two taxon ranks (such as genus and species). To add additional levels of taxonomic information, click on the "Edit" button. You will then see the screen pictured below, where you can specify the name and common names for various taxonomic ranks. When finished, click the "Add" button. You may also delete an entry, or change the order of entries using the buttons located at the right of the screen.

Enter the Taxonomic Hierarchy (in descending order):

Rank	Name	Common Name(s)
Kingdom		
Phylum		
Class		
Order		
Family		
Genus		
Species		

Buttons: Add, Delete, Move Up, Move Do..., OK, Cancel

The second way to add taxonomic information is to click on "Import Taxon Information from Data Table". This data table must be one that you have already added to the data package in Morpho (see [Adding Data to a Data Package](#) for information on how this is done). If you have not yet added a data table to the data package, ignore this option for now - you can always add data and documentation for the taxonomic coverage later (click [here](#) to read how). If you click on the import taxon information link after adding data to the data package, you will see the screen pictured below.



These columns are from a data table in a fictitious sample data package that comes with Morpho. This feature can be used to select taxonomic names from a data table which contains a column of taxonomic information, which will speed the input of taxonomic information into the documentation. Begin by choosing which columns of taxonomic information you wish to import by checking the box of that column. Notice that a pop up box will prompt you to choose the taxon rank that the values in the column correspond to. Next, decide whether all of the values in the selected column(s) will be imported, or if only certain values which actually appear in the data are to be imported. Finally, click "Import".

You will then be returned to the previous screen, where the taxonomic information will be displayed. You can then add additional taxonomic information, or edit or delete selected information. You may also specify what taxonomic classification system is used for the taxonomic information by clicking the box at the bottom left of the screen and typing in the name of that system. Click "OK" when finished, and then "Next".

You will then be prompted to describe the methods, study extent, and sampling description, on the screen shown below. Each of these can be typed directly into the fields or pasted in from elsewhere.

Methods can be described in a single or multiple steps. To add a description of the method as a whole, or the first step in the method, click "Add". You will then be prompted to enter a method title (optional) and a method description. Click "OK" when finished entering the method title and /or description. The method will be displayed in the list on the screen pictured below. Click "Add" again to add another method or method step. You can also edit, delete, and change the order of methods or method steps you have entered using the buttons on the right of the screen.

Enter information into study extent to supplement the information you already provided on the temporal or spatial extent of the study. For example, missing years for temporal coverage should be noted here, or a description of temporal coverage for data sets beyond the calendar range provided previously (such as "the pleistocene").

Finally, in the sampling description field you can provide detail on the sampling design of the study. Click "Next" after describing methods, study extent, and sampling description as you would like.

**New Data Package Wizard**

### Methods and Sampling

**Enter method step description.** Method steps describe a single step in the implementation of a methodology for an experiment.

Method Step Title	Method Step Description	Instrumentation
-------------------	-------------------------	-----------------

Buttons: Add, Edit, Delete, Move Up, Move Do...

**Study extent description.** Describe the temporal, spatial and taxonomic extent of the study. This information supplements the coverage information you may have provided in a previous step.

Study Extent

**Sampling description.** Describe the sampling design of the study. For example, you might describe the way in which treatments were assigned to sampling units.

Sampling

Step 13 of 15

Buttons: Cancel, < Back, Next >, Finish

The next screen allows you to control the access to your data and the data set. First, indicate whether or not you would like the public to be able to read your data package documentation once it is placed on a network (which is described in the section [Uploading and Downloading Data Packages](#)).

You may then specify specific people and detail the permission you wish to grant them for the data package. Click "Add" if you wish to specify access rights for these people.

**New Data Package Wizard**

**Access Information**

**Would you like to allow the public to read your dataset?**

Yes, give read-only access to public.

No, don't give read-only access to public.

**Would you like to give special access rights to other people?** You can specify access for other members of your team or any other person. Use the table below to add, edit and delete access rights to your data package.

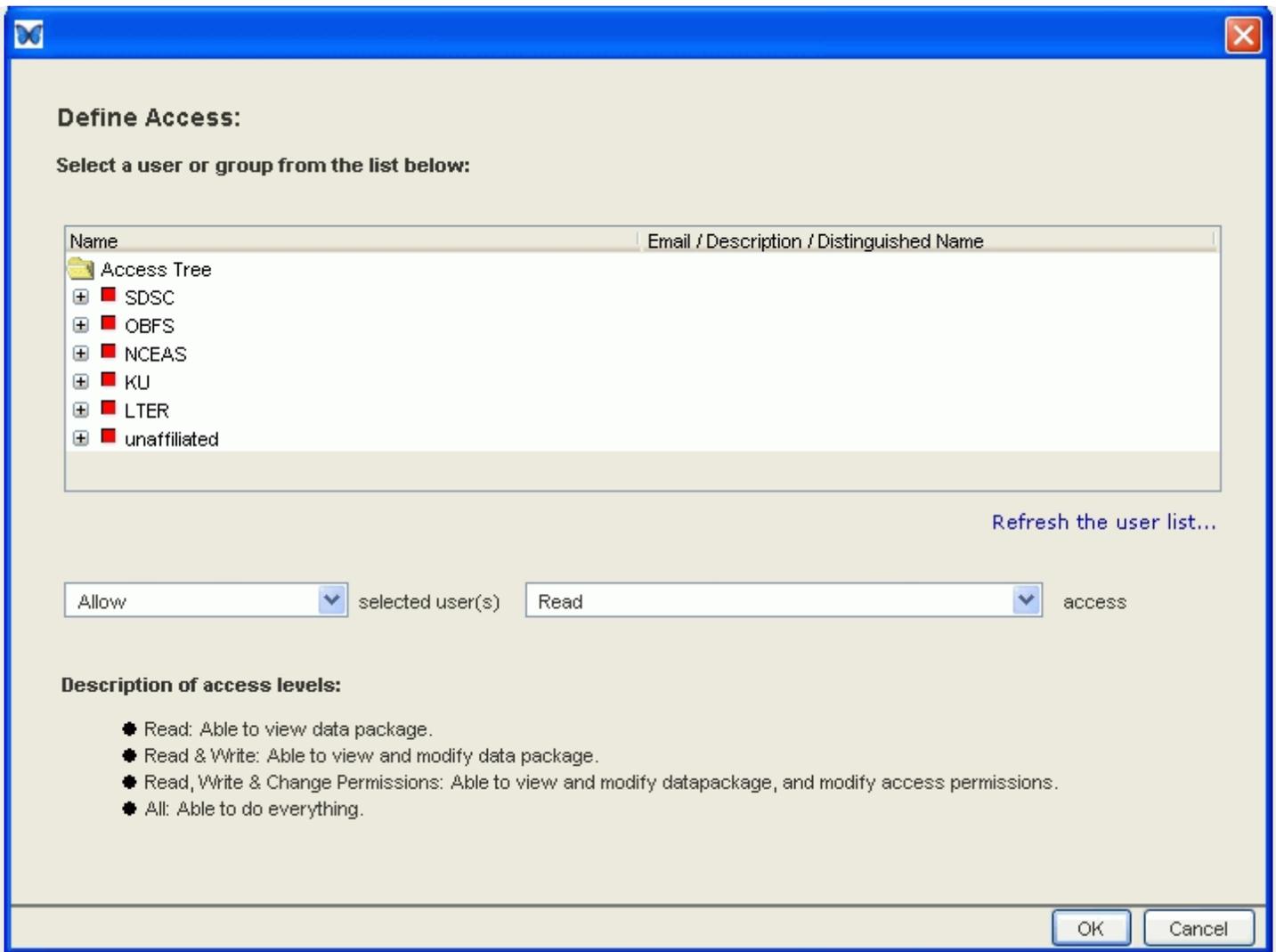
Name	Organization	Email/Description	Permissions

Step 14 of 15

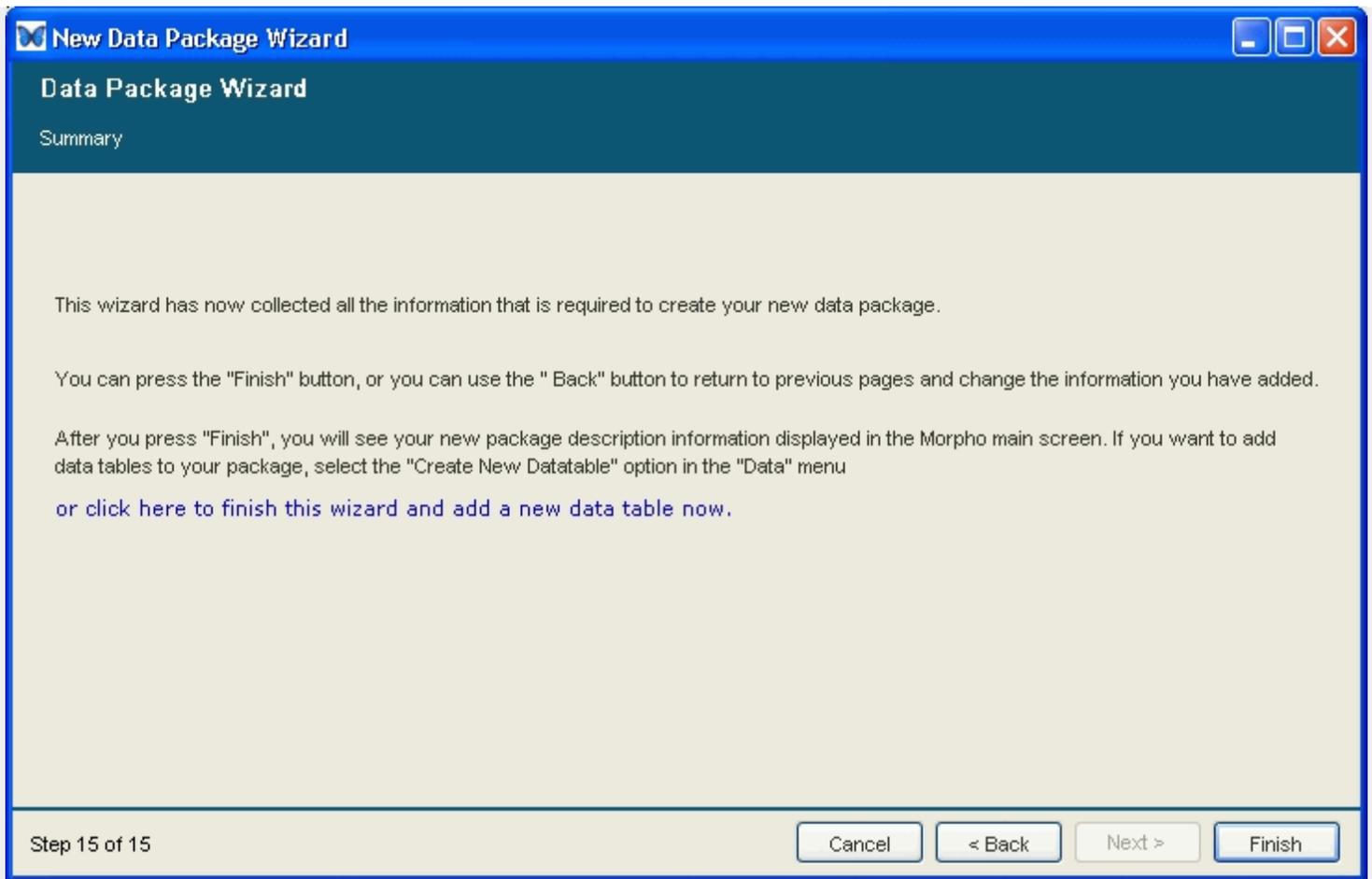
Defining the people and their access rights is accomplished on the screen pictured below. Begin by browsing through the list of groups and users on the left of the screen. You can expand the list by clicking on the plus sign next to the group, or shrink the list back to its original form by clicking refresh at the bottom of the screen.

After selecting a specific user, you will be prompted to type in their name, organization, and email address. Next, define their access permissions on the right of the screen. Choose Allow or Deny, and then Read, Read and Write, Read and Write and Change Permissions, or All from the drop down menus. If you are unsure about what each of these means, read the description of each at the bottom of the screen. Click "OK" when you are finished defining access for one user.

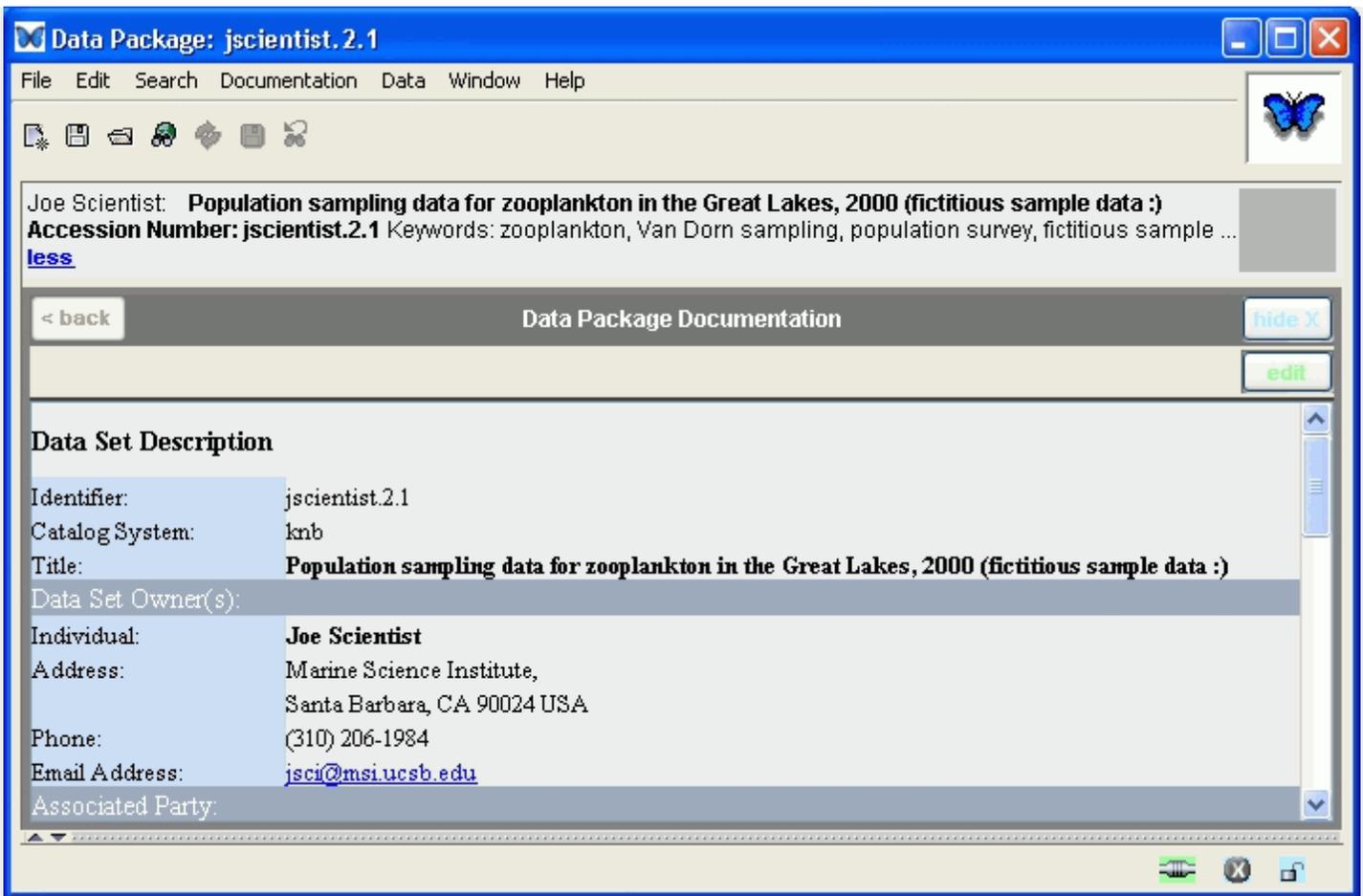
You may define access for additional users by clicking "Add" again on the screen pictured above. As before, you can also edit, delete, or change the ordering of entries you have made by using the buttons on the right of the screen pictured above. Click "Next" when finished.



The final screen of the Data Package Wizard is pictured below. Congratulations - you have created a rudimentary data package documentation! Click "Finish" to view the documentation. Alternatively, you may add an actual data object, such as a table or an image, at this step in the Data Package Wizard by choosing "or click here to finish this wizard and add a new data table now...", or you can do this at a later time. Either way, read the section titled [Adding Data to a Data Package](#) for instructions on how to do this.



The data package shown below is an example (for a fictitious data set with no data added to it) of what your data package would look like after finishing the Data Package Wizard. Note that there are different panels in the documentation.



Alternatively, on the final screen of the Data Package Wizard, before clicking "Finish", you may click on the link at the bottom of the screen which says "or click here to finish this wizard and add a new data table now..." to add data to your data package. You may also add data later on at any time (go to [Adding Data to a Data Package](#) for a description of how to do this).

After creating your data package, you can edit it or add additional information about your data, using the Morpho Editor. Go to a [later section](#) for a description of how to do this.

You can also access, edit, and add to major portions of the documentation at any time by looking under the Documentation menu, pictured below. You may edit or add any type of documentation by selecting "Add Documentation..." which will take you to the Morpho Editor (read about using Morpho Editor [here](#)), or add or edit specific types of documentation by choosing one of the other five choices.

**Data Package: jscientist.2.1**

File Edit Search Documentation Data Window Help

Joe Scientist: P...  
Accession Numb...  
[more](#)

plankton in the Great Lakes, 2000 (fictitious sample data :)  
plankton, Van Dorn sampling, population survey, fictitious sampl...

lake	Accession Number	Date	Depth (meters)	Sampling Volume (cm3)	Species
Lake Erie	N1	10JUN2000	1	10	Daphn
Lake Erie	N1	10JUN2000	5	10	Daphn
Lake Erie	N2	10JUN2000	1	10	Daphn
Lake Erie	N2	10JUN2000	5	10	Daphn
Lake Erie	N3	10JUN2000	1	10	Daphn
Lake Erie	N3	10JUN2000	5	10	Daphn
Lake Erie	N1	10JUN2000	1	10	Daphn
Lake Erie	N1	10JUN2000	5	10	Daphn
Lake Erie	N2	10JUN2000	1	10	Daphn
Lake Erie	N2	10JUN2000	5	10	Daphn
Lake Erie	N3	10JUN2000	1	10	Daphn
Lake Erie	N3	10JUN2000	5	10	Daphn
Lake Erie	N1	10JUL2000	1	10	Daphn

Entity/Attribute **ExampleData.txt** [hide X](#) [edit](#)

**Entity Description**

Identifier: jscientist.2.1

Catalog System: knb

Name: **ExampleData.txt**

Physical Structure Description

Object Name: jscientist.6.1

Size: 1152 bytes

Number

ExampleData.txt

The [next section](#) describes how to add data to your data package.

[Help Index](#)

[Searching for Data Packages](#)  
[Adding Data to a Data Package](#)

[Adding Data to a Data Package](#)



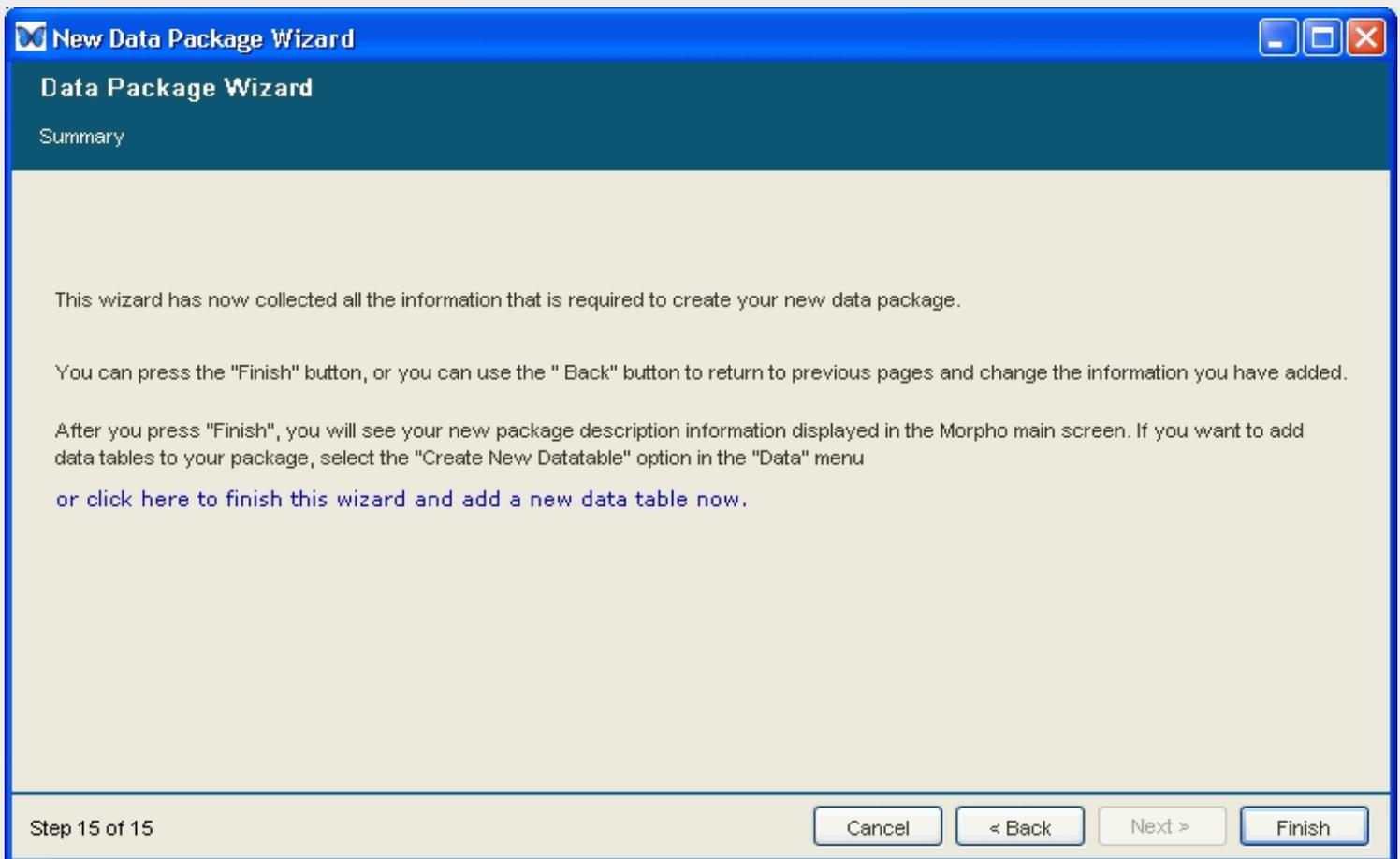
# Morpho User Guide

[Help Index](#)[← Creating a New Data Package Package →](#)[Editing a Data](#)

## Adding Data to a Data Package

### New Data Table Wizard

There are two alternate ways to add a data table to a data package in Morpho. One way is to click on "or click here to finish this wizard and add a new data table now..." at the end of the Data package Wizard, shown below.



Alternatively, after creating a data package, you can select Create/Import New Data Table under the Data menu at the top of the window, shown below.

**Data Package: jscientist.2.1**

File Edit Search Documentation **Data** Window Help

Joe Scientist: **Population sampling data for zooplankton in the Great Lakes, 2000 (fictitious sample data :)**  
**Accession Number: jscientist.2.1**  
[less](#)

< back

**Data Set Description**

Identifier: jscientist.2.1  
 Catalog System: knb  
 Title: **Population sampling data for zooplankton in the Great Lakes, 2000 (fictitious sample data :)**  
 Data Set Owner(s):  
 Individual: **Joe Scientist**  
 Address: Marine Science Institute,  
 Santa Barbara, CA 90024 USA  
 Phone: (310) 206-1984

Menu items: Create/Import New Datatable..., Delete Current Datatable, Sort by Selected Column, Insert Row After Selection (Ctrl+I), Insert Row Before Selection, Delete Selected Row, Insert Column After Selection, Insert Column Before Selection, Delete Selected Column, Edit Column Metadata

Either way you will see the New Data Table Wizard, which is described below. Throughout the New Data Package Wizard, items in **red** are required. The first screen of the New Data Table Wizard is shown below.



Begin by choosing one of the three options to tell the wizard what you would like to do. Each of these is described below.

- [CREATE](#)

An empty data table is created where you can type the data directly into Morpho. You also manually create documentation for the data table.

- [IMPORT](#)

An existing data file is imported into Morpho, and you create the documentation for the data using the wizard, either automatically or manually.

- [DESCRIBE](#)

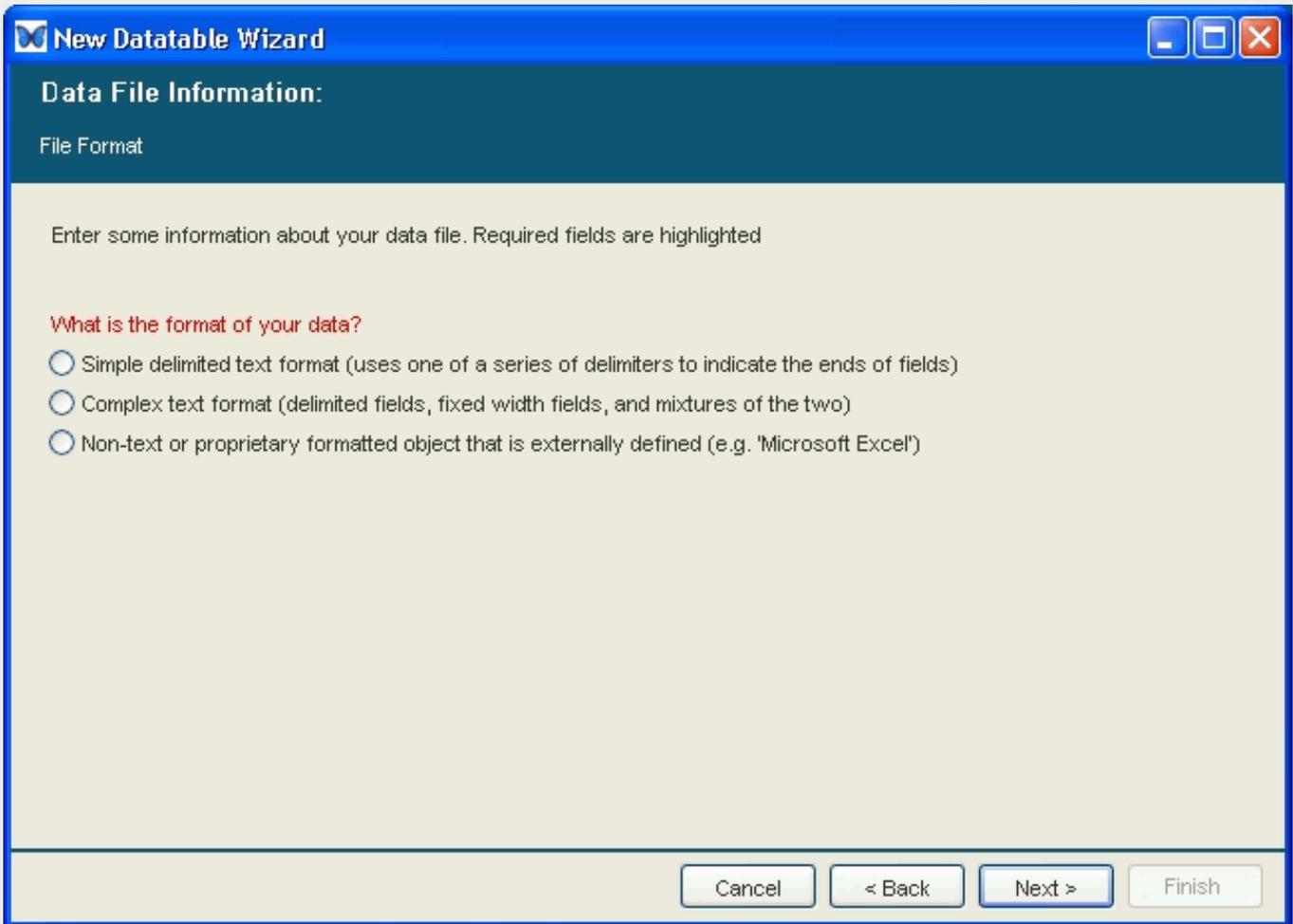
The data are NOT included in the data package, but you create the documentation for the data using the wizard, either automatically or manually.

Depending on which of these first three options you choose, you will see different subsequent screens and provide different information throughout the New Data Table Wizard. Each of these three alternate paths is described below.

## Create

## File Format

If "CREATE" is selected in the screen pictured above, you will create a new data table that is empty, where you can type the data in later, and you will also create documentation (metadata) for the table. Clicking "Next" will bring you to the screen pictured below, where you indicate the format of your data.



The screenshot shows a Windows-style dialog box titled "New Datatable Wizard". The main area is titled "Data File Information:" and has a sub-section "File Format". Below this, there is a prompt: "Enter some information about your data file. Required fields are highlighted". A red heading asks "What is the format of your data?". Three radio button options are listed: "Simple delimited text format (uses one of a series of delimiters to indicate the ends of fields)", "Complex text format (delimited fields, fixed width fields, and mixtures of the two)", and "Non-text or proprietary formatted object that is externally defined (e.g. 'Microsoft Excel')". At the bottom, there are four buttons: "Cancel", "< Back", "Next >", and "Finish".

If the data is in a simple delimited text format, then choose the first option. You will then see the additional prompts shown below. Indicate if the data attributes are arranged in rows or columns. Then choose one or more delimiters used in the formatting to indicate where the end of fields occur.

**New Datatable Wizard**

**Data File Information:**

File Format

Enter some information about your data file. Required fields are highlighted

**What is the format of your data?**

Simple delimited text format (uses one of a series of delimiters to indicate the ends of fields)  
 Complex text format (delimited fields, fixed width fields, and mixtures of the two)  
 Non-text or proprietary formatted object that is externally defined (e.g. 'Microsoft Excel')

**Simple delimited text format (uses one of a series of delimiters to indicate the ends of fields)**

Data Attributes are arranged in:

Columns  
 Rows

Define one or more delimiters used to indicate the ends of fields:

tab  
 comma  
 space  
 semicolon  
 other

Delimiter(s)

If instead the data are in a complex text format, choose the second option. You will then see the additional prompts shown below. Indicate if the data attributes are arranged in rows or columns. You then can define whether the data contain fixed width fields, and if so what the width is, or of the data are delimited, and if so what the delimiter character is. You may add additional data structure documentation to this list, delete existing ones, or change the order of them, by using the buttons to the right of the screen.

**New Datatable Wizard**

**Data File Information:**

File Format

Enter some information about your data file. Required fields are highlighted

**What is the format of your data?**

Simple delimited text format (uses one of a series of delimiters to indicate the ends of fields)

Complex text format (delimited fields, fixed width fields, and mixtures of the two)

Non-text or proprietary formatted object that is externally defined (e.g. 'Microsoft Excel')

**Complex text format (delimited fields, fixed width fields, and mixtures of the two)**

Data Attributes are arranged in:

Columns

Rows

**Define the delimited fields and/or fixed width fields that describe how the data is structured:**

Fixed-Width or Delimited?	Width or Delimiter Character:
Fixed-Width	
Fixed-Width	
Delimited	

Buttons: Add, Delete, Move Up, Move Down

Buttons: Cancel, < Back, Next >, Finish

If the data are not in simple delimited text format or in complex text format, but are instead a Microsoft Excel file, then choose the third option under "What is the format of your data?". Additional prompts will then appear, shown in the screen pictured below. Choose one of the format types from the list. If the format of your data are not shown, then click "Other" and describe the format on the space provided.

**New Datable Wizard**

**Data File Information:**

File Format

Enter some information about your data file. Required fields are highlighted

**What is the format of your data?**

- Simple delimited text format (uses one of a series of delimiters to indicate the ends of fields)
- Complex text format (delimited fields, fixed width fields, and mixtures of the two)
- Non-text or proprietary formatted object that is externally defined (e.g. 'Microsoft Excel')

**Non-text or proprietary formatted object that is externally defined (e.g. 'Microsoft Excel')**

**Format:**

- Microsoft Excel
- XML text
- HTML text
- XHTML text
- mathematica
- other

If your format does not appear in the above list, select "other" and enter a description in the field above.  
This would preferably be in the form of a standard MIME type (e.g: application/msword ), but if you do not know the MIME type, enter a text description

Cancel < Back Next > Finish

Click "Next" when finished describing the file format. You will then see a screen which asks you to describe the data table, also known as an "entity", pictured below.

**New Datatable Wizard**

**Data Information:**

Table (Entity)

Enter some information about the data table contained in your file. If you have more than one data table, additional tables may be added after you create your data package. Required fields are highlighted.

**Table name:**

Enter a paragraph that describes the table or entity, its type, and relevant information about the data that it contains.  
[Example: Species abundance data for 1996 at the VCR LTER site]

Description

One or more attributes (columns) must be defined:

**Attributes**

Attribute Name	Attribute Definition	Measurement Scale

Begin by typing the name of the table, which is required. Add a description of the entity (table) if desired. This will be helpful in informing future viewers of the data package about the contents of the table, and will also serve to document the overall meaning of the table as well, and therefore adding a description is recommended. Next, you define the attributes of the data table in a number of ways. Only one attribute is required to be defined, but it is highly recommended that ALL attributes be defined. Click "Add" to define one of the attributes. You will then see the screen pictured below.

**Define Attribute or Column:**

**Name:**  Name of the attribute as it appears in the data file

**Label:**  A more readable label for the attribute

**Definition:**  Define the contents of the attribute (or column) precisely, so that a data user could interpret the attribute accurately. e.g. "spden" is the number of individuals of all macro invertebrate species found in the plot

**Category:**

Unordered: unordered categories or text (statistically **nominal**) e.g. Male, Female

Ordered: ordered categories (statistically **ordinal**) e.g. Low, High

Relative: values from a scale with equidistant points (statistically **interval**) e.g. 12.2 meters

Absolute: measurement scale with a meaningful zero point (statistically **ratio**) e.g. 273 Kelvin

Date-Time: date or time values from the Gregorian calendar e.g. 2002-10-24

[Help](#)

Begin by naming the attribute (which is often simply a column in the data table, but not always), and providing a label for the attribute (which should be shorter than the name). In the "Definition" field, provide a precise and descriptive definition of the attribute. This is probably the most important part of defining the attribute because it is where you provide information so that future viewers or users of the data can understand what the attribute means or represents. Next, choose the type of measurement scale for the data in the attribute in the "Category" section. Click "Help" for further explanation of each of these categories. Each measurement scale is also described below.

- Unordered (Nominal)

The unordered, or nominal, scale places values into named categories. The different values within a set are unordered. Text fields should be classified as nominal. Examples of unordered, or nominal, scales include gender (Male/Female) and marital status (single/married/divorced).

- Ordered (Ordinal)

The ordered, or ordinal, scale places values in a set order. All ordinal values are also nominal. Ordinal data show a particular value's position relative to other values, such as "low, medium, high, etc." The ordinal scale doesn't indicate the distance between each item. Examples of ordered, or ordinal, scales include level of agreement (Strongly agree, Agree, Disagree, Strongly disagree), or age class (Adult, Sub-adult, Juvenile).

- Relative (Interval)

The relative, or interval, scale uses equal-sized units of measurement on a scale between values. It therefore allows the comparison of the differences between two values on the scale. With interval data, the allowable values start from an arbitrary point (not a meaningful zero), and so there is no concept of 'zero' of the measured quantity. Consequently, ratios of interval values are not meaningful. For example, one can not infer that someone with a value of 80 on an

ecology test knows twice as much ecology as someone who scores 40 on the test, or that an object at 40 degrees C has twice the kinetic energy as an object at 20 degrees C. All interval values are also ordered and therefore are ordinal scale values as well. Example of relative, or interval, scales include the celsius temperature scale and the fahrenheit temperature scale.

- Absolute (Ratio)

The ratio scale is an interval scale with a meaningful zero point. The ratio scale begins at a true zero point that represents an absolute lack of the quality being measured. Thus, ratios of values are meaningful. For example, an object that is at elevation of 100 meters above sea level is twice as high as an object that is at an elevation of 50 meters above sea level (where sea level is the zero point). Also, an object at 300 degrees Kelvin has three times the kinetic energy of an object at 100 degrees Kelvin (where absolute zero (no motion) defines the zero point of the Kelvin scale). Interval values can often be converted to ratio values in order to make ratio comparisons legitimate. For example, an object at 40 degrees C is 313.15 degrees Kelvin, an object at 20 degrees C is 293.15 degrees Kelvin, and so the first object has approximately 1.07 times more kinetic energy (note the wrong answer you would have gotten had you taken the ratio of the values in Celsius). Examples of absolute, or ratio, scales include elevation, height, and the Kelvin temperature scale.

- Date-Time

Date and time values in the Gregorian calendar are very strange to use in calculations in that they have properties of both interval and ratio scales. They also have some properties that do not conform to the interval scale because of the adjustments that are made to time to account for the variations in the period of the Earth around the sun (e.g. leap years). While the Gregorian calendar has a meaningful zero point, it would be difficult to say that a value taken on midnight January 1, 1000 is twice as old as a value taken on midnight January 1 2000 because the scale has many irregularities in length in practice. However, over short intervals the scale has equidistant points based on the SI second, and so can be considered interval for some purposes, especially with respect to measuring the timing of short-term ecological events. Date and time values can be represented using several distinct notations, and so we have distinct documentation needs in terms of specifying the format of the value representation. Because of these pragmatic issues, Date-Time has been separated into its own measurement scale. Examples of date-time values are '2003-05-05', '1999/10/10', and '2001-10-10T14:23:20.3'.

It is important to keep in mind that a given type of data may fall under more than one of these categories because the categories are nested (i.e. ordinal data are also nominal, interval data are also ordinal and nominal, and ratio data are also interval, ordinal, and nominal). This may make choosing one category confusing, so remember to pick the category as low in the list as you can that still accurately describes the attribute's data.

Choosing one of these five choices will bring about additional prompts, allowing you to describe the categories themselves, units, number types, and other details. You will encounter different screens depending on which category is chosen, and each of these screens is described and shown below.

#### Unordered (nominal)

If "Unordered" is chosen, you will be first prompted to choose if the unordered categories are enumerated values belonging to a predefined list, or if they are text values (that are either free-form or that match a pattern). If you choose "Enumerated values", you will be prompted to choose if the location of the enumerated values. If you choose "Codes are defined here", you will see the screen pictured below. Click "Add" to add a code and its definition. For example, in your data table there may be values such as "M" and "F", which stand for male and female, respectively. Therefore M and F would go under "Code", and Male and Female would go under "Definition" in the table at the bottom of the screen.

**Define Attribute or Column:**

**Name:**  Name of the attribute as it appears in the data file

**Label:**  A more readable label for the attribute

**Definition:**  Define the contents of the attribute (or column) precisely, so that a data user could interpret the attribute accurately.  
e.g: "spden" is the number of individuals of all macro invertebrate species found in the plot

**Category:**

Unordered: unordered categories or text (statistically **nominal**) e.g: Male, Female

Ordered: ordered categories (statistically **ordinal**) e.g: Low, High

Relative: values from a scale with equidistant points (statistically **interval**) e.g: 12.2 meters

Absolute: measurement scale with a meaningful zero point (statistically **ratio**) e.g: 273 Kelvin

Date-Time: date or time values from the Gregorian calendar e.g: 2002-10-24

[Help](#)

**Unordered**

**Choose:**  Describe any codes that are used as values of the attribute.

**Location:**

**Definitions:**

Code	Definition

Attribute contains free-text in addition to those values listed above

Alternatively, you can choose to have the enumerated values (codes and their definitions) imported from elsewhere, in which case you will see the screen pictured below. At the right of the screen there is a button labeled "locate" which allows you to tell the New Data Table Wizard where the enumerated codes list is located.

**Define Attribute or Column:**

**Name:**  Name of the attribute as it appears in the data file

**Label:**  A more readable label for the attribute

**Definition:**  Define the contents of the attribute (or column) precisely, so that a data user could interpret the attribute accurately.  
e.g: "spden" is the number of individuals of all macro invertebrate species found in the plot

**Category:**

Unordered: unordered categories or text (statistically **nominal**) e.g: Male, Female

Ordered: ordered categories (statistically **ordinal**) e.g: Low, High

Relative: values from a scale with equidistant points (statistically **interval**) e.g: 12.2 meters

Absolute: measurement scale with a meaningful zero point (statistically **ratio**) e.g: 273 Kelvin

Date-Time: date or time values from the Gregorian calendar e.g: 2002-10-24

**Unordered**

**Choose:**  Describe any codes that are used as values of the attribute.

**Location:**  **Table Name:**

**Definitions:**

Code	Definition

Attribute contains free-text in addition to those values listed above

Clicking the "locate" button brings you to the screen pictured below. To import the codes later, choose the first option, "Import the definitions table into Morpho later", and click "OK" at the bottom of the window.

Alternatively, if the codes and their definitions are already contained in the data table you imported in the New Data Table Wizard, then choose the second option, "The definitions table has already been included in this package". An example of what you will see when this second option is chosen is pictured below for a sample data table. Choose the two columns which contain the codes and their definitions by clicking the check boxes at the top of those columns, and then click "OK" at the bottom of the window. You will be returned to the screen pictured above and the selected codes and definitions will be displayed in the "Definitions" table.

Note the check-box at the bottom of the screen. Check this box if your columns of data contain free-text, such as notes for example, in addition to the defined codes you provide in the "Definitions" table. Click "OK" when finished defining the attribute or column.

Select one of the following

Import the definitions table into Morpho later

The definitions table has already been included in this package

Select the two columns that define the codes and definitions. The selected columns should be in the same data table.

| <input type="checkbox"/> |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| ExampleData.txt          |
lake	site	sampdate	depth	sampvol	species	count
Lake Erie	N1	10JUN2000	1	10	Daphnia pulex	78
Lake Erie	N1	10JUN2000	5	10	Daphnia pulex	71
Lake Erie	N2	10JUN2000	1	10	Daphnia pulex	74
Lake Erie	N2	10JUN2000	5	10	Daphnia pulex	81
Lake Erie	N3	10JUN2000	1	10	Daphnia pulex	87
Lake Erie	N3	10JUN2000	5	10	Daphnia pulex	77
Lake Erie	N1	10JUN2000	1	10	Daphnia magna	78
Lake Erie	N1	10JUN2000	5	10	Daphnia magna	70
Lake Erie	N2	10JUN2000	1	10	Daphnia magna	75
Lake Erie	N2	10JUN2000	5	10	Daphnia magna	75
Lake Erie	N3	10JUN2000	1	10	Daphnia magna	78
Lake Erie	N3	10JUN2000	5	10	Daphnia magna	79
Lake Erie	N1	10JUL2000	1	10	Daphnia pulex	96

OK Cancel

Another possibility is that the data in the attribute or column are unordered, but they are text values. In this case, choose "Unordered" from the "Category" list, and choose "Text values (free-form or matching a pattern)" from the drop-down menu next to "Choose". Next, define the text values, and provide the name of their source, if applicable. You can also define the pattern of the text values by clicking "Add" at the bottom of the screen, and typing the pattern into the "Pattern(s)" table. You can then delete any patterns you would like using the "Delete" button. Click "OK" when finished.

**Define Attribute or Column:**

**Name:**  Name of the attribute as it appears in the data file

**Label:**  A more readable label for the attribute

**Definition:**  Define the contents of the attribute (or column) precisely, so that a data user could interpret the attribute accurately.  
e.g. "spden" is the number of individuals of all macro invertebrate species found in the plot

**Category:**

Unordered: unordered categories or text (statistically **nominal**) e.g. Male, Female

Ordered: ordered categories (statistically **ordinal**) e.g. Low, High

Relative: values from a scale with equidistant points (statistically **interval**) e.g. 12.2 meters

Absolute: measurement scale with a meaningful zero point (statistically **ratio**) e.g. 273 Kelvin

Date-Time: date or time values from the Gregorian calendar e.g. 2002-10-24

**Help**

**Unordered**

**Choose:** Text values (free-form or matching a pat... Describe a free text domain for the attribute.

**Definition:**  e.g. U.S. telephone numbers in the format (999) 888-7777

**Source:**  e.g. FIPS standard for postal abbreviations for U.S. states

**Pattern(s) (optional):**    Patterns are interpreted as regular expressions constraining allowable character sequences. e.g. [0-9K3]-[0-9K3]-[0-9K4] allows only numeric digits in the pattern of US phone numbers

### Ordered (ordinal)

If "Ordered" is chosen as the category, then the same prompts and choices that were just described for the "Unordered" category will be shown. Go through the same steps that were just described, or click [here](#) to jump to that section.

### Relative (interval)

If "Relative" is chosen as the category, then you will be presented with a different set of prompts for documentation than described above. You will see the screen pictured below. Begin by choosing the type of measurement from the first drop-down list. Next, choose the appropriate unit in the drop-down list to the right.

**Define Attribute or Column:**

**Name:**  Name of the attribute as it appears in the data file

**Label:**  A more readable label for the attribute

**Definition:**  Define the contents of the attribute (or column) precisely, so that a data user could interpret the attribute accurately.  
e.g. "spden" is the number of individuals of all macro invertebrate species found in the plot

**Category:**

Unordered: unordered categories or text (statistically **nominal**) e.g. Male, Female

Ordered: ordered categories (statistically **ordinal**) e.g. Low, High

Relative: values from a scale with equidistant points (statistically **interval**) e.g. 12.2 meters

Absolute: measurement scale with a meaningful zero point (statistically **ratio**) e.g. 273 Kelvin

Date-Time: date or time values from the Gregorian calendar e.g. 2002-10-24

[Help](#)

**Relative**

**Standard Unit:** Area  squareMile

**Precision:**  e.g. for an attribute with unit "meter", a precision of "0.1" would be interpreted as precise to the nearest 1/10th of a meter

**Number Type:** NATURAL (non-zero counting numbers: ...

**Bounds:** Min.     Max.

You also have the option of defining a new unit by clicking the "Define new unit" button located at the right of the screen. This option is described in the next paragraph.

To define a new unit, click on the button that says "Define new unit". You will then see the screen pictured below. You can either type in the unit type in the first field, or use the drop down list to choose the unit type from a list. Next, click "Add". You will see a drop-down list of unit types appear under "Unit". The idea here is to construct your new unit by defining the units it is comprised of, and the power of each component unit in the new unit. As an example, consider the new unit to be of the type "velocity". You would begin by choosing "velocity" under the Unit Type drop-down list. You would then click "Add" and choose "Length" from the drop down list found under "Unit". The power of that unit would be 1. You would click "Add" again and choose "Time" from the drop-down list under "Unit", and the power of that unit would be -1. Putting those two units together according to the indicated powers gives you a new unit of length/time.

**New Unit Definition**

Enter the type, definition and name of the new unit. You can either select an existing Unit Type or create a new Unit Type by defining it in terms of the fundamental unit types.

**Unit Type**  Select the category that the unit belongs to. You can also define a new category if needed.

**Unit Type Definition**

Unit	Power

Add  
Delete  
Move Up  
Move D...

Define the unit category as a product of the basic unit types available. Specify the unit type and the power it is raised to.  
e.g: for a unit type like 'velocity', which is given by meterPerSecond, the definition would be -  
Unit = Length Power = 1  
Unit = Time Power = -1

**Unit Name**  Specify the name of the unit. e.g: meterPerSecond

**SI Unit**  Specify the SI unit for this Unit Type. e.g: meter

**Multiplication Factor**  Define the multiplier to convert the given unit to the SI unit. e.g: 1

**Description**

OK Cancel

Next, you name the new unit. You also will specify the SI unit that corresponds to the new unit you have defined. If known, you can provide the conversion factor in the next field that would convert your unit to the SI unit. You can also provide a description of the new unit in the final field. Click "OK" at the bottom of the window when you are done defining your new unit.

After choosing or defining the unit, indicate the precision of the chosen or defined unit in the data by typing in the field next to "Precision". Next, choose the number type of the data from the drop-down list. See the next paragraph for further explanation in choosing a number type. Finally, you can indicate the bounds of the values in the attribute or column at the bottom of the screen. Click "Add" to do this, and type in the indicated information. Use "Delete" to remove a set of bounds you entered.

The four number types provided in the drop-down list are not discrete classes – some overlap, so choosing the appropriate number type can be confusing. Remember to choose the type that most specifically and accurately describes the data in the attribute or column you are defining.

- Natural numbers

Natural numbers are positive and non-zero counting numbers (i.e. non-fractions), such as 1, 2, 3, and so on. They cannot be negative or zero. When thinking of counting numbers, think about counting a basket of oranges, or counting something using your fingers (although natural numbers can be larger than ten!). There are no fractions of oranges or fractions of fingers (hopefully!), and there are no negative numbers of oranges or negative numbers of fingers. Natural numbers are one type of whole numbers.

- Whole numbers

Whole numbers are just like natural numbers, except zero is included in the set of whole numbers, and therefore whole numbers are positive counting numbers and zero: 0, 1, 2, 3, and so on. Just like natural numbers, they cannot be fractions or negative. Whole numbers are a type of integer, and they include natural numbers.

- Integer numbers

Integers are just like whole numbers, except negative counting numbers are included in this set. Therefore integers are positive and negative counting numbers and zero, such as -3, -2, -1, 0, 1, 2, 3, and so on. Just like whole and natural numbers they cannot be fractions. Integers are a type of rational numbers, and they include whole numbers and natural numbers.

- Real numbers

Real numbers are the broadest set of numbers. They can be negative and positive fractions and counting numbers, and can include zero. Therefore a list of numbers like the following would be a set of real numbers:  $-1/2$ , -0.25, 3.14, 0, 1, -25,  $5/8$ , and so on. As you can see from this list of examples, real numbers include integers, whole numbers, and natural numbers.

#### Absolute (ratio)

Choosing "Absolute" as the data category will take you through the same set of choices and prompts as was just described above when "Relative" was chosen. Click [here](#) to read a description of this.

#### Date-Time

The fifth choice under "Category" is "Date-Time". If you choose this category, you will see the screen pictured below.

**Define Attribute or Column:**

**Name:**  Name of the attribute as it appears in the data file

**Label:**  A more readable label for the attribute

**Definition:**  Define the contents of the attribute (or column) precisely, so that a data user could interpret the attribute accurately.  
e.g: "spden" is the number of individuals of all macro invertebrate species found in the plot

**Category:**

Unordered: unordered categories or text (statistically **nominal**) e.g: Male, Female

Ordered: ordered categories (statistically **ordinal**) e.g: Low, High

Relative: values from a scale with equidistant points (statistically **interval**) e.g: 12.2 meters

Absolute: measurement scale with a meaningful zero point (statistically **ratio**) e.g: 273 Kelvin

Date-Time: date or time values from the Gregorian calendar e.g: 2002-10-24

**Datetime**

**Format:**  e.g: YYYY-MM-DDThh:mm:ss , YYYY-MM-DD , hh:mm:ss.sss

**Precision:**  Precision of a date or time measurement, interpreted in the smallest units represented by the datetime format. e.g: 1

**Bounds:**

Min.	Max.
<input type="text"/>	<input type="text"/>

Range of permitted values, in same date-time format as used in the format description above. e.g: if format is "YYYY-MM-DD", a valid minimum would be "2001-05-29"

Type the format of the date and/or time in the field next to "Format", using the examples given to the right of the field as a guide (although formats other than those shown in the examples may be used). Next, provide the precision of the date and/or time format. You may also indicate the upper and/or lower bounds of the date and/or time using the "Bounds" table at the bottom of the screen. Click "Add" to do this, and click "Delete" if you wish to remove a set of bounds you previously entered.

After choosing one of the five choices for "Category" that have been described here, and after filling out all of the required information and any additional information you wish to include at the bottom of the window, click "OK". You have just added a description of ONE of the attributes or columns of the data. You should then see the information displayed in the list of attribute descriptions in the screen pictured below. To describe another attribute or column, click "Add" again, and go through this process again for the new attribute you wish to define. After defining multiple attributes, you can delete the descriptions, or change the order of the descriptions, using the buttons to the left of the screen.

**New Datatable Wizard**

**Data Information:**

Table (Entity)

Enter some information about the data table contained in your file. If you have more than one data table, additional tables may be added after you create your data package. Required fields are highlighted.

**Table name:**

Enter a paragraph that describes the table or entity, its type, and relevant information about the data that it contains.  
[Example: Species abundance data for 1996 at the VCR LTER site]

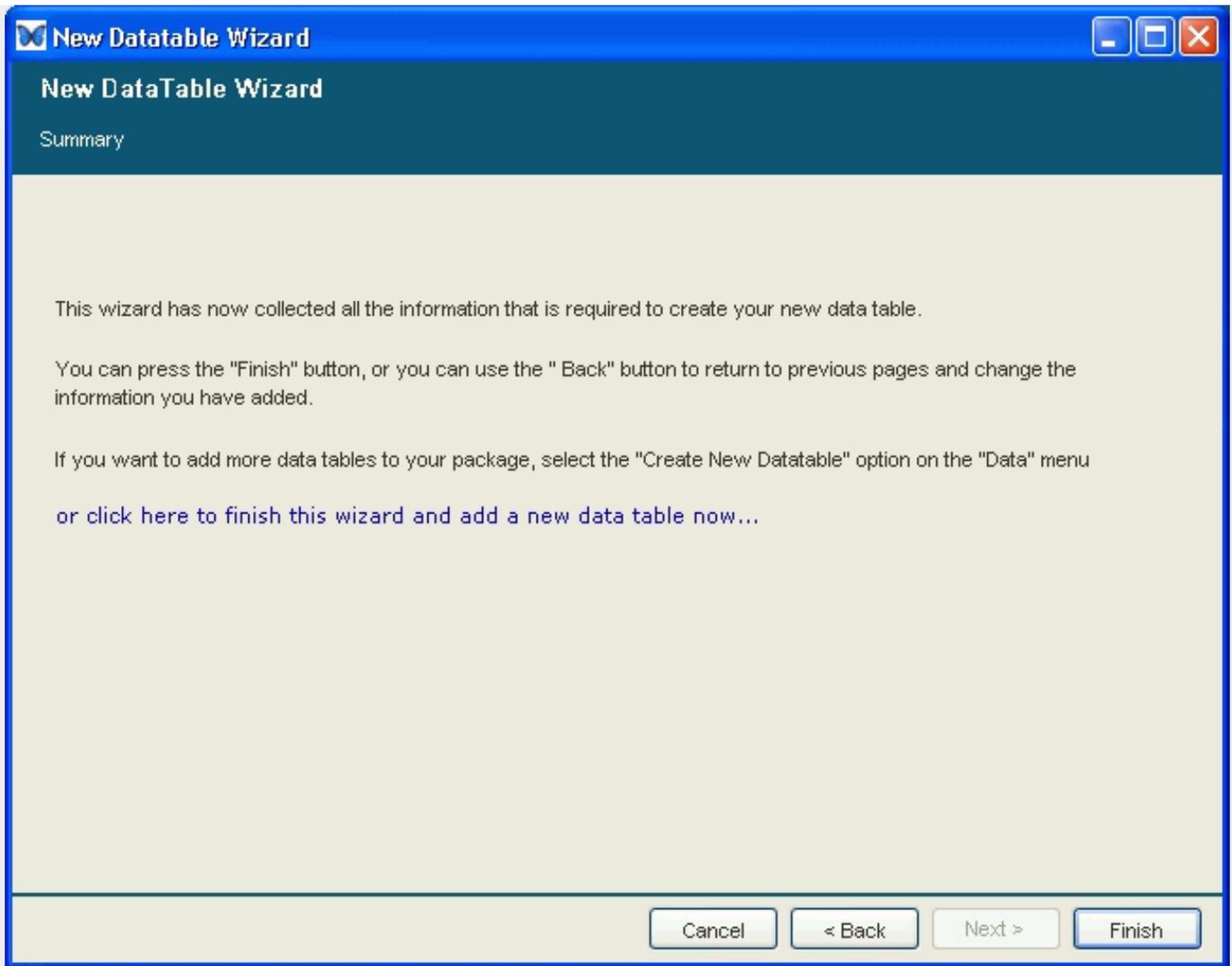
Description

One or more attributes (columns) must be defined:

**Attributes**

Attribute Name	Attribute Definition	Measurement Scale
----------------	----------------------	-------------------

After you have added all of the attribute documentation you would like to, click "Next" at the bottom of the screen. You will then see the final screen of the New Data Table Wizard, pictured below.



Click "Finish" to finish the documentation of the data table, or click on "[or click here to finish this wizard and add a new data table now...](#)" to finish adding documentation of the data table and to add documentation for another data table using the New Data Table Wizard again. After clicking "Finish", you will then be presented with a data package that shows an empty data table, documentation for the attributes or columns of data that you just added using the New Data Table Wizard, and any documentation you had added previously using the [Data Package Wizard](#). You can now type the data directly into the columns in the empty data table, or paste the data into the data table from elsewhere.

### Import

On the first screen of the New Data Table Wizard, you are given three choices under "Where is your data?". If "IMPORT" is selected, you will then see additional prompts, shown in the screen below.

**New DataTable Wizard**

**New DataTable Wizard**

Data Location

Describe and optionally include a data table in your data package. You may create a table from scratch and populate it using Morpho's spreadsheet-style data editor, or you can import certain types of existing data files and use the wizard to automatically extract much of the metadata from the data file itself. If you choose this option, you will be prompted to review the metadata that is extracted and provide any required fields that can not be generated automatically for each column.

You can also choose to manually enter all of the required fields (rather than using the metadata extractor), which is useful for proprietary file types like Excel, or other file types we don't yet support for extraction.

**Where is your data?**

CREATE - create a new, empty data table and its metadata description.

IMPORT - import a data file into the package, and create its metadata description

DESCRIBE - include only a metadata description of a web-accessible, archived or inaccessible data file

**How do you want to enter the metadata description?**

AUTOMATIC - Import data file and extract metadata description for review

MANUAL - Import data file but enter metadata description manually

**File Location:**

Use the "locate" button to locate the data file on your computer:

File Name:

Under "How do you want to enter the metadata description", there are two options. Automatic is where the documentation for the data table is automatically extracted from the table itself by Morpho, and is shown to you for review and editing, if necessary. Manual is where the documentation is entered manually by you in the wizard. After choosing one of these two options, tell the wizard where the data is that you would like to import by clicking on "locate...". You will be shown a map of your computer and can indicate where the data file is. Click "Next" after choosing the file location.

If you chose to document the data manually, then you will follow the steps that were outlined previously under the "Create" section above ([start here](#)).

If you chose to document the data automatically, then clicking "Next" will bring the screen pictured below into view. The screen includes some sample data shown for illustration purposes. Your data might look quite different.

**Text Import Wizard**

**New DataTable Wizard**

This set of screens will create metadata based on the content of the specified data file

Table Name:

Description:

Start import at row:   Column Labels are in starting row

#	Lines in jscientist.txt
1	Lake,site,sampdate,depth,sampvol,species,count
2	Lake Erie N1 10JUN2000 1 10 Daphnia pulex 78
3	Lake Erie N1 10JUN2000 5 10 Daphnia pulex 71
4	Lake Erie N2 10JUN2000 1 10 Daphnia pulex 74
5	Lake Erie N2 10JUN2000 5 10 Daphnia pulex 81
6	Lake Erie N3 10JUN2000 1 10 Daphnia pulex 87
7	Lake Erie N3 10JUN2000 5 10 Daphnia pulex 77
8	Lake Erie N1 10JUN2000 1 10 Daphnia magna 78
9	Lake Erie N1 10JUN2000 5 10 Daphnia magna 70
10	Lake Erie N2 10JUN2000 1 10 Daphnia magna 75
11	Lake Erie N2 10JUN2000 5 10 Daphnia magna 75
12	Lake Erie N3 10JUN2000 1 10 Daphnia magna 78
13	Lake Erie N3 10JUN2000 5 10 Daphnia magna 79
14	Lake Erie N1 10JUL2000 1 10 Daphnia pulex 96
15	Lake Erie N1 10JUL2000 5 10 Daphnia pulex 87

Step #1 of 10

Begin by entering the name and a brief description of the data table. Indicate which row you would like the importation of data to start at (for example, you can skip some blank rows that may occur at the top of your data table by starting at a later row). If the first row that you start at contains the column labels, then click the box in the middle of the screen. Click "Next". You will then see the screen pictured below.

**Text Import Wizard**

If the columns indicated in the table are incorrect, try changing the assumed delimiter(s)

Delimiters:  tab  comma  space  semicolon  other

Treat consecutive delimiters as one

Lake	site	sampdate	depth	sampvol	species	count
Lake Erie	N1	10JUN2000	1	10	Daphnia pulex	78
Lake Erie	N1	10JUN2000	5	10	Daphnia pulex	71
Lake Erie	N2	10JUN2000	1	10	Daphnia pulex	74
Lake Erie	N2	10JUN2000	5	10	Daphnia pulex	81
Lake Erie	N3	10JUN2000	1	10	Daphnia pulex	87
Lake Erie	N3	10JUN2000	5	10	Daphnia pulex	77
Lake Erie	N1	10JUN2000	1	10	Daphnia mag...	78
Lake Erie	N1	10JUN2000	5	10	Daphnia mag...	70
Lake Erie	N2	10JUN2000	1	10	Daphnia mag...	75
Lake Erie	N2	10JUN2000	5	10	Daphnia mag...	75
Lake Erie	N3	10JUN2000	1	10	Daphnia mag...	78
Lake Erie	N3	10JUN2000	5	10	Daphnia mag...	79
Lake Erie	N1	10JUL2000	1	10	Daphnia pulex	96
Lake Erie	N1	10JUL2000	5	10	Daphnia pulex	97

Step #2 of 10

Select one or more of the delimiters listed at the top of the screen. Choosing different delimiters will change the layout of your data. The data should be laid out correctly when the correct delimiter or combination of delimiters is chosen. You may also indicate that consecutive delimiters be counted as one by checking the box. Clicking "Next" will begin the process of verifying the documentation that Morpho has automatically generated for each of the columns in the data table. The screen pictured below is an example of what you might see.

**Text Import Wizard**

**Lake**

**Define Attribute or Column:**

**Name:**  Name of the attribute as it appears in the data file

**Label:**  A more readable label for the attribute

**Definition:**  Define the contents of the attribute (or column) precisely, so that a data user could interpret the attribute accurately.  
e.g: "spden" is the number of individuals of all macro invertebrate species found in the plot

**Category:**

Unordered: unordered categories or text (statistically **nominal**) e.g: Male, Female

Ordered: ordered categories (statistically **ordinal**) e.g: Low, High

Relative: values from a scale with equidistant points (statistically **interval**) e.g: 12.2 meters

Absolute: measurement scale with a meaningful zero point (statistically **ratio**) e.g: 273 Kelvin

Date-Time: date or time values from the Gregorian calendar e.g: 2002-10-24

**Unordered**

**Choose:**  Describe a free text domain for the attribute.

**Definition:**  e.g: U.S. telephone numbers in the format (999) 888-7777

**Source:**  e.g: FIPS standard for postal abbreviations for U.S. states

**Pattern(s):**    Patterns are interpreted as regular expressions constraining allowable character sequences. e.g: `{0-9}{3}-{0-9}{3}-{0-9}{4}` allows only numeric digits in the pattern of US phone numbers

Step #3 of 10

Another example is shown below. Note that Morpho automatically placed the codes in the table under "Code", but you have to provide the definition of the codes. You must also provide definitions of the columns (Morpho does not do this automatically). Examine all of the other areas of documentation, making sure that the category, units, and all other documentation is correct. You may also add to the documentation or change anything that is in error by typing in the fields shown or choosing selections from the drop-down menus. Click "Next" at the bottom of the screen. Each screen provides the documentation for one of the attributes or columns of data. Continue in this way until all of the attributes or columns have been documented.

**Text Import Wizard**

**Define Attribute or Column:**

**Name:**  Name of the attribute as it appears in the data file

**Label:**  A more readable label for the attribute

**Definition:**  Define the contents of the attribute (or column) precisely, so that a data user could interpret the attribute accurately.  
e.g: "spden" is the number of individuals of all macro invertebrate species found in the plot

**Category:**

Unordered: unordered categories or text (statistically **nominal**) e.g: Male, Female

Ordered: ordered categories (statistically **ordinal**) e.g: Low, High

Relative: values from a scale with equidistant points (statistically **interval**) e.g: 12.2 meters

Absolute: measurement scale with a meaningful zero point (statistically **ratio**) e.g: 273 Kelvin

Date-Time: date or time values from the Gregorian calendar e.g: 2002-10-24

**Unordered**

**Choose:**  Describe any codes that are used as values of the attribute.

**Location:**

**Definitions:**

Code	Definition
N1	Deepest part of lake
N2	Northwest corner of lake
N3	Southeast corner of lake

Attribute contains free-text in addition to those values listed above

Step #4 of 10

When all of the columns of data have been documented, you will see the final, finish screen, pictured [here](#).

## Describe

On the first screen of the New Data Table Wizard, you are given three choices under "Where is your data?". If "DESCRIBE" is chosen under "Where is your data?", the data itself will not be included in the data package, but you will provide documentation for it. This is useful for documenting the data for yourself, as well as for telling others about the data if the data package is made viewable by others, without sharing the data itself.

If "DESCRIBE" is selected, then additional prompts will appear on the screen, pictured below. To have the documentation for the data extracted automatically from an existing data file (without the data itself being extracted) for your review, then choose "AUTOMATIC". You will then tell the Wizard where the data file is. Instructions for what to do next if you choose AUTOMATIC have already been provided above (click [here](#)).

**New DataTable Wizard**

**New DataTable Wizard**

Data Location

Describe and optionally include a data table in your data package. You may create a table from scratch and populate it using Morpho's spreadsheet-style data editor, or you can import certain types of existing data files and use the wizard to automatically extract much of the metadata from the data file itself. If you choose this option, you will be prompted to review the metadata that is extracted and provide any required fields that can not be generated automatically for each column.

You can also choose to manually enter all of the required fields (rather than using the metadata extractor), which is useful for proprietary file types like Excel, or other file types we don't yet support for extraction.

**Where is your data?**

- CREATE - create a new, empty data table and its metadata description.
- IMPORT - import a data file into the package, and create its metadata description
- DESCRIBE - include only a metadata description of a web-accessible, archived or inaccessible data file

**How do you want to enter the metadata description?**

- AUTOMATIC - create metadata description by inspecting data file (but omit data file from package)
- MANUAL - Enter metadata description manually

**File Location:**

Use the "locate" button to locate the data file on your computer:

**File Name:**

To manually enter the documentation for the data in the Wizard, choose "MANUAL". You will then be prompted, as shown on the screen pictured below, to indicate where the data resides. If the data are not currently available, then choose "Not available".

**New DataTable Wizard**

Data Location

Describe and optionally include a data table in your data package. You may create a table from scratch and populate it using Morpho's spreadsheet-style data editor, or you can import certain types of existing data files and use the wizard to automatically extract much of the metadata from the data file itself. If you choose this option, you will be prompted to review the metadata that is extracted and provide any required fields that can not be generated automatically for each column.

You can also choose to manually enter all of the required fields (rather than using the metadata extractor), which is useful for proprietary file types like Excel, or other file types we don't yet support for extraction.

**Where is your data?**

- CREATE - create a new, empty data table and its metadata description.
- IMPORT - import a data file into the package, and create its metadata description
- DESCRIBE - include only a metadata description of a web-accessible, archived or inaccessible data file

**How do you want to enter the metadata description?**

- AUTOMATIC - create metadata description by inspecting data file (but omit data file from package)
- MANUAL - Enter metadata description manually

**Data Location?**

- Not available
- Online URL
- Archived

Cancel   < Back   Next >   Finish

If the data are available online, then choose "Online URL", and type in the file name and URL in the spaces provided, as shown in the screen pictured below.

**New DataTable Wizard**

**New DataTable Wizard**

Data Location

Describe and optionally include a data table in your data package. You may create a table from scratch and populate it using Morpho's spreadsheet-style data editor, or you can import certain types of existing data files and use the wizard to automatically extract much of the metadata from the data file itself. If you choose this option, you will be prompted to review the metadata that is extracted and provide any required fields that can not be generated automatically for each column.

You can also choose to manually enter all of the required fields (rather than using the metadata extractor), which is useful for proprietary file types like Excel, or other file types we don't yet support for extraction.

**Where is your data?**

CREATE - create a new, empty data table and its metadata description.

IMPORT - import a data file into the package, and create its metadata description

DESCRIBE - include only a metadata description of a web-accessible, archived or inaccessible data file

**How do you want to enter the metadata description?**

AUTOMATIC - create metadata description by inspecting data file (but omit data file from package)

MANUAL - Enter metadata description manually

**Data Location?**

Not available

Online URL

Archived

**Online URL**

**File Name:**

**URL:**

Cancel < Back Next > Finish

If the data are archived, such as on a disk or a hardcopy, then choose "Archived", and provide the medium the data is found in or on, as well as the name or title of the data, in the spaces provided (pictured below).

**New DataTable Wizard**

**New DataTable Wizard**

Data Location

Describe and optionally include a data table in your data package. You may create a table from scratch and populate it using Morpho's spreadsheet-style data editor, or you can import certain types of existing data files and use the wizard to automatically extract much of the metadata from the data file itself. If you choose this option, you will be prompted to review the metadata that is extracted and provide any required fields that can not be generated automatically for each column.

You can also choose to manually enter all of the required fields (rather than using the metadata extractor), which is useful for proprietary file types like Excel, or other file types we don't yet support for extraction.

**Where is your data?**

CREATE - create a new, empty data table and its metadata description.

IMPORT - import a data file into the package, and create its metadata description

DESCRIBE - include only a metadata description of a web-accessible, archived or inaccessible data file

**How do you want to enter the metadata description?**

AUTOMATIC - create metadata description by inspecting data file (but omit data file from package)

MANUAL - Enter metadata description manually

**Data Location?**

Not available

Online URL

Archived

**Archived**

Archived data may be stored on digital media (tapes, disks), or printed media (hardcopy).

Type of medium on which data is distributed. eg: Tape, 3.5 inch Floppy Disk, hardcopy

**Medium Type:**

Enter an identifying name in the space below eg a title for hardcopy, or a filename for digital media

**Name/Title:**

Cancel < Back Next > Finish

After finishing making selections and filling out fields on the first screen of the New Data Table Wizard, click "Next" at the bottom of the screen to continue. Instructions for what to do next if you choose MANUAL have already been provided above (click [here](#)).

### Importing and Documenting Other Data Types

Although the New Data Table Wizard is designed for importing and documenting tabular data, it can also be used to import and document other types of data, such as images. To do this, you would choose "IMPORT" (or "DESCRIBE" if you do not want to include the image but do want to create documentation) on the Data Location screen, pictured above. You would then choose "MANUAL" metadata entry (since there is no data table from which Morpho can automatically extract the data). Indicate where the data file is located, and then click "Next" at the bottom of the screen. ON the file format screen, you would choose the third option "Non-text or proprietary formatted object that is externally defined", choose "Other", and type in the file type (such as .gif or .jpeg). Continue on in the New Data Table Wizard, filling out the applicable documentation fields (such as name and description) and ignoring or filling in "none" for fields that don't apply to the image. See more about including images in a data package [here](#).

### Manipulating Data Tables

Once you have either created or imported a data table or multiple data tables in Morpho, you can then edit and manipulate that data. Under the "Data" menu there are a number of tools to help you do this. They are shown in the screen below. You can also access this same set of tools by right-clicking on the desired row or column.

The screenshot shows the Morpho software interface with a data table and a context menu open. The data table has columns for lake, site, date, and species. The context menu is open over the 'site' column, showing options like 'Sort by Selected Column', 'Insert Row After Selection', and 'Delete Selected Row'.

lake	site	date	count	species
Lake Erie	N1	10JUN2000	1	Daphnia pule
Lake Erie	N1	10JUN2000	1	Daphnia pule
Lake Erie	N2	10JUN2000	1	Daphnia pule
Lake Erie	N2	10JUN2000	5	Daphnia pule
Lake Erie	N3	10JUN2000	1	Daphnia pule
Lake Erie	N3	10JUN2000	5	Daphnia pule
Lake Erie	N1	10JUN2000	1	Daphnia mac
Lake Erie	N1	10JUN2000	5	Daphnia mac
Lake Erie	N2	10JUN2000	1	Daphnia mac
Lake Erie	N2	10JUN2000	5	Daphnia mac
Lake Erie	N3	10JUN2000	1	Daphnia mac

- Sorting

To sort the rows of a data table, select the column which you would like to sort by, and click "Sort by Selected Column". For example, in the sample data set pictured above, the second column, "site", was selected, and then "Sort by Selected Column" was selected from the "Data" menu. The results are pictured below. Notice that the data in the second column is now sorted, and the data in the other columns have also moved so that all of the rows are the same as they were, only moved.

Joe Scientist: **Population sampling data for zooplankton in the Great Lakes, 2000 (fictitious sample data :)**  
**Accession Number: jscientist.2.1** Keywords: zooplankton, Van Dorn sampling, population survey, fictitious sample dat...

Text	Text	Text	Integers meters	Floating Point cm3	Text	Integers
lake	site	sampdate	depth	sampvol	species	count
Lake Erie	N1	10JUN2000	1	10	Daphnia pulex	78
Lake Erie	N1	10JUN2000	5	10	Daphnia pulex	71
Lake Erie	N1	10JUN2000	1	10	Daphnia ma...	78
Lake Erie	N1	10JUN2000	5	10	Daphnia ma...	70
Lake Erie	N1	10JUL2000	1	10	Daphnia pulex	96
Lake Erie	N1	10JUL2000	5	10	Daphnia pulex	97
Lake Erie	N1	10JUL2000	1	10	Daphnia ma...	91
Lake Erie	N1	10JUL2000	5	10	Daphnia ma...	92
Lake Erie	N2	10JUN2000	1	10	Daphnia pulex	74
Lake Erie	N2	10JUN2000	5	10	Daphnia pulex	81
Lake Erie	N2	10JUN2000	1	10	Daphnia ma...	75
Lake Erie	N2	10JUN2000	5	10	Daphnia ma...	75

ExampleData.txt

Entity/Attribute: site

Column Name: site

Column Label: site

Code: indication

Definition: specific site

Type of Value: Text

Measurement Type: nominal

Measurement: Domain

Domain: Info

- Inserting and Deleting Rows and Columns

The next six items under the "Data" menu allow you to insert new rows or columns, either before or after the row or column that is selected in the table, as well as delete selected rows or columns. This works much like the same functions in Microsoft Excel.

- Editing Column Documentation

In addition to manipulating the rows and columns, you can directly edit the documentation that you previously entered in the New Data Table Wizard, or add documentation, about the columns. After selecting the column for which you would like to edit the documentation, look under the "Data" menu, and select "Edit Column Metadata". You will then see a screen, pictured below for the second column of the sample data set, where the current documentation for the column is displayed. This screen works just like it did in the New Data Table Wizard (click [here](#) to revisit this section). You can edit or add to the documentation shown in this screen, and click OK when finished.

**Define Attribute or Column:**

**Name:**  Name of the attribute as it appears in the data file

**Label:**  A more readable label for the attribute

**Definition:**  Define the contents of the attribute (or column) precisely, so that a data user could interpret the attribute accurately.  
e.g: "spden" is the number of individuals of all macro invertebrate species found in the plot

**Category:**

Unordered: unordered categories or text (statistically **nominal**) e.g: Male, Female

Ordered: ordered categories (statistically **ordinal**) e.g: Low, High

Relative: values from a scale with equidistant points (statistically **interval**) e.g: 12.2 meters

Absolute: measurement scale with a meaningful zero point (statistically **ratio**) e.g: 273 Kelvin

Date-Time: date or time values from the Gregorian calendar e.g: 2002-10-24

[Help](#)

**Unordered**

**Choose:**  Describe any codes that are used as values of the attribute.

**Location:**

**Definitions:**

Code	Definition
N1	N1
N2	N2
N3	N3

Attribute contains free-text in addition to those values listed above

- Cut, Copy and Paste

Cut, copy, and paste, which can be accessed under the "Edit" menu (pictured below) work in Morpho just like they do in Microsoft applications like Word and Excel. Shortcut keys on your keyboard can also be used just like in Microsoft applications (Ctrl+X cuts, Ctrl+V pastes, and Ctrl+C copies). You can relocate or delete rows and columns using these tools.

The screenshot shows the Morpho software window titled "Data Package: jscientist.2.1". The menu bar includes File, Edit, Search, Documentation, Data, Window, and Help. The "Edit" menu is open, showing options: Revert Tab, Revert All Tabs, Cut, Copy, and Paste. The main window displays a data table from "ExampleData.txt" with the following columns: lake, site, sampdate, depth, sampvol, species, and count. The data rows are as follows:

lake	site	sampdate	depth	sampvol	species	count
Lake Erie	N1	10JUN2000	1	10	Daphnia pulex	78
Lake Erie	N1	10JUN2000	5	10	Daphnia pulex	71
Lake Erie	N1	10JUN2000	1	10	Daphnia ma...	78
Lake Erie	N1	10JUN2000	5	10	Daphnia ma...	70
Lake Erie	N1	10JUL2000	1	10	Daphnia pulex	96
Lake Erie	N1	10JUL2000	5	10	Daphnia pulex	97
Lake Erie	N1	10JUL2000	1	10	Daphnia ma...	91
Lake Erie	N1	10JUL2000	5	10	Daphnia ma...	92
Lake Erie	N2	10JUN2000	1	10	Daphnia pulex	74
Lake Erie	N2	10JUN2000	5	10	Daphnia pulex	81
Lake Erie	N2	10JUN2000	1	10	Daphnia ma...	75

To the right of the table is a metadata panel for the "lake" column. It shows "Column Name" as "lake" and "Column Label" as "lake". The "Definition" field contains the text: "The name of the lake (but you could guess".

Another option is to paste data into a data table in Morpho from elsewhere, so that you don't have to type it in. This is easy to do, and generally involves using the "Paste" command in Morpho. Click [here](#) to read more about pasting data into a data table.

- Reverting (undoing changes)

If you change your mind about any of the changes you have made to one or more tables in your data package, you can undo these changes (as long as you have not saved the data package since making the changes). Under the "Edit" menu, choosing "Revert Tab" will cause all changes that have been made on the table that is displayed since the last time you saved the data package to be reversed. Choosing "Revert All Tabs" causes all changes that have been made to all of the tables in the data package since the last time you saved the data package to be reversed. The location of these two tools is shown in the screen above.

The [next](#) section of the Morpho User Guide describes editing a data package.

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# Morpho User Guide

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## Editing a Data Package

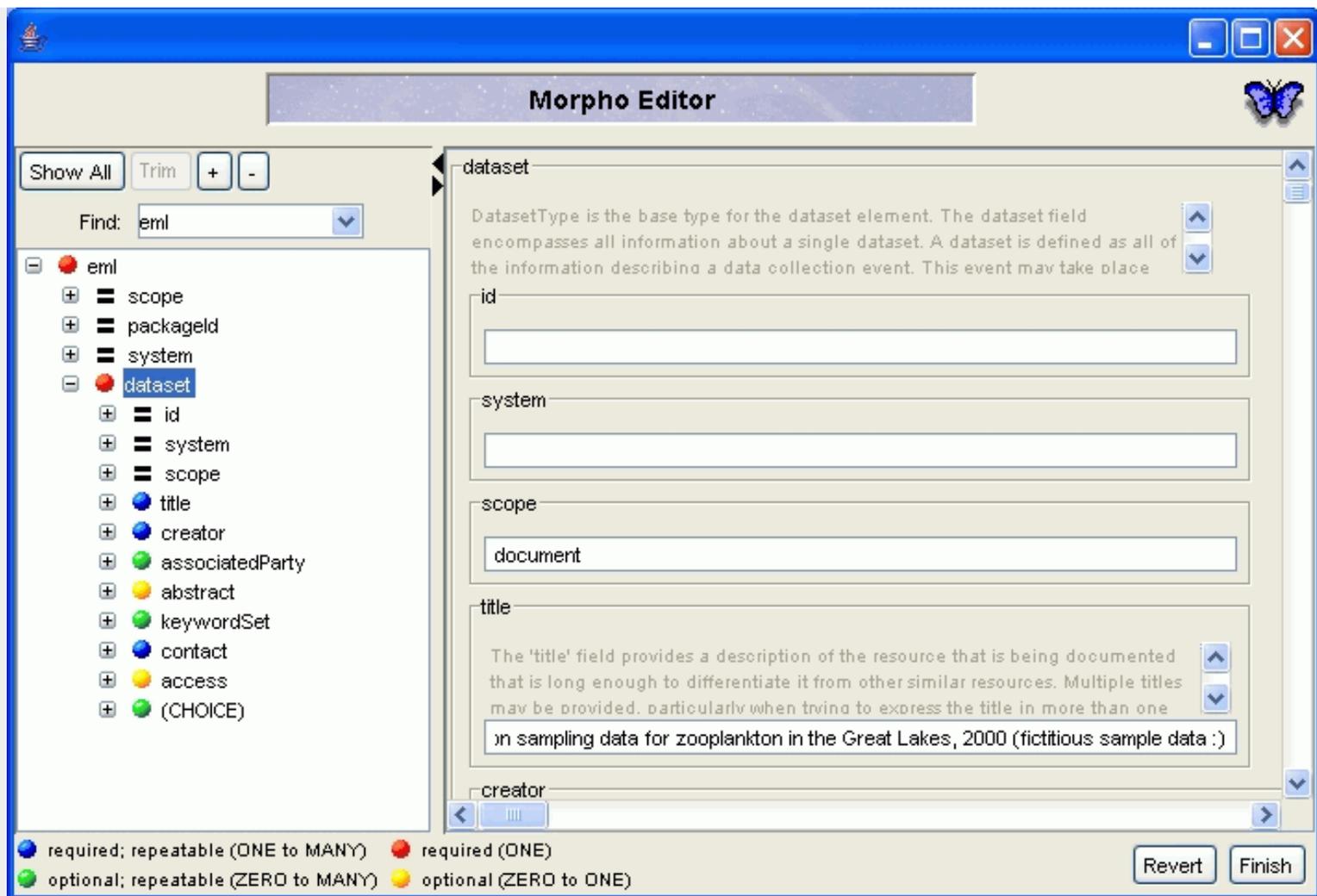
There are two main reasons you may wish to edit a data package. First, you may want to add additional documentation to the data package documentation, that was not available in the [Data Package Wizard](#). Second, you may want to change or delete documentation that you entered in the Data Package Wizard, or that you added to the data package documentation in some other way. For either of these purposes, you can use either the Morpho Editor, or use the selection available under the Documentation menu at the top of each window. The functions and uses of the Morpho Editor are described below, and the Documentation menu is described later (click [here](#) to skip ahead).

### Morpho Editor

Begin by [opening the data package](#) you wish to edit. Next, open Morpho Editor by doing ONE of the following:

- Under the "Data" menu, choose "Add Documentation".
- Under the "Documentation" menu, choose Add/Edit Documentation"
- On the upper right side of the data package documentation, click on the "Edit" button.

You will then see the Morpho Editor, pictured below.



Each type of data documentation document (i.e. each metadata type) has some structure which is indicated by the hierarchical outline on the left. By clicking on the "+" symbol next to a category, you can browse through the hierarchy, viewing "parent" and "child" nodes. Parent nodes are the higher level nodes, and child nodes are the sub-level nodes.

Items in the outline are color coded to indicate which items are required and which can be repeated. The legend for this color-coding is found at the bottom-left of the screen. Blue and red nodes in the hierarchy are required, while green and yellow nodes are optional. Blue and green nodes are repeatable, meaning they can be duplicated (for example, there can be multiple data set owners), while red nodes can only be used once, and yellow nodes can be used once or not at all (zero).

Initially, only the documentation types that already exist in the data package documentation are displayed in the list. When an item is selected in this outline, a form based view of the information contained in the selected item is shown on the right side of the window. You may navigate your way to a desired field that you would like to edit by clicking on the plus symbols next to the documentation types. Alternatively, you can scroll through the fields shown on the right half of the screen by using the scroll bar.

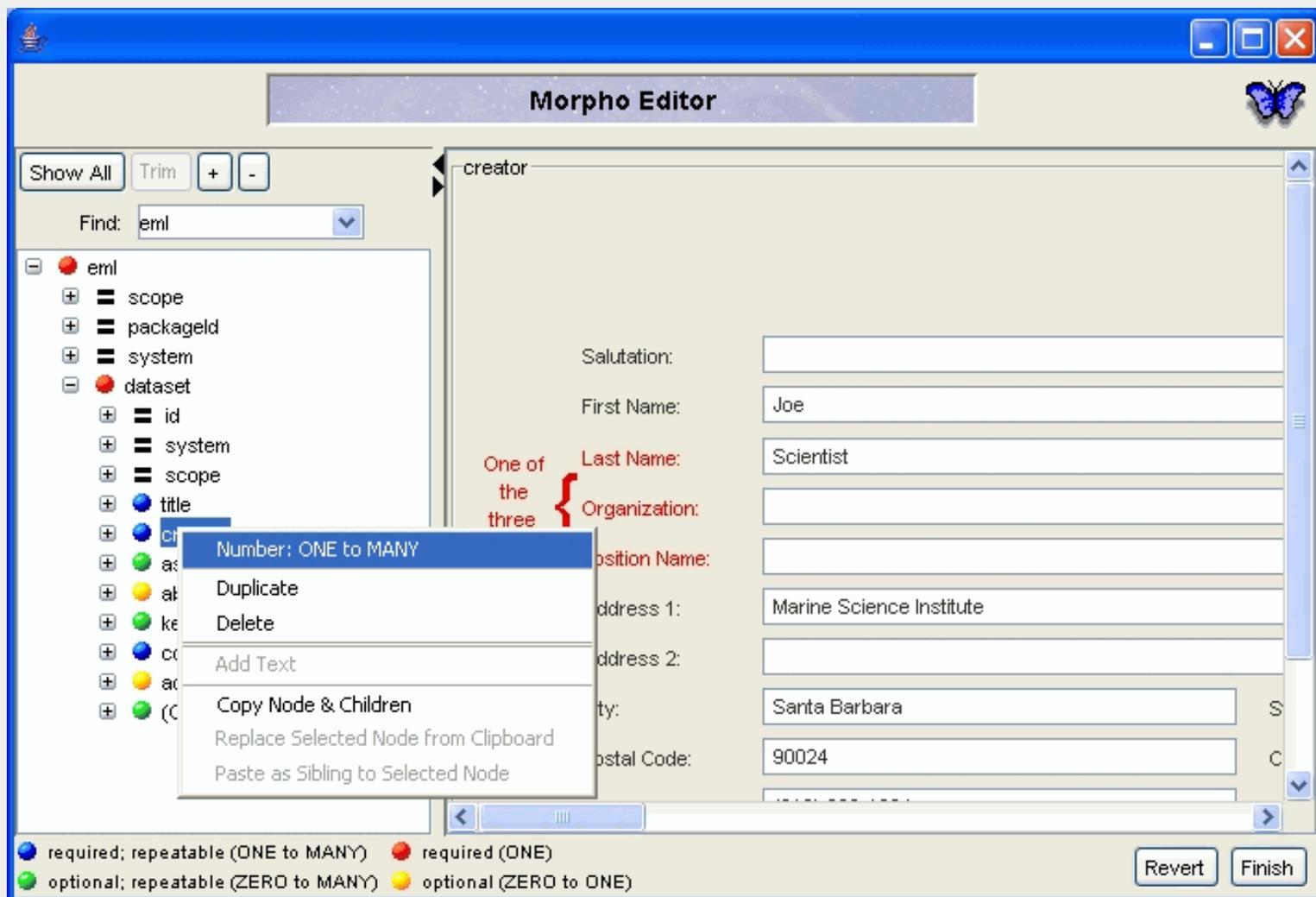
Most of the fields on the right side of the editor screen are editable. One can just click on the field of interest and enter text. The 'tab key' will move the selection to the next editable field.

To add additional documentation for types that are not shown initially in the tree on the left of the screen, click the

"Show All" button. This will cause all of the documentation types to be displayed. To get back to the original view, click "Trim".

To expand and view all of the levels of the tree, click on the "+" button at the top left of the screen. All parents and their children will be displayed. To contract the levels of the tree, click the "-" button.

A right-click on any item in the outline displays a popup menu (as shown below) which allows the user to choose among several options. These include duplicating an item, deleting an item, or copy and pasting items. Note that all of these operations will include not only the selected item, but also all of the item's children, or sub-levels, in the indicated hierarchy.

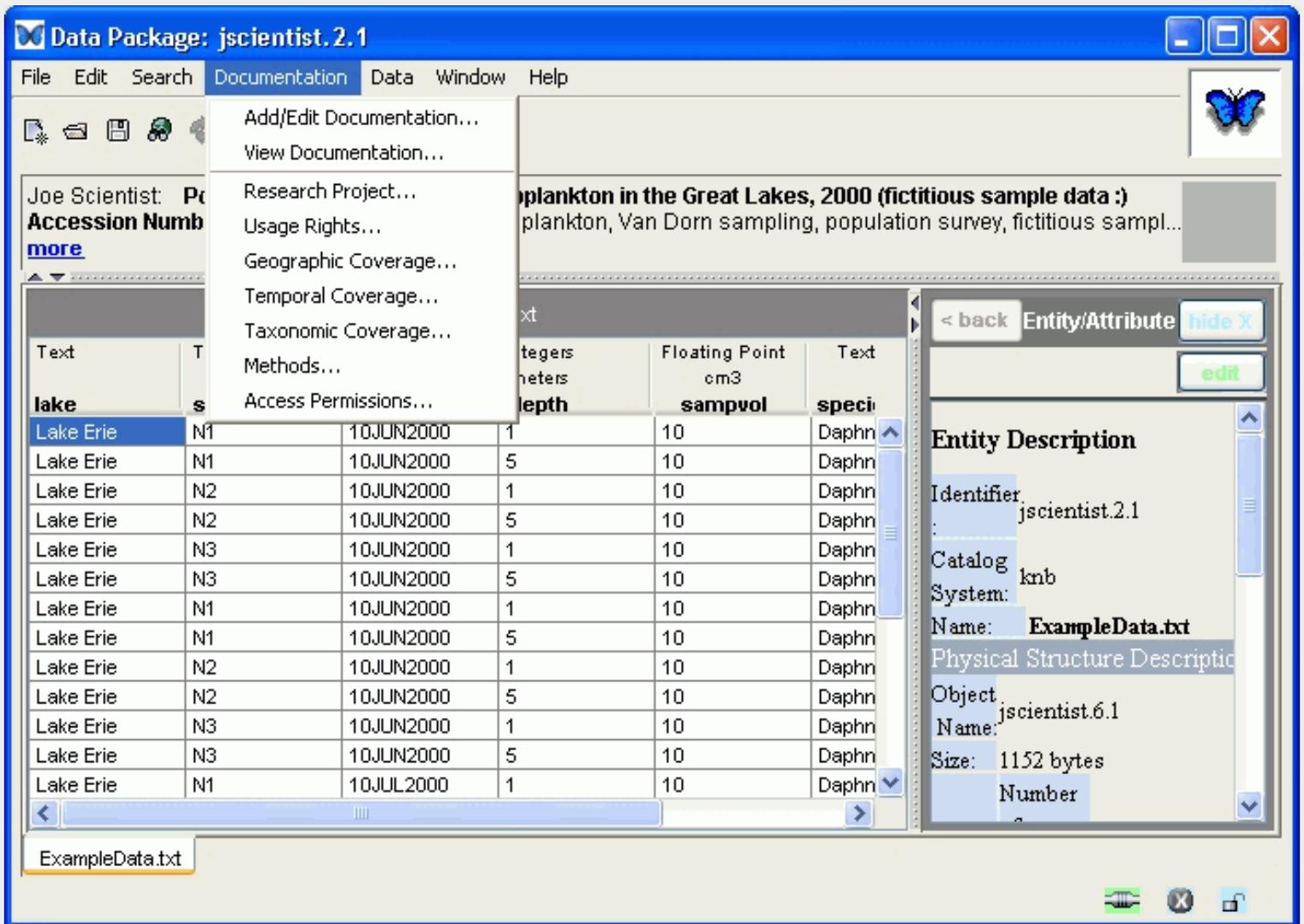


To navigate quickly through the tree, you can find a section of documentation by choosing it from the drop down list located at the top left of the screen, next to "Find:".

### The Documentation Menu

The Documentation menu, which can be found at the top of each screen in Morpho (see picture below), is activated when the Morpho user opens an existing data package. The Documentation menu options invoke various documentation editing tools and/or data entry screens that, together, enable the user to edit any field in the data package. As mentioned in the [Morpho Editor](#) section above, the first choice in the Documentation menu opens the Morpho Editor, which allows the editing of any field. The other choices in the menu bring up screens that allow one to edit or add data for specific subsections of the documentation. These same screens are used in the Data

Package Wizard to create a new data package, and therefore may look familiar.



The Documentation menu options are (with screens pictured below):

- **Add/Edit Documentation:** Invokes the full-featured Morpho Editor, giving the user editing access to all fields in the data package.
- **View Documentation:** Allows the user to view all the documentation for the data package in one window.
- **Research Project:** Allows user to specify whether data is part of a larger research program.
- **Usage Rights:** Accepts a text paragraph that describes the intended usage rights for the data package.
- **Geographic Coverage:** Allows the user to specify and describe the geographic region associated with the data package.
- **Temporal Coverage:** Accepts the specification of a temporal coverage boundaries.
- **Taxonomic Coverage:** Accepts a list of taxa to which the data package applies.
- **Methods:** Allows user to specify the method steps used to collect data, and describe the study extent and sampling area.
- **Access Permissions:** Enablers the user to specify access rights to the data for specific persons, and to establish public access rights to view and/or edit the data.

Click on any of the above menu options to read about how to fill out the screens.

Following are sample screens from each of these options:

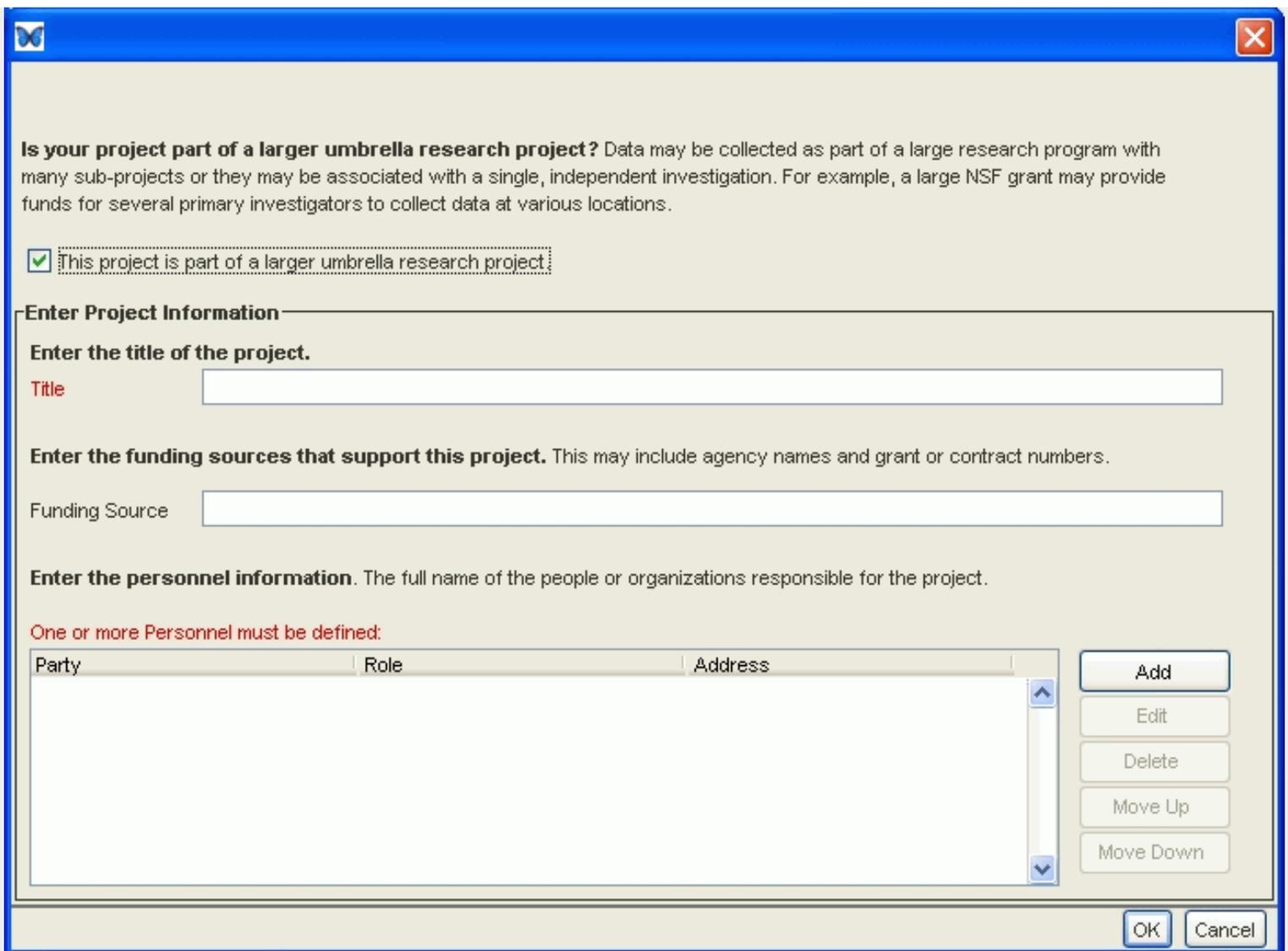
**Add/Edit Documentation:**

The screenshot shows the Morpho Editor application window. The title bar reads "Morpho Editor". On the left is a tree view showing a hierarchy: "eml" (red circle) contains "scope" (blue square), "packageId" (blue square), "system" (blue square), and "dataset" (red circle). The "dataset" element is selected and highlighted. Below the tree is a search box labeled "Find:" with "eml" entered. The main area on the right is titled "dataset" and contains the following text: "DatasetType is the base type for the dataset element. The dataset field encompasses all information about a single dataset. A dataset is defined as all of the information describing a data collection event. This event may take place". Below this text are several input fields: "id" (empty), "system" (empty), "scope" (containing "document"), and "title" (containing "in sampling data for zooplankton in the Great Lakes, 2000 (fictitious sample data :)"). A "creator" field is partially visible at the bottom. At the bottom of the window, there is a legend: a blue circle for "required; repeatable (ONE to MANY)", a red circle for "required (ONE)", a green circle for "optional; repeatable (ZERO to MANY)", and a yellow circle for "optional (ZERO to ONE)". "Revert" and "Finish" buttons are in the bottom right corner.

**View Documentation:**

Data Set Description	
Identifier:	jscientist.2.1
Catalog System:	knb
Title:	<b>Population sampling data for zooplankton in the Great Lakes, 2000 (fictitious sample data :)</b>
Data Set Owner(s):	
Individual:	<b>Joe Scientist</b>
Address:	Marine Science Institute, Santa Barbara, CA 90024 USA
Phone:	(310) 206-1984
Email Address:	jsci@msi.ucsb.edu
Associated Party:	
Individual:	<b>Joe Scientist</b>
Address:	Marine Science Institute, Santa Barbara, CA 90024 USA
Phone:	(310) 206-1984
Email Address:	jsci@msi.ucsb.edu
Abstract:	
	Population smapling data for various zooplankton species in the Great Lakes, 2000. Sampling used Van Dorn samples at 1 m and 5 m depths on a randomly placed sampling grid. Species names according to the ITIS taxonomic database ( <a href="http://www.itis.usda.gov/">http://www.itis.usda.gov/</a> ). This is fictitious sample data and should in no way be construed as meaningful information!
Keywords:	
	<ul style="list-style-type: none"><li>● zooplankton (theme)</li><li>● Van Dorn sampling (theme)</li><li>● population survey (theme)</li><li>● fictitious sample data (theme)</li><li>● Great Lakes (place)</li></ul>

**Research Project:**



**Is your project part of a larger umbrella research project?** Data may be collected as part of a large research program with many sub-projects or they may be associated with a single, independent investigation. For example, a large NSF grant may provide funds for several primary investigators to collect data at various locations.

This project is part of a larger umbrella research project.

**Enter Project Information**

**Enter the title of the project.**

Title

**Enter the funding sources that support this project.** This may include agency names and grant or contract numbers.

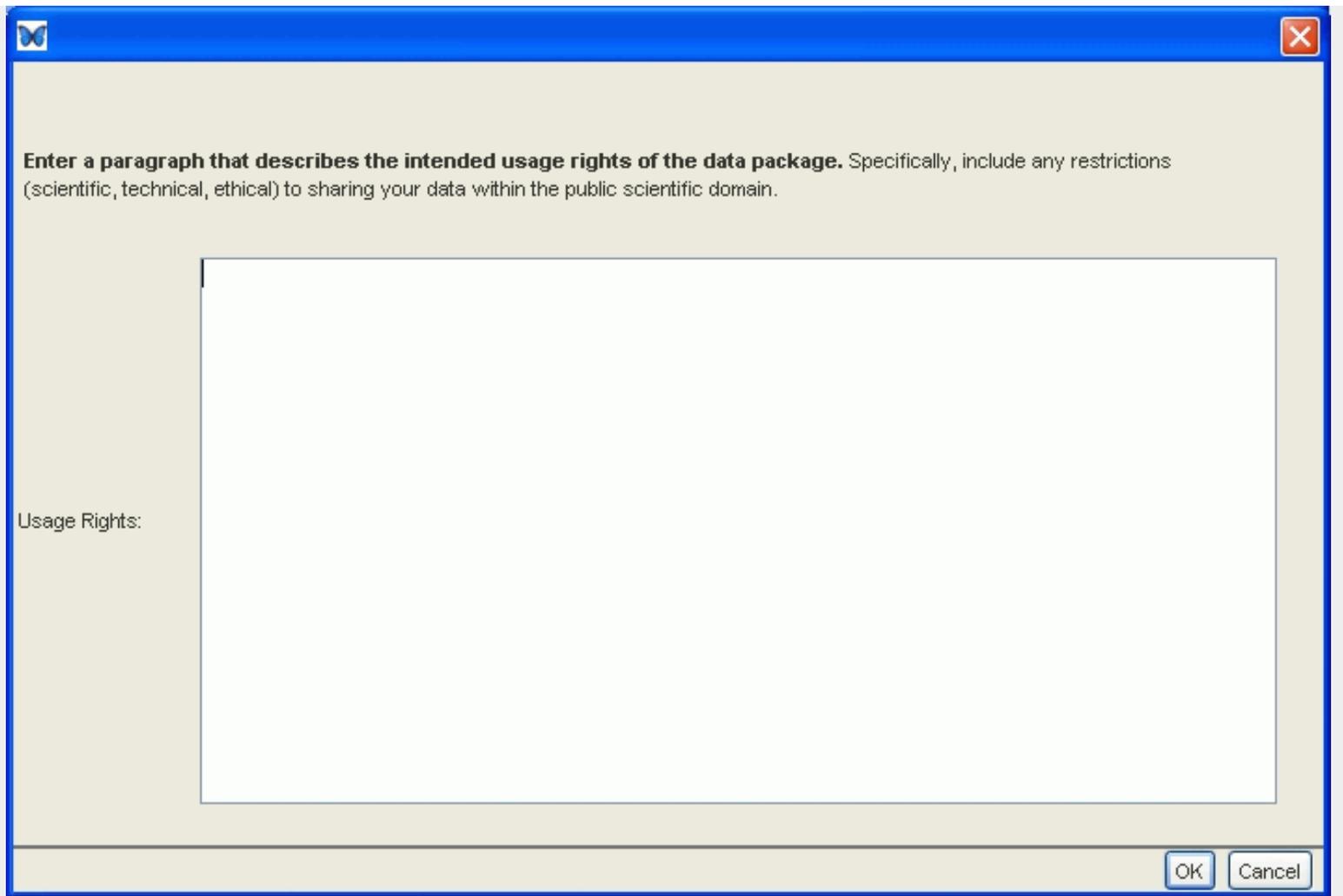
Funding Source

**Enter the personnel information.** The full name of the people or organizations responsible for the project.

One or more Personnel must be defined:

Party	Role	Address
-------	------	---------

**Usage Rights:**



**Enter a paragraph that describes the intended usage rights of the data package.** Specifically, include any restrictions (scientific, technical, ethical) to sharing your data within the public scientific domain.

Usage Rights:

OK Cancel

**Geographic Coverage:**

The screenshot shows a software window with a blue title bar and a close button in the top right corner. The main area contains a text prompt: "Describe the geographic region covered by your data. Use the following screen to provide a complete description or assign one of the existing descriptions." Below this is a large, empty table with two columns: "Description" and "Geographic Coverage". To the right of the table is a vertical stack of five buttons: "Add", "Edit", "Delete", "Move Up", and "Move Down". At the bottom right of the window are "OK" and "Cancel" buttons.

Description	Geographic Coverage
-------------	---------------------

Buttons: Add, Edit, Delete, Move Up, Move Down, OK, Cancel

**Temporal Coverage:**

The image shows a software dialog box with a blue title bar and a close button in the top right corner. The main area has a light beige background. At the top, there is a text instruction: "Enter information about temporal coverage. Temporal coverage can be specified as a single point in time, multiple points in time, or a range thereof." Below this is a large, empty rectangular area with a scroll bar on the right, titled "Time Coverages". To the right of this area is a vertical stack of five buttons: "Add", "Edit", "Delete", "Move Up", and "Move Down". At the bottom right of the dialog box are "OK" and "Cancel" buttons.

**Taxonomic Coverage:**



**Enter information about the Taxonomic Coverage.** By default, you may enter information on Genus and Species. If you would like to enter information at another classification rank or would like to change the default classification rank, click the edit button. Note that the field 'Higher Level Taxa' is dynamically generated from your entries and is not manually editable.

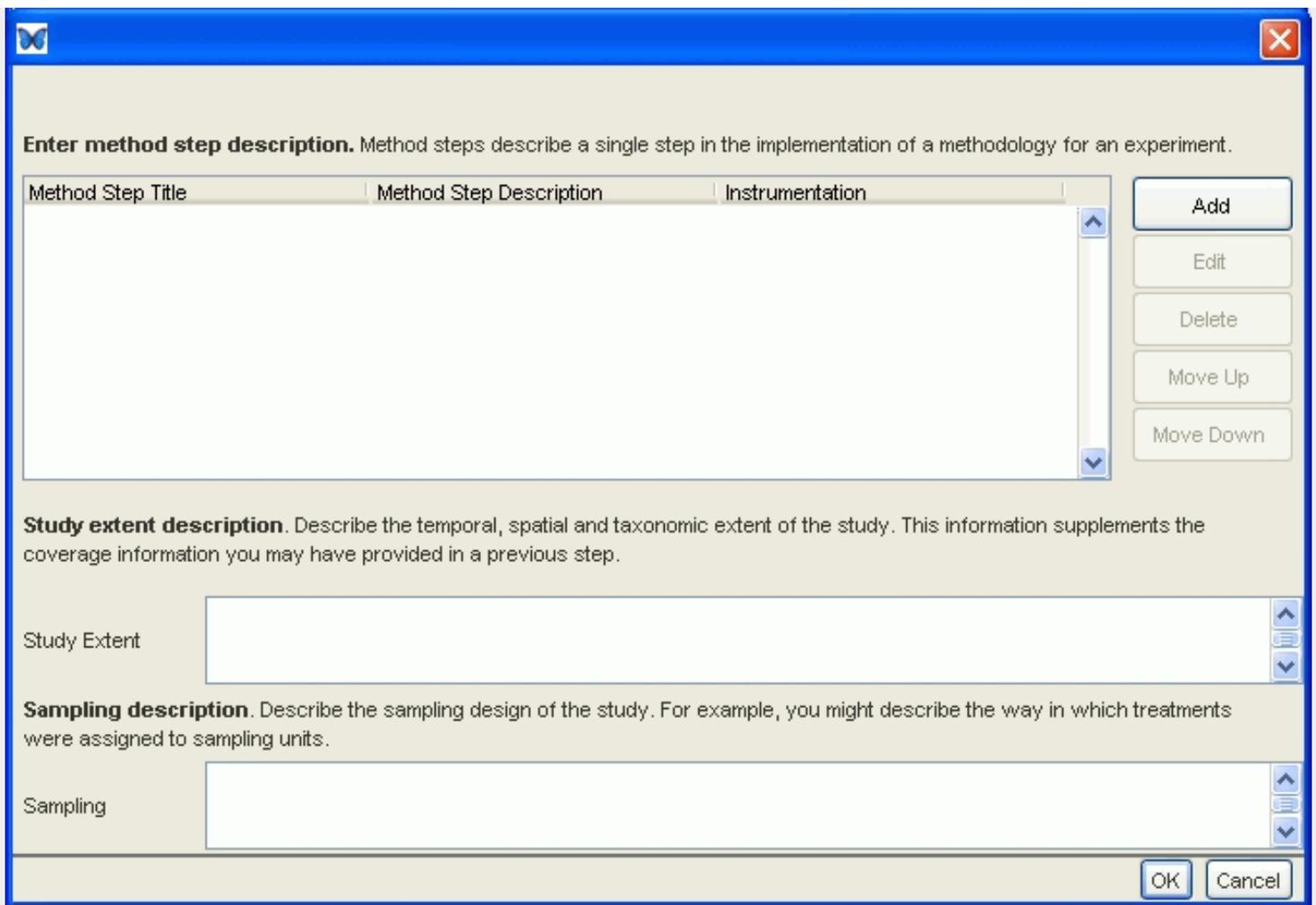
[Import Taxon Information from Data table...](#)

Higher Level Taxa	Rank	Name	Rank	Name	Common Name(s)
	Genus		Species		

**Classification System** If the list of taxa belong to one or more different classification systems, list the citations for those systems.

Citation Title	Creator	Citation Type

**Methods:**



**Enter method step description.** Method steps describe a single step in the implementation of a methodology for an experiment.

Method Step Title	Method Step Description	Instrumentation
-------------------	-------------------------	-----------------

**Study extent description.** Describe the temporal, spatial and taxonomic extent of the study. This information supplements the coverage information you may have provided in a previous step.

Study Extent

**Sampling description.** Describe the sampling design of the study. For example, you might describe the way in which treatments were assigned to sampling units.

Sampling

Buttons: Add, Edit, Delete, Move Up, Move Down, OK, Cancel

**Access Permissions:**

**Would you like to allow the public to read your dataset?**

Yes, give read-only access to public.

No, don't give read-only access to public.

**Would you like to give special access rights to other people?** You can specify access for other members of your team or any other person. Use the table below to add, edit and delete access rights to your data package.

Name	Organization	Email/Description	Permissions
uid=jscientist,o=NCEAS,...	NCEAS		Allow All

Buttons: Add, Edit, Delete, Move Up, Move Down, OK, Cancel

### Technical Notes

For those who are interested in technical details, the Morpho editor is an XML editor. It works by first reading an XML file and building an outline (tree) view of the XML document. XML files can have formalized templates called "DTD's", which describe how the document can be constructed. If the XML document indicates that its structure should conform to a DTD, then the DTD is scanned and a single instance of any optional nodes not present in the original is added to the hierarchy. Finally, if the editor has additional data about the document type, it will add that data as custom displays or help information about the node, as is shown in the above examples. The editor can thus be customized to display the XML data in a variety of ways.

Learn how to upload and download data packages in the [next section](#).

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## Uploading and Downloading Data Packages

Data packages, while created locally, can be uploaded to a network server, or downloaded from a network server to your PC, to become a shared network data package.

### Morpho Preferences

Begin by telling Morpho the location of the network. Go to "File", and select "Set preferences...". The following screen will appear.

**Morpho Preferences**

Metacat URL:

Log Messages?  yes  no

Debug Level (1-100)

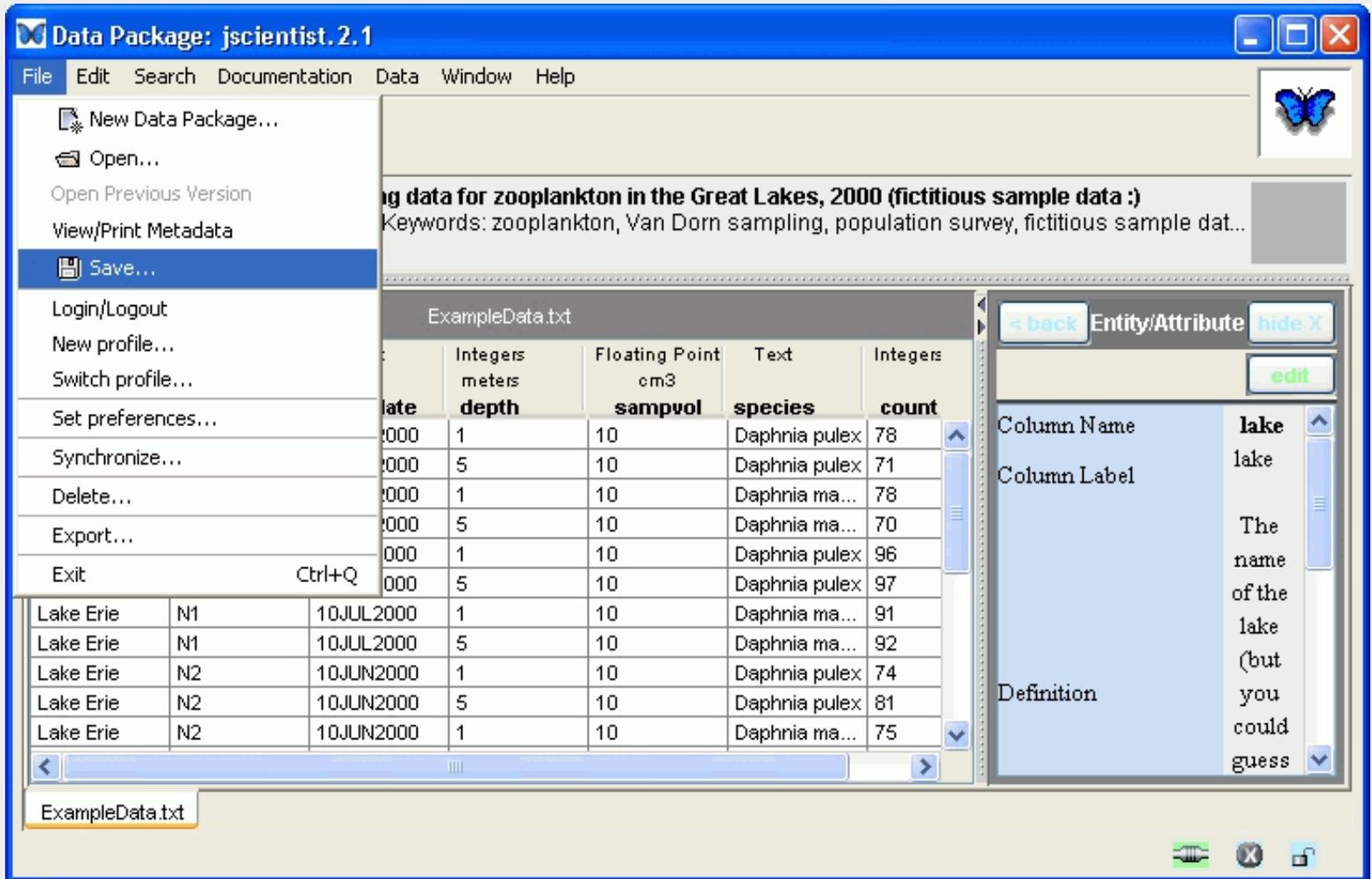
'Look and Feel'

Type the URL of the metacatalog, or network, in the first field. The other fields under Morpho Preferences can be used to control the look and feel of Morpho, the debug level (this affects the content of any error messages you may encounter in Morpho), and whether or not the error messages are logged. Click [here](#) for more information on these options. Click "Set" when finished setting preferences, or "Cancel" to undo.

### Uploading to a Network

There are two ways to place a data package you have created on a network. These are: saving the data package on the network, and synchronizing.

After creating a data package and setting the metacat URL, you can save the data package both locally and/or on a network by selecting "Save..." under the "File" menu, as pictured below.



**Data Package: jscientist. 2.1**

File Edit Search Documentation Data Window Help

New Data Package...  
Open...  
Open Previous Version  
View/Print Metadata  
**Save...**  
Login/Logout  
New profile...  
Switch profile...  
Set preferences...  
Synchronize...  
Delete...  
Export...  
Exit Ctrl+Q

ExampleData.txt

ing data for zooplankton in the Great Lakes, 2000 (fictitious sample data :)  
Keywords: zooplankton, Van Dorn sampling, population survey, fictitious sample dat...

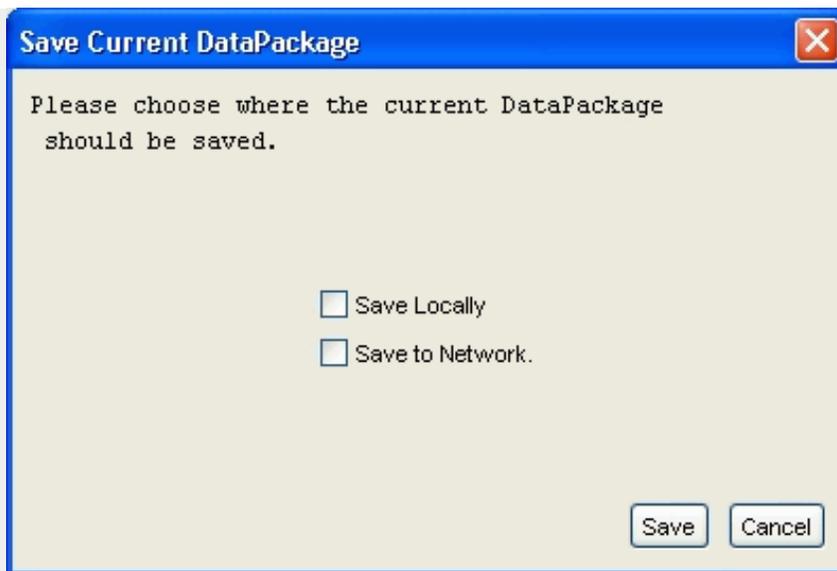
date	Integers meters	Floating Point cm3	Text	Integers		
lake	depth	sampvol	species	count		
2000	1	10	Daphnia pulex	78		
2000	5	10	Daphnia pulex	71		
2000	1	10	Daphnia ma...	78		
2000	5	10	Daphnia ma...	70		
2000	1	10	Daphnia pulex	96		
2000	5	10	Daphnia pulex	97		
Lake Erie	N1	10JUL2000	1	10	Daphnia ma...	91
Lake Erie	N1	10JUL2000	5	10	Daphnia ma...	92
Lake Erie	N2	10JUN2000	1	10	Daphnia pulex	74
Lake Erie	N2	10JUN2000	5	10	Daphnia pulex	81
Lake Erie	N2	10JUN2000	1	10	Daphnia ma...	75

Entity/Attribute hide X  
edit

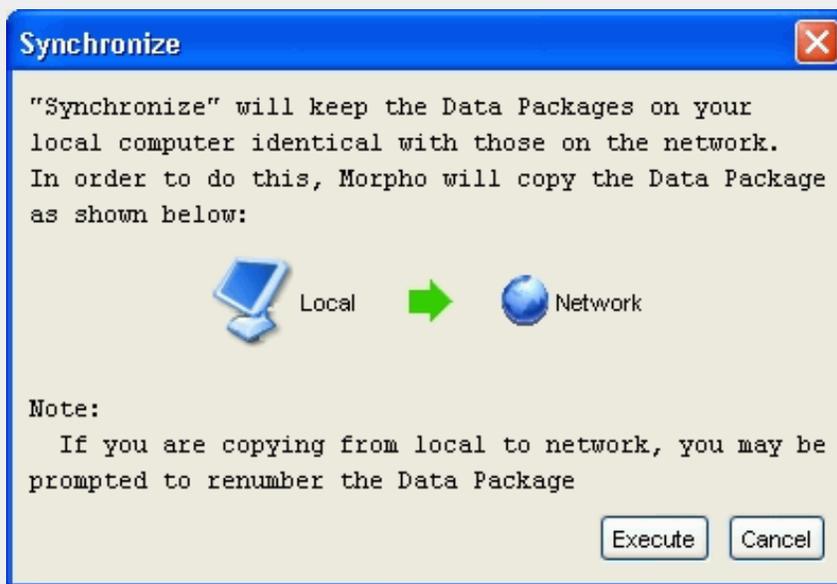
Column Name lake  
Column Label lake  
Definition The name of the lake (but you could guess

ExampleData.txt

You will then see the window below. Select "Local", "Network", or both, by checking the appropriate boxes, and clicking "Save".



Data Packages can also be uploaded by choosing the "File" menu, then clicking "Synchronize". You will see the screen below when using this option. Click "Execute" after reading the screen.



### Downloading from a Network

Similarly to uploading a data package, you can download a data package to your local PC from the network (that you specified in Morpho preferences) by first [opening](#) or [searching](#) for data packages, then right-clicking on a desired data package and selecting "Synchronize" (or through the same option on the "File" menu). The screen below shows how right-clicking brings up a menu of options.

Title	Document ID	Surname	Keywords	Last Modified	Local	Net
Global elevational distributions of small mammals	nceas.133.3		elevation range mo...	2004-03-09 20:0...		
LATE PLEISTOCENE MAMMALS - BODY SIZE AN...	nceas.127.4		community structur...	2004-03-09 20:4...		
Latitudina	nceas.145.4		New World mamma...	2004-03-09 19:0...		
Latitudina	nceas.177.4		latitudinal extents l...	2004-03-09 19:0...		
Mammal li:	obfs.344.2	Wendy Bro...	species list Colora...	2003-04-15 11:1...		
RCN training example using Allison and Cicchetti ...	enviroeducator.5...	Romanello	sleep mammals	2003-10-20 10:1...		
Trapping locations, animal body mass, and breedi...	nceas.104.12		dusky-footed woo...	2004-03-09 20:0...		
Vertebrate Species List	nrs.158.7	Lubin Bro...	Species List Verte...	2003-04-21 12:5...		

8 data sets found

Notice you also have the option to delete data packages listed in the open or search results windows. You are only allowed to delete packages that you have created, or for which you have special permissions that the data package originator has defined.

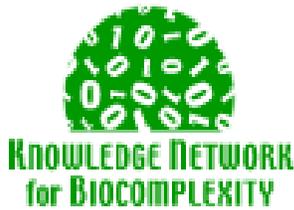
Note also the "Export" feature. This allows you to select a directory where you want the package exported to. Click [here](#) to read more about the export feature.

The [next](#) section are some Frequently Asked Questions, or "FAQs", about Morpho.

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# Morpho User Guide

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## Frequently Asked Questions

### 1. How do I get help?

If Morpho is running, you should be able to use the "Help" menu located at the top of each window. You can also open the "docs/user" directory in the directory where Morpho was installed and then open the file "index.html" in your browser (usually by double clicking on the file name). This will display the same help files as you would see when using Morpho's Help menu. The Morpho User Guide, found under the "Help" menu, contains information on a variety of topics and uses of Morpho. Examine the index to determine where to get help.

### 2. Where are my local data packages stored? And what happens to my local data packages when I upgrade to a newer version of Morpho?

If you have used a previous version of Morpho, then you may have local data packages stored in a "profiles" directory inside the main Morpho data directory. The location where the "profiles" directory is created and accessed is in a subdirectory within the user's "home" directory. [On Windows 2000 or XP machines, the home directory is named after the user name (e.g. "higgins") and is located inside the "Documents and Settings" folder, usually under C:\] A directory named ".morpho" is created inside the user's home directory and the new "profiles" subdirectory is created there when Morpho is first executed. There is a subdirectory under "profiles" with the profile name and another subdirectory under that with the name "data" where local data for that profile is actually stored. Note that this is (usually) not the same directory as the one where the Morpho executable is installed. You should thus be able to uninstall Morpho and update it to newer versions without fear of losing any locally stored data packages.

### 3. How can I add an image to my data package?

Complex, geospatially indexed images can be included and described in eml 2.0 using the "spatialRaster" or "spatialVector" entity modules. However, Morpho currently has no features directly supporting these modules. Nevertheless, images that are stored in .gif or .

jpeg formats (standards for web pages) can be added to data packages as "dataTable" elements (even though they are not really 'dataTables'). To add such an image to an existing package using the "Create/Import New Datatable..." command under the "Data" menu. Choose the "Import" and then "Manual" radio buttons. Then select the image file that you wish to include. Then click the "Next" button. Select the "Non-text or proprietary formatted file" radio button and then select "other". You should then type "image", ".gif", ".jpeg", or ".jpg" in the text box below the "other" button. This tells Morpho to display the data as an image when the package is viewed later. Then continue through the Wizard as with any other data file. You will need to fill out at least the minimal information indicated on several of the next screens.

#### 4. Can I customize Morpho in any way?

In versions 1.3 and earlier, there is no command within the Morpho program to set any preferences. (In Morph 1.4.0, there is a "Set preferences..." menu item in the "File" menu. That menu item makes it unnecessary to change the configuration file as described here.) There are some preferences (and additional data) that are read from the 'config.xml' file that is stored in the ".morpho" directory in the user's home directory. Only a few of these should be set by the user. These include:

`<lookAndFeel></lookAndFeel>` --- As shown on the left, there is nothing between the pair of "lookAndFeel" tags in the default config.xml file. This causes the look of the Morpho display to mimic that of the current operating system - e.g. Windows, Mac, etc. You can see a different look by changing the tag set to be "`<lookAndFeel>kunststoff</lookAndFeel>`". This will cause a variety of minor changes in the look of buttons, scroll bars, etc. The "kunststoff" is a customized look-and-feel created for Java applications.

`<log_file>>false</log_file>` --- Changing the value within these tags from "false" to "true" will send all error messages to a log file. This may be useful if you are having problems.

`<metacat_url>http://metacat.nceas.ucsb.edu/knb/servlet/metacat</metacat_url>` --- The url of the network server where data is stored is set here. You may need to change this if you are using a custom server.

#### 5. How can I "Export" a datapackage? The Export menu item doesn't seem to work.

There may be some confusion because the Export command asks you to select a "directory", not a file. Select a directory where you want the package exported to. On the Mac, you may need to actually type in the name of directory after selecting its parent directory.

#### 6. How can I get more information on problems?

Morpho sends a number of messages about operations that are normally not visible when

you start Morpho using the icons created by the installer. On a Windows machine, the program that normally launches Morpho is called "Morpho.exe". An alternate method for launching Morpho (Windows only) is to execute the batch file "morpho.bat" which is located in the directory where Morpho was installed. When launched using the batch file, a background command window will appear and a number messages will appear in this window while Morpho is running. You can also see all these messages in a log file that is created when the "<log\_file>" parameter is set to "true" in the configuration file (see [FAQ question #4](#)).

## 7. What are the system requirements for running Morpho?

For reasonable performance, a fairly new computer system is recommended (i.e. a clock speed of 700MHz or greater and 256 MB of RAM or greater). Morpho will run on slower systems with less RAM, but some operations may be very slow. More RAM is especially useful if there are a large number of local data packages, since the local data is cached in RAM at startup. Some operations will require several minutes to complete even on newer computers. One example is the initial display of very large (10s of MB) data files.

## 8. How can I add data to a data file?

One can simply paste data from the clipboard into a data file displayed in Morpho. However, currently Morpho does not automatically add rows to the data file when information is pasted. Thus, if you want to add data, you will need to create additional rows before pasting the new data. Select the last row and then use the "Data" menu, the popup menu you get when you right-click on the data table, or press <Ctrl><i> to insert a new empty row. When enough rows have been created, you can select the top empty row and paste new data. Note that the default when copying/pasting from Excel is tab-delimited data. All the data will end up in the first cell if the data being pasted uses a different delimiter than the existing data (e.g. pasting from Excel when the existing data is comma-delimited.).

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