NVS Express: Data Entry

A data entry system for vegetation plot data

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1   Introduction

Data[1] stored in the NVS Databank has great potential to assist in the management of New Zealand's unique biodiversity. Such vegetation data can offer unique insights into vegetation distribution and dynamics, over regional and national scales (e.g. Wiser et al. 1998, Allen et al. 1999, Bellingham et al. 1999). This manual contains a brief introduction to using the data entry module of NVS Express, a program developed by Landcare Research, to assist with entry and validation of vegetation plot data stored within the National Vegetation Survey (NVS) Databank. This module will subsequently be referred to as 'NVS Data entry' and was formerly known as 'NVS Lite'.

Recent progress on the NVS Databank has focused on the development of NVS into a permanent and stable vegetation data management system (Fig. 1). Development of suitable data entry facilities was identified as one of the first steps along an overall pathway, in which tools and applications will become available to validate, exchange, convert, summarise and analyse data stored within NVS (see Richardson et al. 2005). It is envisaged that such tools will be readily available, and will afford significant benefits to end-users, including the Department of Conservation, regional councils, universities and others.

NVS Express was tailored for entry of data collected using standard forest monitoring methods (i.e. permanent 20×20-m plots) and vegetation inventory methods (i.e. the Recce method; see http://nvs.landcareresearch.co.nz/). These are two of the main types of vegetation data currently stored within NVS. Purpose-built data entry applications afford a number of benefits, some of which are as follows:

- Data can be easily entered directly by the person who undertook the data collection. These people are often the best placed to resolve any errors that are identified during data entry.

- The range of values that may be entered within each data-field can be bounded, so only appropriate data entries can be accepted; unrecognised values are highlighted during data validation.

- Data is validated during and following data entry: both errors and warnings are given. For example, if certain data has not been entered for a plot or subplot, a warning is initiated highlighting the potential accidental omission.

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[1] Data (= information stored in a database) is used in the singular throughout this manual.

- Data is entered in formats that are inherently intuitive to users, i.e. entered data appears largely as it does on field-sheets, allowing it to be more easily entered and checked.

- Inbuilt point-of-data-entry checks are conducted against species codes. The presence of invalid or unknown species codes can be one of the most problematic issues when using vegetation data. In NVS Data entry, all species codes entered are checked against those currently recognised in NVS.

- For stem diameter data, inbuilt point-of-data-entry checks are conducted against tag numbers, excluding any possibility that unidentified duplicate tag numbers will result within the same plot in a dataset.

- When data is uploaded into the NVS Databank for permanent archiving, more comprehensive and sophisticated validation procedures can be conducted.

Not all variations to the standard vegetation inventory and monitoring methods can be accommodated in NVS Express. The full NVS Databank system affords greater flexibility, encompassing many alternative or additional methods and options. A minimum of flexibility is retained in NVS Express, for example, plot sizes may be changed where they deviate from standard plot measurement protocols. In NVS Express, this limited capacity to accommodate method variations and options allows the program to remain as user-friendly as possible; however, as a result it is not suitable to be used for the entry of all types of vegetation data.

For further information on NVS Express; or other NVS developments, please contact NVS by email (nvs@landcareresearch.co.nz).
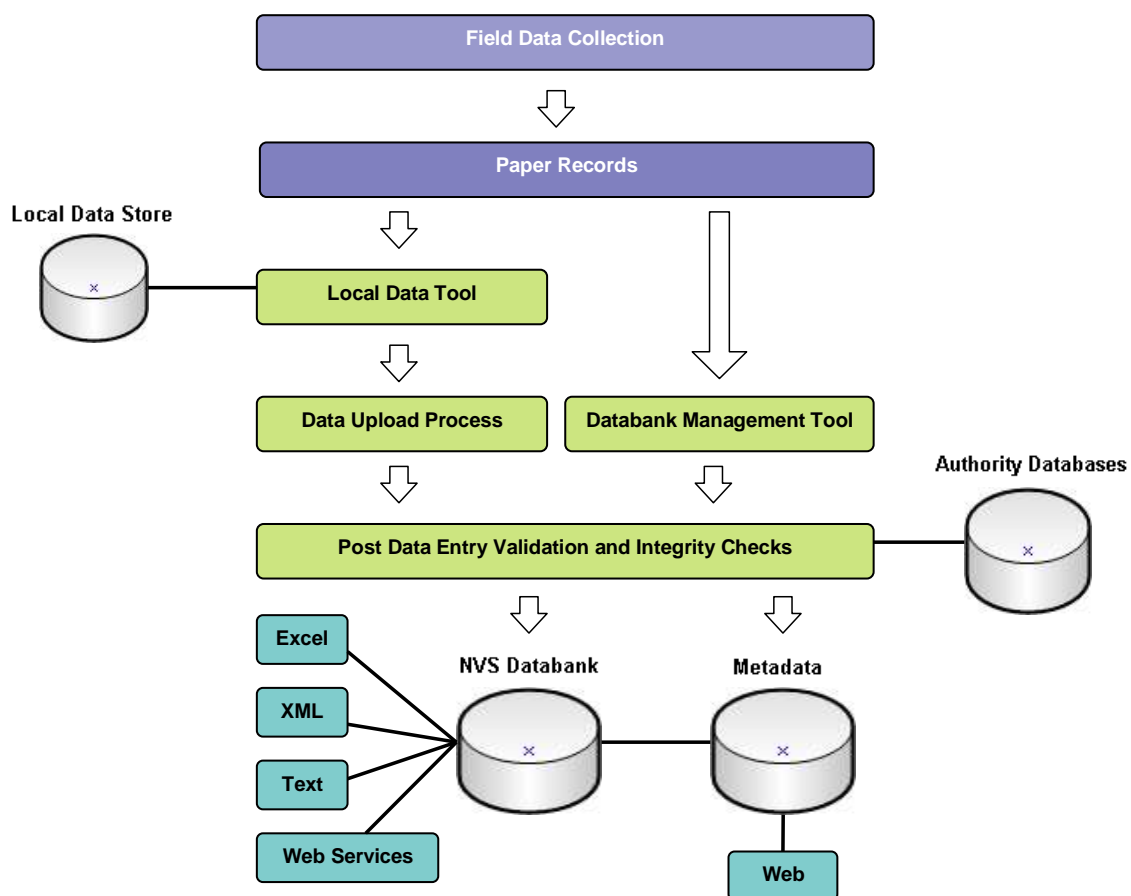
Figure 1 Schematic workflow diagram of the data collection, entry and storage processes, when using the NVS Databank as the data repository.

2 Getting Started

2.1 Installation

The NVS Express installation package can be downloaded via the Internet (see http://nvs.landcareresearch.co.nz/Data/dataentry). NVS Express is a Windows application and will run on Windows 2000 and above.

Users need to register and log in to the NVS Databank before being able to download NVS Express. A valid email address and self-selected password are needed for registration. Registration allows us to notify all NVS Express users when new versions of NVS Express or the authority lists are available, and also means that the NVS Databank is ready to accept data deposits uploaded via the NVS website.

In some cases NVS Express may be available from your organisation's computer support staff. Please contact the appropriate support person in your organisation to find out how to get the application installed (e.g. Department of Conservation staff should contact their network system administrator).

Any previous version of NVS Express must be removed before a new version can be installed. In a network environment, NVS Express must be installed directly on all local drives of those computers from which it will need to be accessed.

- The NVS Express tool requires that the Microsoft .net framework is loaded on your computer. If the .Net framework is not present on your computer you will be asked to download this as part of the installation process.

- The installation package contains the file 'setup.exe'. This is the application file. Double-click on this file and accept the default options to install NVS Express to the default Program files folder. To install NVS Express elsewhere, navigate to the appropriate folder.

- When installation is complete, a shortcut icon will be added to your desktop, if not, navigate to the folder to start the application or save NVS.exe as a shortcut to the desktop or pin the program to the start menu. The default location for the application is at C:\Program Files\Landcare Research\NVS.

2.2   Location of NVS Express project files

NVS Express projects are stored as files on the hard drive of the computer used for data entry. This means that it is recommended that only one computer is used for entering data for any particular project. If it is necessary to move NVS Express project files onto another computer, you will need to move the project file (with extension .mdb) found at:

.........Libraries\ Documents\NVS Projects\

and the party data, usually found at:

C:\Program Files\Landcare Research\NVS Express\Resources\ NVS_PartyData.mdb

Ensure that the NVS Express program is closed before moving these files. Note that these programs are only recognized by the NVS Express program and cannot be opened directly. If you wish to use the data in another program you will need to open the file in NVS Express and export it in a suitable file format.

2.3   NVS Express program updates

Periodic updates to NVS Express authority data are needed to update default methods and species code lists. Updates will be periodically released from the NVS Databank to registered users of NVS Express.

- Updates will be installed onto local versions of NVS Express via the file called 'NVS_AuthorityData.mbd'.

- Select 'Import Authority Data' from the File menu, and navigate to the folder in which the updated 'NVS_AuthorityData.mbd' file is saved.

2.4 Non-standard methodologies

If you want to enter data that does not follow the standard methodology described in the Hurst and Allen (2007) manuals please contact the NVS database administrator (nvs@landcareresearch.co.nz). There are also options for pre-loading tags for re-measured permanent plots that can be discussed with NVS staff.

3   Data Entry Workflow

The following workflow (Fig. 2) should be followed for data entry using NVS Express. See the relevant sections in this manual for step-by-step instructions for undertaking each task. A number of issues are commonly encountered when entering vegetation data, of which data-entry operators should be aware. These include duplicate tag numbers in stem diameter data (Section 8.3), and unrecognised species codes (Section 9). If other issues are encountered that are not covered in this manual, contact the NVS Database Administrator for further help.
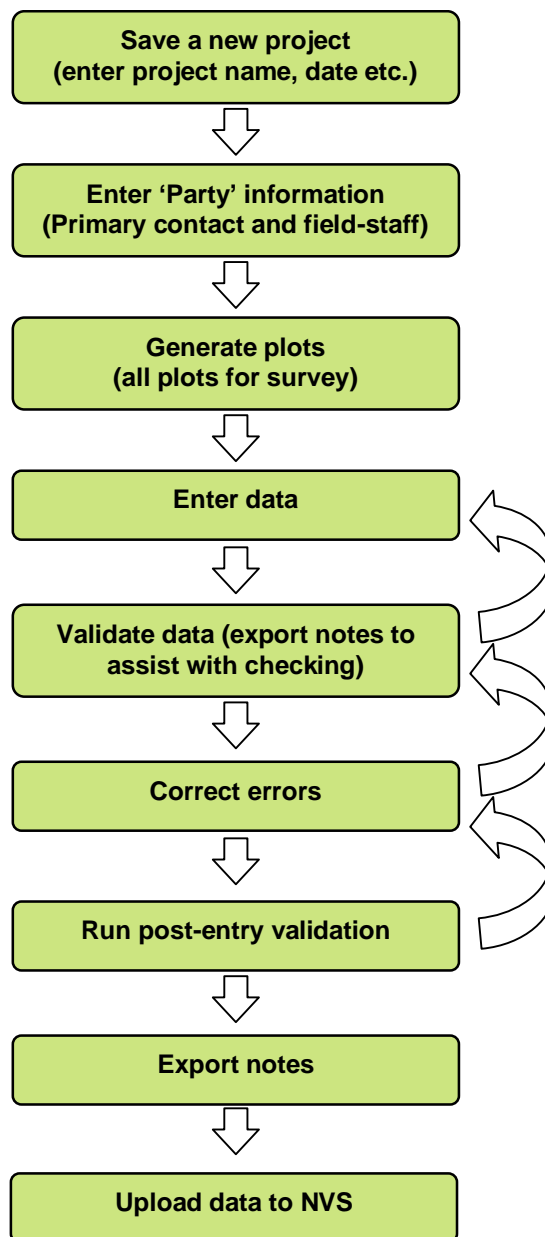
```
┌─────────────────────────────────────┐
│     Save a new project               │
│  (enter project name, date etc.)     │
└─────────────────────────────────────┘
                  ⇩
┌─────────────────────────────────────┐
│     Enter 'Party' information        │
│ (Primary contact and field-staff)    │
└─────────────────────────────────────┘
                  ⇩
┌─────────────────────────────────────┐
│        Generate plots                │
│      (all plots for survey)          │
└─────────────────────────────────────┘
                  ⇩
┌─────────────────────────────────────┐
│          Enter data                  │
└─────────────────────────────────────┘
                  ⇩
┌─────────────────────────────────────┐
│  Validate data (export notes to      │
│      assist with checking)           │
└─────────────────────────────────────┘
                  ⇩
┌─────────────────────────────────────┐
│         Correct errors               │
└─────────────────────────────────────┘
                  ⇩
┌─────────────────────────────────────┐
│      Run post-entry validation       │
└─────────────────────────────────────┘
                  ⇩
┌─────────────────────────────────────┐
│          Export notes                │
└─────────────────────────────────────┘
                  ⇩
┌─────────────────────────────────────┐
│        Upload data to NVS            │
└─────────────────────────────────────┘
```

**Figure 2** Data entry workflow for data entry using NVS Data Entry.

4   General Editing Tips

- Edit Mode: NVS Express must be in edit mode before changes can be made to data. Select 'Edit Mode' using the File menu or toolbar button. If options, buttons, etc are greyed out, it's usually because you are not in Edit mode.
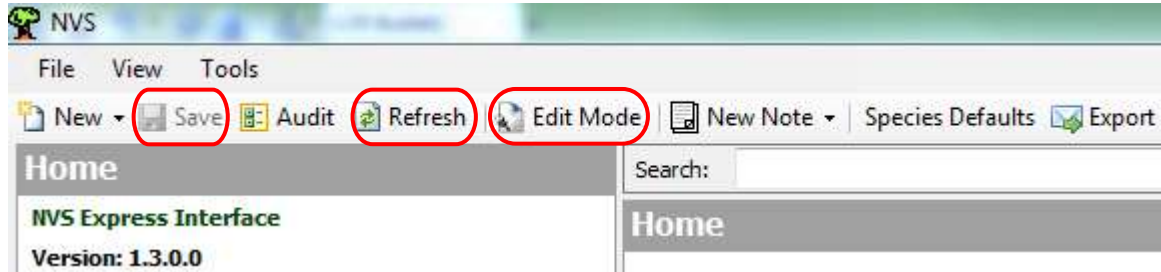
- **Saving data:** Data is not saved as you enter it, only when you click 'Save' or close a form and save when prompted.

- **Refresh button:** Press the 'Refresh' button after changing a project name, or if changes made are not immediately visible on the screen.

- **Data validation**: Data is validated as you enter it and more extensively before saving. Warnings and errors are given – data can be saved if there are warnings, but not where there are errors. **Errors need to be corrected in order to save changes made to the plot or project.** Where errors can't yet be resolved but the data needs to be saved, record a note highlighting the problem so that no information is lost. Either add a plot note or an operator note (within square brackets; see details below). The note should have details of the data that has been removed so that you can return with the correction at a later time.

- See Section 10 for details of the Validation procedure.

- **Recording notes during data entry**: Notes can be attached to any object being edited (i.e. project, plot, plot observation, project method). Notes may be either those recorded by field-staff on the field-sheets, or those recorded by data entry operators during data entry (as denoted by square brackets). If you hover the cursor over a note you can see a description of the object (eg Plot: A1) without having to open the note.

- **Adding a note to a project, project method or plot:** Use either the 'Notes' tab on the toolbar (to add a note) or select 'Notes' from the View menu (to also see all existing notes). If a note is entered while in the Site Description method it will be categorized under the plot being entered. Notes entered in other method screens will be categorized under both the particular method and the plot. When adding a note use Shift + Enter for a line break, and Enter to exit the note window.

- **Entering notes recorded on field-sheets**: When adding a note to an individual observation (e.g. against a species occurrence on the Recce Vegetation Description) use the 'Notes' column on the far right of the data entry form.

- **Data entry operator notes for individual observations:** When adding an operator note to an individual observation the note is also recorded in the notes column. Operator notes should be used to record important data quality observations; any assumptions made by the data entry operator; and to identify problems that still need resolution. Operator notes on data entry forms must be entered using square brackets (i.e. [...]) or must be preceded by double question marks (i.e. ??). These notations distinguish operator notes from those recorded by field-staff, and ensure that these notes will be identified during plot validation procedures.

- **Remeasurement notes:** Notes pertaining to corrections required to previous measures of tagged individuals should be entered in the notes field beside the stem and enclosed in dollar signs (i.e. $$). See section 8.3.1 for a detailed description of the situations in which to use these types of notes.

- **Operator notes for the plot:** Notes can be added to the plot, rather than to an individual observation on the plot. Notes added to the plot can be useful for generic issues relevant to the whole plot (e.g. noting that much of the data on the plot sheet was illegible, or that subplot D contained no trees or saplings). Plot operator notes do not need to be contained in square brackets.

- **Viewing notes:** Notes for an object can be viewed, filtered, and sorted, from the View menu.

- **Exporting all notes for a project:** Use the 'Export' function to extract all the notes from an entire project and create a text file. Give the text file a logical name – one system is to give it an appropriate abbreviation of the project name (up to 6 digits), followed by the year (2 digits; e.g. FYFFE07.txt).
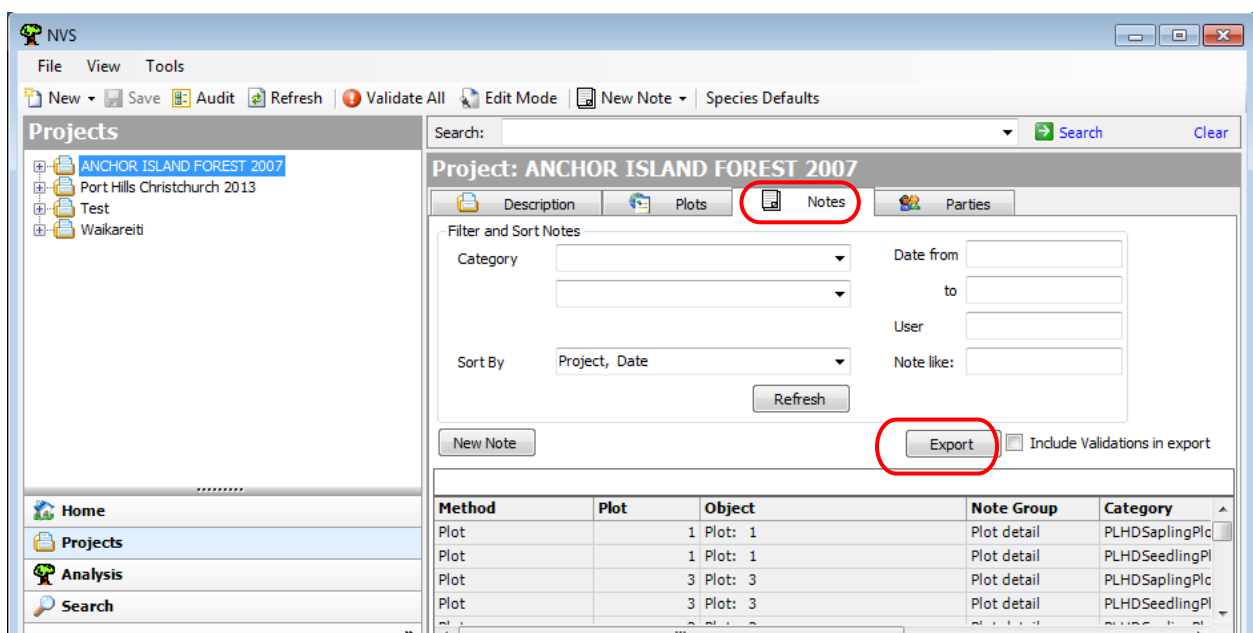
- **Importing notes:** Notes can be imported from text files via the notes form. This might be useful, for example, to avoid re-entering descriptions of modified methods.

- **Highlighting potential species code errors:** Use a double question mark to annotate any valid species code that needs to be double-checked (e.g. QUISER??). This will identify the code as an invalid code during data validation. (Note: The ?? notation is also used automatically to highlight duplicate tag entry; see Section 8.3).

- **Dates**: Dates are entered and displayed in the year–month–day format (e.g. yyyy–mm–dd). For example 5 January 2008 is entered as 2008–01–05. This allows partial dates to be entered where the full date is not known (e.g. the year only may be entered (i.e. yyyy), or the year and month only (i.e. yyyy-mm)).

- **Adding and deleting rows within grid tables**: In NVS Data Entry many kinds of data are entered into tables (e.g. disturbance, fauna and ground cover records in the Recce Site Observation form, and the Stem Diameter, Sapling and Seedling Count forms). When working in tables:

To add a row: either right-click and select 'Add...'; or click in the grid and hit the Insert key. On some forms rows can also be inserted via the Edit menu or toolbar button.

To delete a row: either right-click and select 'Delete...'; or click in the grid and hit the Delete key

Sorting grid tables: Data entered into tables can be sorted by the values in any column, either in ascending or descending order. To sort, click on the column heading.

Order of data entry: To get data back into the order it was entered, sort by the column (#).

- **Maximise each data entry window**: or use the scroll bar on the right of the window to ensure that data is entered in all of the relevant data entry fields.

- **Audit information:** The creation/modification date/time and user can be observed for any project, plot or individual observation. For project methods or plots this information can be accessed via the View menu or the 'Audit' toolbar button; and for individual observations on plots it can be accessed by right-clicking and selecting 'View Audit info'
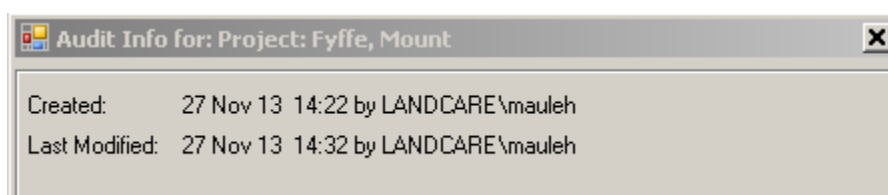
- **Multiple data entry windows open**: If preferred, more than one data entry window can be open at once (e.g. both the sapling and stem diameter tables; or both the site description and the browse table). This allows data to be entered in the order recorded on the field-sheet (e.g. where saplings and trees are recorded on the same sheet). Resize each window, by holding the mouse over the edge of a window and using the mouse to click and drag each window to the required size.

- **Check file integrity**: Check File Integrity on 'File' menu, to test that data has been saved correctly in a NVS Express file.

- **Compacting the project file:** This function should be used periodically to improve the performance of NVS Express. Select 'Compact Project File' from the File menu.
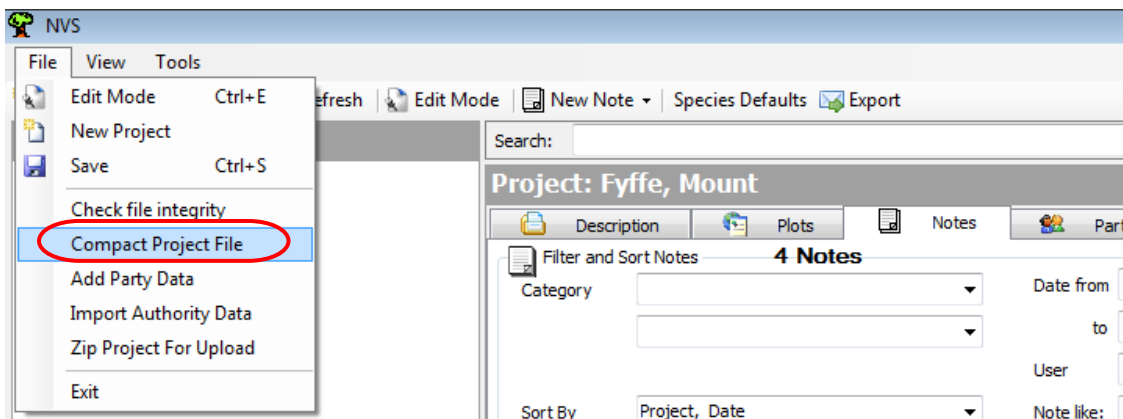
4.1　Keyboard shortcuts used in NVS Data Entry

Tab	Advances curser to the next cell, or if at end of a line inserts a new row
Ctrl + Insert	Inserts a new subplot in grid tables
Insert	Inserts a new species record in grid tables
Delete	Deletes the value in a cell. If in a cell identifying a row (such as a tag or species column) then the whole row is deleted.
Alt + F	Opens File menu
Alt + V	Opens View menu
Alt + E	Opens Edit menu
Ctrl + E	Enables/disenables edit mode
Ctrl + S	Save current window
Ctrl + N	Opens notes to view or add
Ctrl + L	Validate all
F5	Refresh view
Ctrl + A	Associate marked stems (in stem diameter data entry window only)
Ctrl + D	Fill Down function, inserts preceding species in cell or continues tag sequence numerically (in stem diameter data entry window only). New row must be inserted first.

Advancing to the next plot: In most data entry tables, advancing to enter the same type of data for the next plot is possible without closing and re-opening any windows. Use the arrows shown at the top right of the window.
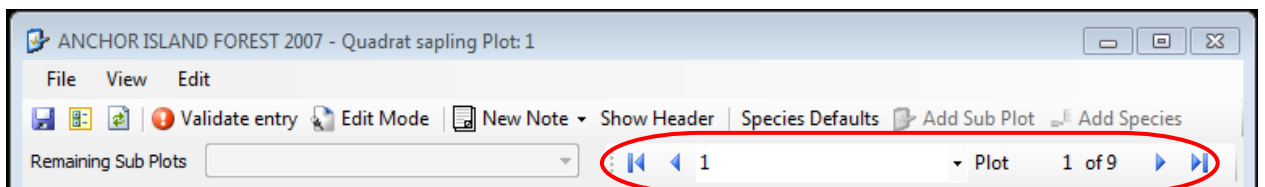

- Often, as you work through NVS Express, you will find there are alternative ways of doing the finer points, usually only one is presented for brevity, but feel free to choose an alternative perhaps depending on your preference as a keyboarder or mouser.

5   Setting Up a New Project

5.1   Creating a new project

- **To create a new project** – Three options, select 'New Project' from the File menu or the new item menu or click on ![New Project...]
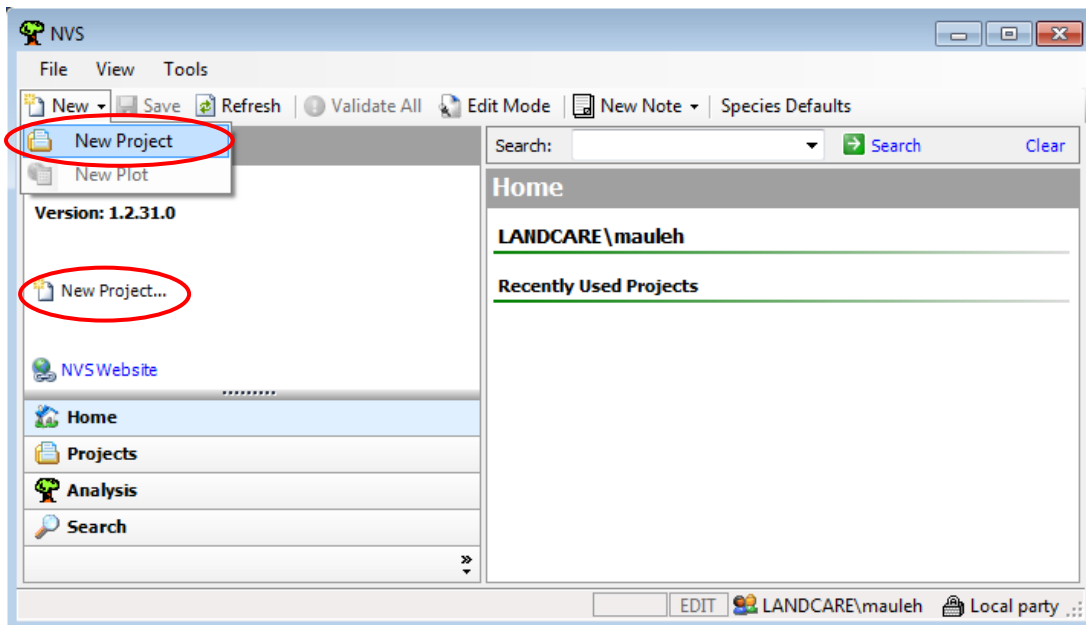
- A window will open, asking you to select the methods that your project uses. The default selection (displayed below) is for a standard 20m x 20m permanent plot.

The method options are:

- **Browse**: browse information as recorded on a standard Recce inventory.

- **Grassland Recce**: Recce inventory using standard grassland tiers (as per Wiser & Rose 1997).

- **Percent Cover by Tier**: Recce inventory using standard forest tiers (as per Hurst & Allen 2007), which allows you to enter actual percentages rather than cover scores.

- **Recce Inventory**: Recce inventory using standard forest tiers (as per Hurst & Allen 2007).

- **Sapling Count**: standard permanent plot quadrat sapling counts (as per Hurst & Allen 2007).

- **Seedling Count**: standard permanent plot quadrat seedling counts (as per Hurst & Allen 2007).

- **Species List**: species list for a plot.

- **Stem Diameter**: standard permanent plot quadrat tree diameter measurements (as per Hurst & Allen 2007).

If you have used another standard method or method variation that you would like to enter, please contact the NVS database administrator for advice.

If you are entering a permanent plot remeasurement, it is possible to be provided with a project pre-loaded with stem diameter tag numbers. Please contact the NVS Database administrator if you would like to receive a template project.

If you are entering anything other than a standard 20m x 20m permanent plot it is important to contact the NVS Databank administrator BEFORE you start entering data. Many options can be accommodated in NVS but it is much simpler to set up a project before any data have been entered.

Contact the NVS Database administrator by email: nvs@landcareresearch.co.nz

- **Access Level:** Choose the appropriate access level for your data from the drop-down menu.
    - **Not Set** – A stop-gap while considering the appropriate access level.
    - **Public** – No limitation on availability of data. The provider puts no conditions on use of the data.
    - **Restricted** – The existence of these data will be shown on data listings, but use is restricted by the provider. Written approval must be obtained from the provider before data will be supplied.
    - **Restricted, Location sensitive** – The existence of these data will be shown on data listings, but not displayed on maps. Use is restricted by the provider and written approval must be obtained from the provider before data will be supplied.
    - **Private** – Confidential or commercially sensitive data. The existence of data will not be advertised; they will be archived in NVS predominantly for data security.

Project name, description, start date and vegetation type.

- **Project Name:** This name will be used to identify the dataset once the data is archived in the NVS Databank. The name used cannot be the same as any existing project you may have established in NVS Data entry. If necessary the project name may be changed at a later date and the project resaved. The name used must be distinctive from any project names already used in the NVS Databank – see https://nvs.landcareresearch.co.nz/ or click on the NVS Website link on the left-hand side of the NVS Data Entry 'Home' screen.

- The basic naming convention adopted from April 2014 is:

    1. Higher level geographic place name based on the spatial extent of the project.

    2. Optional – Lower level geographic place name.

    3. Optional – Special feature of the project data, organization or depositor.

    4. Year(s).

Other criteria:

- Acronyms should be avoided if possible (e.g. CMS, NFS etc)

- Concise names are preferable to very long, overly descriptive names.
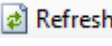
Examples of NVS project naming convention:

1.	2.	3.	4.
Mokau River	Kahikatea Bend	Exclosures	1993
MOKAU RIVER KAHIKATEA BEND EXCLOSURES 1993			
New Zealand		National Forest Survey	1945-62
NEW ZEALAND NATIONAL FOREST SURVEY 1945-1962			
South Island		Coastal	1997-98
SOUTH ISLAND COASTAL 1997-1998			
Ruahine	Tukituki		1974
RUAHINE TUKITUKI 1974			

- If the project being entered was a remeasurement of an existing NVS project, it is important to keep the project name consistent across measurements. This helps to avoid any confusion in future and provides an intuitive link between remeasured projects. Exceptions to this rule may arise if a project combines remeasured plots from more than one NVS project, or includes newly established plots, or comprises non-standard and partial plot remeasurements. In such situations contact the NVS Database Administrator (email: nvs@landcareresearch.co.nz) for advice.

- **Description**: Enter a short description of the project data that will be contained in the project. This project description can be useful to record any notable features of the project. In particular, it is important to record any deviations from standard measurement protocols (e.g. documenting that epicormic shoots were counted as

saplings), or information on the procedure used to collect certain data (e.g. documenting that altitude was read from GPS coordinates and a map rather than from a barometric altimeter).

- **Start date**: Enter the start year (e.g. 2006). The project cannot be saved without a valid start date. The start year should be the year that the fieldwork for the project began. For further details on entering dates see Section 6.

- **Type**: Select your general vegetation type from the drop-down list of options (Forest, Grassland, Mixed, Other, Scrub, Tussock or Wetland).
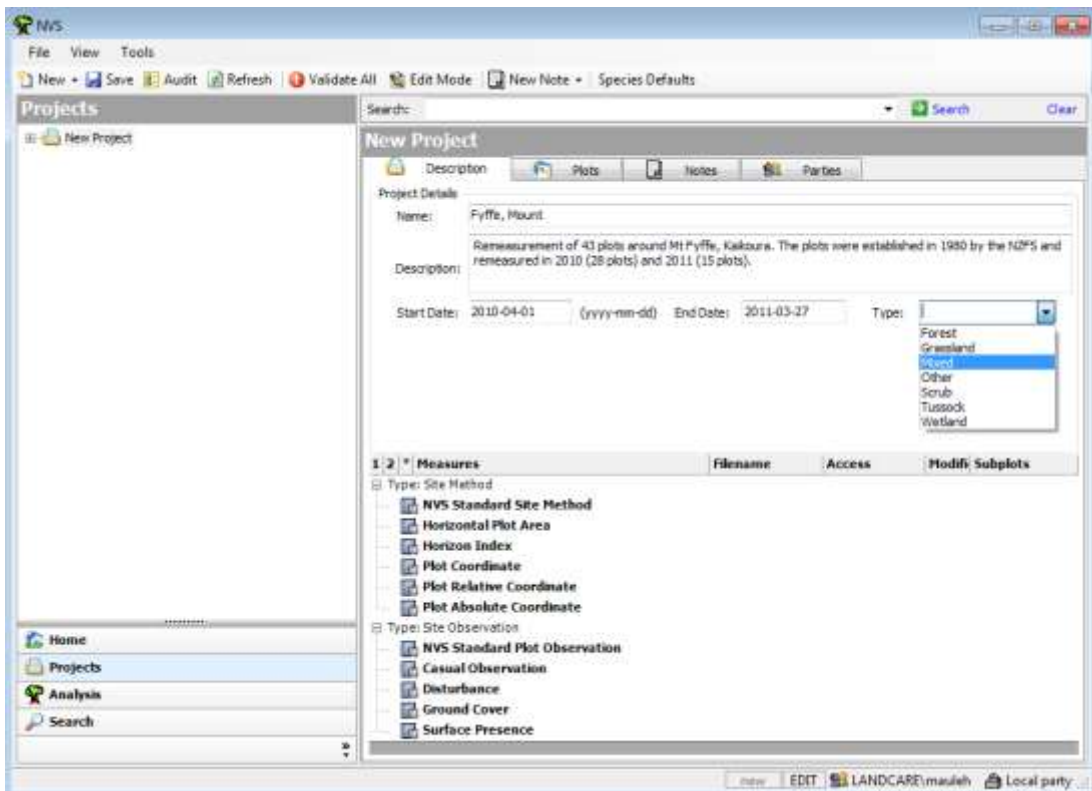
- **Save the project:** Click the 'Save' toolbar button ![Save], or select 'Save' from the File menu. Once saved, press the 'Refresh' ![Refresh] button on the toolbar if the project name shown in the 'Projects' window has not been updated.

- **Project file**: Once saved, each project is stored in a separate file on the local disk (e.g. within a folder 'NVS Projects' in 'My Documents').

- **Deleting a project**: A project can be removed from your NVS Express by deleting the unwanted project file within the 'NVS Projects' folder. Alternatively, for the cautious, an unwanted project file can be shifted to another location using cut/copy & paste or drag & drop. Ensure that important files are backed up periodically until they are completed and sent to the NVS Databank for further validation and archiving.

5.1.1 The Project Methods

Once the new project has been saved, NVS Data Entry will create the methods applicable for the project. The default set of methods are those associated with a standard 20 x 20m forest plot.

Details of the Site Method and Site Observation methods, equivalent to the front side of the Recce description field-sheet, are in the box at the bottom of the screen.

To examine details of the Sample Methods (including Browse (i.e. browse data recorded on the Recce Inventory sheet), Recce Inventory, Sapling Count, Seedling Count and Stem Diameter) click on the node to the left of the project name in the Projects box, then click on the method of interest, method details will appear in the box at the bottom of the screen.

To view the details of each method, Use the '+' symbol next to the aspect (node) that you want to view or, use the numbers 1–6 to view more or less detail under each node; note that this function only operates to expand nodes that have previously been expanded manually (as above). The * symbol expands each node fully to display all available detail. For the node headings that are listed in bold font, the same level of detail may also be viewed in a separate window by double-clicking on the heading.

- **Check the default 'Project Methods'**: It is very important that any variations to the project methods for the current project are identified and documented. For example, the default option for altitude measurement is to use an altimeter (see screen-shot below). If the field-team instead read altitude from a map, then this deviation should be added as a project or plot-level note[2] (see Section 6 for more info on adding notes). Please also include this information in the metadata you send in. When the data is uploaded to the NVS databank, the administrator will ensure that the Project Methods are adjusted to accommodate such variations in methodology.

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[2] 'Survey notes' should be used to document details that are consistent across all or most of the plots in a project; 'Plot-level notes' should be used to describe details pertaining to an individual plot.
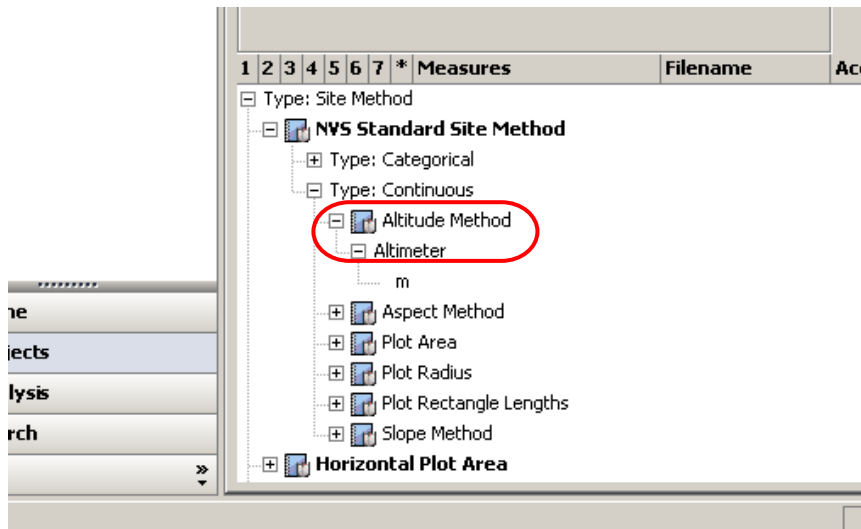
- **Non-standard additions to methods:** Note that the standard Project Methods cannot be changed in NVS Data Entry. If your project used non-standard methods or contains additional methods (e.g. Foliar Browse Indices on plots), use a note (see Section 6) to document the method variation or the existence of additional data; and contact the NVS Database Administrator (email: nvs@landcareresearch.co.nz) for advice on entering or archiving the additional data.

- If, after adding the methods, you discover that you have not added all of the methods measured in the project you can still add additional standard methods. Turn edit mode on, right-click on the project name, and then click on 'Select Project Methods' and add further methods from the list. These methods are applied to existing plots as determined by their Automate settings.
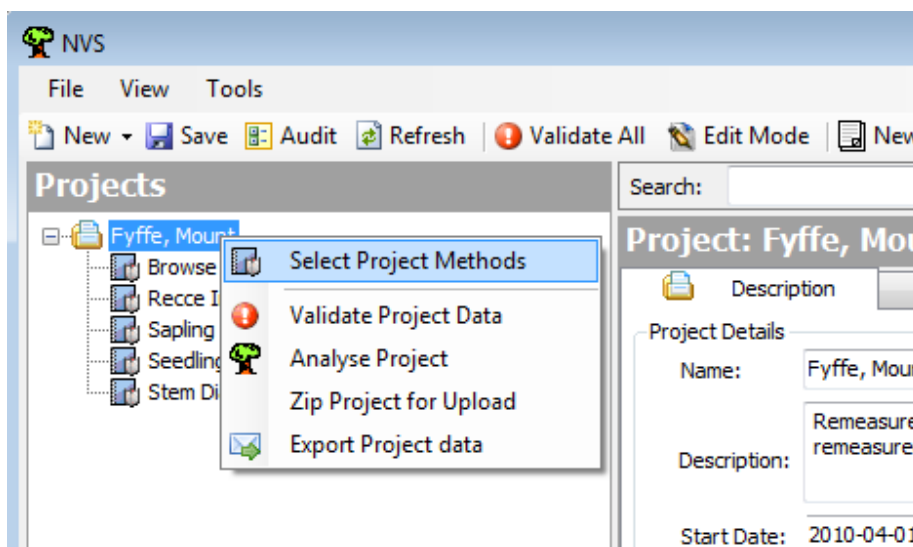
- If you add new methods after creating plot(s) or discover that a plot does not have all of the methods listed you can use the 'Assign' function to assign a method to all plots in the project. Turn edit mode on, select the method you want to add under the project name and then click the assign button on the top toolbar. A message will appear asking you to confirm that you want to assign that method to all plots and will list some details about the method. Select ok, you will then get a confirmation message once the method has been assigned to the plots.
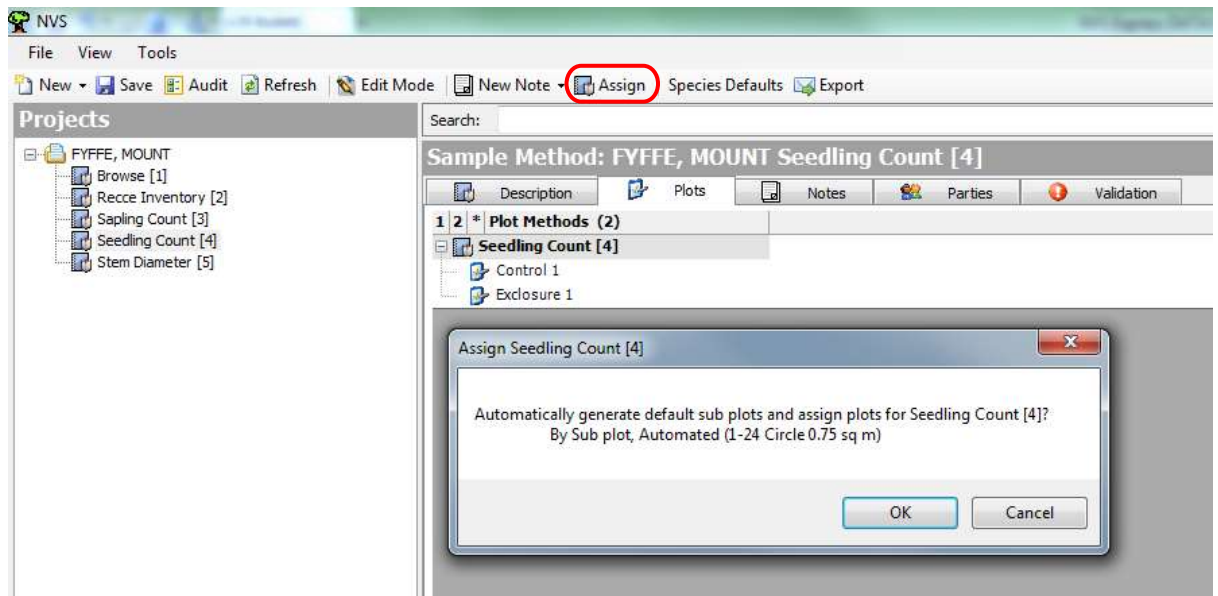
5.2   Entering party (person & organisation) information

A Party in NVS Express can be a person or organisation. Party information is entered against the whole project (e.g. primary contact person) and for each individual method (Recce Inventory, Stem Diameter etc) on plots within the project (e.g. measurers & recorders). The party information gets saved to a file on your computer so in future projects, if the same parties are involved, you can simply add them instead of re-entering their details.

NVS Party Sharing

NVS Express can Export all parties associated with a given project or set of projects, into a party file. NVS Express users working with the same parties (in the same organisation but not on a shared network) can exchange lists using the Export and Merge functions so they don't have to re-enter all party details and to avoid duplicate parties being uploaded to NVS DB. Also, NVS Express users working on a network (in the same organisation) can use a single, shared party file. To do this, an existing party file (such as the NVS Std parties) is placed in a shared location then each user joins to it, which copies all their parties into the shared file. Whenever party lists are joined there is the possibility of creating duplicate

names, In the case of people, surname and email are used to match parties so the entering of an email for each person is recommended.

Details of whole-project Parties

- Click on the project name in the left-hand frame then the 'Parties' tab to open the window in which to enter parties involved with the project.
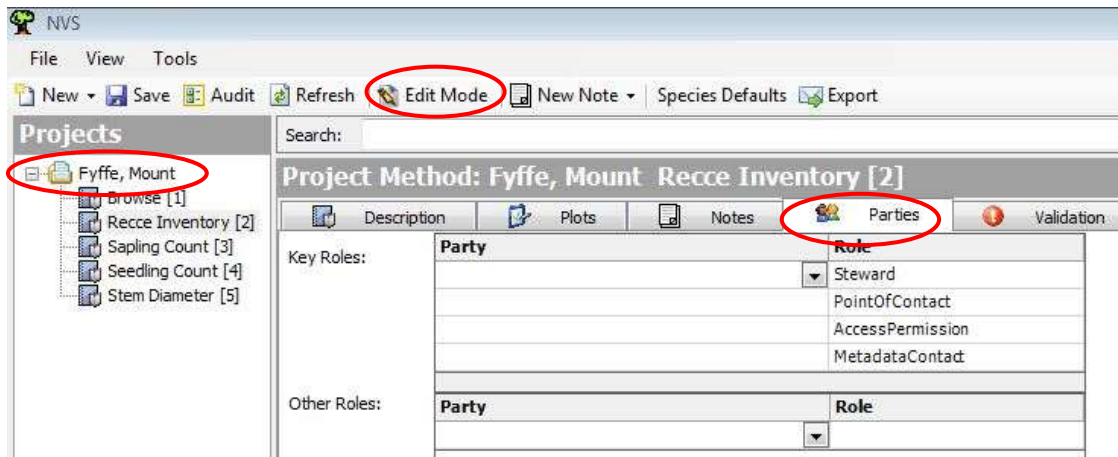
- Click on Edit Mode to enable editing.

- When you first use NVS Express you will need to populate your own Party Data 'database', once parties are in that database you can search for them and add them straight into the 'Party' field. To create a new party record, right-click in the grey space in the Parties window and choose New Party. A New Person form will appear.

New Person

Fullname: Robinson | Margaret
Title | Surname | Firstname
Birthdate: | Deathdate (or X):

☐ Publish contact details

Contacts +
Email ▾ ✕ ☑ Current ☐ Preferred
Office Phone ▾ ✕ ☑ Current ☐ Preferred

Addresses +
Postal ▾ ✕ ☑ Current ☐ Preferred Address: Landcare Research PO Box 69040
City: Lincoln
Region: Canterbury
Country: New Zealand
Postal Code: 7640

Associations
New | + Add | Delete Organisation | Start | End or X
New | + Add | Delete Position | Start | End or X

View | Save | Cancel

New Person

- Enter the person's name and contact details. For each type of contact information you can have multiple current options (e.g. a home phone and an office phone) but only one preferred option. Fill in as much information you deem is necessary. **Save**.

Organisation

- To create an Organisation associated with the person, click the 'New' organisation icon. Be aware that you open up a second window. If you are adding new organisation(s) we recommend that you do this before you start adding people.

Position

- You can also create a position <u>within</u> an organisation by clicking the 'New' icon.

- Once Person, Organisation and Position details are saved in your NVS Express, you can add them to subsequent projects by simply choosing Add Party and searching for the desired person, organization or position when you right-click within the Parties tab.

- Once you have added the Party, you should assign that party a role. Click in the 'Role' field and choose the appropriate role from the drop-down menu.

- **Enter the organisation(s),** if any, that the project is associated with. In the Organisations window right-click under the 'Party' and select 'Add Party'. A Select Party box will come up - if you have added organisations they will be listed here. If you have not added any organisations click the 'New Party' drop down list and select 'Organisation' drop down menu and select 'Organisation'.

- Fill in the details for an organisation. You can also associate people and positions to an organisation, similar to associating details with a person.


Details of Parties for each method

- Open the project header in the left hand frame to reveal each method used in the project. Click on the method (in this case Recce Inventory) and enter each party involved in the recce (this should be recorded on the plot sheets). You can either create new parties as in 5.2 or, if already created, add them from the drop-down list. The whole list appears for the first entry, and the list is 'populated' as you choose each new person from the '(All people)' option. Don't forget to assign a role for each party you include. If you enter a person by mistake, you can right-click & delete.
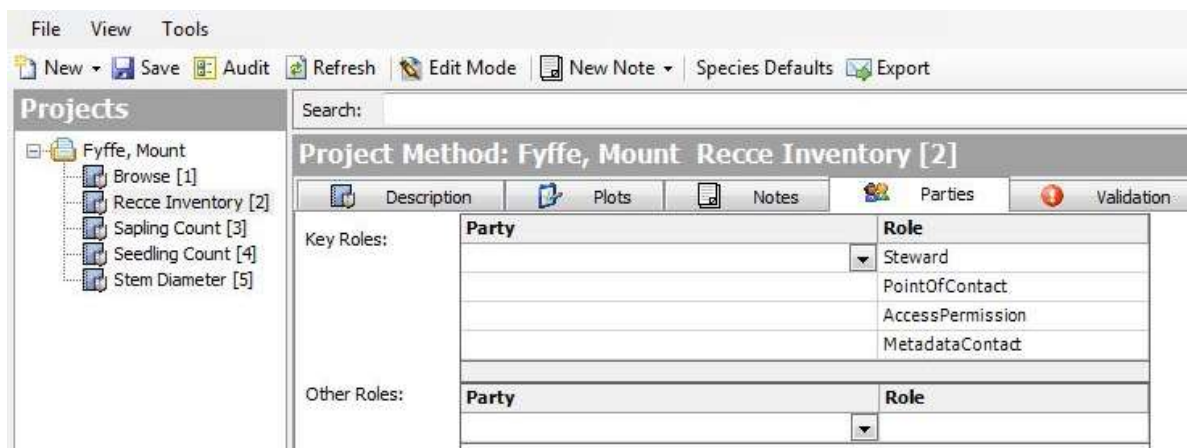
- Save after each method is populated and repeat the process for each method used in the project.

- **People and party information can also be accessed and edited within the site description window for each plot. This is where the party details are entered for the site measurements recorded on the front page of the Recce plot sheet**: This includes the names of the people who measured the plots, the organisations that employ them and their position and contact details. This information will often be the same or similar for many plots within a project, so it is usually most efficient to enter all party details in the plot template (refer Section 3) before starting to enter plot data (although additional people or organisations can be added whenever necessary).

- To enter who did the measuring and recording of the site description, from the plot 'Site Description' window, click on the 'Measurer/Recorder' drop down list to select a person you have previously created (or create a new one by right-clicking & choosing 'New Party'), and the 'Role' drop down list to assign them their role (i.e. either the measurer or recorder) as recorded on the plot fieldsheets).

- To enter who was on the project team as a whole and their roles (which may be multiple), fill in the 'Team' list.
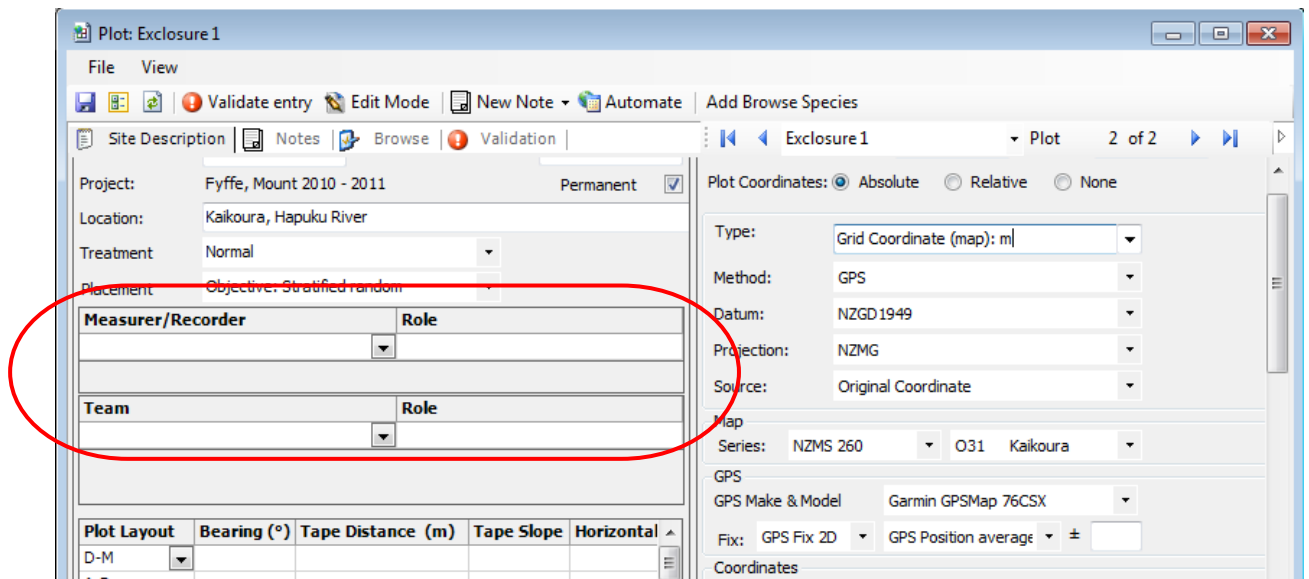

- If the desired person is not listed, create a new person by using the 'New Party' toolbar button in the 'Add Party' box and selecting 'Person'.

- A new window will open. Fill in the details for the new person as described on page 17.

- **Measurers and recorders can also be added to each method on the plots.** To do this you need to be in the method data window for the plot and click the button 'Show Header'. This is best done at the time of entering the data.

  The header will then be displayed, which includes party information. Ensure Edit Mode is turned on. Right-clicking in the 'Party' box and selecting 'New' or 'Add' will bring up the 'Select Party Role' box discussed earlier and you can enter the individuals who measured and recorded the data for this method on the particular plot.

6   Setting Up a New Plot Within a Project

- **Edit mode:** NVS Data Entry must be in edit mode before changes can be made to a project. Select edit mode using the File menu or by clicking the 'Edit Mode' button on the toolbar.
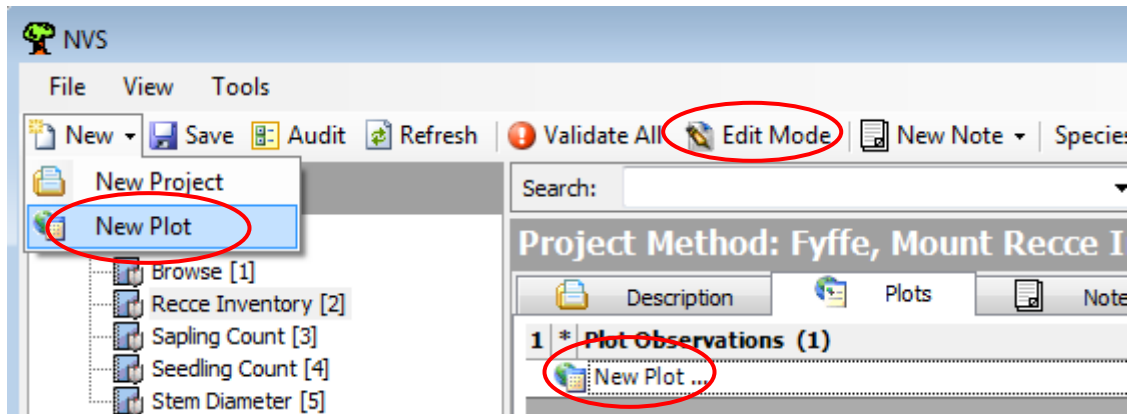
- **Add a plot to the project.** To add the first plot you can either click the 'Plots' tab and click on 'New Plot...' or select 'New Plot' from the drop-down menu.

- When 'New Plot' is chosen a new window will open, the **Site Description** page (see Section 7 below), this is where the plot observation data for the plot will be entered. This identifies the plot, its location and site observations (generally equivalent to the data recorded on the front side of the Recce description sheet).

- Enter the Plot Name (e.g. Exclosure 1) and save, an Automate box will inform about generated plot methods and subplots, click OK.

- Close the Site Description window and note the 'New Plot...' has become 'Exclosure 1' (or whatever you called the plot). Click on the + sign to reveal the items mentioned in the automate box on saving.
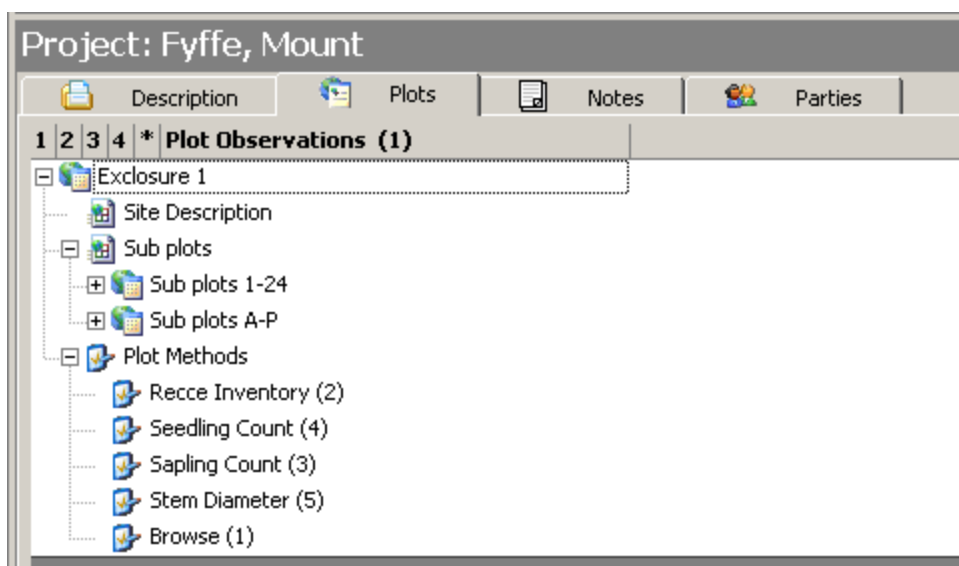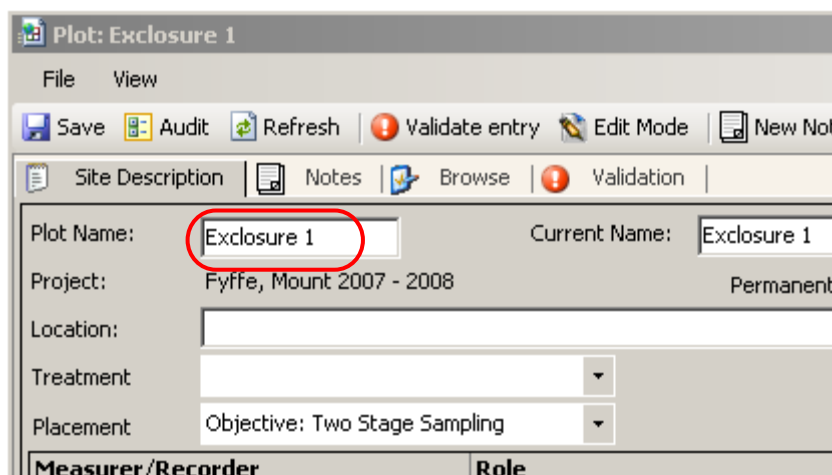
For more information on creating plots which are not 20m x 20m, see section 7.

- **Entering other method data:** NVS Express allows data to be entered and viewed in two different layouts once the plots have been created. The 'Plot Observations' node displays the data grouped by plot whilst the 'Plot Method Data' node shows data grouped by method.

Plot Templates - A time saver

- You can either create a New Plot from scratch every time, which may be time consuming or we suggest you create a plot template.

- **Creating a plot template:** A time-saving plot template can be created so that data that will be the same for all plots in the project can be entered just once. For example, if the same GPS receiver, datum and map series is used throughout the project, then this data can be entered in a plot template and any new plot copied from this will have this information automatically filled in.

- To set up a plot template, enter a plot name, e.g. 'Template', in the Plot Name field then enter any other data which will be the same for all plots in the project (and not already defaulted) e.g. location, plot area, etc. When you save the plot, an Automate box will appear detailing the items automatically generated for your project. Click OK.

- **Copying the plot template:** To create further plots right-click on the template's name (in this case, 'Template') and choose 'Copy plot'. Another Site Description page will appear, this template copy will have the fields filled in as for the template. Type in the plot name (in this case, 'Exclosure 1'), save and close.
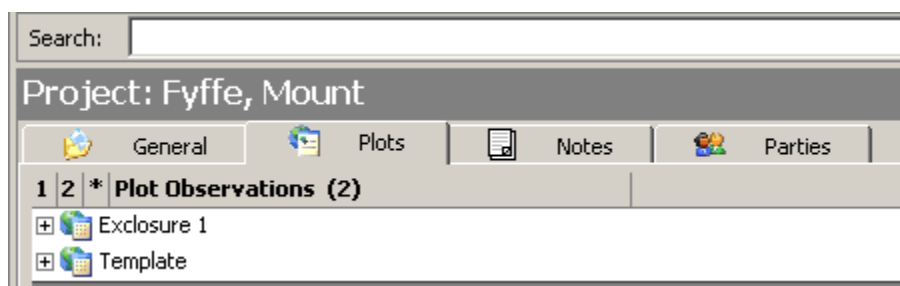

- Back on the Plots tab, the new, copied plot will have appeared.

- When copying plots, always check the data carefully to ensure that all data for the new plot has also been copied.

7   Site Description Data (Recce Site Description)

- **Site description data** (Site data) is generally equivalent to the data recorded on the front side of the Recce field-sheet.

- **Opening the form:** To enter site description data, double-click on 'Site Description' (or right click & choose 'Open Site Description') under the plot name in the Plots tab. The Site Description page will open to fill the screen.

- **Default values:** If the plot was created from a plot template (see Section 4), then some of the cells within the Site Description will be filled in. Make sure that the pre-filled information is correct.

- **Is the plot permanent?** This checkbox has three states: Yes (tick), No (blank), and Unknown (blocked out in grey). If the site description is for a permanent plot, click the 'Permanent' box to display a tick and identify the plot as permanent if the plot is a 20x20-m permanent plot. Once ticked, four default rows are added to the plot layout for entering the measured plot dimensions.

- **Missing data:** Record a note for the plot (see Section 6) noting any data that is missing. Missing data will be highlighted in the data validation functions – the notes will enable a quick check that the data was missing on the field-sheet, rather than missed during data entry.

- **Plot Name:** Enter the unique plot identifier for the project, as recorded on the Recce field-sheet. When entering the plot name for plots that were located on transects, follow the standard system by entering the line number, followed by a space, followed by the plot number (e.g. line 20 plot 1 is entered as 20 1 (not 20/1 or 20-1 as this can cause confusion such as being regarded by MS Excel as a date). If the plot was a remeasurement from a previous project, ensure that the plot name remains consistent in the archived electronic data of each project. This allows the lineage of the plot to be readily identified when the data is uploaded to the NVS Databank. If

the correct plot name used in the archived electronic data is unknown, contact the NVS databank administrator.

- **Current name:** This field is only used where a plot has been renamed between different project remeasurements (as can happen if a new project includes remeasurement of plots from many different historical projects). Only enter data here if necessary. Where nothing is entered the value defaults to the plot name.

- **Location:** Enter the sub-catchment, catchment and region as recorded on the field-sheet, separating each with commas (e.g. West Coast Conservancy, Whitcombe River, Vincent Creek).

- **Treatment:** If the plot is a fenced 'exclosure' or associated 'control', please select these options from the drop-down list. The option of 'normal' can be selected to indicate that there was no treatment applied to the plot. If you have other types of plot treatment you can use the options 'treatment' and 'non-treatment' and specify what these treatments are in a project note (see Section 6).

- **Placement:** The sampling method by which plot locations were decided can be classed as either subjective or objective. The options are:

Subjective:

- **Targeted:** (also referred to as 'preferential' or 'selected'): professional judgment is used to select plot locations deemed to be appropriate to the study.

- **Key area:** locations for sampling are representative of either a larger area e.g. a beech forest on a ridge or of critical areas (e.g. high impact sites or locations where rare species occur).

- **Haphazard:** samples are collected in the field without any pre-determined method for deciding where to sample. In essence, this approach is the de facto method when no other method was used.

Objective:

- **Simple random:** all of the sampling units are enumerated and a specified number of sampling units are selected at random from all the sampling units. Each sampling unit has the same likelihood of being selected and the selection of one sampling unit does not influence the selection of any other sampling unit. Simple random selections are easy and fast to implement using a variety of GIS, statistical or spreadsheet programs.

- **Two-Stage Sampling:** The area is divided into primary sampling units. The primary sampling units to be sampled are selected randomly. Then a secondary selection of plot locations is made within the primary sampling unit. These secondary locations can be random or systematic. This was the plot location method primarily used by the NZ Forest Service in historic vegetation projects using the 20x20-m plots.

- **Stratified random:** Stratification is the process of dividing a set of sampling units into one or more subgroups (i.e., strata) prior to selection of plot. Plots are then selected randomly within each stratum. The purpose of using stratification is to account for variability in a population that can be explained by another variable (e.g. vegetation type, aspect, soil type, etc.).

- **Restricted random:** the area to be sampled is divided up into large segments based on the number of plots needed. Within each segment, a single plot sampling location is selected at random.

- **Systematic:** plots are located within an area according to a regularly repeating pattern. Examples of systematic sampling are: locating sample sites on a 1km grid within a pasture, taking measurements every meter along a transect or orienting transects along cardinal directions.

- **Party data:** Add persons involved in the plot description (Measurer/Recorder) and persons and parties involved in the plot as a whole (see Section 4).

- **Plot layout:** Enter the plot layout data (bearings and tape lengths). When 'Plot' is validated, all layout tape distances are validated against the 'conceptual' plot size (see below) and a warning is given if they are more than 25% above the longest or 25% below the shortest side.

- **Plot Shape:** Choose plot shape from the dropdown list. The default shape is square.

- **Size:** The size of a standard permanent plot is 20×20-m square. The values entered in this field represent the 'conceptual' plot size (i.e. not accounting for minor deviations in tape length that are entered in the plot layout fields above).

- **Plots of non-standard sizes:** Square plots of other sizes may be entered so long as their dimensions are multiples of 5 m (e.g. 10×10 m, 20×30 m). To change the plot size, edit the values and press the 'Calculate' button. When you save the plot NVS Data Entry will then automatically generate enough standard-sized subplots (e.g. 5×5 m) to fill the plot area.

- **Plots of other non-standard sizes or shapes:** NVS Express is unable to automatically generate subplots for plots of other non-standard sizes or shapes. In these cases subplots must be manually generated when the plot is created. If you need to do this please contact the NVS database administrator for advice beforehand (nvs@landcareresearch.co.nz).

- **Altitude:** Enter the altitude in meters above sea level (a.s.l.), or, if the precise altitude is unknown, enter the potential possible range.

- **Physiography:** Use the dropdown list to select the recorded option. If what is recorded does not conform to any of the listed entries, record it in a note for the plot (see Section 6).

- **Aspect:** Enter the aspect in degrees, or if recorded as such, compass direction. If there is no aspect (i.e. where a plot is flat) leave this field blank.

- **Slope:** Enter the slope in degrees. Slope is normally measured using a clinometer, the method specified in the default project methods (see Section 4). If the slope was estimated, or measured using some other procedure, use a plot note (see Section 6) to record the deviation from the standard measurement methods.

- **Shape:** The landform shape of the plot. Use the dropdown list to select the recorded option. If what's recorded isn't in the list, record it in a note for the plot.

- **Parent material:** Enter the parent material if it was recorded in the field. Common options are included in a dropdown list. If what's recorded isn't in the list, record it in a note for the plot.

- **Soil drainage:** Use the dropdown list to select the recorded drainage class. If what's recorded isn't in the list, record it in a note for the plot.

- **Cultural/disturbance:** Select a disturbance type (where recorded) from the dropdown list. Add a comment if one has been recorded on the plotsheet. To add a row in the disturbance box right-click in the box and select 'New disturbance'. Ensure that only one record is entered for each category of disturbance.

- **Approach:** Enter the approach notes recorded for the plot.

- **Notes:** Plot-specific notes can be entered by using the 'New note' button on the top ribbon, by using the 'View notes' button beside the 'Approach' box or by right clicking in the field and adding a new note for the relevant category.

- For **exclosure** plots there are some separate categories of notes to record details of the condition and history of the fencing. Using the 'View Notes' button, select 'New note' and then select the category 'Fence condition' to enter notes on the condition of the exclosure fence. Under the 'New Plot note' option you can select 'Date Fence Build' and 'Date Fence Inspected' categories for notes.

- **Fauna:** To add a row in the Fauna box, right-click in the box and select 'New'. Use the dropdown menu to select the fauna type (i.e. mammal, bird, reptile, invertebrate, marsupial or amphibian); then type the name (either common or scientific) of the fauna observed. A description or additional information can be added where appropriate.

- **Start date:** Enter the date recorded on the field-sheet (in the format yyyy-mm-dd; see section 6 for information on entry of dates).

- **Stop date:** The default 'Stop' date is the same as the 'Start' date and this is automatically generated. If the plot was completed over more than one day, delete the automatically generated date (using the delete or backspace keys) and enter the correct stop date.

- **Absolute coordinates:** Select the methods used to derive the plot location coordinates. In most instances this will be:

  - Grid coordinates: in meters (m)

  - Method: GPS

  - Datum: NZGD49 (or NZGD2000)

  - Projection: NZMG (or NZTM2000)

- **Map:** Select the map series and map sheet number.

- **GPS:** Select the appropriate make and model of GPS receiver, and enter the precision of the fix. If your GPS model is not in the list please add a note listing the unit used. This is helpful in assessing how accurate the reading may be.

- **Coordinates:** Enter the coordinates of the plot. If GPS derived, these will be in seven-figure map grid coordinates. If you are entering three digit offset grid coordinates derived from a map sheet, the default precision (± 50m) will appear in the precision field.

- **Mesoscale topographic index:** Enter each horizon angle, ensuring that the sign of each angle (+/–) is correctly entered.

- **Surface characteristics:** Enter the percentage of 'Surface bedrock' and 'Surface broken rock'. If none was present, enter a zero (i.e. '0'). Where data was not recorded on the field-sheet, delete the entire row, by right-clicking on the row and selecting 'Delete surface'. Additional non-standard categories, which may be added where applicable, are 'Surface rock' and 'Surface charcoal'. Ensure that each category of surface characteristic is entered only once.

- **Size of broken rock:** Select the applicable size (i.e. either less than (<)30 cm or greater than (>) 30 cm diameter). NVS Data Entry will also allow both categories to be selected, in case a non-standard method was used.

- **Ground cover:** Enter the percent cover for each of the standard ground cover categories listed on the field-sheet ('vegetation', 'non-vascular', 'litter', 'bare ground' and 'rock'). If none was present, enter a zero (i.e. '0'). Where data for any category was not recorded on the field-sheet, delete the entire row by right-clicking on the row and selecting 'Delete Ground Cover'. To add a row, right-click in the grid and select 'New Ground Cover'. Ensure that each ground cover category is entered only once. Additional non-standard categories can be selected using the dropdown list and these may be used where applicable.

- **Average Top Height:** Enter in the appropriate field in units of m.

- **Canopy Cover:** Enter in the appropriate field in units of %.

Save the Site Description data and deal with any validations.

8 Plot Methods Data (Vegetation Data)

All plot method data, including the Recce vegetation description, browse, stem diameter data, sapling counts and understory subplot data, is entered for one method and one plot at a time, one row per plot and species (or individual).

8.1 Browse

- Open a Browse form: In the Projects list, open the node of the project you're working on to reveal the methods list of that project, click on 'Browse'. The Browse method will appear in the Plots tab. Double click on the plot name to open the browse data entry form for that plot. This is where the browse data recorded on the front side of the Recce vegetation description sheet is entered.

- Click on 'Edit Mode' button to enable editing.

- **Adding species:** Click on the 'Add Species' button on the toolbar, or press the Insert key on your keyboard.


- **Species codes:** Enter species codes in the 'Verb. Code' column. Either enter the full six-letter code, or select the correct code from the dropdown list. For further information on species codes, see Section 9.

- **Severity:** Begin typing the relevant browse Severity (low, medium or high) or use the dropdown list.

- **Herbivore:** Select the Herbivore by starting to type the name or by using the dropdown lists that appear.

- **Herbivore not in the list?** If the relevant browser is not in the pre-populated list, use the notes column to add the herbivore.

- **Deleting rows:** To delete a row, right-click on the row and select 'Delete Browse Species' or click on the species code or full name and hit the Delete key.

8.2   Recce Inventory

- **Open a Recce Inventory form:** In the Projects list, open the node of the project you're working on to reveal the methods list of that project, click on 'Recce Inventory'. The Recce Inventory method will appear in the Plots tab. Double click on the plot name to open the Recce Inventory data entry form for that plot. This is where the Recce data is entered.
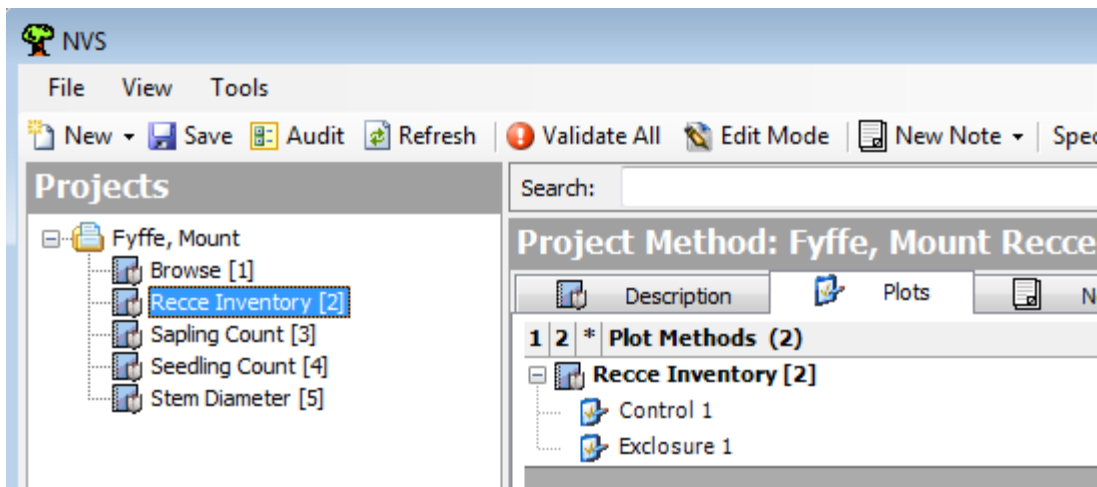
- Click on 'Edit Mode' button to enable editing.

- **Show Header:** Click 'Show Header' on the top tab to open a header where party data can be entered i.e. the names of the people measuring and recording this data. See section 4.2 for further details. Once parties have been added, click 'Hide Header' to toggle back.

- **Edit/delete height tiers:** For ease of data entry and to avoid errors, you can remove any tiers not used for the particular plot. Do this in the Recce Tier details page. Click on the unwanted tier in the (Recce Tier) list and click the Remove Tier button (or, right-click on the tier to remove, and select 'Delete row'). Note the removed tier is placed in a 'Re-insert removed Recce Tier' drop-down list in case you later find you do actually want to use that tier. To reinsert a tier, double-click on the tier in the drop-down list. If you hadn't saved the data, a warning message will appear prompting you to do so before that tier can be reinstated.

- **Lower and Upper Heights:** If different from the standard range, please contact the NVS database administrator (nvs@landcareresearch.co.nz) who can adjust the project for you. It is also important that you list non-standard tier heights in the metadata.

- **Cover Class:** Enter each cover class score, choose from the drop-down list. Where vegetation was present, yet no overall cover class score was recorded use 'P' to indicate the presence of vegetation in that tier.

- **Sorting tiers and columns:** Click on the Recce Species tab and, for convenience, drag and drop any removed tiers (whose labels will now be in brackets) to the far right-hand side of the Recce Species form.

- **Adding species:** Click on the 'Add Species' button on the toolbar, or press the Insert key on your keyboard.

- **Enter data:** Fill in data columns, using the Tab key to move across each row (and the cursor keys to move down or up). Each tier cell has a drop-down list, or just enter the value. As an alternative to having to keep clicking the 'Add Species' button, as you tab across off the end of a row, a subsequent row will automatically be added.

- **Species codes:** Enter species codes in the 'Verb. Code' column. Either enter the full six-letter code, or select, by double clicking, the correct code from the resulting drop-down list. Both duplicate codes and codes not on the dropdown list may be encountered – see Section 9 for instructions on dealing with these situations.


- **Deleting rows:** To delete a row from the table, right-click on the row and select 'Delete Recce Species observation'.

- **Enter each cover class score in the appropriate tier:** The default cover class system in NVS Express is the one described in the Hurst & Allen (2007) field manuals. Accepted values are the numeric values of 1–6 and P. These represent the following cover classes:

Cover class	% Cover
1	<1
2	1-5
3	6-25
4	26-50
5	51-75
6	76-100
P	Present, but cover unknown

Should you have used a different cover class system please contact the NVS administrator (nvs@landcareresearch.co.nz) for advice.

- **Changing or deleting cover class scores:** To change a cover class score, select the cell and type the correct score. To delete a cover class score, select the cell and press the Delete key.

- **Missing cover class scores:** Occasionally field-staff may have recorded a species code, but not assigned a cover-class score. Here, enter a 'P' to indicate the presence of the species.

- **Changing column widths:** Column widths too wide or narrow? Hover the cursor over the edge of the column, then click and move the cursor to change the column width (exactly like changing column widths in Excel). Changes to column widths and positions are retained between sessions of NVS Data Entry.

- **Reordering columns:** Do this by clicking on the column name and dragging it across to a different position (rather similar to moving cells around in Excel). Display of the species name column can be switched on and off using the View menu (select 'Display Species Name').
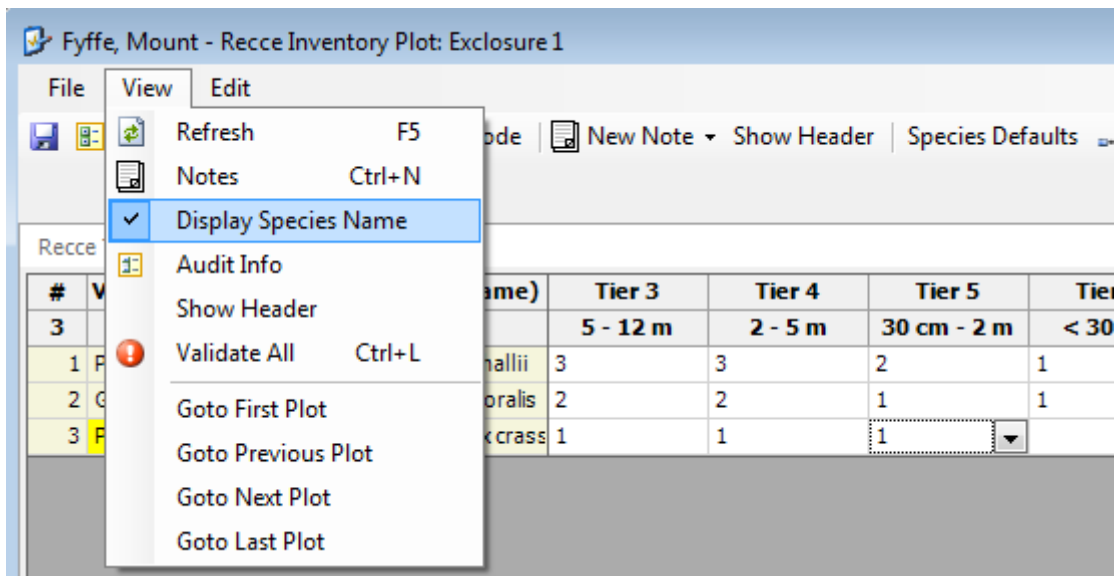
- **Sorting the table:** Data entered into a Recce table can be sorted by any of the headings. For example, to sort by cover class click on the 'Tier' at the top of the column to sort either by ascending or descending values. To sort data in the order it was entered, sort by the order of entry column (labelled #).

- **Data errors:** Errors will be highlighted during data entry and error messages will be shown temporarily in the status bar. Error messages can also be viewed by moving the cursor over the invalid cell. See Section 10 for further information on data validation.

- **Non-standard Recce height tiers:** The standard Recce height tiers cannot be modified in NVS Data Entry. Note that there are a different set of tiers in the two different Recce methods: 'Recce Grasslands' and 'Recce Inventory'. Contact the NVS Database Administrator (nvs@landcareresearch.co.nz) if height tiers used on the plot differ from the standard tiers shown. **Record the discrepancy as a note for the plot (or the project, if applicable).**

- **Data validation:** If you wish to see a list of warnings or errors part way through entry of Recce vegetation description data, click on the 'Validate All' toolbar button (or use the keyboard shortcut of Ctrl + L). This function is also called automatically when you save or exit.

- **Advancing to the next plot:** Arrows on the right-hand of the screen switch between plots on the project. Ensure that each Recce vegetation description is entered for the correct plot.
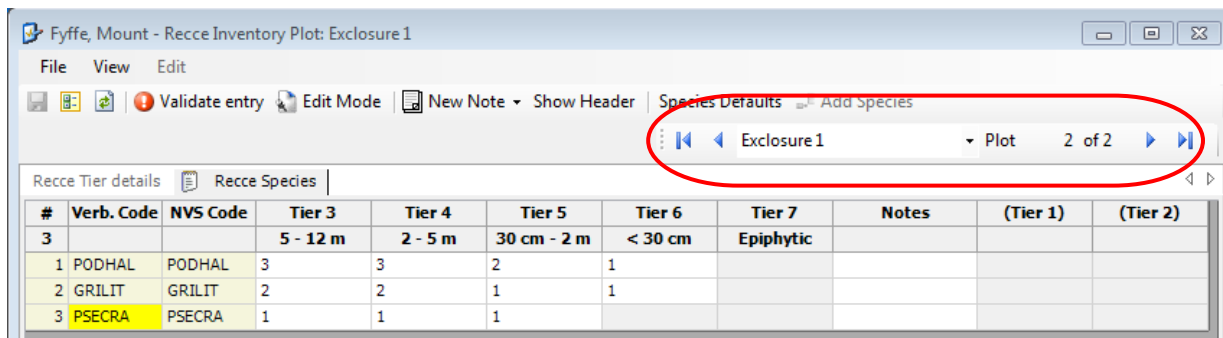
8.3   Stem Diameter

- **Open the stem diameter form for a plot:** In the Projects list open the node of the project you're working on to reveal the methods list. Click on 'Stem Diameter'. The 'Stem Diameter' method will appear in the Plots tab. Double-click on the plot name to open the data entry form for that plot. This is where the diameter data is entered.

- Click on 'Edit Mode' button to enable editing.

- **Show Header:** Click 'Show Header' on the top tab to open a header where party data can be entered i.e. the names of the people measuring and recording this data. See section 4.2 for further detail. Once parties have been added, click 'Hide Header' to toggle back.

- **Insert a subplot:** For the stem diameter data, which is measured by subplot (labelled A–P), the form has a 'Remaining Subplots' list. To add the first row for the next remaining subplot, click the 'Add Sub Plot' toolbar button. To add the first row for a subplot other than the first in the list, select the required subplot from the 'Remaining Subplots' list.
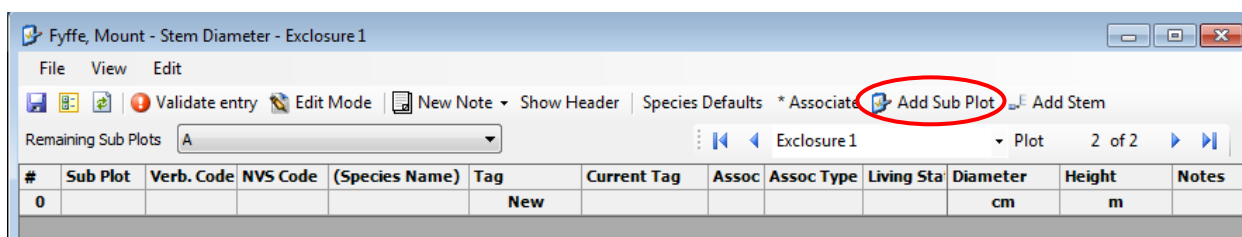
- **Inserting more rows for a subplot:** To add more rows for the current subplot, hit the Insert key, use the Edit menu and select 'Add Stem' or click the 'Add Stem' toolbar button.
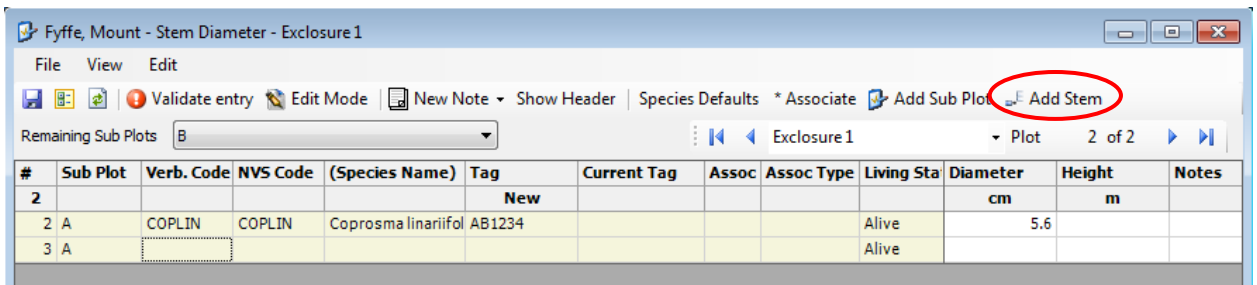
- **Species codes:** Enter species codes in the 'Verb. Code' column. Either enter the full six-letter code, or select the correct code from the dropdown list. If the species to be entered is the same as the preceding species you can use the 'Fill Down' function by either right-clicking and selecting 'Fill Down' or by using Ctrl + D. For further information on species codes, see Section 9.
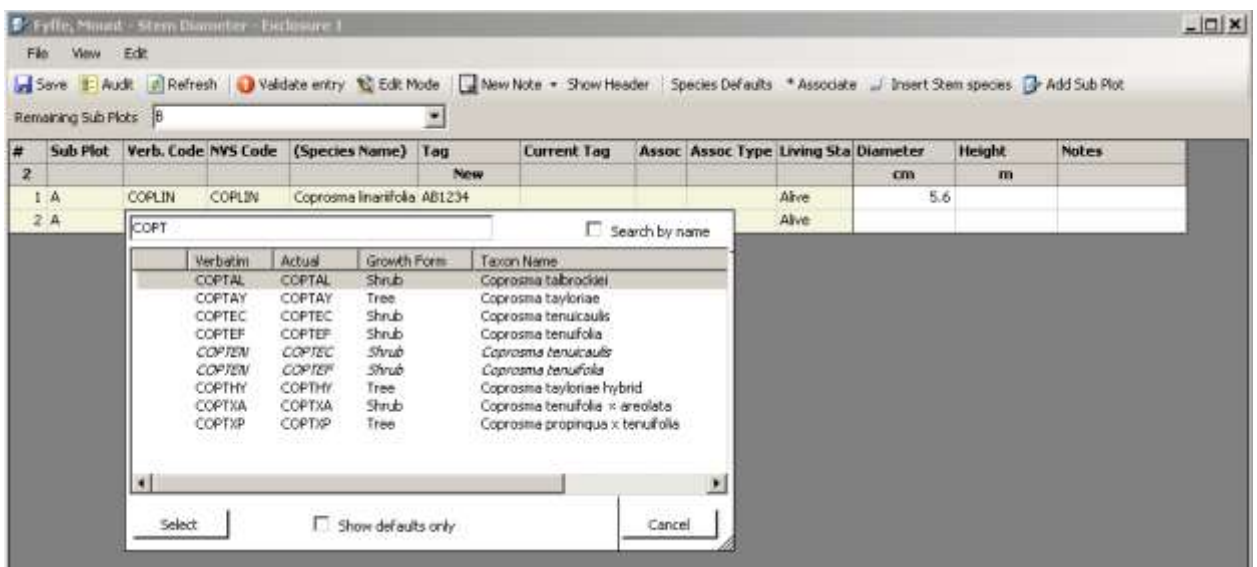
- **Tag number:** In the Tag column, enter the full tag number of the tree stem. If unsure of the correct tag number for a tree stem (perhaps the writing is illegible) the problem can be highlighted using '??' after the tag number (e.g. AB1234??). This will be identified in data validation procedures allowing the value to be rechecked. If the tag numbers are numerical you can use the 'Fill Down' function to insert the next tag in the series by either right-clicking and selecting 'Fill Down' or by using Ctrl + D.

- **Duplicate tags:** If two entries are made of the same tag number, when you go to enter a diameter, a window will appear highlighting the issue and asking whether to edit the first tag entered, flag the tags as duplicates, or edit the last tag. First, recheck the tag numbers you have entered against the field-sheets to ensure they really are duplicates and were not just misread. If the first tag entered was misread

or misentered and needs editing, click 'Yes', and you will be taken back to the first tag to edit it. If the second tag entered was misread or misentered and needs editing, click 'Cancel' and edit the tag number. If the tags really are duplicates, click 'No'. The duplicate tags will then both be highlighted, and an automatic note generated in the notes column. Duplicate tags will be listed as warnings when the data for the plot is validated.
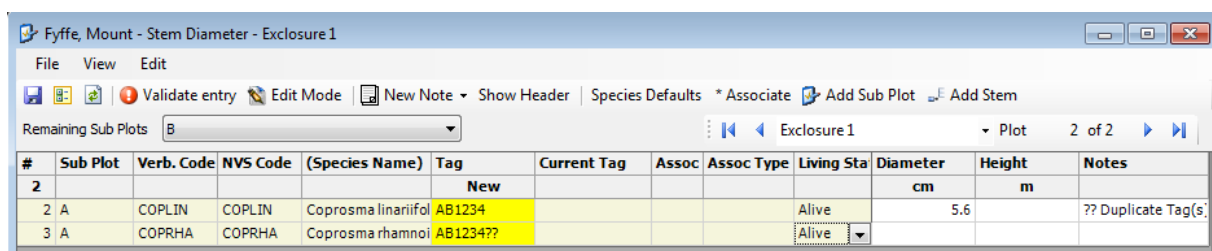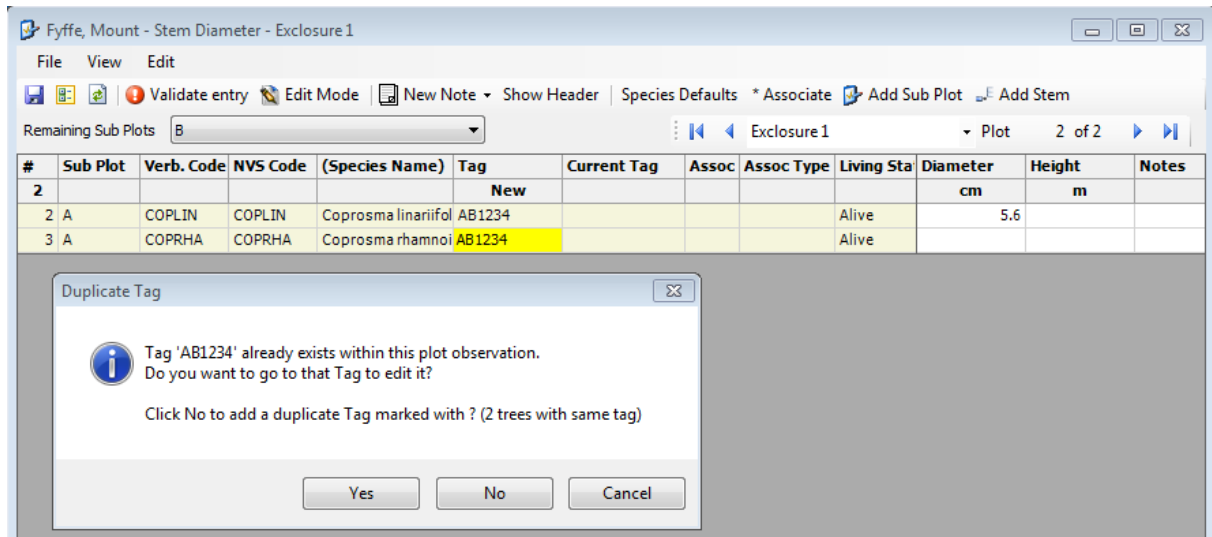
- **Diameter:** Enter the diameter of the tree stem in centimeters (cm). If unsure of the correct diameter for a tree stem (perhaps the writing is illegible) the problem should be highlighted by entering an operator note (see Section 6). This will be identified in data validation procedures allowing the value to be rechecked and/or identifying the problem for future plot measurements.

- **Heights:** Enter the height of the stem (if recorded) in meters (m).

- **Living status:** Usually this will be 'Alive'. On remeasured plots, stems may also be 'Dead' (where recorded dead on the field-sheet), 'Not found' (where a note was recorded indicating this on the field-sheet) or 'Unknown' (where no note was recorded). Use the dropdown list to select the appropriate stem status.

- **Associating stems:** Stems that have one of four relationships can be associated: bracketed, epicormic, epiphytic and fused stems. Stems are 'associated' with one another in the 'Assoc' column. If they are the same individual and bracketed on the

plot sheet they should be listed as **bracketed** (the majority of cases). **Epicormic** branches arise from previously dormant buds along the main stem or branches. **Fused** stems occur when two tagged individuals have grown together and can no longer be measured separately. Both stems should be entered but the fused diameter should only be entered against one of the stems. **Epiphytic** stems can also be associated with the tree they are growing on, as long as none of the stems are already bracketed. Only one relationship can be specified and bracketing should be done in preference to epiphytes.

The process to associate stems is as follows:

- Right-click in the 'Assoc' column of the stem to be associated and select 'Mark or Unmark for Association' or type an asterix (i.e. *) in the column.

- To associate the marked stems, right-click and select 'Associate Marked Tags'. Once associated, the stems are assigned a common association number which appears in the 'Assoc' column.

- Further individuals can then be associated with these stems by entering the association number directly in the 'Assoc' column.

- The default association type is 'Bracketed' but you can change this to 'Epicormic, 'Fused' or 'Epiphyte' by choosing from the drop-down list in the 'Assoc Type' column if required.

- **Subplots with no tree stems present:** To indicate that a subplot was measured but had no stems present, enter a row for the subplot and the code "NOSPEC" in the species code column.

- **Changing the subplot field**: If data was mistakenly entered for the incorrect subplot, click on the subplot observation you want to change and then click the arrow to open the drop down menu and select the correct subplot for that observation.

- **Height:** Tree height can be recorded if measured.

- **Current Tag:** This is only used when a remeasured tree has been retagged with a different number.

- **Data validation:** If you wish to see a list of warnings or errors part way through entry of stem diameter data, click on the 'Validate All' toolbar button. This function is also called automatically when you save or exit. Use the numbers 1–6 to view more or less detail under each method and subplot.

- **Advancing to the next plot**: When all of the stem diameter data for the plot has been entered, save the data, deal with any validations and either go directly to the next plot (click the forward arrow or use the View menu) or enter other types of data for the current plot. Ensure that all data is entered for the correct plot number.

8.3.1   Entering stem diameter data for remeasured permanent plots

It is possible to be provided with a project pre-loaded with tag numbers. Contact the NVS Database administrator (email: nvs@landcareresearch.co.nz) if you would like to receive template diameter forms.

A number of common data-quality and inconsistency issues occur during the remeasurement of permanent plots, especially in stem diameter data where the fates of individually tagged stems are followed over time. Corrections to stem diameter data from previous plot measurements needs to be undertaken carefully to ensure that the data may be used for the intended purposes.

Standard ways of dealing with some common issues in stem diameter data are described below. Please use the standard notations so that changes to historical datasets can be processed once the data is uploaded to the master NVS database. If problems are encountered that are not on this list, please contact the NVS Database Administrator (email: nvs@landcareresearch.co.nz).

- **Tag corrections:** It is essential that tag numbers for individual trees are consistent through time so that the fates of trees can be accurately followed. Corrections to tag numbers may be necessary where the **full** tag number was not entered into the data for previous measurement, or where a tag was misrecorded.

- Enter the corrected tag number into the tag field, and record the old tag number in the notes column. Please use the standard notation of "$" to isolate each note in the notes column, in the format "$Tag corrected from XXX$".

- For example, if a WEIRAC with the tag number E128 was incorrectly recorded as E123, then you should enter the stem as WEIRAC E128 with the following comment in the notes: $Tag corrected from E123$.

- **Retagged stems:** Occasionally stems are given new tag numbers during a plot measurement. Please note that retagging with new tag numbers is not recommended – a dymo with aluminium tape should be used in the field to ensure

that a replacement tag can be generated using the original number (see Hurst & Allen 2007).

- Enter the new tag number into the tag field and record the old tag number in the notes column. Please use the standard notation of "$" to isolate each note in the notes column, in the format "$Retag of XXX$".

- For example, if a WEIRAC with the tag number E123 has been retagged with tag number AB9876 then you should enter the stem as WEIRAC AB9876 with the following comment in the notes: $Retag of E123$.

- **Re-identification of tagged individuals:** Tree stems may have been misidentified in the previous plot measurement. These need to be noted to provide documentation of which of the alternative species names is correct for the tree stem, and so that the old data can be corrected.

- Where a stem has been re-identified as a species that is different to what was previously recorded, enter the correct (new) species code into the 'Verb. Code' field, and record the old (incorrect) species code in the notes column. Please use the standard notation of using "$" to isolate this note and recording in the format "$ReID from XXX$".

- For example, if a WEIRAC with the tag number E123 has been re-identified as a MELRAM, then you should enter the stem as MELRAM E123 with the following comment in the notes: "$ReID from WEIRAC$".

- **Changing the subplot of tagged individuals:** In previous measurements the subplot for a tree stem may have been incorrectly recorded or entered.

- Where a stem has been recorded in a different subplot from what was recorded previously, enter the new subplot into the 'Subplot' field and record the old subplot in the notes column. Please use the standard notation of using "$" to isolate this note and recording in the format "$Subplot corrected from XXX$".

- For example, if a WEIRAC with the tag number E123 has been found in subplot A rather than subplot H, then you should enter the stem in subplot A with the following comment in the notes: "$Subplot corrected from H$".

## 8.4 Sapling Count

- **Open the saplings form for a plot:** In the Projects list open the node of the project you're working on to reveal the methods list. Click on 'Sapling Count'. The 'Sapling Count' method will appear in the Plots tab. Double-click on the plot name to open the data entry form for that plot. This is where the sapling data is entered.

- Click 'Edit Mode' button to enable editing.

- **Show Header:** Click 'Show Header' on the top tab to open a header where party data can be entered i.e. the names of the people measuring and recording this data. See section 4.2 for further detail.

- **Inserting subplots:** As this method is measured by subplot (named A–P), the form has a 'Remaining Sub Plots' drop-down list. To add the first row for the next remaining subplot, click the 'Add Sub Plot' toolbar button. To add the first row for a subplot other than the first in the list, select the required subplot from the 'Remaining Sub Plots' list.
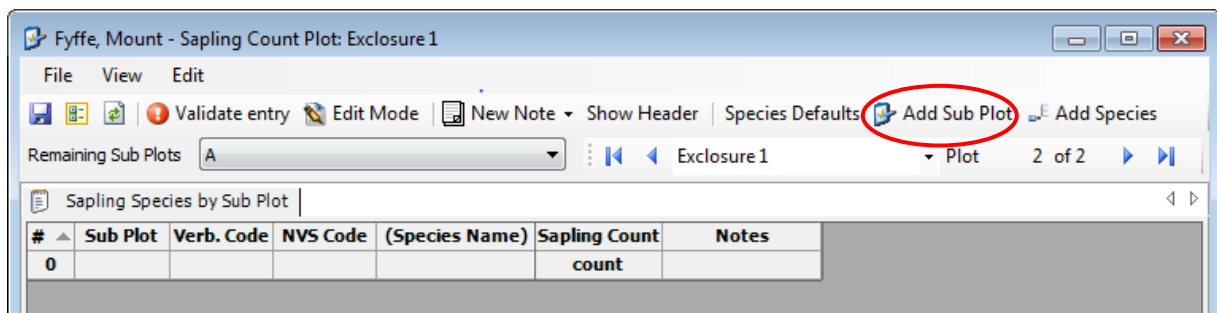
- **Species codes:** Enter species codes in the 'Verb. Code' column. Either enter the full six-letter code or select the correct code from the dropdown list. For further information on species codes, see Section 9.

- **Sapling count:** Enter the number of saplings in the 'Sapling Count' column. If no presence or count has been recorded against a sapling species, enter a P for presence, and record a note (using square brackets to indicate that it is an operator note) in the notes field (e.g. "[NO COUNT RECORDED]").

- **Inserting rows:** To add subsequent rows for the current subplot, click the 'Add Species' toolbar button.

- **Subplots with no saplings present:** To indicate that a subplot was measured but had no saplings present, enter a row for the subplot and the code "NOSPEC" in the species code column.

- **Missed subplots (not measured):** For standard 20×20-m plots in NVS Data Entry, all of the standard subplots are assigned to the relevant project methods. If a subplot was not measured (i.e. not that it didn't have any saplings present but that it was not actually measured and there is no record of that subplot on the datasheet) then record a plot note listing the subplot(s) that were not measured. As no data is entered for the subplot(s) it will be detected in the validation for the plot, but the note will allow the entries to be quickly checked for completeness.

- **Changing the subplot field:** If data was mistakenly entered for the incorrect subplot, click on the subplot observation you want to change and then click the arrow to open the drop down menu and select the correct subplot for that observation.
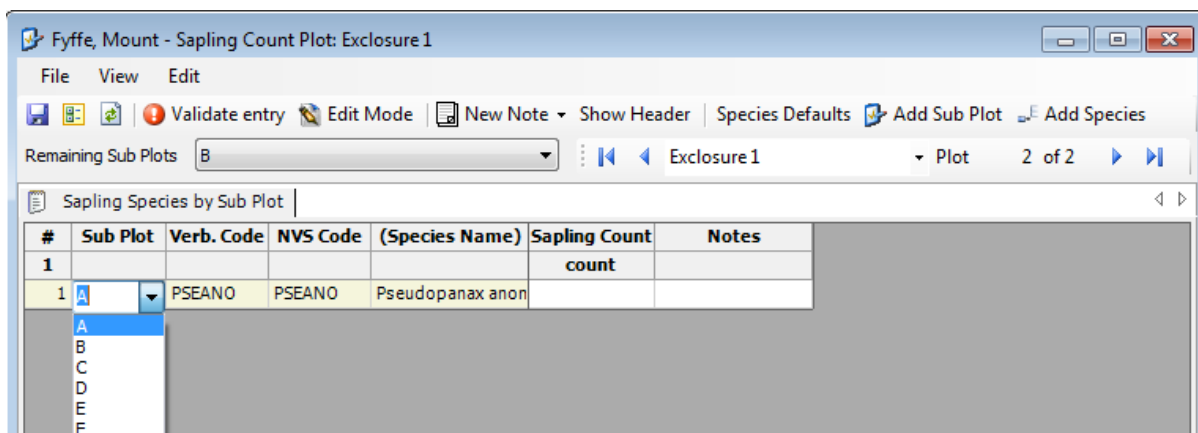
- **Missing data:** Occasionally, field staff may not record any count data against the species code on the field sheet. In such cases, enter a 'P' for presence and use the operator note function to record a note (e.g. [NO COUNT RECORDED]). See Section 6 for further information on adding operator notes.

- **Data validation:** If you wish to see a list of warnings or errors part way through entry of sapling count data, click on the 'Validate All' toolbar button. This function is also called automatically when you save or exit. Use the numbers 1–6 to view more or less detail under each method and subplot.

- **Advancing to the next plot:** When all of the sapling data for the plot has been entered, save the data, deal with any validations and either go directly to the next plot (click the forward arrow or use the View menu) or enter other types of data for the current plot. Ensure that all data is entered for the correct plot number.

8.5 Seedling Count

- **Open the seedlings form for a plot:** In the Projects list open the node of the project you're working on to reveal the methods list. Click on 'Seedling Count'. The 'Seedling Count' method will appear in the Plots tab. Double-click on the plot name to open the data entry form for that plot. This is where the seedling data is entered.

- Click on Edit Mode button to enable editing.

- **Show Header:** Click 'Show Header' on the top tab to open a header where party data can be entered i.e. the names of the people measuring and recording this data. See section 4.2 for further detail.

- **Inserting subplots:** As this method is measured by subplot (named 1–24), the form has a 'Remaining Subplots' list. To add the first row for the next remaining subplot, click the 'Add Sub Plot' toolbar button. To add the first row for a subplot other than the first in the list, select the required subplot from the 'Remaining Subplots' list.

- **Species codes:** Enter species codes in the 'Verb. Code' column. Either enter the full six-letter code or select the correct code from the dropdown list. For further information on species codes, see Section 9.

- **Seedling presence or count:** Enter the seedling presence (P) or count in the column for each height tier. If no presence or count has been recorded against a seedling species, enter a P in the <15cm tier, and record a note (using square brackets to indicate that it is an operator note) in the notes field (e.g. "[NO COUNT RECORDED]").

- **Inserting rows:** To add subsequent rows for the current subplot, click the 'Add Species' toolbar button.

- **Subplots with no seedlings present:** To indicate that a subplot was measured but had no seedlings present, enter a row for the subplot and the code "NOSPEC" in the species code column.

- **Missed subplots (not measured):** For standard 20×20-m plots in NVS Data Entry, all of the standard subplots are assigned to the relevant project methods. If a subplot was not measured (i.e. not that it didn't have any seedlings present, but that it was not actually measured – there is no record of that subplot on the datasheet) then record a plot note listing the subplot(s) that were not measured. As no data is entered for the subplot, it will be detected in the validation for the plot, but the note will allow the entries to be quickly checked for completeness.

- **Changing the subplot field:** If data was mistakenly entered for the incorrect subplot, right-click and select 'Change Subplot'. This will open a window where the correct subplot can be selected from a list. Double-click on the correct subplot to select it, and then close the window.

- **Data validation:** If you wish to see a list of warnings or errors partway through entry of seedling count data, click on the 'Validate All' toolbar button. This function is also called automatically when you save or exit. Use the numbers 1–6 to view more or less detail under each method and subplot.

- **Advancing to the next plot:** When all seedling count data for the plot has been entered, Save the data, deal with any validations and either go directly to the next plot (click the forward arrow or use the View menu) or enter other types of data for the current plot by going back to the 'Plot Method Data' window.
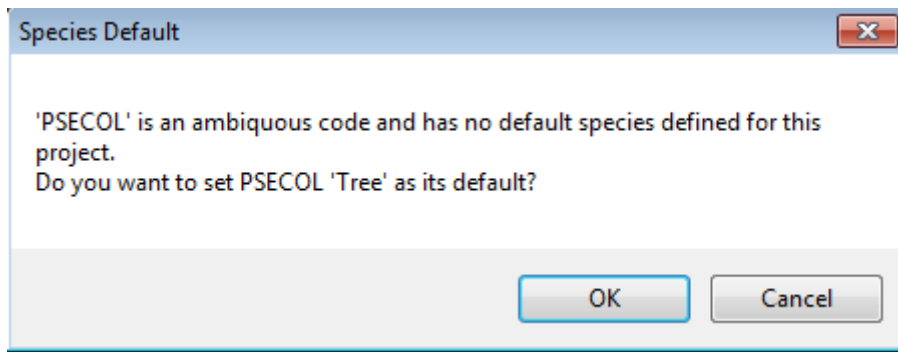
9   Species Codes

- **The verbatim code is:** The species code as recorded on the original datasheet. This may not be a valid NVS code. It also may not resolve ambiguous species codes.

- **The NVS code is:** A species code that uniquely links to a species name

- **Collected specimens awaiting identification:** Unknown species are often collected and given an interim 'tag name' on field-sheets, until such a time as the specimen can be properly identified. Where the identity of a specimen is yet to be resolved, type the tag name in the 'Verb. Code' column. If the tag name recorded on the field-sheet is longer than ten letters, enter a sensible abbreviation of it (ensuring that it does not conflict with any valid NVS code). Check that the entry is highlighted as an error code (to ensure it will be picked up during data validation) and type the full tag name (exactly as recorded on the sheet) in the operator notes column, using square brackets (i.e. [UNCfine collected]). Such entries need to be resolved once the specimens have been identified.

- **Species codes:** The procedure for entering species codes is the same for all plot methods. Enter species codes in the 'Verbatim Code' column. Either enter the full six-letter code, or select the correct code from the dropdown list. The NVS code will default to the verbatim code when the code is recognized.

- **Species code list:** In NVS Data Entry the species code list includes names that are recorded in both historical and recent NVS projects. 'Out-of date' names, representing older taxonomic concepts, are present along with more recently accepted taxonomic names. This means that if field staff used an older taxonomic concept for a species, the data can still be entered.

- **Species not on NVS list:** Occasionally a recently described species may not yet have been added to the NVS species code list. Enter the species as an 'error' code, and type the full species name in the notes column. To resolve this error contact the NVS Database Administrator (email: nvs@landcareresearch.co.nz) who will update the NVS list and provide you with an updated authority file containing the new code/s.

- **Commonly used 'tag' names:** Some tag names are in widespread use and many of these are valid NVS codes and are on the NVS list. Where appropriate, document important details on the use of a tag name as a plot note, in particular where a reference to a published work can be provided. Some tag names on the NVS list are used where a more precise identification could not be provided (e.g. 'ORCHID').

- **Updating the species name list:** A periodic update process for the NVS names list will allow the addition of newly added NVS species codes. Registered users of NVS Express will be notified of these updates.

- **Species defaults options:** The correct NVS six-letter species codes for some taxa are unintuitive (refer to the plot measurement manuals for full details; see http://nvs.landcareresearch.co.nz/). For these species codes, for which confusion potentially exists, the 'Species Defaults' function can be used to select the default taxon for the project.

- Duplicate' codes: When a potentially incorrect code ('duplicate codes', e.g. PSECOL) is entered in the 'Verb. Code' column, a drop-down list will identify several taxa that field staff may potentially be referring to.
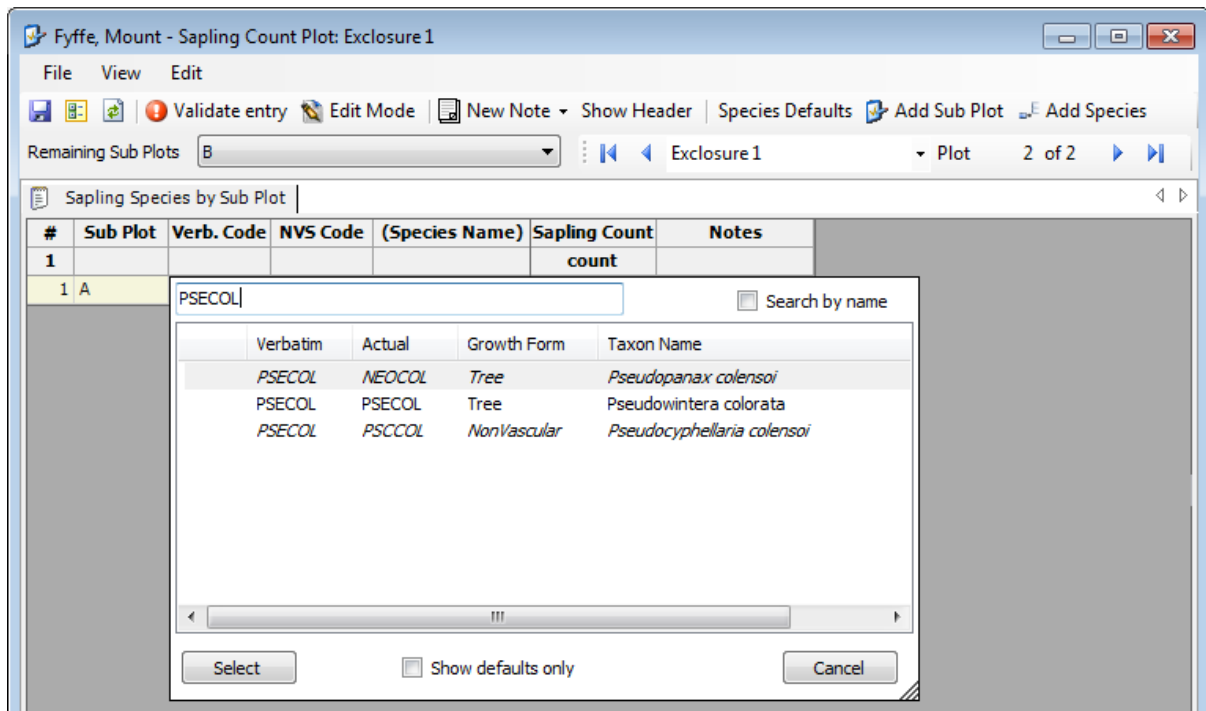

- Select the taxon intended for the code (e.g. *Pseudowintera colorata*). Field staff may need to be asked to confirm what taxon was intended.

- If it is unclear which taxon was intended, record an operator note for the plot to identify that the data needs to be checked (e.g. [PSECOL written on field-sheet, check with field staff that the intended taxon was *Pseudowintera colorata*], see Section 9).

- Once a taxon has been selected for a duplicate code, NVS Data Entry will check whether that taxon should become the default for the species code entered. If 'OK' is selected, the next time the code is entered the dropdown species code list will jump to the default taxon for the code.

- Viewing species defaults: Default species options can be viewed by clicking on the 'Species Defaults' button on the toolbar. Default species codes can also be edited in this window. Note: The 'Species Defaults' selection is active for the current project only
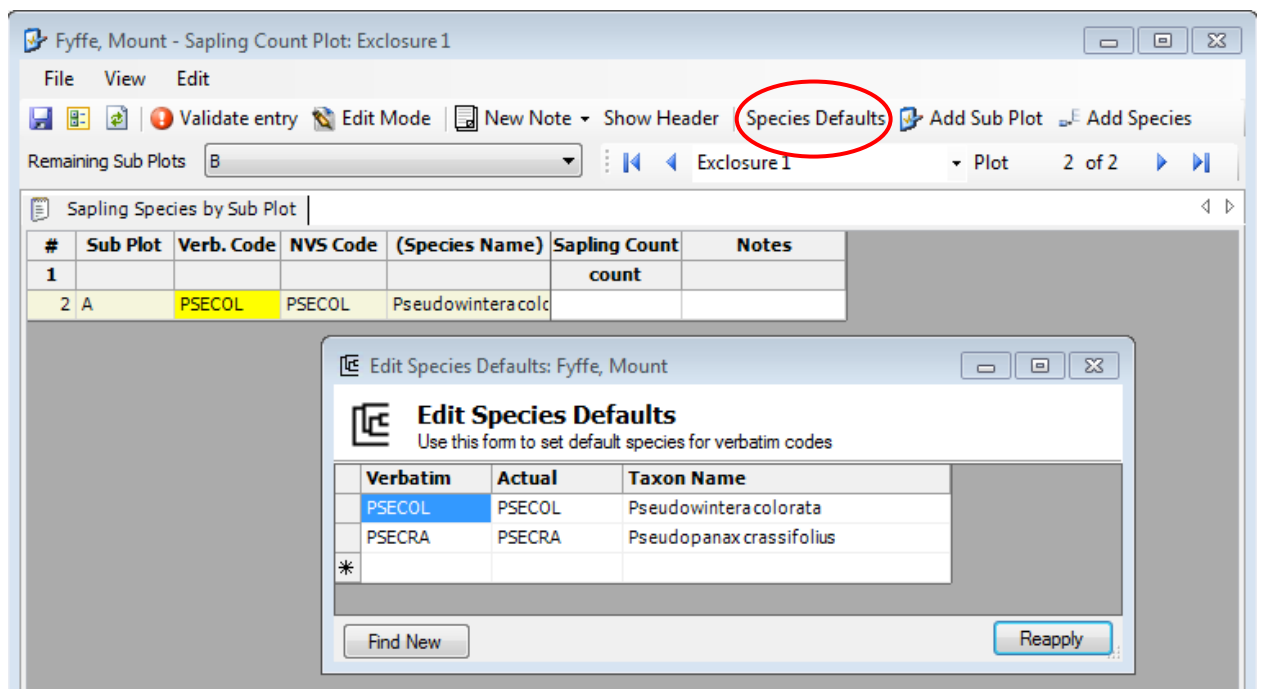
- Updating species defaults: A default species selection can be changed and re-applied. Click on the 'Species Defaults' button and then double click on the species you would like to change. Select the preferred default species from the drop down list by double clicking on it. You will then be asked to confirm that you want to update all entries of the particular code throughout the project.
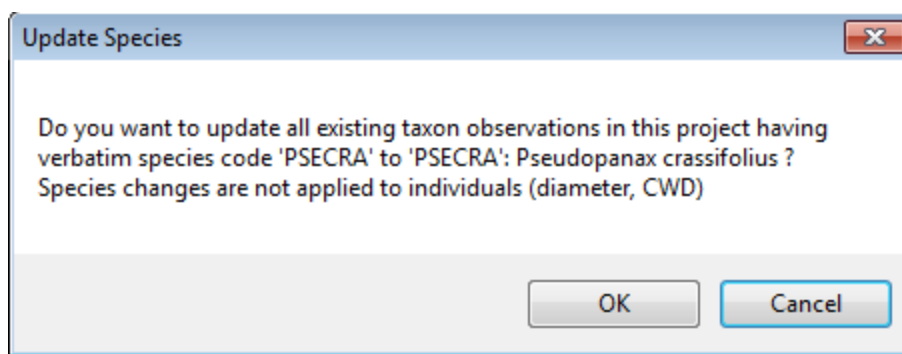
- If desired, only default codes can be displayed in the dropdown species code lists that appear when entering stem diameter, sapling or seedling count data. Select this option at the bottom of the drop-down species list
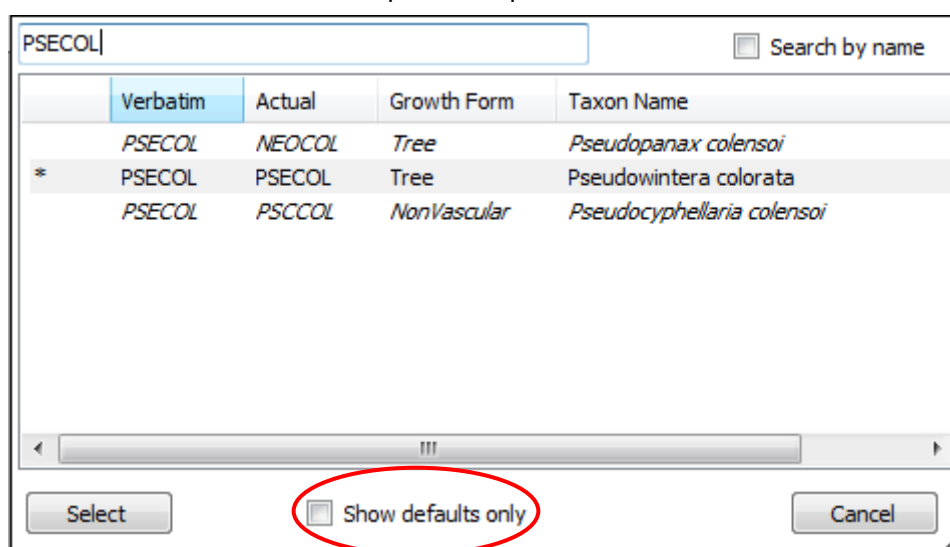
10   Data Validation / Error Checking
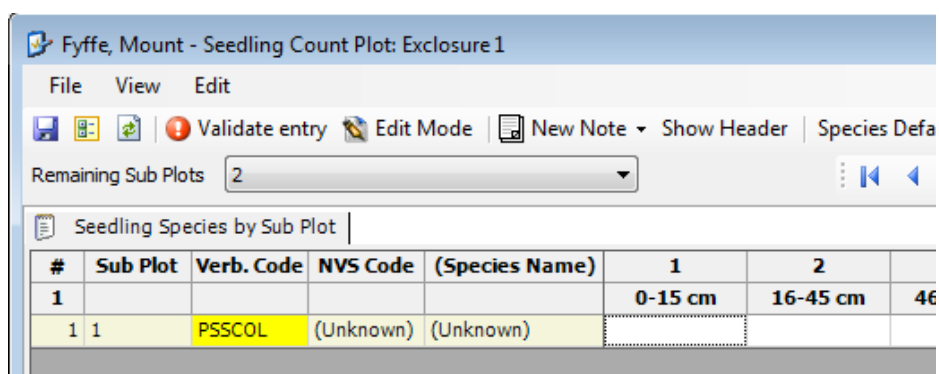
All data entered must be validated before uploading to the NVS databank. Data should be validated during data entry (section 10.2) as well as once all data entry is complete (section 10.3).

10.1 Quality Assurance procedures for data entry

The inbuilt data validation functions in NVS Data Entry help to identify errors in the data by ensuring that valid data is entered in each field, but typos by data entry staff may lead to unidentified errors in your data. As a general rule-of-thumb it is suggested that data entered for 10% of plots should be checked, line-by-line, directly against field sheets for the presence of typos.

10.2 Data validation during data entry

- **Validation functions:** These enable checks on the values entered both during and following data entry. Validation functions produce either errors or warnings. Data with errors cannot be saved. Data with warnings can be saved.

- **Species code warnings:** Unknown six-letter species codes are immediately highlighted in yellow during data entry, but will also be identified during validation.


- **Incorrect value errors:** Constraints on some data fields prohibit the entry of inappropriate values. In other data fields inappropriate values may be accidentally entered but will be identified by the validation functions.

- **Missing-value warnings**: Missing values in some data fields also produce a warning. In some tables species codes may also be highlighted where there has not yet been any data entered against them.

- **Validation function:** All data entry forms in NVS Data Entry have a 'Validate Entry' button on the toolbar. Click the button to obtain a summary of errors and warnings identified for the method on that plot.

10.3 Post-entry data validation

Post-entry data validation and correction of errors should be undertaken prior to uploading data to the NVS databank. This will ensure a high-quality dataset is archived. If errors remain unresolved when data is uploaded, the NVS databank administrator will contact the 'Primary contact' for the project to try and resolve any outstanding data issues.

- **Performing post-entry validation:** Post-entry validations operate at a higher level, identifying any unlikely data that could be indicative of errors. All data for each plot method can be checked at one time. Plots can be selected separately.

- Click on the project title in the Projects column then click the 🔴 Validation tab in the Projects tool bar (The 'Validate All' option can also be found under the main dropdown menu 'View'). The screen below will appear. Click the 'Import' button to find and select the project you want to check for errors.

- By default all project methods and all validation tests are selected – unselect any that you do not wish to run.

- Click on the 'Validate' button.
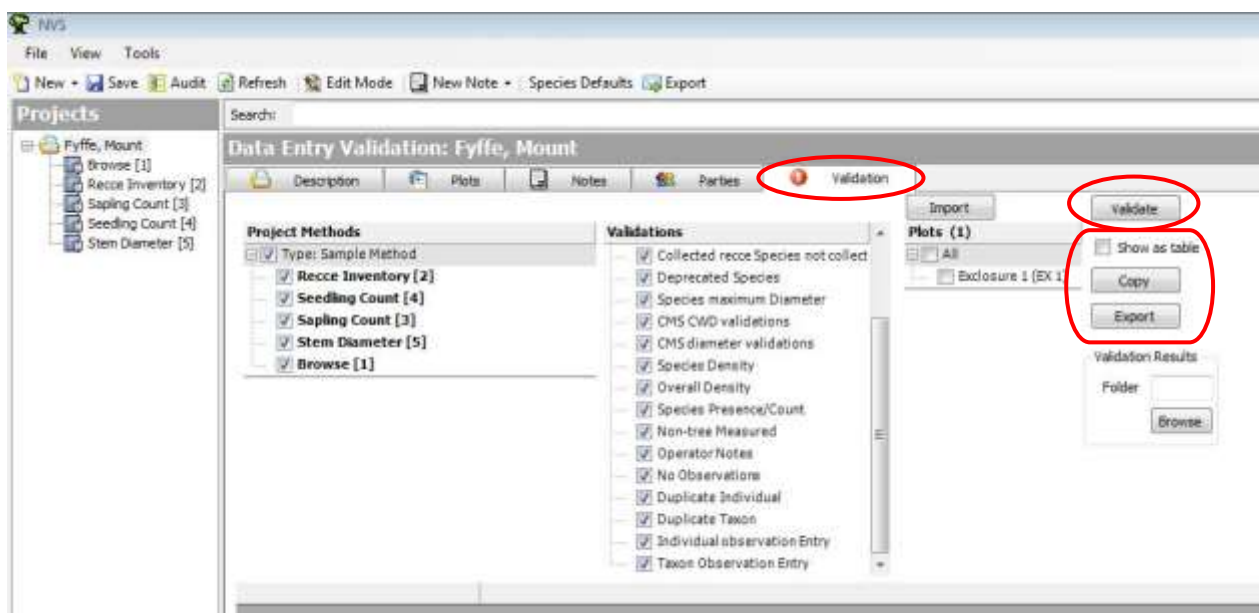
- **Viewing results:** The results are shown as a list in the Plot Methods grid in the lower part of the screen, ordered by method. You can edit those plot methods with errors by double-clicking on the plot or subplot. The usual form for editing that method is displayed for the plot:

Errors and warnings are highlighted immediately in the data.

The validation window displays immediately (before editing) – some validations relate to missing rows and therefore cannot be highlighted.

After closing the edit form, the post-entry data for that plot method is updated.

- Use the buttons 1–4 to view more or less detail under each method and subplot. The '*' button displays the maximum level of detail.

- To view the validation results as a table in the Plot Methods grid in the lower part of the screen, tick the checkbox **Show as table**. This is useful for sorting and looking at validations in groups.

- The **Export** button allows you to save the validations as a separate .csv file.

- A description of the validation messages and suggested solutions can be found in Appendix 1.
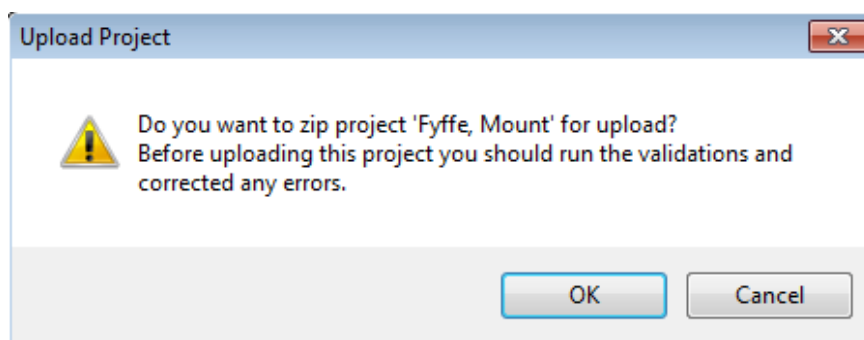
11   Uploading Data to the NVS Databank

Once data entry is complete and all data validations and warnings have been checked and corrected where possible, the project should be exported so that it can be uploaded to the NVS Databank. Data for the project is sent back to the NVS Databank as a zip file, which is created in NVS Data Entry.

- **Registration:** NVS Express Data Entry users must be registered and logged in before data can be uploaded (see http://nvs.landcareresearch.co.nz/). This is required so that the databank has a record of where deposited data came from and allows the NVS Database Administrator to clarify any data-related issues that may arise during the import process.

- **Uploading data:** Select 'Zip Project For Upload' from the File menu **Note:** This is different from "Export project data", which will produce .csv files containing the data. It is important that you download the actual project files.
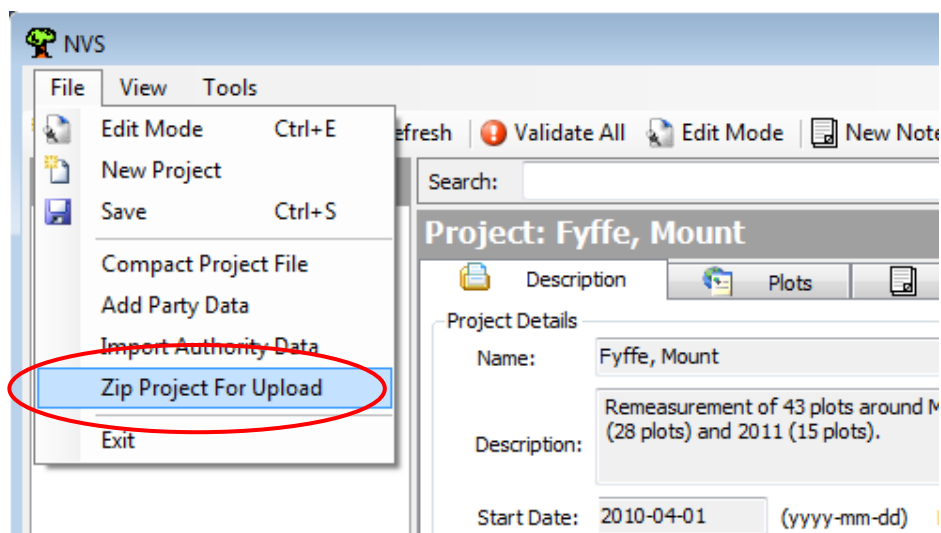
- If you have run the validations and corrected any errors select 'OK' to create the zip file. If not, click cancel and run the validations before exporting the data.

- Once created, the file may be uploaded via the Internet (https://nvs.landcareresearch.co.nz/Data/contribute) or emailed directly to nvs@landcareresearch.co.nz

- Contact the NVS Database Administrator (nvs@landcareresearch.co.nz) for further information on uploading data. When the data is uploaded to NVS further validation checks will be undertaken, and you will be queried on any errors or abnormalities identified.

- **Metadata:** Data deposited with NVS must be accompanied by metadata that describes a dataset's content. An online metadata form is available on the website at: https://nvs.landcareresearch.co.nz/Data/Contribute

Checklist for uploading data:

☐ Complete data entry

☐ If the project is a remeasure ensure the project name and plot names match the previous measurement

☐ If the project is a remeasure ensure any tag corrections and species corrections are clearly noted

☐ Run the data entry validations (under the analysis tab), check all validations and correct errors

☐ Export the zipped project file

☐ Create metadata

☐ Send the project file and metadata to the NVS Database Administrator (nvs@landcareresearch.co.nz) or upload it on the NVS website at https://nvs.landcareresearch.co.nz/Data/contribute

12   Exporting Data

- **Data Selection:** The whole project can be downloaded or data can be selected by plot and/or method:

- To export all data from a project, right-click on the dataset name in the Projects column and select 'Export Project data'
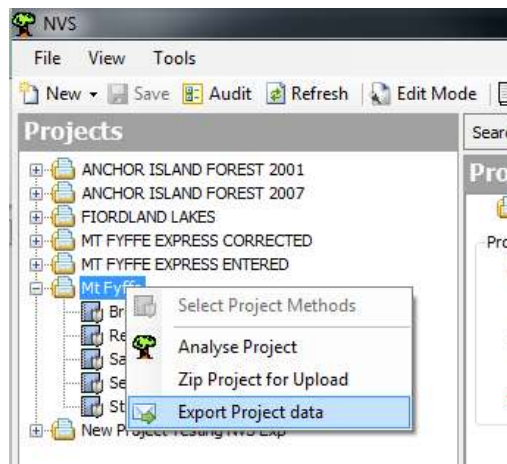
- By Plot -To export data from a single plot, click on the project name in the Projects column, right click on the plot name under the Plots tab and select 'Export data for Plot: x'. The export form has a Use Plot Group checkbox showing the name of the selected plot, ticked by default. To export a subset of plots create a plot group in the analysis tab (see NVS Express analysis manual).

- By Method- To export data from a single method for all plots within a Project, right-click on the method in the Projects column and select 'Export Sample Method data'.

- To export data from a single method from a single plot, click on the method in the Projects column, the plots that have that method will appear under the plots tab, right-click on the plot and select 'Export data for x method (plot: x)'

- Data can be exported for multiple projects and by using the Export function from within the Analysis tab.

- A form will appear:

- Using this form you can choose to export all the data in the project (if you've chosen the export from the whole project option) or by ticking & unticking boxes, limit your export to only that data you are interested in.

- Adding a method keyword to the Method field in the data selection box will limit the exported data to the method containing that keyword, e.g. 'debris' for coarse woody debris.

- **Table Types:** Tables are grouped into Project data, Plot data and Vegetation data.

- Table types for which the project has no measures are not listed for export.

- Tables types which are selected but have no data entered will be excluded from the results.

- Checkboxes can be used to select or unselect tables individually or by group, to change the default selections.

- The table type of each method in a project is shown in the Type column of its Measures (in the description tab). For example seedling and sapling methods have type Taxon Simple Value.

Formats:

Options for the format of the exported data are also given.

Column Formats:

- For the main three formats data is exported in columns:

- CSV produces one comma-delimited text file per table/dataset

- TXT produces one tab-delimited text file per table/dataset

- Excel produces a single excel file with one worksheet per table/dataset

- The 'Zip results' option puts all exported files into a single ZIP file. This option is the default for CSV and TXT files.

- The 'Cross-tabulate' option affects Vegetation data only. With cross-tabulation tables are formatted like a plotsheet:

- one row per observed species or individual

- a column for each tier, each attribute, and each diameter or orthogonal width.

- Since tiers and attributes can differ between methods, each sample method is exported as a separate file or worksheet.

- Without cross-tabulation tables are exported as they are stored in the database:

- one row per observed value (cover class, count, diameter etc).

- a single column for each type of value (usually only one, except two widths for orthogonal width)

- each table contains all datasets of that type, such as seedling and sapling together in TaxonCategoryValue, with columns to identify the dataset ID and method name.

- attributes must be exported separately

Other Formats

Other export formats are for special purposes

- Formatted:

- Plotsheet/Species List produces an excel file with one worksheet per table type.

- For diameter and orthogonal with methods, the plotsheet lists tagged individuals.

- For aggregate methods:

- NVS Express

- PC Packages

- Intermediate Files –These are only used when exporting for multivariate analysis (see the NVS Express: Summary and Analysis software manual).

Other Documents

- The **Include NVS documents and Definitions** option adds 3 standard documents to the export:

    1. NVS Data Use Protocol,

    2. NVS Terms of Use and Copyright Statement,

    3. Read Me

- It also adds a file containing definitions of all tables and columns that were exported. The **Detailed Definitions** option determines whether dataset-specific information is included, such as the definitions of each tier.

- **Exporting:** Once you have chosen your options, click the Export button , navigate to where you want to save the exported file then click Save. If you've chosen to export the data as non-zipped .csv or .txt files, each method will export as a separate file. A confirmation message box will appear once the export is complete.

Troubleshooting

If you experience any difficulty in the use of this program please feel free to contact the NVS Database Administrator (nvs@landcareresearch.co.nz) for advice.

NVS Express we are interested in any feedback that you may have. If you get any error messages whilst using this program please contact us. Knowing exactly what was being done and receiving the text of the error will help us isolate the problem. If you get a message that includes the note "Full details have been copied to the clipboard" the error details have been copied onto the windows clipboard. This means that the error can be pasted into an email or word document.

13　References

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Bellingham PJ, Stewart GH, Allen RB 1999. Tree species richness and turnover throughout New Zealand forests. Journal of Vegetation Science 10: 825–832.

Richardson S, Wiser S, Cooper J, Spencer N 2005. Adding value to the National Vegetation Survey (NVS) Databank: development of software tools for the analysis of vegetation data. Landcare Research Contract Report: LC0405/073; prepared for the Terrestrial and Freshwater Biodiversity Information System programme, Department of Conservation.

Wiser SK, Allen RB, Clinton PW, Platt KH 1998. Community structure and forest invasion by an exotic herb over 23 years. Ecology 79: 2071–2081.

Wiser SK, Rose AB 1997. Two permanent plot methods for monitoring changes in grasslands: A field manual. 51p. Manaaki Whenua Landcare Research NZ Ltd, Christchurch, New Zealand)

Appendix 1 – Data Entry Validation Errors and Their Resolution

There are a number of data entry validations that have been included in the NVS Express tool. The following is a list of the Data Entry Validation Messages:

Area is missing

> Reason: No area has been recorded for a plot or sub plot.

> Solution: Check the area and enter where possible.

Area differs from calculated value

> Reason: The area calculated using the tape lengths from the plot layout differs from that indicated by the size; e.g. a plot may be entered as 20 m × 20 m but have a calculated size of >400 due to differing tape lengths.

> Solution: Check that the tape lengths are entered correctly and that the difference is not significant. This validation is bringing this difference to your attention but it is not always a problem as the actual tape lengths are affected by terrain.

Counted Species Density - Species had density greater than the maximum

> Reason: The counts in Quadrat sapling or Quadrat seedling data exceed the maximum expected density for the species, which has been derived from existing data in the NVS databank.

> Solution: Check that the relevant data is entered correctly.

Deprecated Species – Species names no longer in use

> Reason: You have entered a species code that is in the NVS list but is no longer in active usage.

> Solution: Check the entry of this species. If this code is entered correctly, check that this is a recognised name through searching the New Zealand Plants Database at http://nzflora.landcareresearch.co.nz/

Diameter – Observations had diameter greater than their species maximum

> Reason: A stem has been entered with a diameter greater than the expected maximum size for the particular species, which has been derived from existing data in the NVS databank.

> Solution: Check that the stem has been entered correctly.

Duplicate Individual

Reason: There are duplicate tags within a plot or sub plot (stems without tags are excluded).

Solution: Check duplicates to see if they can be resolved. Sometimes duplicate tags can be resolved by reference to the tag sequence or previous measurements.

Duplicate Taxon

Reason: There are duplicate taxon rows within a plot or sub plot (for Recce, Quadrat seedling, Quadrat sapling). This validation will normally prevent saving the record after entry or editing.

Solution: Edit the first record of the species to include the data for both records. For example, if there are two Recce records for the same species, enter the species using the higher cover class recorded for each tier. For sapling and seedling data counts can be summed.

Individual Entry Validation – Item duplicate tag – Item has duplicate tag indicated: (* or ?)

Reason: There are multiple tags in a plot with the same tag number. One of these tags should be entered with a * followed by the last three tag digits (in older projects) or as the full tag number followed by ??

Solution: Check whether the tags were entered properly, whether it is a problem with reading the handwriting or with the use of two similar tag sequences. If it looks like an obvious recording error, please make an operator note against the tag.

If it is not possible to resolve these as being different numbers then leave them marked as duplicates.

Individual Entry Validation – Item Obs has missing tag

Reason: An individual item (normally a stem diameter) has been entered without a tag number

Solution: Check whether a tag number has been recorded. If it has been recorded, enter the tag number, otherwise a note should be made. This note can be a general note against the entire method (using the Notes option on the toolbar) in the case where no stems were tagged. Alternatively a specific operator note can be made against the individual stem (in the Notes column) where this is a single omission, e.g. [no tag recorded].

Taxon Entry Validation – Taxon Obs no data – Taxon Obs has no data entered, note: (if any)

See description under "Individual Entry Validation – Item Obs no data – Item Obs has no data entered, note: (if any)"

Individual Entry Validation – Item Obs query – Text of note ?

> Reason: The note for an item observation (i.e. diameter or orthogonal width) contains '??'. This is usually used to denote a duplicate tag or another problem to be checked.

> Solution: Check the reason for the note and resolve if possible.

Individual Entry Validation – Item Obs remeasure note – Remeasure note: Text of note $

> Reason: A remeasurement note has been recorded (as described in the NVS-Data Entry manual (Vickers et al. 2009).

> Solution: This is an operator note that is designed to bring a remeasurement issue to the attention of the NVS Administrator when the data is uploaded into the main NVS database. Appropriate notes include:

- $Tag corrected from xxx$ denotes a tag correction for an existing tag

- $Retag of xxx$ denotes a retag of an existing tag

- $ReID from xxx$ denotes the re-identification of a tagged individual

- $Subplot corrected from xxx$ denotes a change in the subplot that a tagged individual is measured in.

  Please see section 8.3.1 for further details.

Individual Entry Validation – Item Obs verbatim species code – Verbatim code is different to the species code

> Reason: The 'verbatim' code entered differs from the species code selected for an individual item. This can occur for a couple of different reasons:

> 1. Where there are mis-spellings and the verbatim code is entered as recorded but a different code has been selected as the NVS code.

> 2. Where a tagged stem is remeasured with a different species identification. In this case the verbatim code represents what was recorded in the current year and the NVS species code shows what was recorded in previous year(s).

> Solution: Check the reason for this difference.

> 1. It is acceptable to retain a different verbatim code where there is a mis-spelling as this shows where any assumptions have been made by the data entry operator.

> 2. Where there are two different identities for a tagged individual the NVS code can be changed when there was a clear note recorded stating that the new identification was checked and correct. This can only be done in the main NVS

database. NVS Express Data Entry users need to record a remeasurement note in the following format: $ReID from [previous code]$

Individual Entry Validation – Missing Taxon – Taxon is missing
Taxon Entry Validation - Missing Taxon – Taxon is missing

Reason: A row has been entered without any species being recorded.

Solution: First check whether this is a data entry error.

Sometimes people will create a new row for a note, e.g. Seedling plot 13 'in stream'. This is not appropriate. Any such note should either go against an observation or into the general notes found on the toolbar.

If using the general notes remember to record which plot this refers to, e.g. Plot 1EX, seedling plot 13, in stream.

If there is a note that there are no species in a particular subplot then the code 'NOSPEC – No species on plot' can be used, rather than leaving the species blank. Be careful not to make assumptions where there are no recorded notes, as it is possible that a subplot may not have been measured rather than having no species present.

Individual Entry Validation – Species Mapping – Species is not the default for …
Taxon Entry Validation – Species Mapping – Species is not the default for …

Reason: Where there is a duplicate code (the intuitive six-letter code matches more than one species), one of the options has been selected as the default species for the project. Whenever this duplicate code is entered subsequently, the default species will be automatically selected. This validation is generated where there is a default selection but the same code has been used elsewhere in the project to represent one of the other duplicate options.

e.g. COPPSE is the intuitive code for two species: *Coprosma pseudocuneata* (NVS code = COPPSE) & *Coprosma pseudociliata* (NVS code = COPPSC). If a default selection has been made so that all entries of COPPSE default to COPPSE *Coprosma pseudocuneata* then a validation will be brought up if COPPSC *Coprosma pseudociliata* is selected for the duplicate code COPPSE.

Solution: Check that the correct species has been selected for this duplicate code – you may have to check with the field staff. If you have selected the incorrect species, you can correct all entries in one action by using the 'Species Defaults' option on the toolbar. Edit the species in the Species Default list and select the appropriate species. You should be asked if you want to update all occurrences of this species code.

It is also possible that both species might be present in the one project, in which case it is not appropriate to set a default code.

Individual Entry Validation – Unknown Taxon Verbatim – Taxon is unknown for Verbatim code

Reason: An unknown six-letter code has been entered. The code entered is not in the current NVS code list.

Solution: Check the recorded code with the field staff to obtain the full species name. If the recorded code is a misspelling, then enter the correct code in the NVS code field, leaving the Verbatim code as it is (unless a correction has been made to the original plotsheets). If the species is not on the NVS code list, please send the full species name to the NVS database administrator [Hazel Broadbent, nvs@landcareresearch.co.nz], who will generate a new code for you. In the interim, type the full species name into the Notes column.

If no definite species can be obtained for the recorded code, you may wish to discuss with the field staff whether this record should be removed. If this is the case, please make a note regarding this. When using the general notes remember to record which plot this refers to, e.g. Plot 1EX seedling plot 1: unknown code 'hairy herb' not entered.

Alternatively, if you wish to retain the species but it is not identified, you may assign it to a general descriptive NVS code, e.g. FERN, HERB, GRASS, TREEFE, ORCHID, DANDEL, THISTL. Note that we do not recommend the routine use of these codes – all possible attempts should be made to resolve species to specific or generic level.

Individual Species Density - Species had density greater than their maximum

Reason: The values of individuals, such as tagged stems, exceed the maximum expected density for the species, which has been derived from existing data.

Solution: Check that the relevant data is entered correctly.

Non-tree measured – Species entered is not on the validation list for this type of data – please check that the species code is correct

Reason: A species has been entered for a method where it is not on the list of validated species for the method.

Solution: Check that the species was recorded under the particular method. It may also be necessary to consider whether the inclusion of the species is consistent with the standard methodology, for example if a crown fern has been recorded as a sapling.

Operator note: Text of note []
Taxon Entry Validation – Taxon Obs operator note – Operator note: Text of note []

Reason: An operator note has been entered in the Notes field. This validation displays the content of the operator note.

Solution: Check to see whether this note requires any action.

Plot has no observations entered

Reason: This occurs in a subplot-based method (diameters, saplings, seedlings) when nothing has been recorded against a subplot.

Solution: Where there is a note that there were no individuals (e.g. 'no saplings in A') this validation can be removed by adding the code 'NOSPEC No species in plot' to the appropriate subplot (A in this example).

Recce Species – Some species measured in other Methods were not included in Recce

Reason: This occurs when a species was recorded on another method but was not recorded on the Recce.

Solution: To correct this omission please add the species as 'present' to the Recce as follows:

*For species in diameters – add as a presence in the 2-4 m tier with an operator note: [Added to Recce as recorded in diameter method]

*For Species in saplings – add as a presence in the 0.3–2 m tier with an operator note: [Added to Recce as recorded in sapling method]

*For species in seedlings – add as a presence in the appropriate tier (with reference to seedling tier, for seedlings 0-15 cm and 15-45 cm add as a presence in the 0–0.3 m tier and for seedlings >45 cm add as a presence in the 0.3–2 m tier on Recce) with an operator note: [Added to Recce as recorded in seedling method]

 Some things to watch for:

- Genera recordings: only add these if there is not a species in this genus already on the Recce.

- Synonyms (e.g. PSESIM = RAUSIM).

- Previous tag identifications will also come through on this validation so you may already have these under the current identification.

- Watch out for duplicate codes. If a duplicate is already present, determine whether both or only one of the duplicates are present before adding.

Individual Entry Validation – Missing Taxon – Taxon is missing

See description under " Taxon Entry Validation - Missing Taxon – Taxon is missing"

Taxon Entry Validation – Taxon Obs operator note – Operator note: Text of note []

See description under "*Operator note: Text of note []*"

Taxon Entry Validation – Taxon Obs no data – Taxon Obs has no data entered, note: (if any)
Individual Entry Validation – Item Obs no data – Item Obs has no data entered, note: (if any)

> Reason: A species or tag has been entered with no data against it.

> Solution: Check whether this data has been entered correctly. If no data was recorded for the species, you can make an operator note, e.g. [no data recorded for this species]. For sapling and seedling records it is often possible to make an assumption, as long as the assumption is recorded. For saplings it is often assumed that if a species has no count recorded then there was at least one sapling. In this case a count of 1 can be entered and an operator note recorded in the notes column: [no count recorded, assumed 1]. Likewise, if no seedlings were recorded but a species was written then it can often be assumed that the particular species was present in the <15 cm tier. In this case a 'P' is entered in the <15 cm tier and an operator note recorded in the Notes column: [no count recorded, assumed presence in <15 cm tier].

Taxon Entry Validation – Species Mapping – Species is not the default for …

> See description under " Individual Entry Validation – Species Mapping– Species is not the default for …"

Taxon Entry Validation - Taxon Obs query - Text of note ?

> Reason: The note for an item observation (i.e. Recce, Quadrat sapling or Quadrat seedling) contains '??'. This is usually used to denote a problem to be checked.

> Solution: Check the reason for the note and resolve if possible.

Taxon is unknown for Verbatim code
Taxon Entry Validation – Unknown Taxon Verbatim – Taxon is unknown for Verbatim code

> Reason: An unrecognised six-letter species code has been entered.

> Solution: Check that the species was entered correctly. The field recorder should be contacted to provide the full species name. If the code is misspelled, the Verb. code should be left as recorded and the correctly spelled code should be entered under the NVS code. For example if 'WAIRAC' is recorded and found to be a misspelling of 'WEIRAC' then the Verb. code should be WAIRAC and the NVS code should be WEIRAC.

> If the species is not on the NVS list then the full species name should be entered in the Notes field next to the species. This name should be sent to the NVS Administrator so that a new NVS code can be created. An email will be returned specifying the new code.

Taxon Obs verbatim code is different to the species code

> Reason: This occurs when a NVS code different to the Verbatim code is selected.

In many methods this can be deliberately used for when there is a spelling error on the plotsheets. For example if 'WAIRAC' is recorded and found to be a misspelling of 'WEIRAC' then the Verbatim code should be WAIRAC and the NVS code should be WEIRAC.

In remeasured diameters this can occur when a project is uploaded into the main NVS database and the current species recorded (Verb. code) is different to the tag species ID from the past measures (NVS code). Corrections will be made to the NVS code in the main NVS database where there is a specific remeasurement note detailing that the previous ID was incorrect.

Solution: Check the reason for this difference and correct any entry errors.