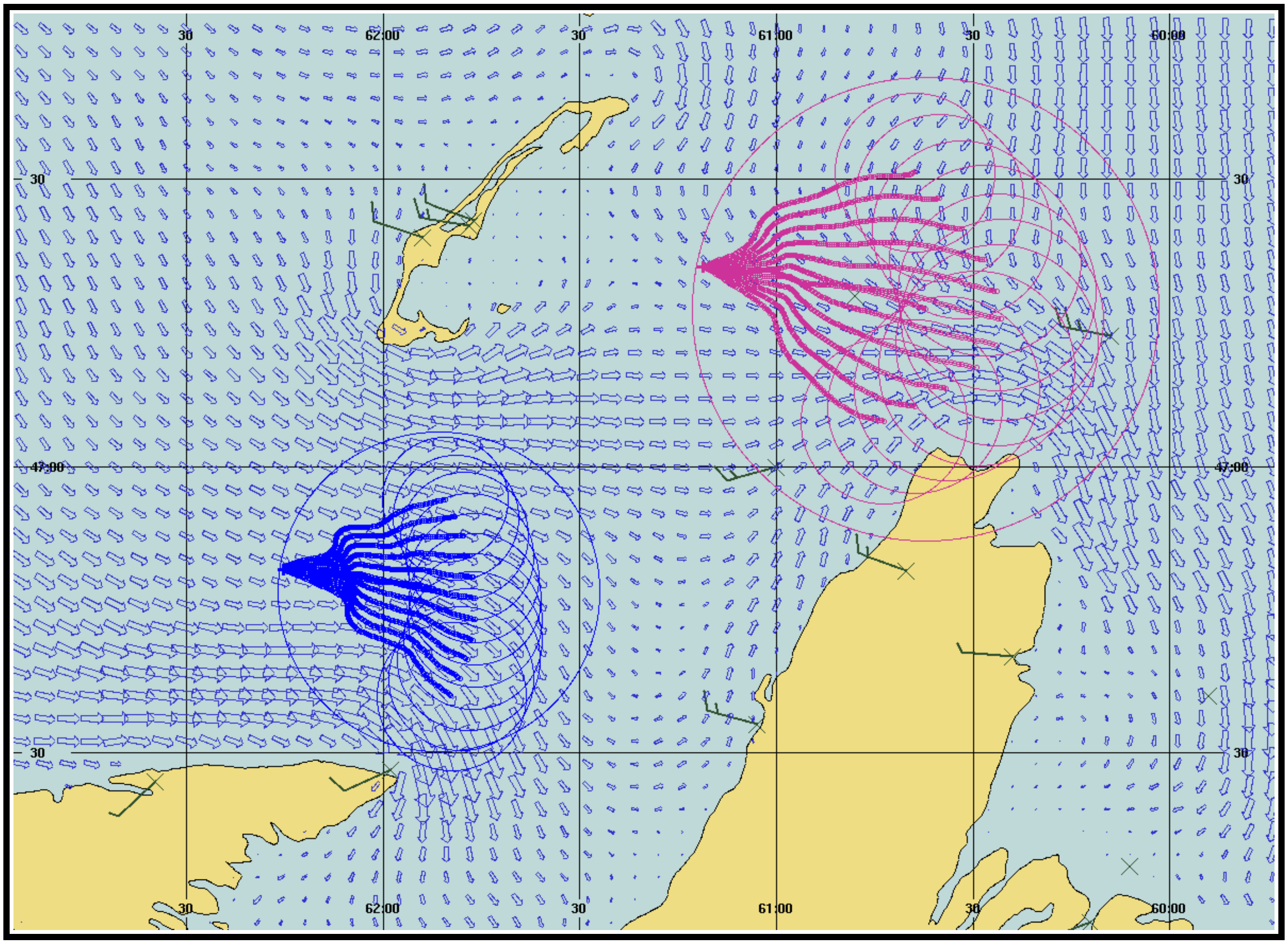
CANSARP V 5.0 User Manual



Partial Draft

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Control	-	Zoom Out	Decrement Clock	Iconify All SRUs		-	Reload Scenario	Recover Scenario	View Editor		Chart Manager	Current Manager	SRU Manager	Print Scenario	**Control**
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User Interface

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Chapter 3

Case and Scenario File Management

In CANSARP, the term “file management” refers to the manipulation of cases and scenarios – creating new ones; opening and closing existing ones; saving, viewing, duplicating and deleting them, and many other operations. While most of these actions are performed via the File Menu, others are accessed via the Scenario Manager and still others are only available outside CANSARP.

This chapter explains all the elements of the File Menu in detail, as well as the parts of the Scenario Manager that relate to file management. It also introduces the Nautilus File Manager and explains how it is used to perform advanced file management outside of CANSARP.

In this chapter, you will learn:

- The difference between a case and scenario
- The rules for naming cases and scenarios
- How to tell which case and scenario are active
- What scenario components are and how they are saved
- How to create new scenarios and to load, save, duplicate and delete existing scenarios
- The difference between a hard save and an autosave
- How to use the Scenario Manager to duplicate scenarios or to switch between active scenarios in a case
- How to perform advanced file management in Nautilus File Manager, including renaming, deleting, archiving and locking cases and scenarios

3.1 Before you begin...

3.1.1 What Is a Scenario? What Is a Case?

The basic CANSARP search plan is called a ***scenario***; a collection of related scenarios is known as a ***case***. A scenario contains all the information related to a single search plan, such as search objects, SRUs, environmental data, etc. You may wish to develop alternate plans for the same SAR incident – to document a change in logic that leads to a revised plan, to test a different arrangement of SRUs in the search area or a different combination of drift factors, to plan a second or third search, or for various other reasons. All scenarios related to a single SAR incident should be created as part of the same case.

The relationship between a case and scenario is akin to the relationship between a file folder and the documents contained within it. In fact, this is how CANSARP organizes the save files for cases and scenarios.

3.1.2 Case Numbers and Scenario Names

Each case has its own unique name that distinguishes it from all others. In keeping with the SAR Master case management tool, this unique name is referred to as its ***case number*** even though in CANSARP it might not be numeric. Each scenario has its own unique ***scenario name*** that distinguishes it from all other scenarios *within the same case*.

Every scenario must be uniquely identified by its name and the number of the case it belongs to. For this reason, no two cases can have the same number, and no case may contain two scenarios with the same name. It *is* possible for two different cases to contain scenarios with the same name because the scenarios' case numbers will differ.

Case numbers and scenario names are case sensitive and may contain letters, numbers and the dash and underscore characters. Other characters, such as punctuation marks, are not allowed. Spaces are replaced automatically with the underscore character. Case numbers typically begin with the current year in four digit format in an effort to match the naming conventions of the SAR Master case management tool but this isn't a strict requirement. Most RCCs establish their own conventions for numbering cases and naming scenarios; it's a good idea to familiarize yourself with the conventions used at your location.

3.1.3 Active Case and Scenario

The scenario which is currently open is known as the ***active scenario*** and the case it belongs to is the ***active case***. The active case and scenario are always listed in the title bar at the very top of the CANSARP window. When CANSARP first starts up, there is no active case or scenario; a scenario must be created or loaded into memory before you can perform scenario operations. Once a scenario is created or reopened by loading it, it becomes active and its name and its case number appear in the title bar:

Figure 3.1: The Title Bar with case number, scenario name and CANSARP user name displayed

A single CANSARP session can have only one scenario open at a time. If you wish to have more than one scenario open, you must start a new CANSARP session from the desktop for each scenario. You may have as many CANSARP sessions open as you wish.

3.1.4 Scenario Components

Every scenario has a list of components that are saved in separate data files and can be saved, loaded or discarded independently. The list of scenario components may be found by opening any of the submenus in the File Menu:

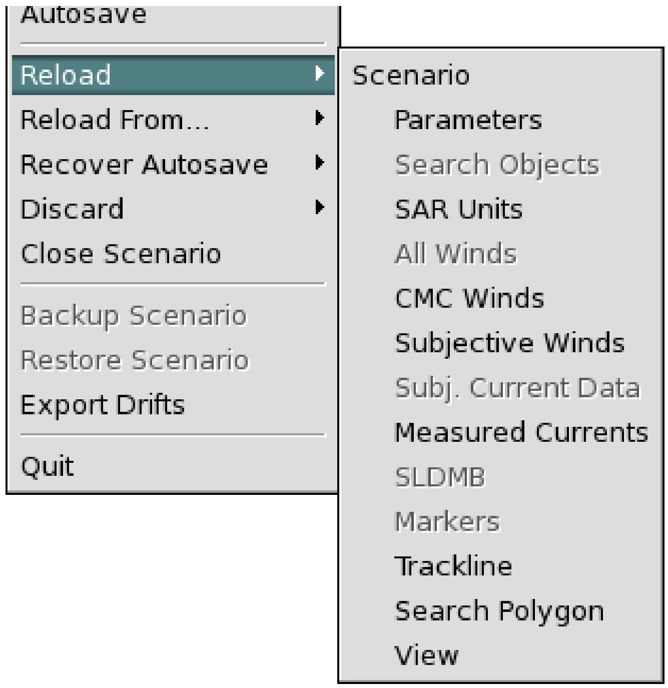

Figure 3.2: The scenario components submenu

Not all scenarios contain all these components; components that a scenario does not contain may be greyed out in the menu in certain situations. For instance, search objects have not yet been added to the scenario associated with the scenario shown in Figure 3.2, so this option is greyed out in the menu.

The methods for saving, reloading, recovering or discarding scenario components are covered in this chapter but the details of the components themselves are covered in later chapters.

3.1.4.1 Scenario Parameters

Scenario parameters actually include three types of information required to reload the scenario in the same state it was in when last saved: the list of map options turned on at the time, the list of wind and current forces active, and scenario attributes set and modified via the Scenario Manager, such as CANSARP User, search number, and sea state. These three things are covered in separate locations as indicated above.

3.2 File Management within CANSARP: The File Menu

Most case and scenario file management within CANSARP is performed via the File Menu:

Figure 3.3: The File Menu

3.2.1 Creating a New Scenario In a New or Existing Case

The first step in starting a new search plan is to create a new scenario to contain it. Because a scenario cannot exist outside of a case, you must either add the new scenario to an existing case or create a new case to add it to. If you create a new case, it will contain only one scenario for the time being but you may add additional scenarios to it at a later time.

To create a new scenario, choose **New Case/Scenario** from the **File Menu**, click the **New Case/Scenario** button on the tool bar, or press F5. A dialog box will appear and prompt you for a case number and a scenario name:

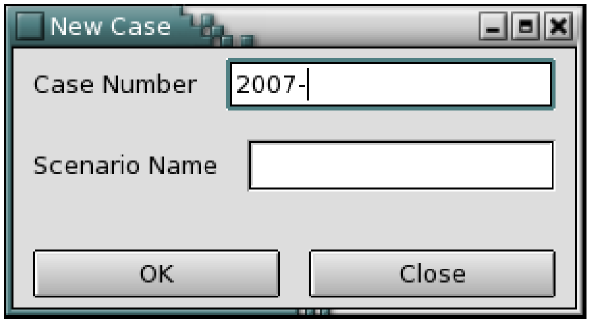

Figure 3.4: The New Case dialog box

If a case is already active, the **Case Number** field will contain the active case's number. Otherwise, this field contains the current year in four digit format followed by a dash and the cursor, as above. In either event, the characters that appear in the field may be modified or deleted.

If you wish to create the scenario as part of an existing case, enter that case's number in the first field. Otherwise, enter a new case number into the first field.

> ***Caution****: There is no way to tell whether the case number you enter is new or already exists. To avoid using an existing name when your intention is to create a new case, check the menu of existing cases that comes up when you select* **Load Scenario** *from the File Menu before creating a new case.*

Enter a name for your new scenario in the second field. Once you've entered the case number and scenario name, click **OK**.

If you haven't duplicated the name and case number of an existing scenario, the new scenario is created and becomes active. If you *have* duplicated the name and number of an existing scenario, you'll be asked if you want to load that scenario into memory. If you click **Yes**, the existing scenario is loaded and becomes active. If you click **No**, you must change the case number or scenario name or both before the new scenario can be created. Once your new scenario is created (or existing scenario is loaded). It becomes active and its case number and scenario name are displayed on the Title Bar at the top of the CANSARP window.

3.2.2 Loading an Existing Scenario (Load Scenario)

A scenario that was created and saved previously may be reloaded into memory and further modified. To load an existing scenario, choose **Load Scenario** from the File Menu, click the **Load Scenario** button on the tool bar, or type F4. The **Load Scenario** dialog box will appear:

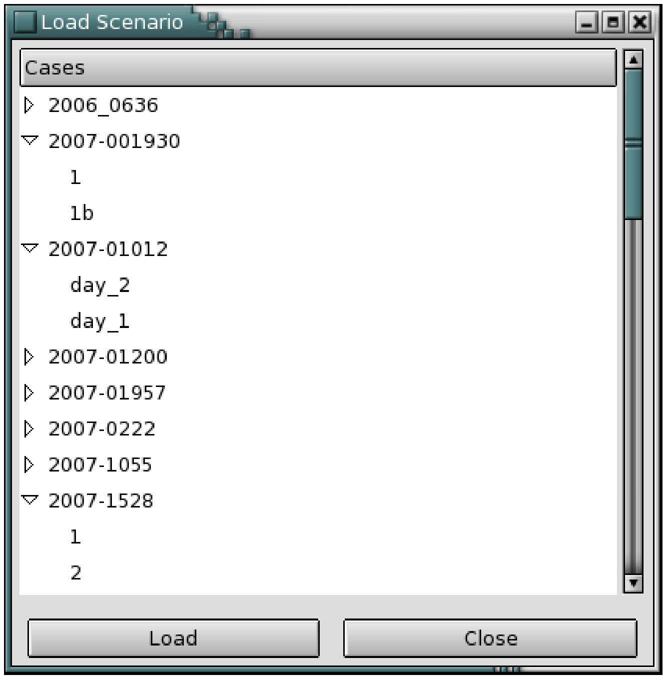

Figure 3.5: The Load Scenario dialog box with some cases expanded to show scenarios.

The dialog box contains a list of case numbers in alpha-numeric order. Each case number has a small triangle to its left; click on this triangle to expand the case into the list of scenarios it contains. Several of the cases in the above diagram have been expanded in this fashion. Select the scenario you wish to open and then click **Load**.

This loads a scenario in its entirety, including all scenario components. It is not possible to load a single scenario component independently of the others when no scenario is open but, once a scenario is active, you may reload one of its components or load one or more of another scenario's components into the active scenario. See the sections on *Reloading The Active Scenario* and *Reloading From Another Scenario Into The Active Scenario* later in this chapter for more information.

3.2.3 Viewing a Scenario In View Mode (View Case)

Sometimes you may wish to look at a scenario without making any further changes to it. This is particularly useful if a case has been completed and you want to review the search plan that was developed at the time without inadvertently modifying it, or if you want to open a plan someone else is working on without affecting the work in progress. In these situations, you may view the scenario.

When a scenario is opened in view mode, you may work with it as usual but none of your changes will be saved, nor will the scenario autosave. In this way the original scenario is preserved unchanged.

To open a scenario in view mode, choose **View Case** from the File Menu. A dialog box just like the Load Scenario dialog box will appear, containing a list of case numbers in alpha-numeric order. Each case number has a small triangle to its left; click on this triangle to expand the case into the list of scenarios it contains. Select the scenario you wish to open and then click **Load**.

3.2.4 Printing the Active Scenario (Print Scenario)

To print a copy of the active scenario, select **Print Scenario** from the File Menu or type Ctrl-F12. The details of the Print Scenario window are covered in *Chapter 14: Printing, Reports And The Logging System*.

3.2.5 Saving the Active Scenario (Save)

To save the active scenario, click the **Save Scenario** button on the toolbar or by clicking on **Save** in the File Menu and then selecting **Scenario** from the submenu that appears (similar to the submenu shown in Figure 3.2). This is known as performing a *hard save*, as opposed to the autosaves that CANSARP performs intermittent in the background (see Section 3.2.7).

You may also save an individual scenario components by selecting the given component from the ***Save*** *submenu.*

You will be prompted to save your work whenever you close or discard a scenario or when you quit CANSARP. If you click

> ***Caution****: There is no prompt to save your work when you create a new scenario or load a different scenario into memory. Any changes made since the last autosave will be lost!*

Whenever you make a hard save, the autosave files are also updated. That is, the autosave files are never older than the most recent hard save.

3.2.6 The Autosave System (Autosave and Recover Autosave)

CANSARP periodically saves your work to an autosave file that is separate from the active scenario's hard save file. This gives you the option to return to the last saved state (i.e. the last hard save) at any time via Reload as described in Section 3.2.7, or to return to the most recent autosave state. This second option is useful when you wish to reverse some recent changes but don't want to discard all your changes since you last saved.

By default, CANSARP performs an autosave every two minutes. See Section 3.2.6.3 for more information.

3.2.6.1 Recovering from the Autosave File

To recover the state of the entire scenario or an individual scenario component from the autosave file, choose **Recover Autosave** from the File Menu and then **Scenario** or the scenario component you wish to recover from the submenu that appears. This discards any changes made to the scenario or the component in question since CANSARP last autosaved. Only components that the active scenario contains are autosaved, so some of the options may be greyed out.

> ***Hint***: *Although CANSARP has no undo function, Recover Autosave may be used like a limited undo. If you apply a change and wish to undo it, recovering from the autosave file will revert that change if it was changed more recently than the last autosave was performed. You must consider, however, whether it will also undo other changes you wish to keep.*

3.2.6.2 Recovering after a Crash or Forgetting to Save

Whenever you load a previously saved scenario into memory, CANSARP checks to see if that scenario's autosave files are more recent than its hard save files. If they are *and there is a difference between the two*, you are given the option to load the autosave data instead of the save data.

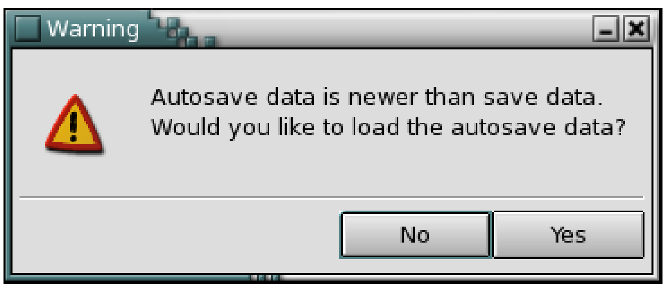

Figure 3.6: If a scenario is closed without saving (such as in a crash) and there is autosave data that's more recent than the last save, you are given the option to load the newer data.

This protects you from losing more than a few minutes worth of work if you forget to save before opening a different scenario or in the event of a crash. Any changes made since the last autosave will still be lost, but unless the Autosave Data Interval has been changed, this is limited to two minutes of work.

Whether you choose to load the hard save files or the autosave files, you may still make use of Reload and Recover Autosave to achieve a combination of the two. That is, if you choose to load the hard save files, you can still use Recover Autosave as described in Section 3.2.6.1 to recover more recent versions of individual scenario components. Alternately, if you choose to load the autosave files, you can still use Reload as described in Section 3.2.7 to set individual components back to their hard save state.

> ***Hint***: *Unless you are certain that you don't want to keep the autosave data, it is safer to load it rather than the hard save data. The autosave data may be overwritten very quickly (see Section 3.2.6.3) whereas the hard save data will never change until you perform a hard save.*

3.2.6.3 Setting the Autosave Data Interval

By default, CANSARP performs an autosave every two minutes but you may change the frequency of autosaves or turn them off entirely. To do so, choose **Autosave** from the File Menu; this brings up the **Autosave** dialog box:

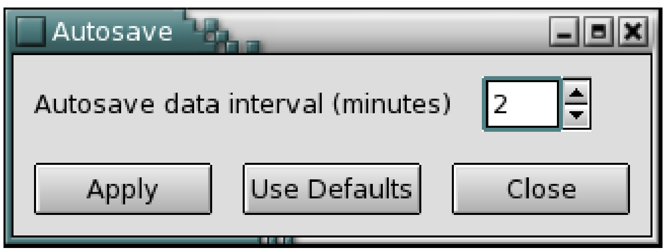

Figure 3.7: The Autosave dialog box in which the autosave interval is set

Use the up and down arrow keys or click on the up and down arrow buttons to the right of the **Autosave Data Interval** field to change the autosave data interval. To turn off autosaving entirely, set the interval to 0. To turn it on again, set the interval to something greater than 0. You may return to the default value of two minutes by clicking the **Use Defaults** button.

The moment at which autosaves are performed is established when you first start CANSARP, not when a scenario is opened, and it is not reset if you open a different scenario. This means that the time between opening a scenario and the *first* autosave will be less than the autosave interval.

For example, if you start CANSARP at 14:01:10, it will perform an autosave at 14:03:10, 14:05:10, etc. If you open a different scenario at 14:06:50, that scenario will still autosave at 14:07:10, or 20 seconds later rather than the full two minutes.

3.2.7 Reloading the Active Scenario (Reload)

If, after making changes to a scenario, you wish to return to the scenario's previously saved state (i.e. the last hard save), you may reload the scenario from its save file. To do so, choose **Reload** from the File Menu and then select **Scenario** from the submenu that appears.

This discards all changes you have made to the scenario since the last time you made a hard save and reverts to the scenario's state at that time. Reloading does *not* make use of the scenario's autosave file.

It is also possible to load individual scenario components independently. To do so, choose **Reload** from the File Menu and then select the scenario component you wish to reload from the submenu that appears. This will revert only that component to its last saved state, leaving all other scenario components in their current states. Only components that the active scenario contains may be reloaded, so some of the options may be greyed out.

3.2.8 Reloading from Another Scenario into the Active Scenario (Reload From...)

You may replace individual scenario components in the active scenario with those from another scenario entirely. This is useful if you wish to create an entirely new search plan that contains only some aspects of one previously created.

To do so, choose **Reload From...** from the File Menu and choose the component you wish to replace from the submenu that appears. This brings up the **Select Case** dialog box which performs exactly like the **Load Scenario** dialog box described earlier. Select the scenario from which you wish to load the component and click the **Load** button. The current state of the scenario component you indicated will be discarded and replaced with the saved state of the alternate scenario you selected.

You may also replace the entire active scenario with another in memory, in effect creating a copy of the previously saved scenario. To do this, choose **Reload From...** from the File Menu and choose **Scenario** from the submenu that appears, then select the scenario to load from the **Select Case** dialog box. This differs from actually loading the scenario itself into memory in that the previously active scenario stays active and future saves will not affect the alternate scenario's save files.

3.2.9 Discarding the Active Scenario (Discard)

It is possible to discard an entire scenario or any of its individual scenario components. Discarding a scenario is equivalent to closing it as described below. Discarding a single scenario component resets that component to its initial blank state. Note that discarding the scenario or an component removes it without saving or modifying the active scenario's save files; to delete a scenario's save files entirely, you must use the Scenario Manager or the Nautilus File Manager as described later in this chapter.

To discard the scenario or one of its components, choose **Discard** from the File Menu and then select **Scenario** or one of the scenario components from the submenu that appears. Only components that the active scenario contains may be discarded, so some of the options may be greyed out.

3.2.10 Closing the Active Scenario (Close Case)

Closing the active scenario returns CANSARP to the state in which it initially opens – that is, with no active case or scenario open. Note that this does not save the scenario's current state, so you must save any changes you wish to keep before closing the scenario. Once the scenario is closed, CANSARP continues to run and the active CANSARP User is unchanged, but no scenario operations are possible until a new scenario is loaded into memory.

To close a case, select **Close Case** from the File Menu. You will be asked to confirm that you wish to close the scenario before it is actually closed.

3.2.11 Backup Case

> ***Note:*** *Backup Case is not implemented in CANSARP version 4.9.5.28. When implemented, it will create an archive of a case and its scenarios. Archived cases and scenarios will not appear in the list of files available to the* **Load Scenario** *or* **Reload From...** *features but may be unarchived if required by using the* **Restore Case** *feature.*

3.2.12 Restore Case

> ***Note:*** *Restore Case is not implemented in CANSARP version 4.9.5.28. Once implemented, it will return a previously archived case to active duty so that its scenarios may be loaded into memory and components from those scenarios may be loaded into other scenarios.*

3.2.13 Export Drifts

Export Drifts is a feature intended for research and validation rather than search planning. It produces a raw data file in a binary format.

3.3 File Management within CANSARP: The Scenario Manager

While most file management within CANSARP is performed via the File Menu, some file management features are accessed via the Scenario Manager. To open the Scenario Manager, choose **Scenario Manager** from the Managers Menu. The top half of the manager window is related to file management:

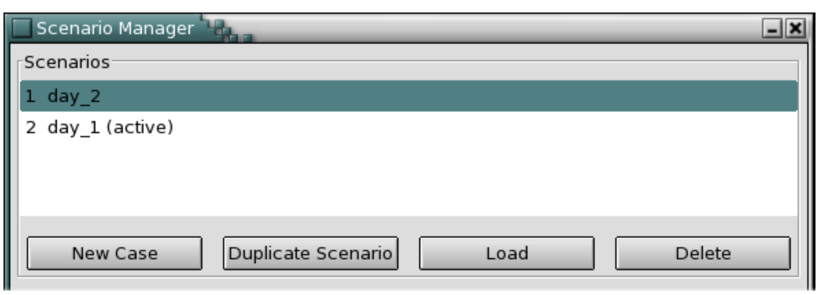

Figure 3.8: The top half of the Scenario Manager window

The top of the manager window contains the list of scenarios contained within the active case and indicates which one of these scenarios is active. The buttons below the list of scenarios are used for file management. The bottom of the manager window, not shown here, is used to set scenario attributes as discussed in Chapter XX.XX.

3.3.1 Creating a New Scenario in a New or Existing Case (New Case/Scenario)

The New Case button in the Scenario Manager calls up the same dialog box as choosing New Case/Scenario from the File Menu and prompts you for a case number and a scenario name:

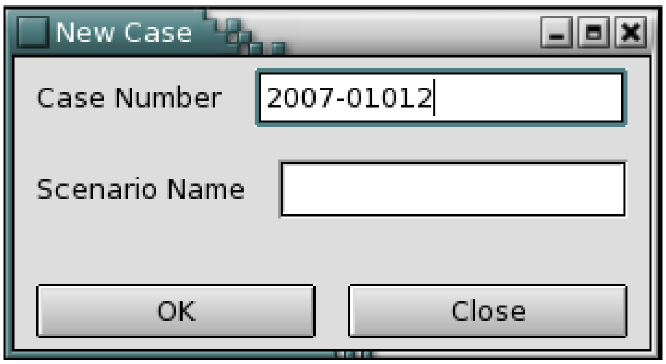

Figure 3.9: The New Case dialog box with the active case number filled in

The active case's number appears in the **Case Number** field. If you don't change the case number, the new scenario will belong to the active case; otherwise, a new case will be created for the new scenario. Enter a name for your new scenario in the second field. Once you've entered the case number and scenario name, click **OK**. Regardless of whether the new scenario belongs to a new case or the previously active one, the Scenario Manager stays open and the new scenario becomes active.

3.3.2 Switching between Active Scenarios in a Case (Load)

The Scenario Manager allows you to easily switch between the scenarios contained within the active case. Select the scenario you wish to make active by left clicking on its name, then click the **Load** button. Note that this does not save the previously active case before switching to a new one, so you should save any changes you don't wish to lose before loading a new scenario.

3.3.3 Deleting a Scenario from the Active Case (Delete)

The Scenario Manager allows you to delete a scenario from the active case. This completely removes all of the scenario's save files. To delete a scenario, select it by left clicking on its name, then click the **Delete** button.

You cannot delete the active scenario; if the active scenario is the one you wish to delete, load another scenario to make it active and then delete the previously active scenario. You cannot delete the last scenario in a case, delete scenarios from other cases, nor delete entire cases from within CANSARP. See Section *3.4* later in this chapter to learn how to perform these actions.

3.3.4 Duplicating a Scenario (Duplicate)

You may create an exact copy of an existing scenario via the Scenario Manager. To do so, select the scenario you wish to copy by left clicking on its name, then click the **Duplicate Scenario** button. This calls up the **Duplicate Scenario** dialog box:

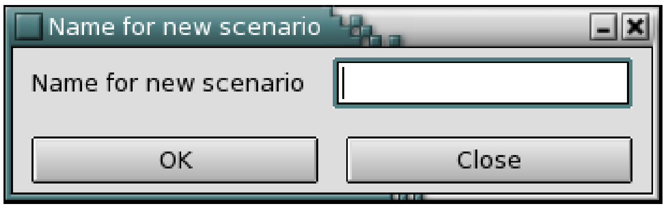

Figure 3.10: The Duplicate Scenario dialog box

Enter the name of the new scenario in the field provided (making sure to meet the naming requirements as described in the *Before You Begin* section of this chapter) and click **OK**. This creates a duplicate of the last saved state of the selected scenario in the active case and makes the newly created scenario active.

> ***Caution**: If you are duplicating the active scenario, be aware that the duplicate is made of the scenario's **last saved state**, not its current state. You must save the active scenario before duplicating it if you wish your changes to be part of the new copy.*

3.4 File Management outside CANSARP: Nautilus File Manager

The CANSARP application runs within the Gnome Desktop environment in the Solaris 10 operating system. One component of the Gnome environment is the Nautilus File Manager, which allows users to manage files and directories. Nautilus File Manager is similar to Windows Explorer in the Microsoft Windows operating system and functions in much the same way.

Nautilus may be used to perform several file management operations on CANSARP files outside of the CANSARP program itself. Some of these operations are only available within the Nautilus File Manager, while others may be performed within CANSARP as well.

You may perform these operations within Nautilus while CANSARP is running, though you should take care when manipulating any active cases or scenarios. Some operations can introduce instability and may make CANSARP crash when performed on files currently in use; perform these operations on the active case or scenario at your own risk!

> ***Caution**: It is imperative that you follow the requirements for scenario names and case numbers when changing file names in the Nautilus File Manager. Nautilus will allow you to add spaces and punctuation to file names that will prevent those cases and scenarios from behaving as expected within CANSARP.*

3.4.1 File Structure within Nautilus

As of CANSARP 5.0 version 4.9.5.28, all CANSARP case and scenario save files are located in the directory /export/home/cansarp/incidents/. Each case is a directory located in that parent directory, and the scenarios it contains are themselves directories located in the case directory. For instance, for the scenario named 1 in the case 2006_0636 (see Figure 3.11) the scenario directory is /export/home/cansarp/incidents/2006_0636/1/. A scenario directory includes all the data files associated with each scenario component for the given scenario.

> ***Caution**: While you can perform many useful operations within Nautilus at the case or scenario **directory** level, it is not advisable to manipulate individual data files within a scenario directory as this may corrupt the scenario and the case that contains it.*

3.4.2 Opening the File Browser in Nautilus File Manager

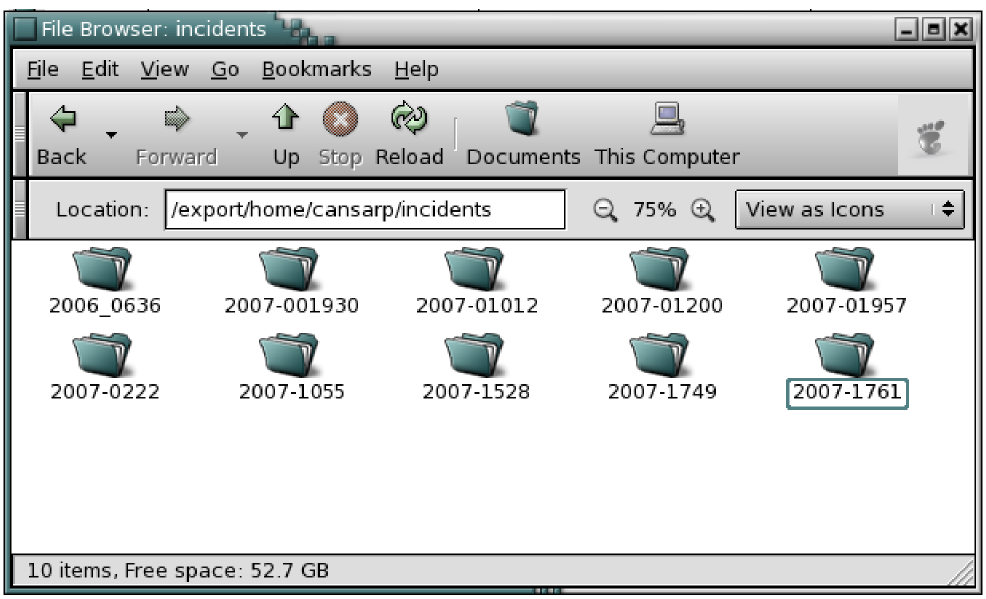

Figure 3.11: The Incidents directory opened in Nautilus File Manager

To find case and scenario directories, open the File Browser by double clicking on the **This Computer** icon in the top left corner of the desktop. Once the file browser is open to This Computer, you may either type /export/home/cansarp/incidents in the **Location** field (as shown in Figure 3.11) and hit the Enter key to move into the incidents directory, or double click first on the File System icon, then on the home directory icon, then the cansarp directory icon and finally the incidents directory icon to do the same.

In Figure 3.11 there are 10 existing cases. Double clicking on any case directory icon will open it and display the scenarios it contains. Double clicking on a scenario directory will display the save files associated with that scenario. To return to the case directory from a scenario directory or to the incidents directory from a case directory, click the Up arrow icon above the **Location** field.

If a case or scenario directory or the incidents directory itself is open in the File Browser when a change is made within CANSARP that affects it (for instance, if a case or scenario is created, duplicated or deleted), these changes are not immediately visible within the File Browser window. To update the list of files, choose **Reload** from the View Menu or type Ctrl-R to reload the window and see the effect of these changes.

Similarly, if the contents of a directory are changed outside of CANSARP, the changes will not be evident in any dialog boxes currently open within the program. You will need to close and reopen any dialog boxes that display a list of cases or scenarios in order to see the revised list.

3.4.3 Deleting Scenarios and Cases

You may delete an existing case or a single scenario by selecting the case or scenario directory and hitting the Delete key or choosing **Cut File** from the Edit Menu in the File Browser window. This has the same effect as deleting a scenario from the Scenario Manager, but can be used to delete scenarios in any case or even entire cases. There is no way to undo this operation, so take care when deleting files.

Do not delete the active case or scenario. If this happens, the scenario will stay open in CANSARP but the directory containing its save files will no longer exist. If this should happen inadvertently, saving the scenario should recreate the case and scenario directories as required for the active scenario but not other scenarios in the case. Note that there is no guarantee this will work every time: sometimes too much instability is introduced, causing CANSARP to perform strangely or to crash.

3.4.4 Duplicating Scenarios and Cases

While it is possible to duplicate a scenario within CANSARP, you cannot duplicate an entire case, nor can you duplicate more than one scenario at a time. You can do both these things in Nautilus.

To copy an existing case or scenario, select the directory of the case or scenario you wish copy and choose **Duplicate** from the Edit Menu in the File Browser. This creates a new copy of the directory and places it inside the same directory as the original. The new copy will have the same name as the old one, with the characters “ (copy)” appended to the end. Note that this introduces a space and parentheses into the file name, hence it is *not* a valid case number or scenario name for CANSARP and the name must be changed as described shortly.

You may select more than one directory at a time for copying. Each directory will be copied as described above (and each new copy will need to be renamed).

3.4.5 Renaming Scenarios and Cases

CANSARP does not allow you to rename a scenario or case once it is created but you can do this within Nautilus. Be advised that Nautilus will allow you to give directories names that CANSARP cannot handle. In fact, if you have duplicated a scenario or case within Nautilus, you *must* rename it as the new copy will contain spaces and punctuation that make the file unusable to CANSARP.

To change the name of a case or scenario, select the directory in question and choose **Rename...** from the Edit Menu or type F2. This allows you to edit the directory's name as you would text in a word processor. Make sure the new name follows the guidelines described in the *Before You Begin* section of this chapter. In particular, be sure to remove any spaces and punctuation.

3.4.6 Moving or Copying Scenarios to Another (or a New) Case

CANSARP does not allow you to move a scenario to another case once it is created but you can do this within Nautilus. To do so, first select the scenario directory and choose **Cut File** from the File Menu. Next, use the Up arrow to move up to the incidents directory and then double click on the case directory where you want the scenario to be located to open it. Once in the new case's directory, choose **Paste File** from the File Menu. This removes the scenario from its original case and moves it to the new one.

To create a copy of the scenario in a new case but leave the original in its place, follow the above instructions but use **Copy File** instead of **Cut File**.

To move a scenario to a brand new case, you must first create a case directory for it. In the incidents directory, choose **Create Folder** from the File Menu. This will create a directory and give it the name "untitled folder". You must change this folder's name as described above, giving it an appropriate name for the new case. Then follow the procedure for moving a scenario from one case to another to move it into the newly created case directory.

3.4.7 Archiving and Unarchiving a Case

This operation should only be performed by the CANSARP adminstrator.

Should you wish to preserve a case on the CANSARP workstation but prevent it from being opened within CANSARP (and so from appearing in the Load Scenario dialog box), you may archive it. This operation will be added to future versions of CANSARP but in the meantime you may perform it manually from the Nautilus File Manager.

First you must create a directory in which to archive the case if one does not already exist. To do so, move into /export/home/cansarp and choose **Create Folder** from the File Menu. Be sure to select the newly created folder and change its name to something meaningful.

To move the case to be archived into the new folder, first open the incidents directory where it is currently located. Selecting the case directory, choose **Cut File** from the Edit Menu, move into the newly created archive directory and then chose **Paste File** from the Edit Menu.

> ***Caution**: Do **not** choose **Create Archive...** from the Edit Menu when archiving a case. This does something else entirely that is not compatible with CANSARP's file structure.*

To unarchive a case, move it out of its archive directory and back into the incidents directory.

Scenarios may be archived in the same fashion, but it is advisable to archive entire cases rather than individual scenarios. If you wish to prevent a scenario from being modified but leave the case it belongs to unarchived, lock the scenario rather than archiving it.

3.4.8 Locking a Scenario or a Case

This operation should only be performed by the CANSARP adminstrator.

Should you wish to prevent changes to a scenario or an entire case but still allow the scenario or scenarios within the case to be opened in CANSARP, you may lock the scenario or case directory by removing write access to it. This operation will be added to future versions of CANSARP but in the meantime you may perform it manually from the Nautilus File Manager.

To do so, select the scenario or case directory in question and right click on it, then choose **Properties** from the menu that appears. This calls up the file properities dialog box:

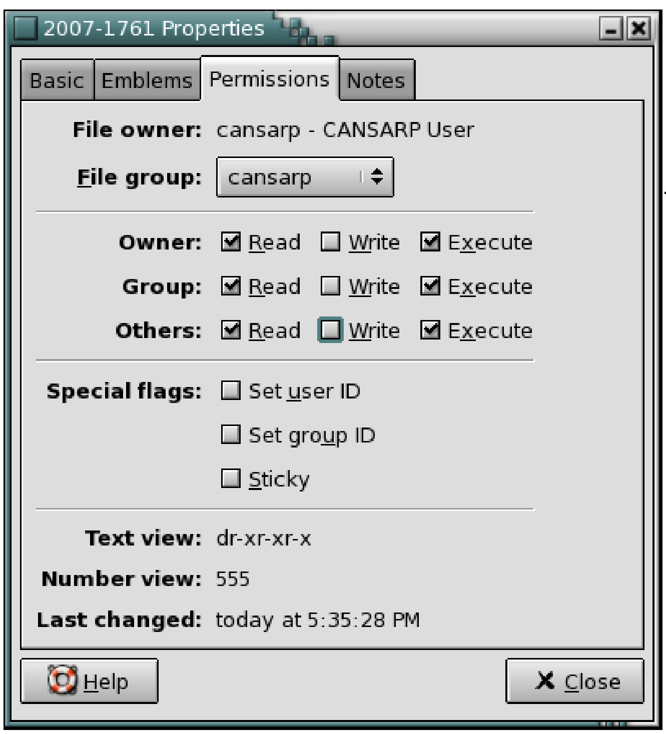

Figure 3.12: The Permissions tab of the Properties window for the 2007-1761 case directory. Notice that the check boxes for the write permissions are unchecked. This will prevent saves and autosaves from making any changes to the files.

Switch to the Permissions tab, then click on all three check boxes labeled **Write** to uncheck them as shown above.

When write permissions are turned off in this way for a scenario, that scenario performs normally within CANSARP in all ways, except that neither hard saves nor autosaves are performed. If a case is locked, this is true of all scenarios within that case.

> ***Caution****: There is no indication within CANSARP that saves are not being performed when a scenario or case is locked in Nautilus. Saves will appear to work but no changes are actually written to the save files. When this feature is implemented within CANSARP, it will be possible to tell when a scenario is locked.*

To unlock a case or scenario, turn write permissions back on by opening the properties dialog box and clicking on all three check boxes labeled **Write** so that the check marks appear as they do for the read and execute permissions in Figure 3.12.

Chapter 4
Overview of Search Planning

Chapter 5

Starting a New Search Plan and the Scenario Manager

Chapter 6
Search Objects and the Search Object Manager

One of CANSARP's primary functions is to calculate where objects in the water will drift given their type, the estimated incident position, and environmental conditions. The first step in this process is adding the search objects themselves and configuring their parameters. This chapter introduces the Search Object Manager and covers the methods used to add, modify and manipulate standard search objects.

In this chapter, you will learn:

- The difference between standard search objects and tracklines
- What search object parameters are
- How to use the Search Object Manager
- How to add standard search objects
- How to modify, duplicate and delete standard search objects
- How to deactivate and reactivate standard search objects
- How the canvas menu interacts with search objects

6.1 Before you begin...

6.1.1 Search Objects Vs. Tracklines

CANSARP uses two managers to handle search objects: the Search Object Manager and the Trackline Manager. Standard search objects represent a single object in a single position and are used when the estimated incident position (EIP) is more or less clearly defined. Tracklines are used when the course a vessel expected to follow is known but the point along that path at which the vessel went into distress is not. In this case, a trackline is used to deploy several search objects at various points along the vessel's course, with drift starting times calculated to compensate for the time required to reach each deployment location.

Tracklines are covered in *Chapter 7: Track Lines And The Trackline Manager* but the information in this chapter applies to trackline search objects as well. The Trackline Manager deploys its objects into the Search Object Manager, where they perform like standard search objects in almost all respects and may be modified like any other search object.

6.1.2 Search Object Parameters

Regardless of how they are added, all search objects have four parameters that affect drift calculations: object type, drift starting point, initial position error and leeway divergence. Each of these is introduced briefly below; instructions for setting them for a particular search object follow in the section titled Editing Search Objects later in this chapter.

6.1.2.1 Search Object Type

Every search object represents a particular type of object adrift in the water. These may be persons in the water (PIWs), life rafts, sailboats or ships. As well, each type may or may not have a drogue attached. An object's type and the presence or lack of a drogue determine its default leeway parameters and the sweep width for SRUs allocated to search for that object.

CANSARP provides a list of 26 types to choose from; these correspond directly to the search object types in the sweep width tables in Annex 7D of the National SAR Manual. They also correspond to the leeway tables in Chapter 7 of the National SAR Manual, although the manual's categories are broader than CANSARP's in the case of leeway.

6.1.2.2 Drift Starting Point: LKP/EIP

A search object's drift starting point includes both its drift starting time and its drift starting position, and indicates when and where the object began to drift. For example, this might be the point at which a ship lost power, a person fell into the water, or life rafts were deployed. This point is referred to by the National SAR Manual as last known position (LKP) however, because the object's last *known* position might not be near the best estimate of its position when it went into distress, IAMSAR Vol. 4 refers to this point as Estimated Incident Position (EIP). CANSARP and this manual use the terms LKP and EIP interchangeably.

6.1.2.3 Initial Position Error

A search object's initial position error describes the margin of error in the estimate of its drift starting position owing to two factors: fix error and dead reckoning (DR) error. Fix error is based on the navigation system of the reporting agency – whether the search object itself or a passing vessel or aircraft – or the type of electronic direction finding source used to fix the object's position. If the search object's position has been calculated using dead reckoning procedures, the margin of error associated with that calculation must also be included. A search object will always have fix error; if it also has DR error, these two values are added together to determine total initial position error.

6.1.2.4 Leeway Divergence

Leeway is the movement of the search object through the water caused by the action of the wind on the exposed surfaces of the object. There are four leeway parameters: coeffiecient, left and right angle of divergence, and correction. Coefficient determines the magnitude of leeway's impact on the drift calculations: the higher the value, the greater the effect of leeway on drift.

Left and right divergence determine how far leeway pushes the object off the downwind path: the higher the value, the wider the spread of drift tracks. Correction is a constant correcting factor applied based on experimental results. It should not be applied when wind speed is less than 5 knots.

When leeway divergence is turned on for a particular search object, these parameters are used in drift calculations for that object; when it is off, drift calculations do not include leeway. CANSARP turns leeway on automatically for those object types for which it is appropriate and assigns leeway parameter values according to the tables in the National SAR Manual. You may override these default vaults for each object if desired.

6.2 The Search Object Manager

Most operations related to standard search objects are carried out via the Search Object Manager. To open the manager, choose **Search Object Manager** from the Managers menu, click on the **Search Object Manager** button on the managers tool bar, or type **F11**.

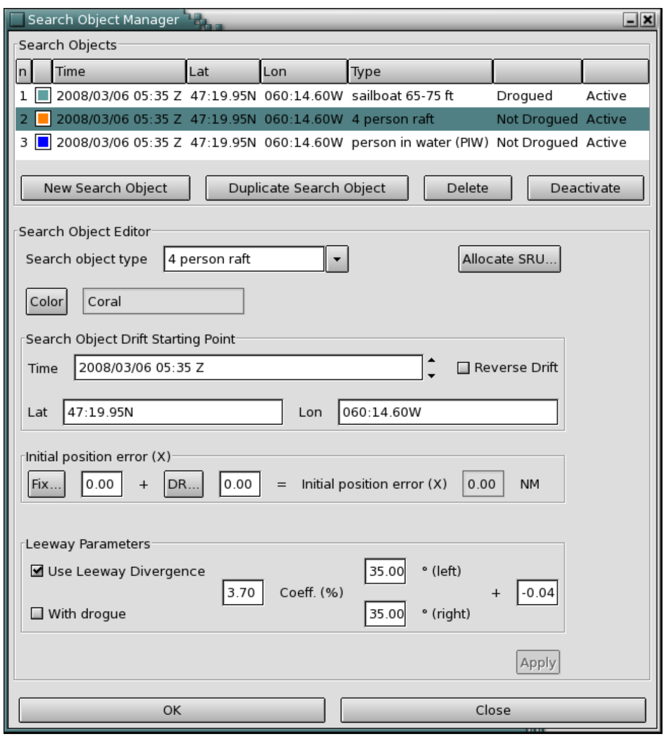

Figure 6.1: The Search Object Manager

The list at the top of the manager window contains all search objects placed on the canvas. This list displays each object's number, icon colour, drift starting point time and position, type, drogue status and activation status. Immediately below the search object list are buttons that allow you to add new objects, duplicate or delete them, and activate or deactivate them. The rest of the manager window comprises the Search Object Editor, which is used to edit a search object's parameters.

When you open the Search Object Manager, the first search object in the list will be selected by default and the fields of the Search Object Editor will be filled with the values corresponding to that object. If no search object has been added yet, the fields will be filled with the last settings used.

To select a search object in the manager, click on it in the list; the selected object becomes highlighted (as is Object 2 in Figure 6.4) and a selection circle appears around its icon on the canvas.

6.2.1 Adding a New Search Object

To add a new search object, open the Search Object Manager and click on the **New Search Object** button. The new search object will appear in the Search Object List. New objects are added to the bottom of the list, so you may need to scroll down to see it. The object is also assigned a unique colour and an search object icon this colour appears on the canvas at the object's drift starting position.

When added in this way, a new object's type and drift starting position are set to the values that appear in the corresponding fields of the Search Object Editor when it is created. Its drift starting time is set to the time displayed on the scenario clock and its initial position error is set to 0. Leeway parameters are assigned automatically according to the object's type.

You may also add a new search object by right clicking on the canvas at the desired latitude and longitude. This brings up the canvas menu; choose either **Add Search Object (no Drogue)** or **Add Search Object (with Drogue)** as appropriate and then select a type from the submenu that appears:

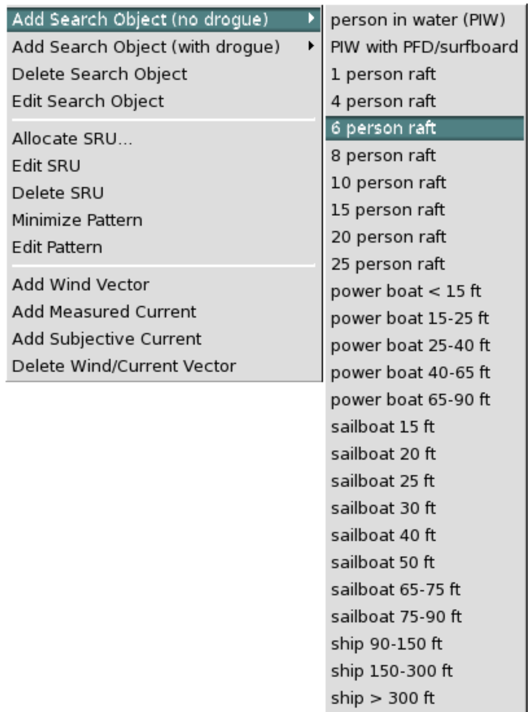

Figure 6.2: Adding a search object from the canvas menu

This sets the object's type and its drift starting position; as with the first method, drift starting time is set by the scenario clock, initial position error is set to 0 and leeway parameters are set according to its type.

Finally, you may create a new search object by duplicating one that already exists. This creates an exact copy of an existing object and assigns the new object its own colour. See the section on duplicating search objects later in this chapter for more information.

6.2.2 Modifying Search Objects

Once a search object appears on the canvas, any of its parameters may be modified. In fact, all search objects must be modified to some degree as initial position error must be set. Search objects' parameters are modified in the Search Object Editor located in the bottom half of the Search Object Manager window. See the *Before You Begin...* section at the beginning of this chapter for a brief introduction to the various search object parameters.

6.2.2.1 Selecting an Object to Edit

If the Search Object Manager is already open, select the search object you wish to modify by left clicking on it in the Search Object List at the top of the manager window or by left clicking its icon on the canvas. The line it occupies in the list becomes highlighted, a selection circle appears around its icon on the canvas and the fields of the Search Object Editor fill with the selected object's parameter values.

If the Search Object Manager is not already open, you may left click on a search object's icon on the canvas to bring up the manager or right click on its icon and choose **Edit Search Object** from the canvas menu:

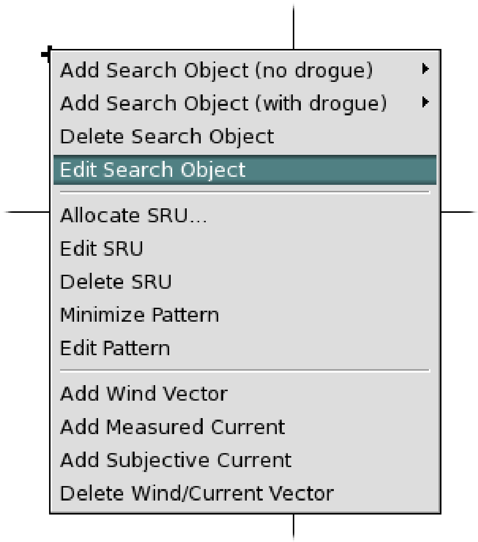

Figure 6.3: Selecting a search object to edit from the canvas menu

In either case, the manager opens with the selected automatically.

> ***Caution****: If objects are stacked on top of each other on the canvas, left or right clicking to bring up the manager will select the object in the stack that was created first – most likely the bottom object in the stack. Make sure that the object you wish to modify is selected before you continue.*

6.2.2.2 Applying changes

Once the object is selected, you may modify its parameters by entering new values into any of the fields in the Search Object Editor and clicking the **Apply** button. If you are making several changes, you may apply them individually, or make them all and then click **Apply** once they are all made. The changes you make to an object will not appear in the Search Object List until they are applied.

None of your changes actually take affect until you apply them, so you may cancel your changes at any time by closing the manager without applying. If you make changes to an object and then close the window or select (or create) another object without applying, you will be asked whether or not you want to apply before continuing.

6.2.2.3 Search Object Type

To change a search object's type, click on the small arrow to the right of the **Search Object Type** field and select the appropriate type from the drop down menu that appears:

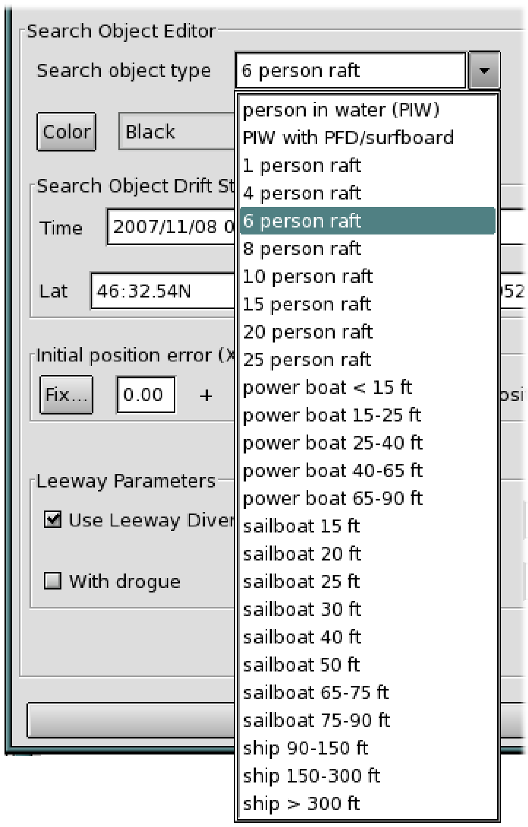

Figure 6.4: The Search Object Type menu in the Search Object Manager

When you set a search object's type, leeway divergence parameters for that type are automatically entered into the corresponding fields at the bottom of the Search Object Editor.

> ***Note:*** *CANSARP does not include a type for capsized or swamped rafts. To simulate this type, select the appropriately sized raft and set the leeway divergence parameters to the following: coefficient 1.3%, 35º left and right angle of divergence, and correction -0.6. Drogue may be left on or off.*

> ***Note:*** *Search object type has no impact on drift calculations in CANSARP 5.0 apart from setting default leeway parameters. Drift calculations are based entirely on leeway parameters, so if you add two objects of different types – a raft and a 300' ship, for instance – and then make their leeway parameters equal, the two objects' drift tracks will be identical. Search object type* ***does*** *affect SRU sweep width calculations, however.*

6.2.2.4 Drift Starting Point: LKP/EIP

An object's drift starting point is comprised of two values: its drift starting position and its drift starting time.

To change an search object's drift starting position, type new values into the longitude and/or latitude fields or left click at the new position on the canvas to read new values into those fields automatically. Once you apply this change, the new position is reflected in the Search Object List and the search object's icon moves to the new position on the canvas.

To change an object's drift starting time, type a new time into the **Time** field or advance or rewind the **Time** field just as you would the scenario clock. As with the scenario clock, you may right click on the **Time** field to bring up the clock increment menu.

> ***Caution:*** *A search object's drift starting time is* ***not the same*** *as its drift track starting time. For more information on drift track starting times, see Chapter 11: Drift And Search Area Determination.*

6.2.2.5 Initial Position Error: Fix Error

All new search objects must be modified to account for their initial position error. This value defaults to 0 but should be at least 0.25 NM – this is the margin of error for GPS, the most accurate position fixing method.

If you know the degree of fix error, type it into the field to the right of the **Fix...** button. Otherwise, you may look up suggested values by clicking the **Fix...** button to call up the Fix Error dialog box:

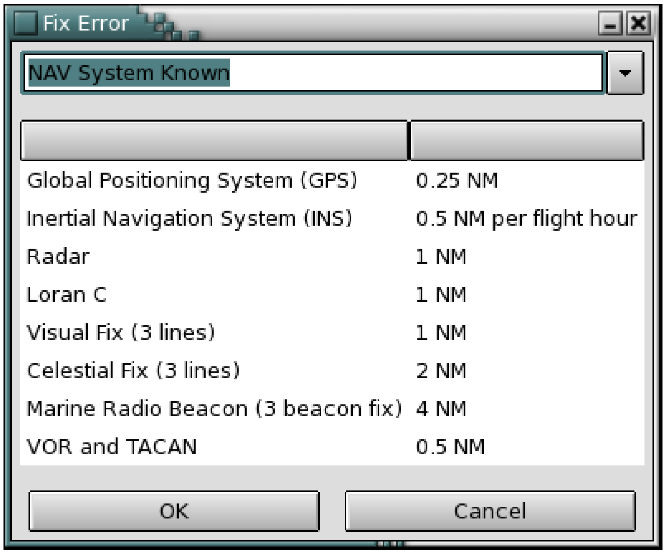

Figure 6.5: The Fix Error dialog box in the Search Object Manager

Indicate whether the navigation is known or unknown by clicking on the arrow in the top right corner of the dialog box and choosing one or the other from the drop down menu that appears. Based on your choice, one of two tables will appear in bottom half of the window (NAV System Known appears in Figure 6.2). If the navigation system is known, a list of navigation systems and electronic direction finding methods appears in the table; if the navigation system is not known, a list of vessels and aircraft types appears instead. In either case, select the appropriate option and click OK; this automatically enters the suggested value into the fix error field in the Search Object Manager and closes the Fix Error dialog box.

6.2.2.6 Initial Position Error: DR Error

If the drift starting position has been calculated using Dead Reckoning procedures, you must allow for a margin of error in that calculation as well. If you know the degree of dead reckoning error, enter it into the field to the right of the **DR...** button. Otherwise, you may look up the values outlined in the National SAR Manual based on calculated DR distance and vessel type.

> ***Hint:*** *To calculate DR distance, use the linear range tool. This tool is not available when the Dead Reckoning Error dialog box is open, so measure the distance before continuing to the next step. If you have already opened the DR Error dialog box, close it to calculate DR distance, then reopen it. The Search Object Manager may stay open during this process.*

To look up National SAR Manual values for DR Error, click on the **DR...** button to call up the Dead Reckoning Error dialog box:

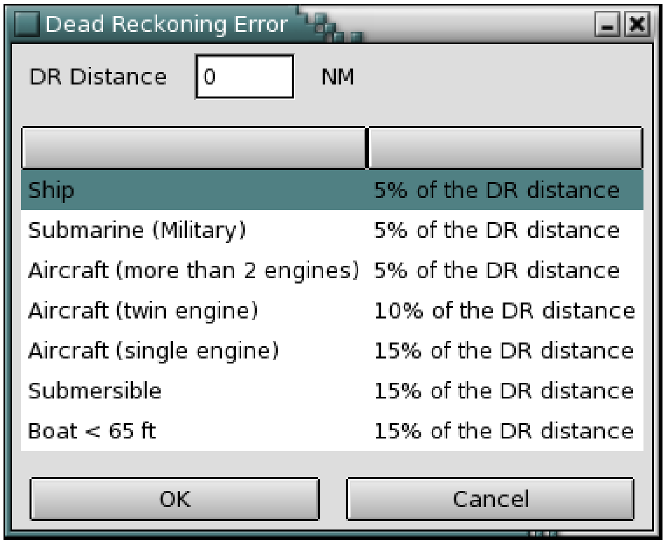

Figure 6.6: he Dead Reckoning Error dialog box from the Search Object Manager

Enter the DR distance into the field at the top of the dialog box, then select the appropriate type of vessel or aircraft in the table provided and click **OK**. This will calculate the appropriate percentage of the distance traveled and enter it into the **DR...** field in the Search Object Manager. The Dead Reckoning Error dialog box closes automatically.

6.2.2.7 Leeway Parameters

To turn leeway divergence on or off, click on the check box labeled **Use Leeway Divergence**. If a check mark appears in the box, leeway is turned on for the selected search object and the parameter fields are editable. If it is turned off, leeway is *not* included in drift calculations for the search object and the parameter fields are greyed out and cannot be edited.

> ***Hint**: You can turn off the effects of leeway in drift calculations for ALL search objects on the wind drift forces sidebar or in the Wind Manager. Doing so will override the individual search objects' settings but does not reset them; if you later turn leeway back on on the sidebar or in the Wind Manager, the individual objects' settings come into play once more.*

When you set a search object's type, CANSARP automatically turns leeway divergence on or off as appropriate for that type and inserts the corresponding National SAR Manual leeway values into the leeway parameter fields at the bottom of the Search Object Editor. To change any of the leeway parameter values, type new values into the fields next to the corresponding labels.

> ***Caution****: The leeway values in the National SAR Manual were calculated using wind speeds measured at the 10 metre wave height (U_{10}). Be aware that winds measured at a higher wave height may be significantly greater than the U_{10} winds. The values also assume a wind speed of 5 to 40 knots and should be used with caution for winds of more than 40 knots, as high waves may reduce the wind speed effect on the search object. For wind speeds of less than 5 knots, do not apply the correction factor.*

6.2.2.8 Drogue

For many search object types, leeway values differ depending on whether or not a drogue is attached to the object. For this reason, the drogue check box appears in the leeway parameters section of the manager window even though it is technically part of the search object type designation.

To indicate that the search object has a drogue attached, click the check box labeled **With Drogue**. You may remove the drogue by clicking the box a second time. If a check mark appears in the box, drogue is turned on for the selected search object. Turning drogue on or off resets the leeway parameters to the National SAR Manual values; if you have changed an object's leeway parameters and then change its drogue setting, you will have to re-enter the leeway parameters.

6.2.2.9 Colour

You may change the colour assigned to a search object by selecting it and clicking on the Color button near the top of the Search Object Editor. This brings up a small dialog box containing the list of available colours; drag the handle in the scroll bar on the right side of the box to see the entire list. Click on the colour you wish to assign to the search object and then click **OK**. This assigns the new colour and closes the dialog box. The new colour appears in the Search Object List and the search object's icon on the canvas changes to match.

6.2.3 Duplicating Search Objects

Once a search object has been added, you may create an exact copy of it by selecting it and clicking the **Duplicate Search Object** button below the Search Object List. A new search object is created, entered into the list and added to the canvas; it also becomes active so that it may be edited immediately.

This is extremely useful in situations where multiple search objects have the same drift starting point or where one type of search object drifts from multiple points. For example, suppose that a fishing vessel overturns and some of its crew deploy into rafts while others fall into the water. In this case, you might create and configure a search object for the vessel itself, then duplicate it for the PIW and raft. Since the duplicate objects would have the same drift starting point and initial position error as the fishing vessel, all you would need to change for each is its object type, as doing so automatically sets its leeway parameters to the appropriate values. Alternately, if you have a rough idea of the area in which a vessel has begun to sink, you might create and configure a search object for it at one end of the region, then duplicate it and move the copy's drift starting location to a point at the opposite end in order to bracket the possible area, leaving all other parameters the same.

6.2.4 Deleting a Search Object

To delete a search object, select it in the Search Object List and click the **Delete** button below the list. Alternately, you may right click on its icon on the canvas and choose **Delete Search Object** from the canvas menu that appears. If the search object was one of a stack of search objects, only the topmost object, the one visible on the canvas, will be deleted.

6.2.5 Deactivating and Reactivating Search Objects

During complex SAR operations with multiple search objects, the canvas can sometimes appear cluttered with too much information. As well, CANSARP may take some time to calculate extended drifts, especially where multiple search objects are involved. In these cases, it may be helpful to deactivate some search objects; deactivated objects still appear on the canvas, but their drift tracks are not calculated.

To deactivate a search object, select it in the Search Object List at the top of the Search Object Manager and then click the **Deactivate** button below the list. Its activation status will change to "Inactive" in the Search Object List.

To reactivate an inactive search object, select it in the Search Object List at the top of the Search Object Manager and then click the **Activate** button below the list. Its activation status will change to "Active" in the Search Object List.

6.2.6 Allocating SRUs

The Search Object Manager may be used to allocate a new SRU to the search. To do this, select a search object and click the **Allocate SRU** button in the Search Object Editor. This adds a new SRU to the SRU Manager and sets its search object type to the type of the search object you selected.

> ***Caution:*** *allocating an SRU in this way sets the SRU's search object type but does not link the SRU to the selected search object. If you later change the search object's type, this change is not reflected in the SRU – you will also need to change the SRU's type in the SRU Manager.*

SRUs and the SRU manager are discussed in detail in *Chapter 12: Effort Allocation: SRUs And The SRU Manager*.

6.2.7 Reverse Drift

To the right of the **Time** field in the Drift Starting Point section of the Search Object Manager window is a check box labeled **Reverse Drift**. By turning on reverse drift, a search object may be set to drift backwards in time rather than forwards.

To toggle a search object between reverse and forward drift, click on the **Reverse Drift** check box. If a check mark appears in the box, the object is set to drift backwards in time. If it does not appear, the object will drift forward in time as usual.

Reverse drifts are covered in *Chapter 11:Drift And Search Area Determination*.

6.3 Search Objects and the Canvas Menu

You may perform several operations related to search objects from the canvas menu. These include adding a new search object (with or without drogue), editing a search object, and deleting a search object. To bring up the canvas menu, right click on the canvas. You may add a search object at any location but in order to edit or delete a search object you must right click on the search object's icon. The procedure for carrying out each of these actions is covered in the preceding sections of this chapter.

If search objects are stacked on top of each other on the canvas, as they will be if they share the same drift starting position, left or right clicking on the stack will affect the object at the top of the stack, i.e. the one that you can see on the canvas. In the case of editing search objects, make sure that the object you intend to edit is the one selected once the Search Object Manager opens. To delete an object that's lower down in the stack, you must open the Search Object Manager and delete it from there.

Chapter 7
Track Lines and the Trackline Manager

When the route a vessel expected to follow is known but the point along that path at which the incident occurred is not, a track line may used to model the vessel's speed and route. The Trackline Manager is used to define such a track line, as well as to distribute search objects along the vessel's route in a manner that facilitates search planning in this situation. This chapter introduces the Trackline Manager and covers the methods used to define and modify a track line, and to configure and deploy track line search objects.

In this chapter, you will learn:

- The purpose and composition of a track line
- The difference between track lines added by time and by speed
- How to use the Trackline Manager to add and manipulate track lines
- How to use the Trackline Manager to configure and deploy search objects
- How search objects deployed by the Trackline Manager are grouped together
- How track line search objects interact with the Search Object Manager
- How to modify individual track line search objects
- How to activate and deactivate track line search objects in deployment groups and individually
- How to clear and redeploy track line search objects

7.1 Before you begin...

7.1.1.1 The Purpose and Composition of a Track Line

Track lines are used to model the route a vessel expected to travel and are comprised of way points and the track segments that join them. The first and last waypoints are called *end points*; these represent the vessel's starting location (or its LKP) and its intended final destination. Interior waypoints are called *turning points* and represent intermediate destinations or points at which the vessel's course was expected to change.

For instance, if a fisherman left port with the intention of checking traps at three locations and then returning to port before dark, the end points of the track line would both be the port from which he left and planned to return, while the turning points of the track line would be the three locations where his traps were located.

The major benefit of using a track line is that CANSARP can automatically calculate the time at which the vessel was expected to reach any position along its course, not only the waypoints. This allows the Trackline Manager to deploy search objects with drift starting times that automatically compensate for the vessel's movement along its intended course.

> ***Caution****: One limitation of track lines as implemented in CANSARP 5.0 version 4.9.5.9 is that the vessel's speed is assumed to be constant along the entire length of the line. This is expected to change in future versions of the program.*

7.1.1.2 Behaviour of Search Objects Deployed by Track Lines

Once deployed by the Trackline Manager, search objects appear in the Search Object Manager and behave like normal search objects except that they continue to be associated with the track line and may be manipulated to a limited extent via the Trackline Manager. Furthermore, if the track line's search objects are cleared, they are removed from the Search Object Manager leaving those search objects not added by the Trackline Manager in place. If the track line's search objects are redeployed, the existing track line search objects are removed from the Search Object Manager and new ones are added in their place.

Because the Trackline Manager deploys its objects into the Search Object Manager where they behave like standard search objects in all respects, you should review *Chapter 6: Search Objects And The Search Object Manager* before reading this one. In particular, you should be familiar with the four parameters that affect a search objects' drift calculation: object type, drift starting point, initial position error and leeway parameters. This chapter will explain how to *set* these parameters for track line search objects but does not go into detail regarding their purpose or their effect on drift calculations.

7.2 The Trackline Manager

Most operations related to track lines are carried out via the Trackline Manager. The manager has two primary functions: defining the track line itself – that is, the number, time and position of its points – and deploying and manipulating search objects distributed along the line's length.

To open the Trackline Manager, choose **Trackline Manager** from the Manager menu, or click on the **Trackline Manager** button on the manager tool bar.

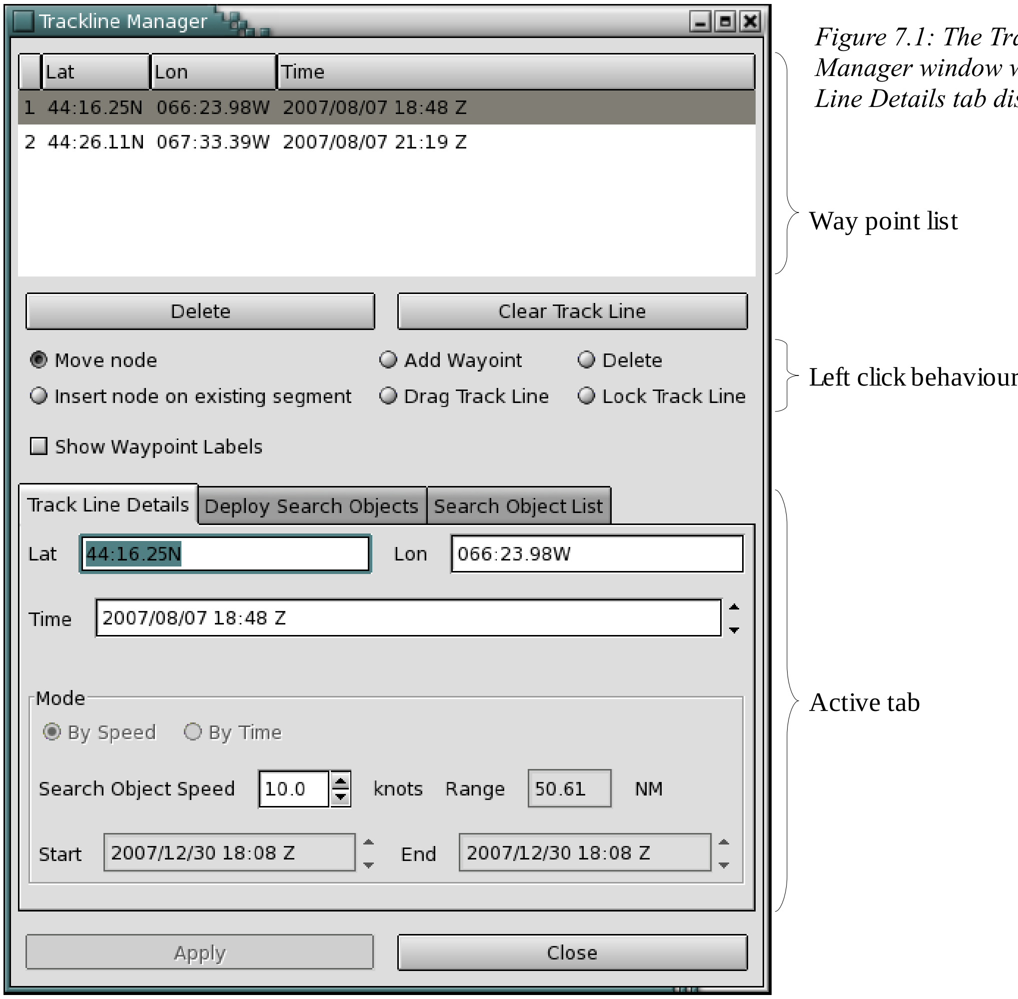

Figure 7.1: The Trackline Manager window with Track Line Details tab displayed

The table at the top of the manager window lists the way points that comprise the track line; if no points have been added, this table is empty. The way point list displays each point's number, latitude, longitude, and time. Points are numbered and listed in order according to their times, which represent the time at which the vessel was expected to reach each way point as it followed its intended course. You must set the first node's time and, in some cases, the last node's; the times of all turning points are calculated automatically. See the sections relating to adding a track line by speed or by time for further details on how time values are calculated.

Immediately below the list of points are buttons that allow you to delete a single node or to clear the track line entirely. Below these are radio buttons which determine the action performed when the track line is manipulated with the mouse. See the sections on editing points and track lines for further information on both these subjects. Below the radio buttons is a check box that indicates whether or not the waypoint labels appear on the canvas; clicking on this check box toggles the display on and off.

The bottom half of the Trackline Manager window contains three tabs: the Track line Details tab, the Deploy Search Objects tab and the Search Object List tab. The first of these is covered in the following sections on adding track lines and editing points. The second is covered in the section on deploying track line search objects. The third tab contains a list of search objects associated with the track line in the same format as the search object list in the Search Object Manager – see *Chapter 6: Search Objects And The Search Object Manager* for further information..

7.3 Adding a Track Line

Each scenario may have only one track line at a time. If a scenario already as a track line, it must be cleared before another one may be added. Although this does not automatically remove any search objects associated with the original track line, deploying search objects from a new line removes any search objects associated with the old one from the Search Object Manager.

7.3.1 How to Draw a Track Line

Track lines are drawn directly on the canvas by clicking with the mouse at the various way points that comprise the line. To draw a track line, left click on the canvas at the position of the first end point, which will likely be the vessel's LKP or the port from which it left. Then left click at each of the vessel's *turning points* in the order it expected to arrive at each. Finally, *right click* at the vessel's expected destination or the last point on the line. Right clicking finishes the draw routine; until you right click, anything you do with the mouse can be interpreted as adding new way points to the track line. This process is illustrated in Figure 7.2:

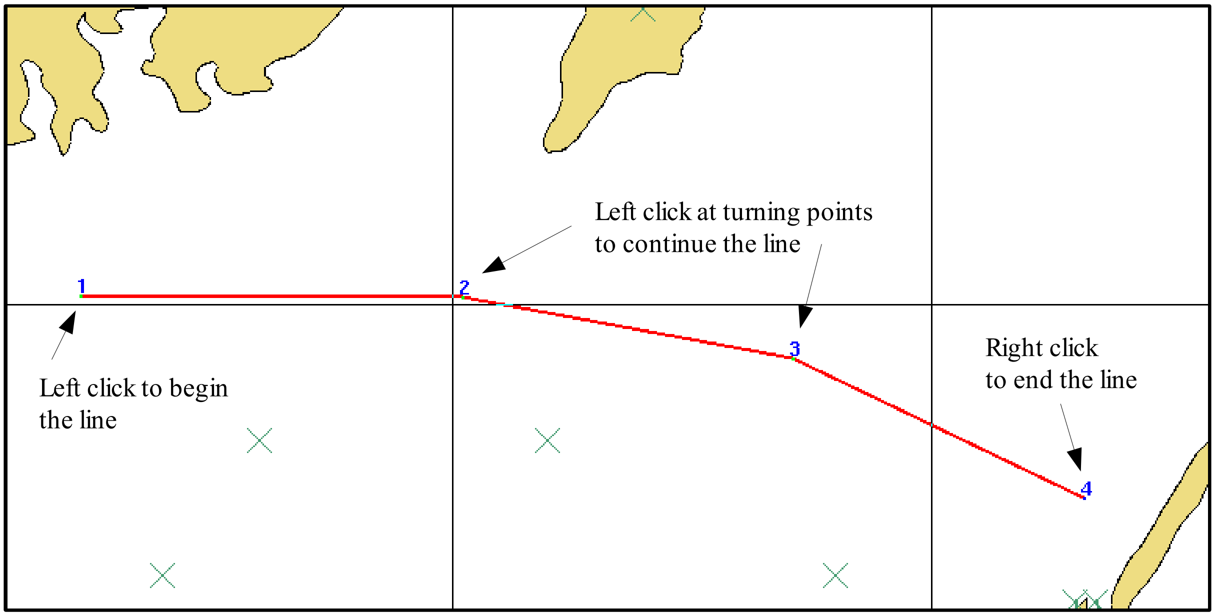

Figure 7.2: The process for drawing a track line: left click to begin and continue, right click to end.

Don't be too concerned with adding the way points at exactly the right latitude and longitude as their positions can be changed easily later. If you have added too many way points, the extraneous points can be deleted easily as well. See the section on editing a track line for instructions on how to move or delete way points as well as other editing options.

7.3.2 By Speed Vs. By time

The first step in adding a track line is deciding whether to add it by speed or by time. This selection is made before the track line is added and determines the way in which the times of all points after the first are calculated. This choice cannot be changed after a track line is added; to change from one mode to the other, you must clear the track line completely and readd it using the other method.

When adding a track line by speed, you set the rate of travel and the time of the first node yourself; all later points' times are calculated according to how much time is required to travel the distance from one node to the next at the given speed. When adding a track line by time, you must set the time of the first and last node yourself. CANSARP calculates the speed required to travel the total distance of the line within that time period and assigns times to the turning points accordingly.

> ***Note:*** *Speed is assumed to be constant along the track line's entire length whether it is added by speed or by time. It is not possible to change the rate of travel from one section of the track line to another.*

If you know the vessel's intended rate of travel, add the track line by speed. If you know the time at which the vessel left port (or the first location on the track line) and the time at which it expected to arrive at its final destination (or the last location on the track line), add the track line by time.

7.3.3 Adding a Track Line by Speed

A track line should be added by speed when you know the time at which the vessel left the first location on the line and the rate at which it was traveling. In this case, you will set the time of the first end point and CANSARP will automatically calculate the times of all other way points.

To add a track line by speed, open the Trackline Manager and make sure that Track Line Details tab is displayed, as in Figure 7.1. If a track line has already been added, you must clear it before adding a new one. If no track line has been added, the Mode radio buttons labeled **By Speed** and **By Time** are enabled. Note that a track line has already been added in Figure 7.1 so these radio buttons are disabled.

First, make sure the **By Speed** radio button is selected; to select it, click in the circle to the left of the button label. Next, set the scenario clock to the time of the first way point. Third, set the speed at which the vessel was expected to travel by entering the appropriate value into the **Search Object Speed** field or using the up and down arrows to the right of the field to modify the speed shown. Finally, draw the trackline on the canvas as described above.

As you draw the track line, the times of all way points after the first are automatically calculated based on their distance from the previous way point and the speed at which the vessel is traveling. The total range of the track line is also calculated and represents the entire length of the track line as drawn (rather than straight from the first point to the last).

7.3.3.1 Modifying Way Points Added by Speed

Once you right click to end the track line, you can select any way point in the way point list and then modify its latitude and/or longitude by changing the values in the **Lat** and **Lon** fields at the top of the Track Line Details tab. You may also change the vessel's speed, which automatically recalculates the times of way points after the first. You must click the **Apply** button after making either of these changes.

You may change the time of the first way point only. If you do, all other way points' times are automatically adjusted.

7.3.4 Adding a Track Line by Time

A track line should be added by speed when you know the time at which the vessel left the first location on the line (often its LKP) and the time at which it expected to reach its final destination. In this case, you will set the time of the first and last end points and CANSARP will automatically calculate the speed required to travel from one to the other as well as the times of all turning points.

To add a track line by time, open the Trackline Manager and make sure that Track Line Details tab is displayed, as in Figure 7.1. If a track line has already been added, you must clear it before adding a new one. If no track line has been added, the Mode radio buttons labeled **By Speed** and **By Time** are enabled. Note that a track line has already been added in Figure 7.1 so these radio buttons are disabled.

First, make sure the **By Time** radio button is selected; to select it, click in the circle to the left of the button label. Next, enter the time the vessel left the location of the first way point into the **Start** field. Third, enter the time at which the vessel expected to arrive at the final way point into the **End** field. Finally, draw the trackline on the canvas as described above.

> ***Caution***: *You must set the start and end time before you begin to draw the track line, and the end time must come after the start time chronologically. If it is the same or earlier than the start time, CANSARP cannot calculate the times of the turning points accurately.*

As you draw the track line, the total range of the track line is calculated. The speed at which the vessel must have traveled to traverse the entire line between the given start and end times is also calculated and the times of all turning points are set accordingly.

7.3.4.1 Modifying Way Points Added by Time

Once you right click to end the track line, you can select any way point in the way point list and then modify its latitude and/or longitude by changing the values in the **Lat** and **Lon** fields at the top of the Track Line Details tab. You must click Apply before these changes are accepted.

You may not change the vessel's speed, as it is calculated automatically based on start and end times and the total range of the track line.

You may change the times of the first and last way points only, by changing the times displayed in the Start and End fields at the bottom of the Track Line Details tab. If you do, all turning points' times are automatically recalculated.

> ***Caution***: *Although it is possible to modify the time displayed in the* **Time** *field for the first way point in a track line added by time, doing so has no effect. To change the start time of a track line added by time, modify the time displayed in the* **Start** *field at the bottom of the Track Line Details tab.*

7.4 Editing a Track Line

Once a track line has been drawn on the canvas, it may be modified in a variety of ways.

7.4.1.1 Changing the Speed of a Track Line

A track line's speed may only be modified if the track line was added by speed. To do so, open the Track Line Details tab of the Trackline Manager and enter a new value into the Speed field or adjust the value displayed by clicking on the up and down arrows to the right of the field. You must click the **Apply** button for this change to take effect.

7.4.1.2 Changing the Times of Way Points

If the track line was added by speed, only the first end point's time may be set directly. To do so, select the first way point in the way point list at the top of the Trackline Manager window and change the value displayed in the **Time** field near the top of the Track Line Details tab. You must click the **Apply** button for this change to take effect.

If the track line was added by time, both end points' times may be set directly. To do so, change the values displayed in the **Start** and **End** fields near the bottom of the Track Line Details tab. Although it is possible to select the first way point and change the value displayed in the **Time** field near the top of the tab, this does not actually affect the starting time of the track line.

The times of a track line's turning points can never be set directly by the user.

7.4.1.3 Changing the Positions of Way Points

To reposition a way point, select the way point in the list at the top of the Trackline Manager window and then change the values in the **Lat** and **Lon** fields at the top of the Track Line Details tab. This method works best if the way point's position is known with a high degree of accuracy. You must click the **Apply** button for this change to take effect.

A second method of repositioning a way point that is less precise but often more convenient involves the mouse and is described later in this section.

7.4.1.4 Deleting Way Points

To delete a way point, select that way point in the list at the top of the Trackline Manager window and then click the Delete button below the list. A second method for deleting a way point involves the mouse and is described later in this section.

7.4.1.5 Clearing the Track Line

To remove the track line completely, click the Clear Track Line button below the way point list in the Trackline Manager. Note that this removes all the way points from the canvas but does *not* remove any search objects previously deployed via the Trackline Manager. Such search objects will still appear on the Search Object List tab of the Trackline Manager and may be cleared there.

7.4.2 Manipulating a Track Line Via the Mouse

Once drawn, a track line may be manipulated in a number of ways by left clicking or dragging the mouse on the canvas. The behaviour of the mouse while the Trackline Manager is open is determined by which radio button is selected in the region labeled “Left Click Behaviour” in Figure 7.1. To change the mouse's behaviour, click in the circle to the left of the label corresponding to the desired behaviour. Note that these mouse behaviours apply regardless of which of the three tabs are displayed at the bottom of the manager window.

Before manipulating the track line or any of its way points, it may be helpful to turn on way point labels. This causes numerical labels to appear on the canvas near each way point that correspond to the labels in the way point list, and makes it easier to tell which way point is being manipulated. To toggle way point labels on or off, click on the check box labeled **Show Waypoint Labels** below the mouse behaviour buttons.

7.4.2.1 Moving Way Points (Move Node)

If the **Move Node** mouse behaviour is selected, left clicking on the canvas near any way point will reposition that point to the spot at which you clicked. The way point nearest to the new location will move.

If you left click on a way point and hold the button down while you drag the mouse, the way point will reposition to the location at which you release the mouse button. This method works better than the first if you are trying to move one way point close to another, as you can be sure of which way point will move.

If you use this second method, the latitude and longitude of the mouse's position is displayed in the **Lat** and **Lon** fields of the Track Line Details tab as you drag the mouse so that you may place the point precisely. However, if you wish to move a way point to an exact position, it is easier to simply modify the values of the **Lat** and **Lon** fields in the Track Line Details tab directly as described earlier.

7.4.2.2 Inserting a New Turning Point (Insert Node on Existing Segment)

To add a new turning point to a track line, set the mouse behaviour to **Insert Node On Existing Segment** and then left click on the canvas at the location of the new point. This inserts a new way point into the segment closest to the point at which you clicked, and calculates its time according to the method by which the track line was added. Whichever method was used, the new point's time will fall between the times of the way points at the ends of the original segment.

The time of the new point is calculated automatically according to the method in which the track line was added. If the track line was added by speed, the times of all later turning points are also adjusted. If the track line was added by time, the times of *all* turning points are adjusted to account for the change in speed required to accommodate the new track line segments.

> ***Hint**: If the new point's location is nearer to a track segment other than the one to which it should be added – that is, if it would be out of chronological order by adding it to the closest segment as may happen if the vessel's course changes direction dramatically at some point – add the new way point near the correct track segment chronologically speaking and then move it to the proper position.*

7.4.2.3 Extending the Track Line (Add Waypoint)

To add a new end point to a track line, select the **Add Waypoint** mouse behaviour and then left click on the canvas at the location of the new end point. This connects the new point to the nearest original end point and turns the original end point into a turning point.

If the new end point was added to the beginning of the track line, its time is set to the track line's beginning time. If the track line was added by speed, all other points' times are recalculated to account for the time required for the vessel to traverse the new track segment. If the track line was added by time, all the turning points' times are recalculated to account for the change in speed due to the increase in the track line's total range.

If the new end point was added to the end of the track line and the track line was added by speed, its time is calculated automatically and no other way points are affected. If the track line was added by time, however, the times of all turning points' are recalculated to account for the change in speed due to the increase in the track line's total range.

> ***Hint**: If the new end point's location is nearer to the opposite end from the one to which it should be added – that is, if it would be out of order chronologically by adding it to the closest end, as may happen if the vessel is returning to port – add the new end point near the correct end chronologically speaking and then move it to the proper position.*

7.4.2.4 Repositioning the Track Line (Drag Track Line)

You may drag the entire track line to a new location without changing the angles between or the length of any track segments. To do so, first select the **Drag Track Line** mouse behaviour and then left click on the canvas near the track line and hold down the mouse button as you drag. This changes the positions of every way point but has no effect on their times.

7.4.2.5 Deleting Way Points (Delete)

You may delete a way point from a track line by clicking with the mouse on the canvas. To do so, select the **Delete** mouse behaviour and then left click on or near the point you wish to delete. The point closest to the location at which you clicked will be deleted. This works for both end points and turning points.

7.4.2.6 Locking the Track Line (Lock Track Line)

Once the track line is defined with all way points in their correct positions, it is a good idea to set the mouse behaviour to **Lock Track Line**. This prevents any of the other possible mouse behaviours from acting upon the track line and eliminates the possibility of inadvertently moving or deleting any way points or otherwise manipulating the line with the mouse. Note, however, that it does *not* prevent changes being made to the track line by changing the values in fields of the Trackline Manager window or using the **Delete** or **Clear Track Line** buttons.

7.5 Deploying Search Objects

After a track line is complete, search objects may be distributed along its length. These search objects must be configured as they are when added via the Search Object Manager and, once deployed, may be further manipulated via both the Trackline Manager and the Search Object Manager. These actions are performed via the second tab of the Trackline Manager, the Deploy Search Objects tab shown in Figure 7.3.

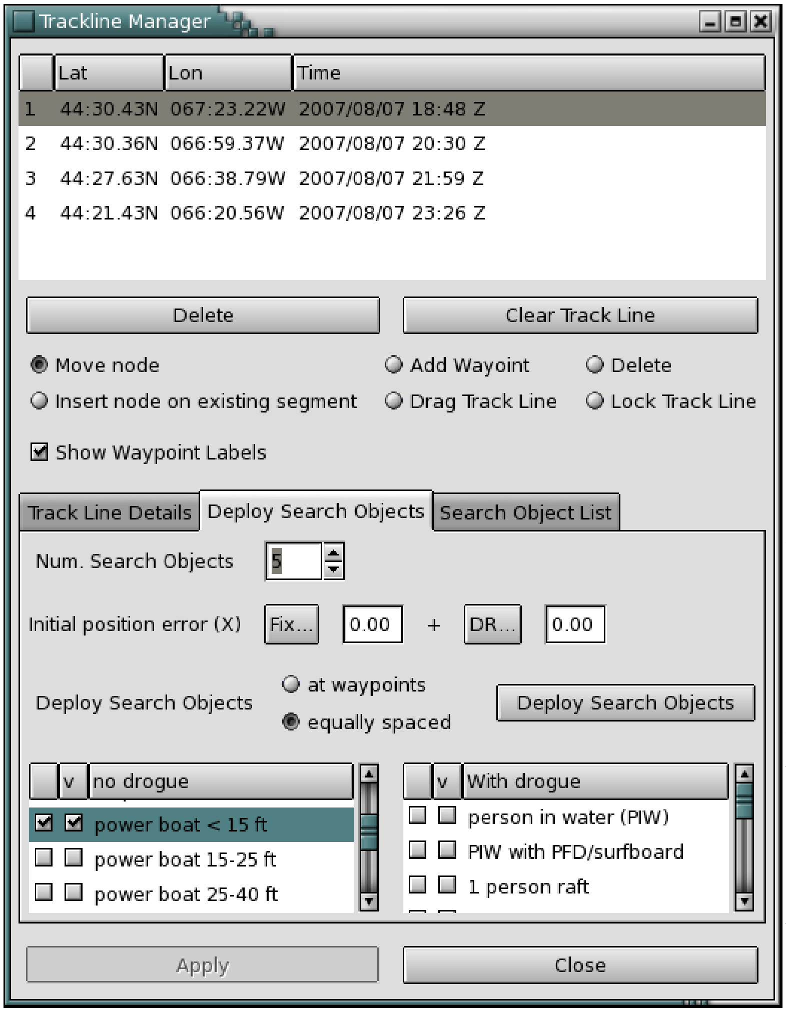

Figure 7.3: The Trackline Manager, open to the Deploy Search Objects tab

7.5.1 Distributing Search Objects Along a Track Line

You have two options when distributing search objects along a track line's length: you may deploy them at each way point or you may deploy them at a number of evenly spaced locations along the track line's length.

To deploy search objects at way points, including both end points and turning points, click the radio button labeled at waypoints to select it.

To distribute search objects evenly along the track line's length, first click the radio button labeled equally spaced as shown in Figure 7.3. Next, enter the number of locations at which to deploy search objects in the **Num. Search Objects** field or use the up and down arrows to adjust the value displayed. Note that search objects are always deployed at the track line's end points, so choosing 5 locations as in Figure 7.3 would deploy search objects at each end point and at three locations between them.

> ***Caution**: Although the field is named **Num. Of Search Objects** the value displayed in it actually determines the **number of deployment locations**. The number of search objects to deploy at each location is set elsewhere. The total number of search objects deployed is the number of deployment locations multiplied by the number of search objects deployed at each.*

7.5.2 Configuring Search Object Parameters

Search objects deployed by the track line manager must be configured just as normal search objects are. The manager automatically calculates the drift starting point time and position of the search objects it deploys but you must still set their type, including the presence or lack of a drogue, and their initial position error. Leeway parameters are assumed to be normal for the selected type(s). For details on each of a search object's four parameters, see the *Before You Begin* section of *Chapter 6: Search Objects And The Search Object Manager*.

7.5.2.1 Search Object Type

The two tables at the bottom of the Deploy Search Objects tab are used to set the number and type of search objects the Trackline Manager will deploy at each location. The left table lists search objects without drogue and the right table lists search objects with drogue. To select one or more of these objects, click on the leftmost check box in the double row of boxes to the left of each type. You may select as many types from one or both lists as you require; a search object corresponding to each type will be deployed at each of the deployment locations.

7.5.2.2 Drift Starting Point

Drift starting points for each search object deployed by the Trackline Manager are automatically calculated based on the time of each position on the track line.

7.5.2.3 Initial Position Error

To set the initial position error for objects deployed by the Trackline Manager, enter values into the Fix and DR fields in the same manner as described in . These values apply to all objects deployed by the manager.

7.5.2.4 Leeway Parameters

Leeway parameters are assumed to be normal for the selected search object type(s). The Trackline Manager has no facility for adjusting leeway parameters.

7.5.3 Deploying the Search Objects and the Search Object List

Once you have selected a distribution pattern and configured the search objects' parameters, you may deploy them by clicking the Deploy Search Objects button. This automatically chooses a colour for each object type and deploys the selected combination of objects at each deployment location. The same colour is used for a particular object type at each location, so that you may easily see which icons and drift tracks correspond to that object type in each group.

All of the search objects deployed by the Trackline Manager are listed on the manager's third tab, the Search Object List tab, as shown below:

Search objects tied to a track line also appear in the Search Object Manager's search object list.

7.6 Modifying Deployed Search Objects

Once search objects are deployed by the Trackline Manager, they appear in the Search Object Manager where they can be modified individually like any other search object. Specifically, leeway parameters may be set via the Search Object Manager if they differ from the default values for a search object's type. Any other change normally possible within the Search Object Manager, such as icon colour, activity status, presence or lack of a drogue, etc. may also be made to search objects deployed by the Trackline Manager.

Changes made to one search object via the Search Object Manager do not affect others in its deployment location, nor to others of the same type at other deployment locations.

7.6.1.1 Changing Activity Status

In addition to toggling a single object between an active and inactive state in the Search Object Manager, you may make a particular search object deployed by the Trackline Manager active or inactive at all its deployment locations at once. To do so, open the Deploy Search Objects tab of the manager and click the rightmost check box in the pair of boxes to the left of the search object's type (in the column labeled **v** for visibility). This has the same effect as making each of the individual objects active or inactive within the Search Object Manager. See *Chapter 6: Search Objects And The Search Object Manager* for more information.

7.7 Deleting and Redeploying Search Objects

An individual search object deployed by the Trackline Manager may be deleted via the Search Object Manager in the usual fashion by selecting it in that manager and clicking the **Delete** button. The search objects deployed by the Trackline Manager may also be deleted en masse via the Trackline Manager itself by switching to its Search Objects List tab and clicking the **Clear Search Objects** button.

If you change the track line or wish to alter the types or distribution of search objects tied to it, you may redeploy the track line's search objects by clicking the **Deploy Search Objects** button in the Trackline Manager a second time. There is no need to delete previously deployed search objects before doing so, as the Trackline Manager keeps track of which search objects are tied to a track line and, when objects are redeployed, removes all previous objects from the Search Object Manager and the canvas before the adding new ones. You may redeploy search objects along a track line repeatedly.

Note that clearing a track line does not delete the search objects deployed by the Trackline Manager. The search objects will remain on the canvas and in the Search Object Manager until they are deleted via either manager, cleared in the Trackline Manager, or until the objects are redeployed via the Trackline Manager.

Chapter 8
Environmental Time Series Data and the Time Series Editor

Much of the current and wind data that CANSARP uses to simulate drift is organized as time series. It is important to understand how to read and interpret these time series in order to use them correctly; specifically, an understanding of time series is particularly important when adding wind or current data into a simulation manually. This chapter explains how to read and interpret time series. It also introduces the Time Series Editor and explains how it is used to add and modify environmental data.

In this chapter, you will learn:

- How environmental data is arranged in vectors and time series
- How to display time series on the canvas
- How to open time series in the Time Series Editor
- How to use the Time Series Editor
- How to interpret time series data
- How to add new time series
- How to modify existing time series

8.1 Before you begin...

8.1.1 Vectors and Time Series

A single piece of data in an environmental time series is called a *vector*. Vectors represent speed and direction; each also has a time stamp that identifies when the the wind or current was moving in the given direction at the given speed. In CANSARP, a *time series* is a collection of such vectors all at the same latitude and longitude; it gives a picture of how winds or currents are changing over time in that location. A time series may contain many vectors or just a single one.

> ***Caution**: Although some of the canvas menu options refer to vectors, these options actually act on complete time series, not on individual vectors.*

8.1.2 Range of Influence

Because environmental data isn't available in every single location for every moment in time, CANSARP fills in the gaps between data points by allowing each vector to exert its influence over a wider region and a span of time. The region is referred to as the time series' *radius of influence* and the span of time as its *persistence*. Collectively, these two values are the time series' *range of influence.* The default radius and persistence of different types of environmental data are show in Table 1.

Data type	***Radius of Influence***	***Persistence***
Wind	100 NM	+/- 3 hours
Current	10 NM	+/- 3 hours
SLDMB	10 NM	+/- 0.5 hours

Table 8.1: Default range of influence by environmental data type

Whatever its range of influence, a vector's speed and direction is considered to apply to the entire region within the given radius about its position and for the given number of hours before and after its time stamp.

As more than one vector may exert its influence over a given point at a given time, CANSARP employs an interpolation method which combines the data from up to eight vectors distributed about the given point to produce these intermediate values.

8.1.3 Only Some Data May Be Opened

Not all of the environmental data CANSARP uses is arranged in time series and not all of it can be opened in the Time Series Editor. All data entered by an SMC (measured currents, subjective currents and subjective wind) may be opened and edited. CMC wind data and SLDMB current data may also be opened and read but care should be taken when editing these types of data. For more information on editing data from external sources, see the sections on CMC and SLDMB data in the next two chapters.

> ***Caution****: In CANSARP 5.0 version 4.9.5.9 Grand Banks model data may also be opened in the Time Series Editor but it should* ***not*** *be edited.*

Other types of data, such as sea, tidal currents, and IML currents do not have the same data format and cannot be opened in the Time Series Editor.

8.2 Displaying Time Series on the Canvas

Time series of all types appear on the canvas as an X; the colour of the X indicates the type of data. If the time series is not deactivated and it contains a vector whose range of influence covers the time currently displayed on the scenario clock, the X is superimposed with another icon that indicates whether the time series contains current data (an arrow) or wind data (a feather). For more information on colour coding and the icons associated with each type of environmental data, see *Chapter 9: Environmental Data: Current Data And Models* and *Chapter 10: Environmental Data: Wind Data And Models*.

The following table lists the default colour scheme for environmental time series (these colours can be changed in the Map Properties window):

Type of Data	***Colour***
Subjective Wind	Red
CMC Wind	Cornflower blue
Measured Current	Sea green
Subjective Current	Orange red
Modeled Current	Medium blue

Table 8.2: Colour of time series icons by environmental data type

8.3 Opening a Time Series in the Time Series Editor

8.3.1 Opening a Time Series from the Canvas

The easiest way to open a time series of any type in the Time Series Editor is to left click on its icon on the canvas. In order to do this the icon must be visible, so first make sure the appropriate data type is turned on in the Map Options sidebar to the left of the canvas. For instance, to open a measured current time series, make sure the checkbox labeled **Measured Currents** is checked. When you left click on the icon, the Time Series Editor opens and contains the selected time series.

8.3.2 Opening User Entered Data from a Manager

Three types of environmental data are entered directly into the simulation by an SMC: measured currents, subjective currents and subjective winds. These types of data may be opened in the Time Series Editor from their respective managers. To do this, open the manager in question, switch to the tab labeled with the type of data you wish to open, select a time series from the list displayed and then click the **Edit Time Series** button.

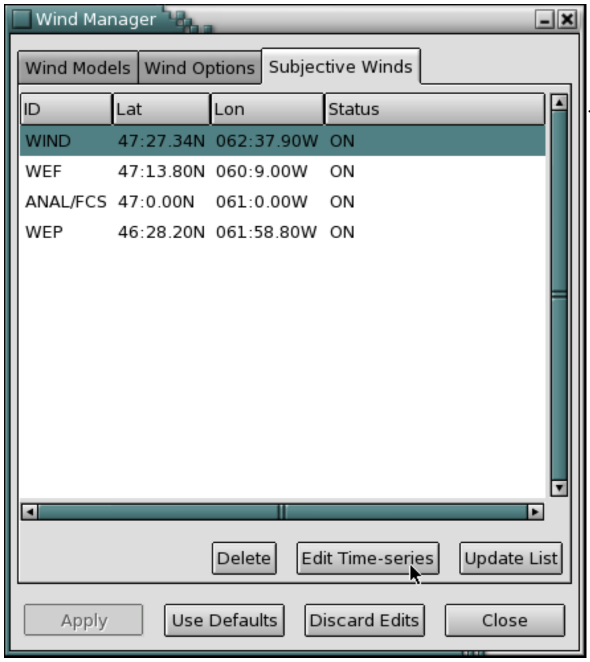

Figure 8.1: Opening a wind data time series from the Wind Manager

All other environmental data is loaded from external sources and, though it is possible to read some of it in its time series format, care should be taken when editing this data. Generally speaking, changes to data from external sources should be limited to changing its activation status. These types of data may only be opened by left clicking on the time series' icons as described previously.

> ***Note****: If you make any change to a time series containing CMC wind data, it is automatically converted to a subjective wind and, from that point on, it is considered a subjective wind for purposes of calculations and for display on the canvas. Its ID remains unchanged to indicate its original source, but its icon colour changes to match other subjective winds.*

8.4 Interpreting Time Series Data

Once opened, a time series appears in the Time Series Editor. The name of the window will change depending on the type of data but its fields and their function remain the same regardless.

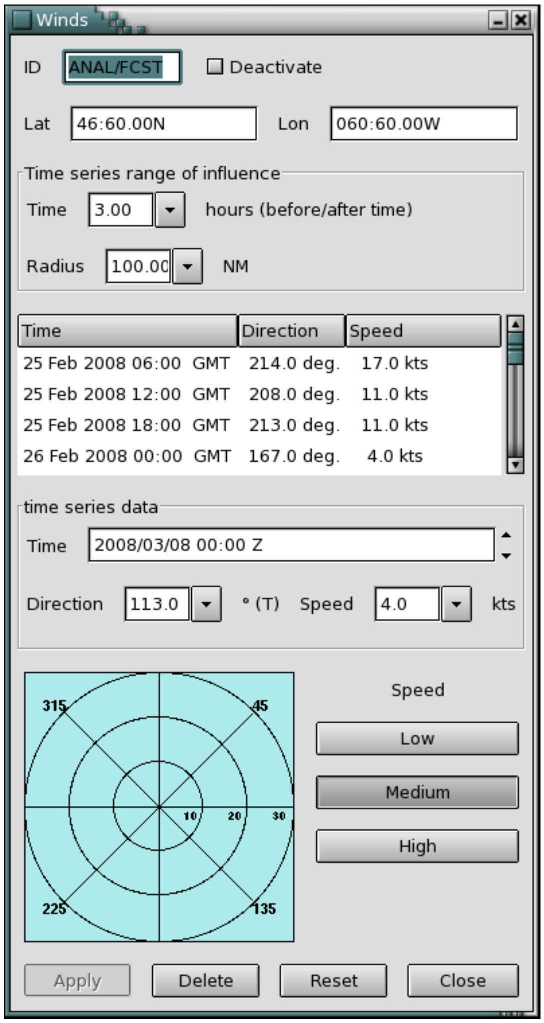

Figure 8.2: A CMC ANAL/FCST wind data time series opened in the Time Series Editor

Series parameters

Vector list

Vector parameters

Vector compass

8.4.1 Time Series Parameters

The top portion of the Time Series Editor displays the parameters of the time series itself: its ID, its position, its range of influence and its activation status. This information applies to every vector that the time series contains.

8.4.1.1 Time Series ID and Position

Every time series has an ID that indicates the source of the data. For instance, the time series in Figure 8.3 has the ID ANAL/FCST because it contains analyzed and forecast wind data from the CMC. Other examples of IDs are the call sign of the ship that provided the data, the ID of the buoy or weather station that measured it, or the name of the data model that generated it. User entered data is automatically assigned an ID according to its type.

Because more than one time series will have the same source, this ID is not unique. When data is entered correctly, however, each source will usually produce only one time series at a given latitude and longitude, so the time series' position along with its ID should identify it uniquely.

8.4.1.2 Range of Influence

Recall from the *Before You Begin...* section of this chapter that a vector represents wind or current speed and direction at a specific latitude and longitude at a particular moment in time but exerts its influence over a larger region for a longer span of time. This radius and time span are set by the series to which the vector belongs and are common to all vectors a time series contains.

The number of hours displayed in the **Time** field in the series parameters section of the editor window indicates the number of hours before and after each vector's time stamp during which the vector's speed and direction will apply. The distance displayed in the **Radius** field indicates the extent of the geographic region in which the same is true.

In the above example, the time series' range of influence is three hours and 100 nautical miles. Looking at the vector that is highlighted in the vector list as an example (see Figure 8.3), CANSARP will assume that wind speed is 12.0 knots per hour at 200.0 degrees within 100 NM of 47:0.00N, 059:0.00W from 15:00 GMT to 21:00 GMT. These values are adjusted if other vectors from other time series are influencing the same region at the same time using CANSARP's interpolation method.

8.4.1.3 Activation Status

A time series may be deactivated so that it isn't used in drift calculations even when the current or wind force it belongs to is turned on. To toggle a series' activation status, click on the checkbox labeled **Deactivate**. See Section 8.6 later in this chapter for further details.

8.4.2 Vector List

This table displays all the vectors that make up the time series. A series may contain only a single vector or may contain many. SLDMB data, for instance, contains only one vector per series because the buoys continually move, whereas some CMC data series can contain 50 vectors or more.

The table displays the time stamp, direction and speed of each vector in the series. If there are more than four vectors, you may see the others by dragging the slider in the scrollbar on the right side of the table up and down or by rolling the mouse's wheel over the table.

8.4.3 Vector Parameters

When a vector is selected in the vector list, its vector parameters (time stamp, direction and speed) are also displayed in the fields below the vector list. These fields may be used to modify the parameters of the selected vector or to add a new vector to the series as described in the next section.

8.5 Adding a New Time Series

To add a new environmental data time series to the simulation, right click on the canvas at the time series' latitude and longitude and then choose the type of data you wish to add from the menu that appears. Don't be too concerned about clicking at exactly the right position as this can be corrected easily later if need be.

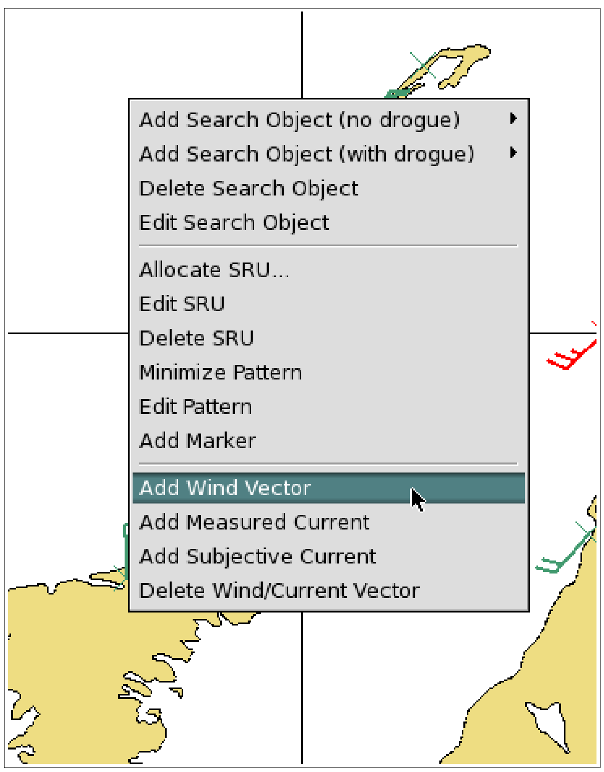

Figure 8.3: Adding a time series from the canvas menu

This will open the Time Series Editor and set its series parameters by default. The time series' position is set by the location at which you clicked on the canvas. Its range of influence is set to 3 hours and 100 NM in the case of current vectors, or to the default values set on the Wind Options tab of the Wind Manager in the case of winds (which is also 3 hours and 100 NM unless it has been changed). If the time series is a subjective wind, its ID is set to WIND. If it is a measured current, its ID is set to MEASURE. If it is a subjective current, its ID is set to SUBJ.

A new time series contains no vectors until you add one. If you close the Time Series Editor without adding any vectors, the time series will be empty. An empty time series has no impact on drift calculations.

8.5.1 Adding the First Vector to a Time Series

When an empty time series is opened or when a new time series is added, the **Time** field in the vector parameters section defaults to the time currently displayed on the scenario clock and the **Direction** and **Speed** fields default to 0. To add a vector to such a series, adjust the time, direction and speed of the new vector as required by entering new values into these fields. Once all three fields are set, click the **Apply** button at the bottom of the editor window to add the vector to the time series. The new vector will appear in the vector list.

8.5.1.1 Direction of Wind and Current Vectors

Wind vectors are drawn upwind, in the direction the wind is blowing from. A wind vector with a direction of 315º describes a wind blowing from the northwest to the southeast. If the time on the scenario clock is within the vector's range of influence, the wind's “arrow” (the line plus the feathers) points downwind. Think of it like an arrow flying at a target, with the head of the arrow in the target and the feathers pointing back in the direction from which the arrow came.

Current vectors are drawn downstream, in the direction the water is moving. A current vector with a direction of 315º describes a current flowing from to northwest. If the time on the scenario clock is within the vector's range of influence, the current's arrow icon points downstream.

8.5.1.2 The Vector Compass

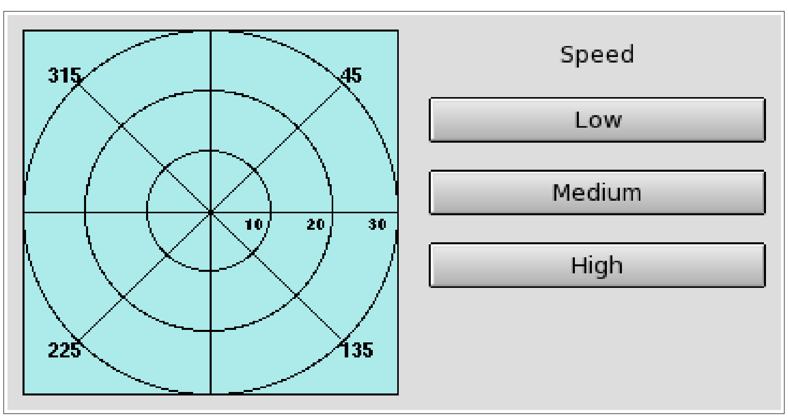

Figure 8.4: The vector compass with medium speed scale for winds displayed

Alternately, you may set the speed and direction of the selected vector by “drawing” it on the vector compass near the bottom of the Time Series Editor. The angles of the compass are labeled around its perimeter. The speeds represented by the concentric circles are labeled along the right side of the horizontal axis. For example, in Figure 8.3 the circles are labeled 10, 20, and 30 so a vector drawn on the compass would be between 0 and 30 kph.

The compass defaults to medium speeds, which are 10-30 kph for winds and 2-6 kph for currents. Before drawing a vector on the compass, you may change this scale to one that makes it easier to "draw" the vector's speed. To change the scale, click on the scale selection button to the right of the compass. The low, medium and high ranges vary depending on the type of data, as indicated in the following table:

Scale	***Wind (kph)***	***Current (kph)***
Low	5, 10, 15	1, 2, 3
Medium	10, 20, 30	2, 4, 6
High	20, 40, 60	3, 6, 9

Table 8.3: Speed scale ranges in vector compass by environmental data type

Once the speed scale is set, left click within the compass at the point which indicates the correct direction and speed of the vector. For instance, if the wind is blowing from the northwest at 20 kph, click along the 315º axis on the 20 kph line. When you do so, the direction and speed of the selected vector are set corresponding to the point at which you clicked and the new values appear in the **Direction** and **Speed** fields below the vector list.

You may also left click and hold the mouse button down while you drag the vector line around the compass. The **Direction** and **Speed** fields change as the mouse pointer moves so that you can see the result of releasing the mouse at any point. When you do release the mouse, the selected vector is modified and the fields are set.

8.5.2 Adding Additional Vectors to a Time Series

Once a time series contains at least one vector, one of its vectors is always selected and that vector's parameters appear in the fields below the vector list. To add a new vector, change the **Direction** and **Speed** fields as necessary using either method described above, and then *change the **Time** field* and click **Apply**. The new vector will be inserted into the vector list in chronological order.

Note that changing a vector's direction and/or speed and clicking **Apply** without changing its time will simply modify the selected vector rather than create a new one.

8.6 Modifying a Time Series

Once a series is open in the Time Series Editor, you may modify its series parameters as well as the individual vectors.

8.6.1 Changing Time Series Parameters

To modify a time series parameter (ID, position or range of influence), simply modify the contents of the field(s) you wish to change and then click the **Apply** button.

8.6.2 Deactivating a Time Series

When a time series is deactivated, it exerts no influence on the region surrounding it and is not included in interpolation calculations. When a time series is activated, it only influences the region surrounding it and is only included in interpolation calculations if its drift force is turned on.

To deactivate a time series, click the checkbox labeled **Deactivate** at the top of the editor window, to the right of the time series' ID. To reactivate it, click the checkbox a second time.

8.6.3 Adding a New Vector

The procedure for adding a new vector to an existing time series is the same as that for adding a vector to a new time series. See the previous section for details.

8.6.4 Deleting a Vector

To delete a vector from a time series, select that vector in the vector list and then click the **Delete** button at the bottom of the editor window.

8.6.5 Modifying a Vector

To modify a particular vector, select that vector in the vector list. Its time stamp, speed, and direction will appear in the corresponding fields below the vector list. You may modify its direction and speed by entering new values into the fields or by using the vector compass as described in the previous section.

Note that you cannot change an existing vector's time simply by changing the value that appears in the **Time** field when it is selected, as this adds a new vector instead of changing the existing one. To change an existing vector's time, select the existing vector, change its time and click **Apply** (to add the new vector with the same direction and speed as the existing one), then re-select the original vector in the vector list and delete it as described above.

8.7 Deleting a Time Series

There are two ways of deleting a time series entirely: via the canvas menu or from the Wind or Current Manager.

Any time series may be deleted via the canvas menu. To do so, right click on its icon on the canvas and then choose **Delete Wind/Current Vector** from the menu when it appears. The icon must be visible on the canvas to do this, so first make sure the appropriate data type is turned on in the Map Options sidebar to the left of the canvas. For instance, to delete a wind time series, make sure the checkbox labeled **Subjective Winds** is checked. Any time series may be deleted from the canvas using this method.

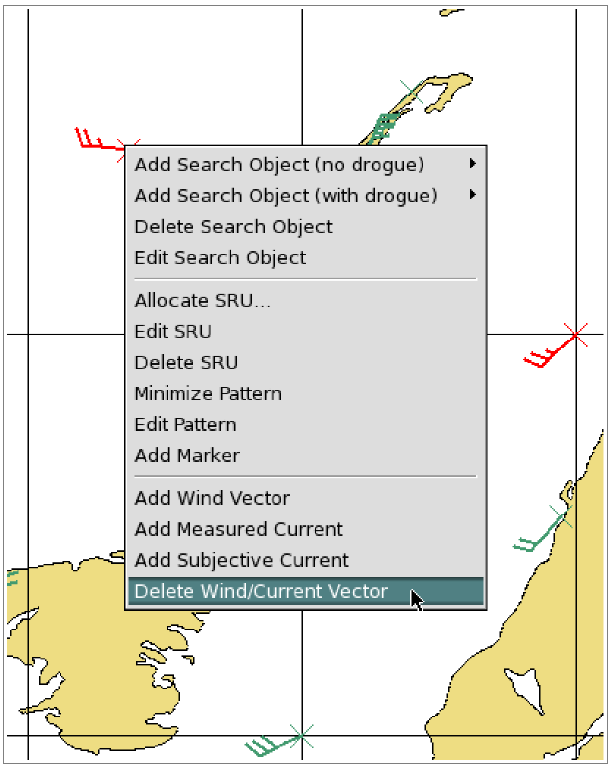

Figure 8.5: Deleting a time series from the canvas menu

User entered time series (subjective winds, measured currents and subjective currents) may be deleted from their respective managers. To do so, open the Wind or Current Manager as appropriate and switch to the tab that corresponds to the type of data you wish to delete. All the time series of the type indicated by the tab's title will be listed in the table that appears on that tab. If the table seems incomplete, click the **Update List** button to refresh the list. Select the series you wish delete from the list and click the **Delete** button (see Figure 8.3).

> *Hint: Unless a time series was entered by mistake, it may be preferable to deactivate the series rather than deleting it so that you have the option of reactivating it later should you decide to include it in drift calculations again. When a series is deactivated, it has no impact on calculations so the effect is the same as deleting it.*

Chapter 9
Environmental Data: Current Data and Models

CANSARP makes use of as many as seven different types of current data in its drift calculations, including data produced by static and dynamic models, data entered by the user as measured or subjective currents, and data loaded from self locating datum marker buoys (SLDMBs).

This chapter introduces each type of current data and explains how they interact and when each type is appropriate to use. It also introduces the Current Manager and how it is used to manipulate current data.

In this chapter, you will learn

- What types of current data are used by CANSARP
- How these types are prioritized and which types are preemptive and additive
- How dynamic models and static data models differ
- How dynamic current model data is acquired
- How measured currents and subjective currents differ and when to use each
- How to load and use data from SLDMBs
- How and when to use the various data models
- Which data models require the use of wind driven currents and which do not
- What geographic regions are covered by each data model
- How to override the default selection of tidal currents
- How to change the appearance of current vectors on the canvas

9.1 Before you begin...

9.1.1 Data Priority and Additive vs. Preemptive Data Types

All current data types have a priority; if a search object falls within the range of influence of more than one type of data, the types with higher priority are used in drift calculations before types with lower priority. Furthermore, all current data types are either preemptive or additive. Generally speaking, real time data and the dynamic models are preemptive while the static models are additive. Table 9.1 lists the various types of data in order of priority from high to low and indicates whether each type is preemptive or additive.

Data Type	***Rule for Combination***
Measured Currents	Preemptive
SLDMB	Preemptive
IML Gulf	Preemptive
Grand Banks	Preemptive
Subjective Currents	Preemptive OR Additive (set by user)
Wind Driven Currents	Additive
Tidal Currents	Additive (but preempts Sea)
Sea Currents	Additive (but preempted by Tidal)

Table 9.1: The priority and rules for combination of current data types.

If a preemptive data type has priority in a drift calculation, it is used to the exclusion of all other types. If an additive data type has priority, it is used in combination with all other additive types. The one exception is tidal and sea currents: as indicated in Table 9.1, tidal currents preempt sea currents in regions where the two types of data overlap.

Only current forces that are turned on in the Current Forces sidebar are considered when determining which forces to use in calculations. If a data type is not enabled in the sidebar, it will not be used in drift calculations nor will it preempt data types of lower priority. Similarly, deactivated data is not used in calculations and does not preempt data of lower priority.

The sections in this chapter related to each data type go into further detail about that type's priority and ability to preempt or combine with other types. For more details about how current forces are used in drift calculations, refer to Chapter 11..

9.1.2 Time Series Terminology

This chapter makes frequent use of terms defined in the *Before You Begin...* section of *Chapter 8: Environmental Time Series Data And The Time Series Editor*, specifically *time series* and *vector,* and *persistence*, *radius* and *range of influence*. You should be familiar with these terms before reading the rest of this chapter.

Although the term *range of influence* is defined in the context of the time series data format, the same concept applies to all types of current data. The range of influence of other data types cannot be modified by the user, however.

9.1.3 Entering and Modifying Time Series Data

Measured currents, subjective currents, SLDMB data and the data produced by the Grand Banks model all share the standard time series format discussed in *Chapter 8: Environmental Time Series Data And The Time Series Editor*. Although this chapter discusses when to use measured and subjective currents, it does not go into detail about how to add them to a scenario, nor does it give details on using the Time Series Editor to edit any of these data types. For detailed instructions related to working with data in the time series format, refer to Chapter 8. Specifically, you may wish to review the sections on adding, modifying and deleting time series before reading the rest of this chapter and the sections on measured currents and subjective currents in particular.

9.1.4 CANSARP 5.0 Technical Manual

This user manual introduces each data model used by CANSARP only briefly. Further information, including technical details relating to the coverage and theoretical basis of these models may be found in the separate *CANSARP V5.0 Technical Manual*.

9.2 Types of Current Data

9.2.1 Modeled Current Data

Most of the current data used by CANSARP is the product of complex mathematical models that attempt to describe the currents and/or tides in various geographic regions. Some of these are static, meaning that the systems of equations that make up the models do not change, while others are dynamic, meaning that the systems evolve over time based on actual observations and near real time inputs.

The two categories of current models are described briefly in this section; each individual model is described in more detail later in this chapter.

9.2.1.1 Static Data Models

CANSARP's tidal and sea current models are static. They are based on historical data, seasonal averages and, in some cases, phases of the moon. Because there are no near real time inputs driving these models, they may be less accurate than dynamic models.

Generally speaking, the tidal and sea current models used by CANSARP do not include the effect of wind on surface currents, so these must be used in conjunction with wind driven current to best represent total water current. The International Ice Patrol (IIP) data model is the one exception to this rule: it *does* include the effect of wind on the water.

The mathematical systems that comprise these models as well as the databases they require to function are installed directly on the CANSARP workstation so they are always available to the program.

The tidal and sea current models in CANSARP V5.0 have not changed since CANSARP V3.3.

9.2.1.2 Dynamic Data Models

In contrast to the static tidal and sea models, the IML Gulf and Grand Banks models are dynamic. They are based on actual observations and dynamic wind models rather than historical averages, and they evolve over time to better represent changing environmental conditions. Because they are driven by near-real time inputs, these models reflect environmental conditions more accurately than static models are able to.

Given the higher confidence in the output of the dynamic data models, CANSARP allows them to preempt the static models in regions where dynamic and static grids overlap. As well, because the dynamic current models already include the effect of wind on surface currents, they also preempt wind driven current so as not to double count its effect.

These dynamic models are created and maintained by third parties and are not part of CANSARP or located on the workstation; instead, their output is downloaded onto the workstation each day as it becomes available. See Section 9.3 later in this chapter for information about how IML and Grand Banks data is acquired.

The dynamic data models are new to CANSARP V5.0. Although this version contains only two such models, it is hoped that future versions of the program will include more models of this sort so that all regions of the country have access to this type of high confidence data.

9.2.1.3 Modeled Current Data Grids

All of CANSARP's current models, static and dynamic, produce data distributed over the regions they cover in a grid-like pattern. Some of these grids are more dense than others geographically, and some contain data points with shorter intervals of time. In the case of static models, most also have seasonal variations that reflect the changes in currents between the summer and winter months.

9.2.2 Non-modeled Data – User Entered Currents and SLDMBs

CANSARP also makes use of current data which is not the product of any kind of model, such as actual on scene observations entered by the user, data loaded into the program from self locating datum marker buoys (SLDMBs), or data from other external sources such as pilot charts or tide tables (also entered by the user). Subjective currents and SLDMB data are implemented in CANSARP V5 in much the same way as in V3.3. One type of user entered data, measured currents, is new in V5.0.

9.2.3 Wind Driven Currents

Assuming it has wind data to work with, CANSARP is able to calculate the effects of wind on surface currents. Wind driven currents are not technically a type of current data but rather the inclusion of an additional mathematical formula based on local winds into drift calculations. See *Chapter 10: Environmental Data: Wind Data And Models* for more details on how this is accomplished. The discussion of wind driven currents in this chapter is limited to whether it is appropriate to combine this extra calculation with various current types.

Note that, in the case of additive data models, it is up to the user to decide whether or not wind driven currents are added to the calculation. Preemptive models never use wind driven currents.

9.3 Acquisition of Dynamic Model Data

As mentioned previously, CANSARP's tidal and sea current models are static; they are part of the program and the databases on which they rely are installed directly on the CANSARP workstation. This means tidal and sea model data is always available for use in any scenario regardless of the time period the scenario covers.

In contrast to the static models, the IML Gulf and Grand Banks dynamic models are completely external to CANSARP. These models are developed and maintained by third parties; the output they produce is sent to the CANSARP servers at the Coast Guard College on a daily basis. The time of this transmission varies so, to ensure that new data is acquired as quickly as possible, the CANSARP workstation in each RCC queries the Coast Guard College servers hourly for new data. When new data becomes available, it is downloaded to the workstation. If there is an interruption of service by the third parties that maintain these external models or a problem with the data acquisition system, new data may not be downloaded to the CANSARP workstation and therefore may not be available within CANSARP.

When new dynamic model data is downloaded to the workstation, it is not immediately available within the program. In the case of the Grand Banks model, newly acquired data may be loaded into the scenario in the usual fashion (refer to Section 9.9.2.1). In the case of IML Gulf data, you must close CANSARP and restart the program to begin using the newly downloaded data.

9.3.1.1 The Watchdog

You may determine how recently new dynamic current data was acquired by checking the Watchdog.

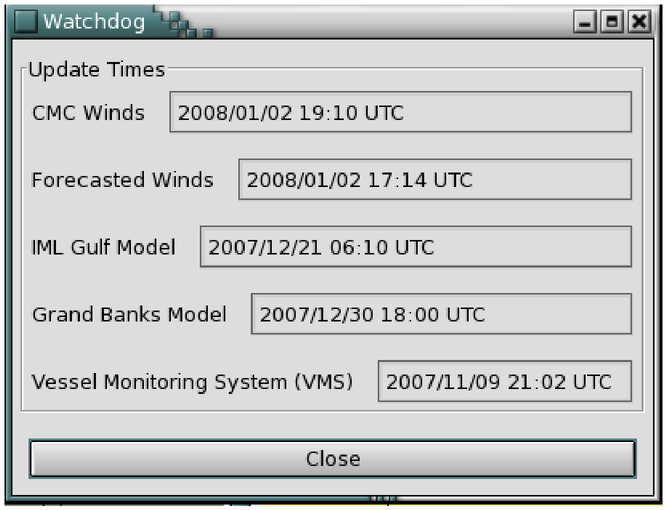

Figure 9.1: The Watchdog

To open the watchdog, select **Watchdog** from the Managers Menu, or click the **Watchdog** button on the Managers toolbar. The time at which data of each type was most recently acquired appears in the fields to the right of the corresponding labels.

Note that the Watchdog cannot tell you if historical IML Gulf or Grand Banks data is available. To determine whether dynamic current model data is available for a historical drift, you must turn on the display of the particular data model in the display options sidebar and then, in the case of the Grand Banks model, load the data for the given time period. If no current vectors appear on the canvas, no data is available for that time period.

9.4 Displaying Currents on the Canvas

In order for a current of any kind to appear on the canvas, the appropriate display option must be turned on in the display options sidebar. Tidal and sea current grids are only displayed on the canvas if a search object has been deployed within their boundaries. All other current vectors appear on the canvas even if no search objects have been deployed.

When displayed on the canvas, current vectors of any kind appear as arrow icons that point in the direction of flow. If the data is formatted as a time series (as are measured and subjective currents, SLDMB data and Grand Banks data), this arrow is superimposed upon an X. If an X appears without an arrow, this indicates that the time currently displayed on the scenario clock falls outside the range of influence of the time series data at that location. See *Chapter 8: Environmental Time Series Data And The Time Series Editor* for further information about time series and their ranges of influence.

The colour of the arrow and the X correspond to the type of current data, as indicated in Table 9.2:

Type of Data	Colour
Measured Current	Sea green
Modeled Current and SLDMBs	Medium blue
Subjective Current	Orange red

Table 9.2: Default colour of current data icons

The relative size of the arrows indicates the force of the current: the larger the arrow, the stronger the current. The arrows are scaled according to the current zoom factor and appear larger the further you zoom in. If Scales is turned on in the display options sidebar, a scale bar at the top of the canvas indicates the speed in knots that corresponds to various sizes of arrows at the current zoom factor, as shown in Figure 9.2

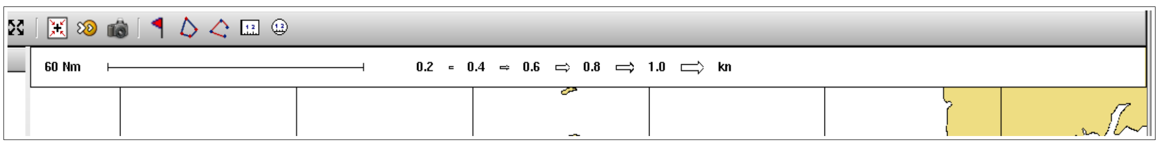

Figure 9.2: The scale bar, indicating scale of vector icons

9.4.1.1 Changing the Appearance of Current Icons

It is possible to change the colour and size of current vectors in the Map Properties dialog box. To open this dialog box, select **Map Properties** from the View Menu, or click on the **Map Properties** button on the managers tool bar.

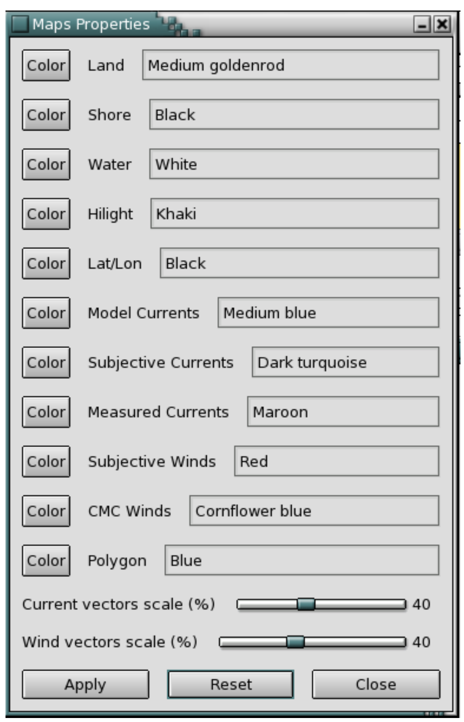

Figure 9.3: The Map Properties dialog box

To change the colour of a particular type of current data, click the **Color** button to the left of the corresponding label and then select a new colour from the dialog box that appears.

To change the size of current vectors, left click the blue slider labeled **Current Vectors Scale (%)** at the bottom of the dialog box and, while holding down the mouse button, drag it to the left or right. Dragging it left will reduce the scale percentage; dragging it to the right will increase it. The larger the scale percentage, the larger the arrow icons will appear.

You must click **Apply** to see the effect of either change on the canvas.

9.5 The Current Manager

Most operations relating to current data are carried out via the Current Manager. To open the manager, select **Current Manager** from the Managers menu, click on the **Current Manager** button on the managers toolbar, or press the F10 key while holding down the Ctrl key.

The first time the Current Manager is opened, its first tab is displayed:

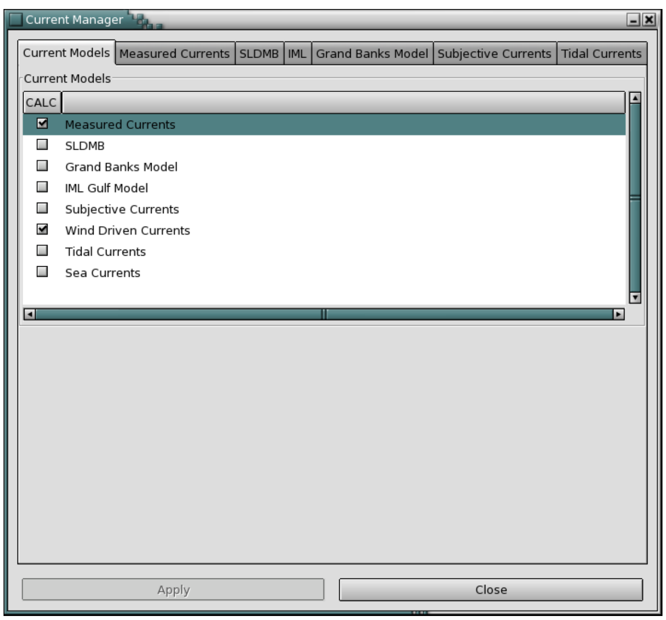

Figure 9.4: The Current Models tab of the Current Manager.

The Current Models tab lists the various current models as well as the other types of current data and allows you to select which will be used in drift calculations. The table displayed on this tab is equivalent to the Current Forces sidebar and changes made in either place are immediately reflected in the other. Both list the various types of current data in order of priority.

In addition to the Current Models tab, the Current Manager contains a tab for each type of current data apart from sea currents. The operations specific to each type of data are carried out on the corresponding tab, as described in the following sections of this chapter.

9.6 Measured Currents

Measured currents are new in CANSARP V5.0 but are closely related to the subjective currents familiar to users of CANSARP V3. They are used to represent on scene, real time observations in which the user has high degree of confidence, such as readings from instruments on board vessels or other weather sensing platforms in the area. Because of this high degree of confidence, measured currents preempt all other types of current data, including SLDMB data. This is different from the behaviour of subjective currents in both V3 and V5.

> ***Note**: The methods for adding measured currents to a scenario are covered in* *Chapter 8: Environmental Time Series Data And The Time Series Editor.*

9.6.1 The Measured Currents tab of the Current Manager

Once measured currents time series have been added to the scenario, they appear in the table on the Measured Currents tab of the Current Manager.

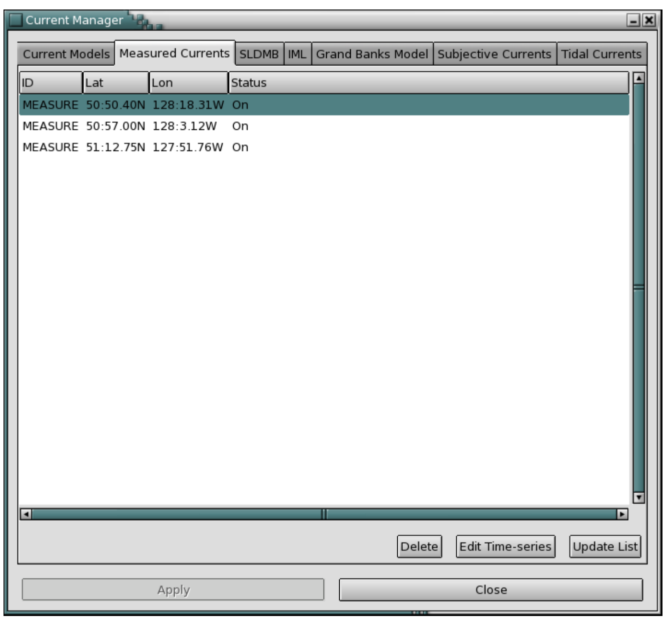

Figure 9.5: The Current Manager's Measured Currents tab

The table that comprises the bulk of this tab displays all of the measured currents that have been added to the scenario. As indicated by the column headings, the table displays each time series' ID, its position, and its activation status (see Chapter 8).

If the Current Manager is open when a new measured current is added to the scenario, the new current will not immediately appear in the table; likewise, if the manager open when a measured current is deactivated or deleted, this change is not immediately reflected in the table. If the table appears incomplete or out of date, click the **Update List** button at the bottom right to update it.

9.6.2 Editing a Measured Current

To edit a particular measured current time series in the Time Series Editor, select it in the table and then click the **Edit Time-series** button. Alternately, you may left click on the current's icon on the canvas.

See Chapter 8 for further information on editing currents in the Time Series Editor.

9.6.3 Deleting Measured Currents

To delete a particular measured current entirely, select it in the table and then click the **Delete** button.

To discard *all* measured currents from the active scenario, select **Discard** from the File Menu and then select **Measured Currents** from the submenu that appears.

9.7 SLDMBs

Dropped near the scene of an incident and allowed to drift with the current, self locating datum marker buoys (SLDMBs) are a source of highly reliable, real time data in which there is usually a high degree of confidence.

Once dropped, an SLDMB uses the GPS satellite network to record its position on an hourly basis; it transmits this GPS position history as well as various types of sensor data constantly so that, when a NOAA polar-orbiting satellite that is part of the ARGOS network passes overhead, it receives this information and passes it on to Service Argos to be processed. The processed data is downloaded by the CANSARP workstation every 15 minutes.

> ***Note:** Although SLDMBs transmit their data constantly, it cannot be processed by Service Argos until a polar-orbiting satellite passes overhead and is able to receive the data. For this reason, it can sometimes be several hours after a buoy is dropped before its data is available in CANSARP. This is especially true of buoys dropped in locations such as narrow fjords where transmitter visibility to overhead satellites is restricted.*

SLDMB data loaded into CANSARP is preempted by measured currents entered by the user but preempts all other current data.

9.7.1 PIW Mode vs. Life Raft Mode

SLDMBs may be deployed in either PIW mode or life raft mode.

> ***Note:** For the purposes of CANSARP, **only data from SLDMBs deployed in PIW mode is useful.** Data from SLDMBs deployed in life raft mode should not be used.*

This is because an SLDMB deployed in PIW mode has a drogue attached that is calibrated to neutralize the effect of leeway on the inflated part of the buoy. Without this drogue, an SLDMB is affected by leeway and so any data collected from that buoy is compromised. In effect, if such a buoy is used within CANSARP, the leeway effects of a life raft are added to the leeway calculations for any search object type and cannot be removed. For instance, life rafts will be subject to double the expected amount of leeway and PIWs, which shouldn't be subject to leeway at all, will affected by leeway as a life raft would.

If it is desirable to load the data from an SLDMB deployed in life raft mode into CANSARP for some reason, care should be taken to ensure this data is not used in drift calculations. If no SLDMBs deployed in PIW mode are loaded, simply turning off SLDMB data in the Current Forces sidebar will suffice. If SLDMBs deployed in PIW mode are also loaded into the scenario and should be used in drift calculations, every vector from any SLDMBs deployed in life raft mode should be deactivated so that they are not used in drift calculations.

9.7.2 GPS vs. Argos 0-3

Although SLDMBs are equipped with GPS receivers and transmit their GPS position history along with their sensor data, Service Argos also uses a Doppler shift algorithm to calculate the buoy's position at the moment each transmission is received. This can be useful if the GPS receiver on the buoy fails or the GPS position data is unavailable for some reason. Calculating the buoy's position using this method introduces a certain amount of error, so these calculated positions are categorized as 0, 1, 2, or 3 according to how accurate they are guaranteed to be (the higher the number, the more accurate the calculated position):

Argos Category	***Position accurate to***
Argos 3	within 150 m
Argos 2	Between 150 m and 350 m
Argos 1	Between 350 m and 1000 m
Argos 0	Greater than 1000 m

Table 9.3: Accuracy of calculated position in Argos data

There are usually two sets of position data associated with each SLDMB, GPS position data and Argos 0-3 data, but occasionally only one of these is available. When the GPS position data is available, it should be used. If it is not available, Argos position data may be used instead. Argos 3 position data is fairly accurate and Argos 2 position data is acceptable, but Argos 1 or 0 data should be used with caution or not at all.

9.7.3 The SLDMB Tab of the Current Manager

SLDMB data is loaded into CANSARP via the SLDMB tab of the Current Manager.

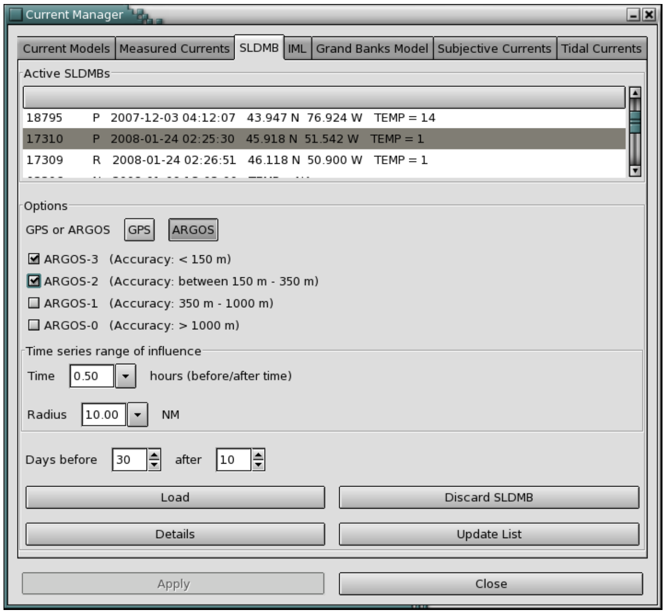

Figure 9.6: The Current Manager's SLDMB tab

9.7.4 Displaying available SLDMBs

The table at the top of the tab lists SLDMBs that were active during the time period indicated by the **Days Before** and **After** fields near the bottom of the window. When the tab is first opened, this table will be blank; it is updated whenever the **Update List** button in the lower left corner of the window is clicked.

To generate a list of active SLDMBs, you must first indicate the time period of interest. By default, CANSARP looks for SLDMBs active during the 30 days prior to the scenario date and 10 days after, as indicated in Figure 9.24, but this period can be extended to as much as a year before or after the scenario date.

> ***Note****: Only the date of the final transmission from the buoy is considered when determining which buoys to include in this list, so buoys that continued to transmit after the specified time frame will not appear. SLDMBs are set to sink after five days, so any buoy actually transmitting on the scenario clock date should appear in the list as long as days after is at least 6.*

Once the days before and after are set, click the **Update List** button to generate a new list. Once generated, a list will not change until updated another time, even if the date on the scenario clock changes.

The table displays five columns of information for each SLDMB. From left to right, these are ID, deployment mode, time stamp (including date), latitude, longitude, and sea surface temperature. SLDMBs in the list are sorted by ID. Deployment mode is P for SLDMBs deployed in PIW mode, R for those deployed in life raft mode, or N when this data is not available. The time stamp, lat/lon and sea surface temperature listed all correspond to the most recent reading from the given SLDMB.

9.7.4.1 Loading an SLDMB into the Active Scenario

To load an SLDMB into the scenario, select it in the list of active SLDMBs, then select the type of position data you wish to load for that SLDMB – either GPS or Argos. To do this, click either the **GPS** button or the **Argos** button. The button will stay depressed to indicate the set of data to be loaded. For example, in Figure 9.24, Argos position data has been selected.

When loading Argos data, you must also specify which categories of Argos data you want to load (refer to Section.9.7.2). To do so, click the check boxes to the left of each category of data to be loaded (note that these boxes are only enabled once Argos position data is selected). For example, in Figure 9.24, Argos 3 and Argos 2 data have been selected. You may select more than one type but the data associated with all of the selected types will only be as accurate as the *least accurate* category selected. See Section 9.7.5.1 for further information.

If you know in advance that the default range of influence is inappropriate for the selected SLDMB, you may change it before loading the SLDMB. Otherwise, use the default range of influence but refer to Section 9.7.8 for further information.

Once the buoy is selected, the type and categories of position data are chosen and the default range of influence is determined, click the **Load** button to load the SLDMB's data into the scenario. Only data transmitted by the buoy during the date range specified by the **Days Before** and **After** fields will be loaded, even if it began transmitting before or continued to transmit after this period of time.

After loading the SLDMB, you should review its details to ensure that the type of data (GPS or Argos) requested was actually available. In some cases, only GPS or Argos data is available; if a type is requested but unavailable, the details for the SLDMB will be empty.

9.7.5 SLDMB Details

Once loaded, you may view the details of the particular buoy by selecting it in the list of active SLDMBs and clicking the **Details** button to open the SLDMB Details window.

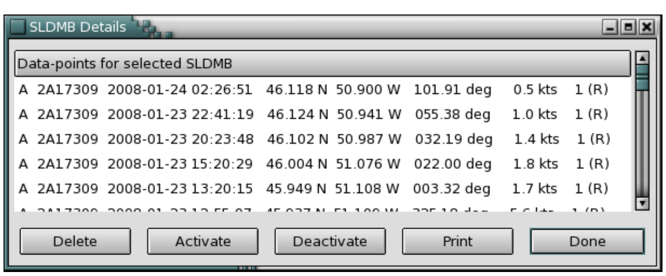

Figure 9.7: The SLDMB Details for an SLDMB loaded with Argos 3 and Argos 2 data selected. Note that every vector is considered to be only as accurate as Argos 2.

The table in this window displays each current vector associated with the selected SLDMB. These vectors all appear on the canvas as described in Section 3.4.

The first column in the table indicates whether each vector is active (A, as above) or has been deactivated (D). Deactivated vectors are not used in drift calculations. The second column displays its ID, preceded by two characters that indicate the type of position data: GP for GPS position data, and 0A, 1A, 2A or 3A for Argos position data (the numeral indicates the least accurate category of Argos position data included in the list – refer to Section 9.7.5.1). For example, in Figure 9.23 the buoy ID begins with 2A, indicating that the vectors were categorized as Argos 2 or above. The third column displays the time at which the buoy's position was determined and the next two columns display its latitude and longitude at that time. The sixth column indicates the direction in which it was traveling and the seventh its speed. The last column displays the sea surface temperature at each time and indicates whether this value is an actual reading from the buoy's sensors (R, as above) or has been extrapolated from other values (E) (see Section 9.7.5.2).

9.7.5.1 Calculation of Direction and Speed

An SLDMB's direction and rate of travel are calculated values rather than sensor readings. CANSARP compares the position and time stamp of each vector with the position and time stamp of the preceding vector and determines how fast the buoy must have traveled and in which direction to reach the new location at the given time.

This is of particular importance when Argos position data is being used for two reasons. Firstly, the list of current vectors associated with an SLDMB depends on which categories of data are loaded, so if a different combination of categories is selected and the SLDMB is reloaded, a vector's direction and speed will change if a different vector precedes it in the revised list. Secondly, because a vector's direction and speed depend on and influence that of other vectors, this information is only as accurate as the *least accurate vector* in the entire list. Therefore, all the vectors in the list are considered to have this same least degree of accuracy. For example, in Figure 9.23.4 Argos 3 vectors may appear in the list, but these vectors are considered to be accurate only to within 350 m rather than 150 m because their direction and speed may be based on Argos 2 vectors.

9.7.5.2 Extrapolation of Deployment Mode and Temperature Readings

Deployment mode and actual sea surface temperatures are only included with Argos position data. For GPS position data, CANSARP extrapolates these values based on those in the given SLDMB's Argos data. If no Argos data is available for an SLDMB, deployment mode and temperature data will not be either.

9.7.5.3 Deleting an Individual SLDMB Vector

You should always skim an SLDMB's details for inconsistencies and determine whether the data looks reasonable. Occasionally something may happen that calls the validity of an SLDMB's data into question – it might transmit data more frequently than expected, or fail to work properly in some way. Buoys may also wash ashore or become trapped in ice; on occasion they have even been picked up by vessels and taken away from the scene of an incident.

If none of an SLDMB's data looks reasonable, you should discard the SLDMB entirely (see Section 9.7.6). If m*ost* of the SLDMB's data does look reasonable but some of it does not, you can keep the general body of data and remove only those vectors that appear suspect. You have two options in this case: deleting the suspect vectors or deactivating them.

To delete an individual vector, select it in the SLDMB Details table and click the **Delete** button. This may only be done when the SLDMB Details window is open; the change is reflected in the table immediately.

Alternately, you may right click on the vector's icon on the canvas and select **Delete Wind/Current** from the canvas menu when it appears. The SLDMB Details window need not be open when this is done; if it is, the change is not reflected in the table until the window is refreshed. To refresh the window, click the **Details** button on the Current Manager's SLDMB tab, or close the window and reopen it.

> ***Hint****: It may be preferable to deactivate a vector rather than deleting it so that you have the option of reactivating it later should you decide to include it in drift calculations again, or as a reminder of why the vector isn't being used in calculations. When a vector is deactivated, it has no impact on calculations so the effect is the same as deleting it.*

9.7.5.4 Deactivating an Individual SLDMB Vector

To deactivate an individual vector, select it in the SLDMB Details table and click the **Deactivate** button. To reactivate it later, select it in the list and click the **Activate** button. The A or D in the first column indicates whether a vector is activated or deactivated. This may only be done when the SLDMB Details window is open; the change is reflected in the table immediately.

Alternately, you may left click on the vector's icon on the canvas at any time and then check or uncheck the checkbox labeled **Deactivated** in the Time Series Editor when it appears. The SLDMB Details window need not be open when this is done; if it is, the change is not reflected in the table until the window is refreshed. To refresh the window, click the **Details** button on the Current Manager's SLDMB tab, or close the window and reopen it.

9.7.5.5 Printing SLDMB Details

To print the details of a given SLDMB, open it in the SLDMB Details window and select any one of its vectors, then click the **Print** button.

The printed version of an SLDMB's details includes its ID and its range of influence as well as the lat/lon of its most recent vector and the temperature at that time, if available. The time stamp, direction and speed are printed for each individual vector in the list.

> ***Caution**: An individual vector's range of influence may differ from the norm for a given SLDMB if it has been modified in the Time Series Editor. There is no way to tell from the printed details if this is the case.*

> *In future versions of CANSARP, the position of each individual vector will be included in the printed details.*

9.7.6 Discarding SLDMB Data

If you decide not to use a particular SLDMB's data for some reason (see Section 9.7.5.3), you may discard it completely. This unloads all of its data from the active scenario but has no effect on the SLDMB data downloaded onto the CANSARP workstation.

To discard an SLDMB from the active scenario, select it in the table on the SLDMB tab of the Current Manager and click the **Discard** button. The icons marking the SLDMB's vectors will disappear from the canvas.

To discard *all* the SLDMB data currently loaded into the scenario, select **Discard** from the File Menu and then select **SLDMB** from the submenu that appears.

9.7.7 Reloading SLDMB Data

You may reload an SLDMB after it has already been loaded. This is useful if you wish to switch from GPS position data to Argos position data or vice versa, to include a different combination of Argos position data categories in the vector list, to reset the SLDMB's default range of influence, or if you have changed or deleted some of the SLDMB's vectors and wish to reset them all to their original values.

Before reloading an SLDMB, you should discard it to ensure that the previous information is completely cleared. The method for reloading an SLDMB is exactly the same as loading it the first time – refer to Section 9.7.4.1.

> ***Note**: When you reload an SLDMB, any vectors previously deleted are recovered, any vectors previously deactivated are reactivated, and all vectors are reset to the SLDMB's default range of influence.*

9.7.8 Range of Influence

SLDMB data has the same time series format as many other types of current data and therefore has a range of influence (refer to the *Before You Begin...* section of Chapter 8). Because the buoys generally calculate their position once per hour, the default persistence for SLDMB data is 30 minutes. They have the same 10 NM radius of influence as other currents.

The time intervals between Argos position data are less consistent than GPS data. It is a good idea to inspect the details of the downloaded data (see Section 9.7.5.3) and determine the median interval between points; if it is not one hour, the default range of influence for the buoy should be set to half of this median value and the buoy should be reloaded so that all its vectors have the new range of influence.

Note that this is the *default* persistence. If some of the vectors have a significantly different time interval than the median, you can change the persistence for those particular vectors in the Time Series Editor. See Chapter 8 for details.

Because any SLDMB whose data is used in CANSARP was deployed in PIW mode (refer to Section 9.7.1), search objects of other types may drift beyond the range of influence of the SLDMB's data. An SLDMB deployment plan should be followed to ensure that SLDMB data is continuously available for the duration of the search.

9.7.9 Viewing SLDMB Data in the Time Series Editor

SLDMB data has the standard time series format but, because each reading from an SLDMB is potentially at a different latitude and longitude than every other, each time series contains only a single vector and each vector appears on the canvas as a separate time series. Because it is in the time series format, SLDMB data may be opened in the Time Series Editor. To do so, left click on an SLDMB vector icon on the canvas.

Caution*: Although SLDMB vectors can be modified in the Time Series Editor, doing so is not recommended as there is no indication afterwards that the data used in drift calculations is not the same as that transmitted from the SLDMB. Modifications should be limited to activating or deactivating vectors.*

As of CANSARP 5.0 version 4.9.5.28, modified SLDMB vectors do not turn into subjective currents. This may change in future versions of the program.

9.8 The IML Data Model (Dynamic)

The IML Gulf data model is produced and maintained by the Institute Maurice Lamontagne in Mont-Joli, Québec. It provides current data in the region shown in Figure 9.8.

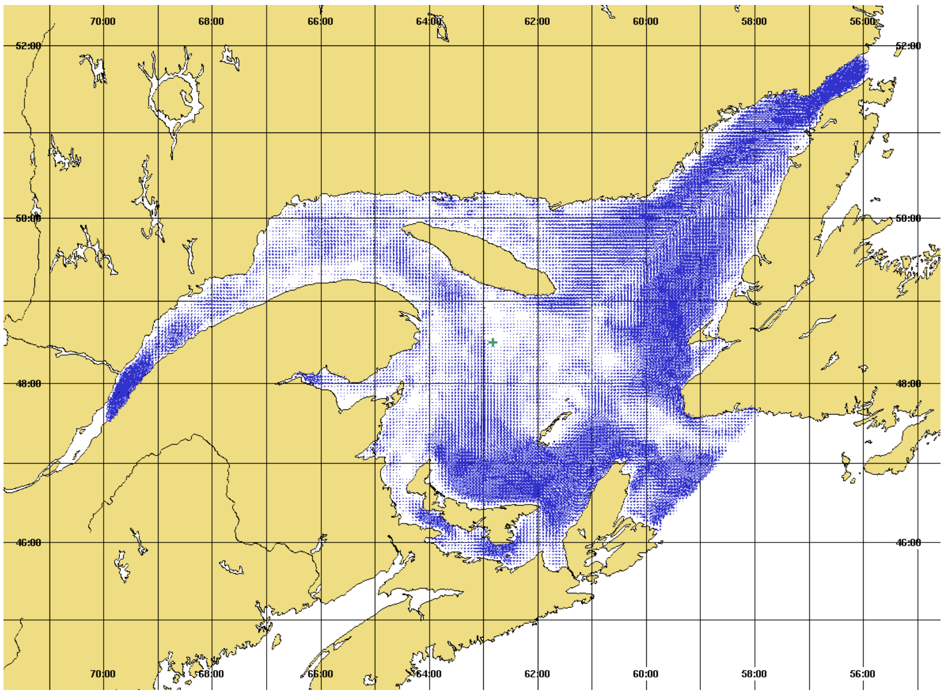

Figure 9.8: The IML dynamic current model region

IML data is preempted by measured currents and SLDMB data. It preempts subjective, wind driven, tidal and sea currents. Technically, IML data also preempts Grand Banks data but since the two data grids do not overlap, this has no impact on drift calculations.

There is no need to load IML data into a scenario; although it is not saved, it is automatically loaded as required to perform drift calculations. However, if new IML data is downloaded onto the CANSARP workstation while the program is running, it does not immediately become available. You must quit CANSARP and restart the program to access the newly acquired data.

> *The IML grid is very dense. Drifts in this area take longer to calculate than drifts elsewhere because of the density of the data.*

9.9 The Grand Banks Data Model (Dynamic)

The Grand Banks data model is produced and maintained by the Bedford Institute of Oceanography (BIO) in Dartmouth, Nova Scotia. It provides current data in the region shown in Figure 9.22

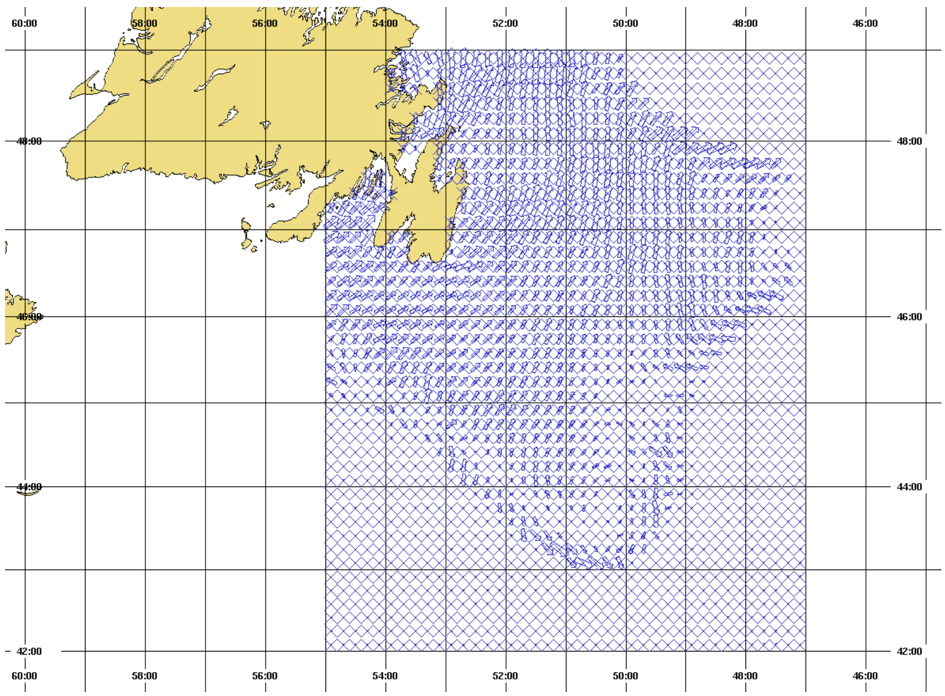

Figure 9.9: The Grand Banks dynamic current model region

Grand Banks data is preempted by both measured currents and SLDMB data. Technically, IML data also preempts Grand Banks data but since the two data grids do not overlap, this has no impact on drift calculations. Grand Banks data preempts Subjective, Wind Driven, Tidal and Sea currents.

9.9.1.1 <u>Grand Banks Data Format</u>

In CANSARP V5.0, Grand Banks data is the only current data *model* that has the same time series format as user entered currents. In contrast to the IML, tidal and sea current models, Grand Banks data have a persistence and radius of influence that can be modified, and the arrow icons that represent Grand Banks currents appear on the canvas superimposed on Xs that indicate these series may be opened and manipulated in the Time Series Editor. However, see Section 9.9.3.

9.9.2 The Current Manager's Grand Banks Model tab

The data produced by the Grand Banks model is used in a fashion more similar to the CMC wind model than the IML current model. Like the winds, Grand Banks data is in time series format and, like winds, it must be loaded into a scenario before it can be used in drift calculations.

> ***Caution:*** *Unlike CMC winds, Grand Banks data is* ***not saved with the scenario****. Each time a previously saved scenario is loaded into memory, Grand Banks data must be loaded again.*

These operations are performed on the Grand Banks model tab of the Current Manager:

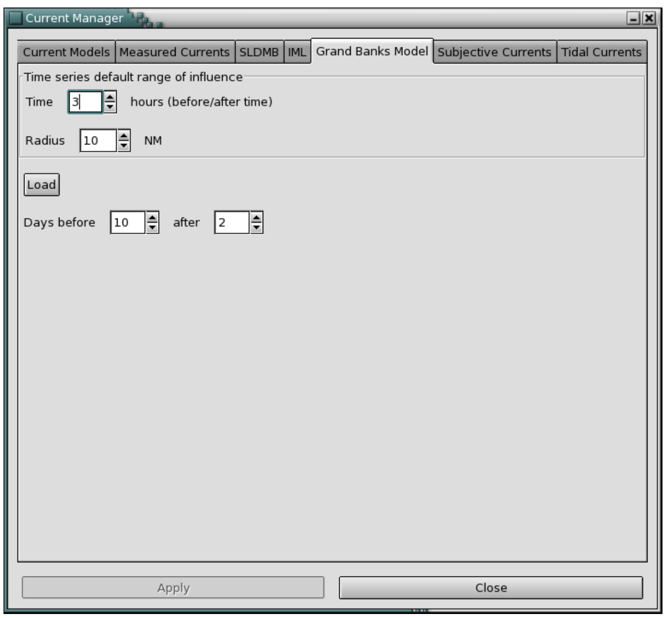

Figure 9.10: The Grand Banks Model tab of the Current Manager

9.9.2.1 Loading Grand Banks current data

To load Grand Banks Data, you must first open the Grand Banks tab of the Current Manager. To do so, select **Current Manager** from the Managers Menu, press the **Current Manager** button the Managers button bar or press the F10 key while holding down the Ctrl key. Once the manager is open, switch to its **Grand Banks Model** tab if it is not already visible.

As for other currents, the persistence of Grand Banks data defaults to +/- 3 hours and its radius of influence defaults to 10 NM. You may change these values before loading the data. Each time series will have the given range of influence when initially loaded but you may modify individual series afterwards, as described in Chapter 8.

To change the default range of influence, select the text in the **Time** and/or **Radius** fields and change it to the new values. There is no need to click **Apply** for the new values to be accepted.

> *If Grand Banks data has already been loaded, changing the range of influence settings will not affect the data already in memory. You must reload the data for the new range of influence settings to take effect.*

Before loading the data, you must also specify which dates you wish to load data for. By default, the time span is the same as for CMC winds: 10 days prior to the date which currently appears on the scenario clock and 2 days after. The **Days Before** and **After** fields are always relative to the scenario clock, so verify that the scenario clock is set to the appropriate date before loading the data.

Once the default range of influence and the time span of data has been set, click the **Load** button to load the data into the active scenario.

> *If there is data available for the given frame of time, the Grand Banks options will automatically turn on in both the display options sidebar and the Current Forces sidebar. If these changes do not occur automatically, it indicates that no Grand Banks data is available for the time frame used.*

9.9.2.2 Reloading Grand Banks Data

If new Grand Banks Data is acquired while CANSARP is running, you may begin using the newly acquired data by reloading the data. As well, reloading the data is necessary if you change the default range of influence and wish the new defaults to apply to vectors already in memory.

To reload Grand Banks data, follow the same procedure as for loading it initially as described in Section 9.9.2.1.

> ***Note**: If you reload the data, any deleted vectors are restored, any deactivated vectors are reactivated, and any modified vectors are reset to their original values.*

9.9.3 Modifying Grand Banks data

Because Grand Banks data is in the standard time series format, it can be opened and edited in the Time Series Editor as described in Chapter 8.

> ***Caution**: Although Grand Banks data can be modified in the Time Series Editor, doing so is not recommended as there is no indication afterwards that the data used in drift calculations is not the same as that downloaded from BIO. Modifications should be limited to activating or deactivating individual vectors.*

9.9.3.1 Deactivating and Deleting Grand Banks data

Like other time series data, you may deactivate or delete individual Grand Banks time series after the data has been loaded. If you suspect that a time series contains incorrect data, consider deactivating or deleting the time series rather than modifying it. The methods for deactivating and deleting time series are discussed in Chapter 8.

9.10 Subjective Currents

Subjective currents are very similar to measured currents, with two major differences. Firstly, they are preempted by SLDMBs and the dynamic current models. Secondly, they may be set as either preemptive or additive with respect to wind driven, tidal and sea currents. This is because subjective currents are used to represent two different types of current data: estimations of on scene conditions in which there is low confidence for some reason but which represents total water current (TWC), or data from other sources such as pilot charts or tide tables that do *not* include TWC. Depending on how they are used in the simulation, the preemptive/additive mode of subjective currents may need to be changed. Note that all subjective currents are treated in the same way: they are either all additive or all preemptive.

> ***Caution:** If you make subjective currents additive in one scenario and then create a new scenario without closing CANSARP first, the new scenario will also use subjective currents in additive mode. When you add a subjective current to a scenario, you should always check to see how it is being used.*

The methods for adding subjective currents to a scenario and for working with them once they've been added are covered in *Chapter 8: Environmental Time Series Data And The Time Series Editor*.

9.10.1 Subjective Currents Used as Low Confidence Real Time Data

If on scene conditions have been estimated in some way or prior knowledge of the area suggests what they may be, this information can be added to the simulation as subjective currents. This allows such estimates to be preempted by actual observations from the scene when and where they are available but to still affect drift in those regions and during those times when there is no higher confidence data available.

If such estimates or prior knowledge represent total water current, subjective currents should be left as preemptive so that the effect of wind is not added twice. If they do not, the currents should be made additive so that the effects of wind may be included.

9.10.2 Subjective Currents Used to Represent Charts or Tables

Subjective currents may also be used to represent data from other external sources, such as sea currents or tidal currents in regions for which CANSARP has no data, or information taken from pilot charts. Data from these and other similar sources do *not* include the effect of wind on the water and so do not reflect total water current. When used in this way, subjective currents should be used additively with wind driven currents.

9.10.3 The Subjective Currents Tab of the Current Manager

Once subjective currents time series have been added to the scenario, they will appear in the table on the Subjective Currents tab of the Current Manager:

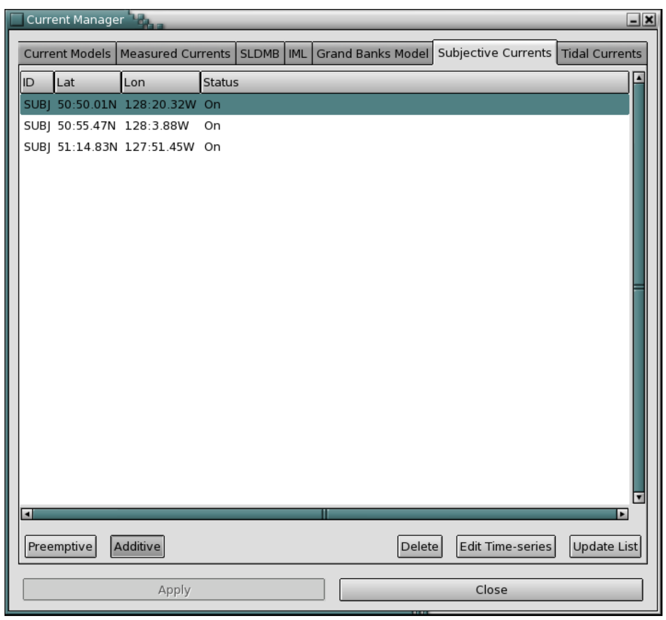

Figure 9.11: The Current Manager's Subjective Currents tab

The table that comprises the bulk of this tab displays all of the subjective currents that have been added to the scenario. As indicated by the column headings, the table displays each time series' ID, its position, and its activation status (see Chapter 8).

Note that, if this window is already open when a new subjective current is added to the scenario, the new current will not immediately appear in the table; likewise, if the window is already open when a subjective current is deactivated or deleted, this change is not immediately reflected in the table. If the table appears incomplete or out of date, click the **Update List** button at the bottom right to update it.

9.10.4 Making Subjective Currents Preemptive or Additive

Subjective currents are preemptive by default. To switch them from preemptive to additive or vice versa, locate the two buttons labeled Preemptive and Additive at the bottom left of the tab. One of these buttons is always depressed, indicating how subjective currents are currently being used. For example, in Figure 9.11 subjective currents have been made additive as indicated by the depressed **Additive** button. To change between modes, simply click the other button.

9.10.5 Editing a Subjective Current

To edit a particular time series, select it in the table by left clicking on it and then click the **Edit Time-series** button. This will open the Time Series Editor with the selected time series displayed. Alternately, you may left click on the current's icon on the canvas.

See Chapter 8 for further information on editing currents in the Time Series Editor.

9.10.6 Deleting Subjective Currents

To delete a particular subjective current entirely, select it in the table and then click the **Delete** button.

To discard *all* subjective currents from the active scenario, select **Discard** from the File Menu and then select **Subj. Current Data** from the submenu that appears.

9.11 Tidal Current Data Models (Static)

CANSARP contains static models that produce grids of tidal data for certain geographic areas. Because these models are part of the program itself and the databases they rely on are installed directly on the CANSARP workstation, tidal data is always available within CANSARP.

The grids that the tidal data models produce are more dense than most other current models, both in terms of geographic distribution and in terms of the time interval between data points. Unlike the other data models, tidal data is available in 15 minute increments; for this reason, the positions of search objects drifting through tidal regions are calculated in 15-minute time steps rather than the one hour time steps used elsewhere.

Tidal data is additive with wind driven currents and subjective currents if they are set to additive mode. It is preempted by all other data types except sea currents.

> ***Note**: Although each is an additive data type, tidal current data preempts sea current data in regions where tidal and sea grids overlap because the data is more dense and tidal effects are typically much stronger.*

9.11.1 Tidal Grid Boundaries and Seasons

CANSARP includes tidal models for four geographic regions: the west coast of British Columbia, the Bay of Fundy and Gulf of Maine, the Gulf of St. Lawrence, and the Straits of Georgia and Juan de Fuca. There are multiple grids for each region, as described in the following sections.

9.11.1.1 Tidal Grids for the west coast of British Columbia

Figure 9.12 shows the BC_Coast.win tidal grid, which is used in the region during the winter months. The BC_Coast.sum grid covers the same geographic region but the data changes to reflect seasonal differences in currents.

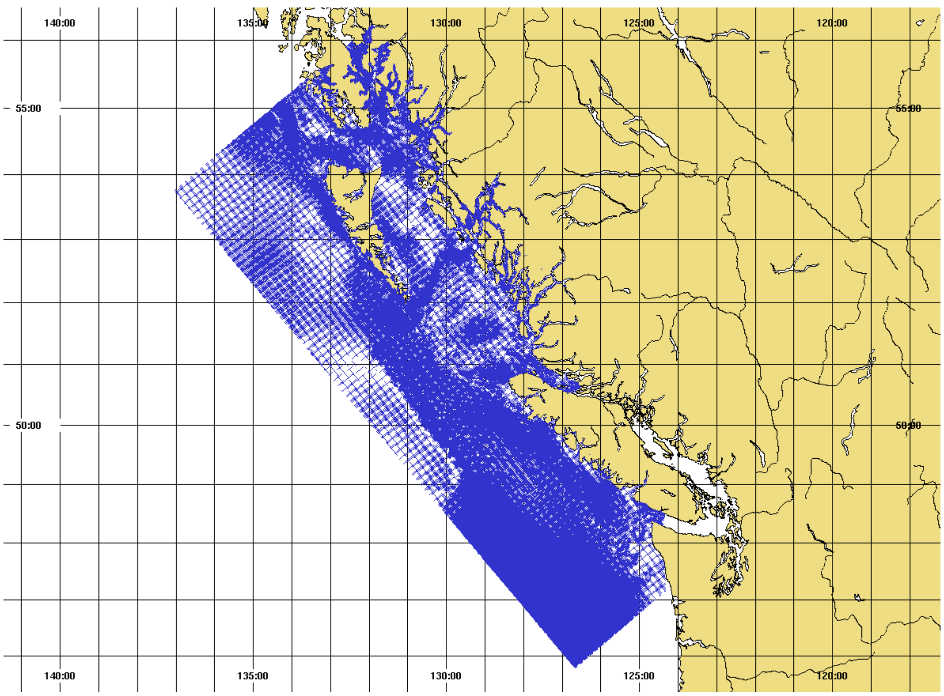

Figure 9.12: The BC Coast tidal grid region

9.11.1.2 Tidal Grids for the Straits of Georgia and Juan de Fuca (GF7)

There are three tidal grids available in CANSARP for use in the Strait of Georgia and Juan de Fuca Strait, all of which cover the same geographic region as the GF7_medium grid shown in Figure 9.13. The differences between the three grids depend on the activity of the Fraser River at different times of the year.

The choice between Low, Medium and High is determined by obtaining the daily flow rate for the Fraser River at Hope, from the Water Survey of Canada. The methods to determine the velocity data in these three grids for Strait of Georgia is different than Juan de Fuca Strait. You may refer to CANSARP V5.0 Technical Manual for more details on the three different sets of tidal harmonic constants used to obtain velocities.

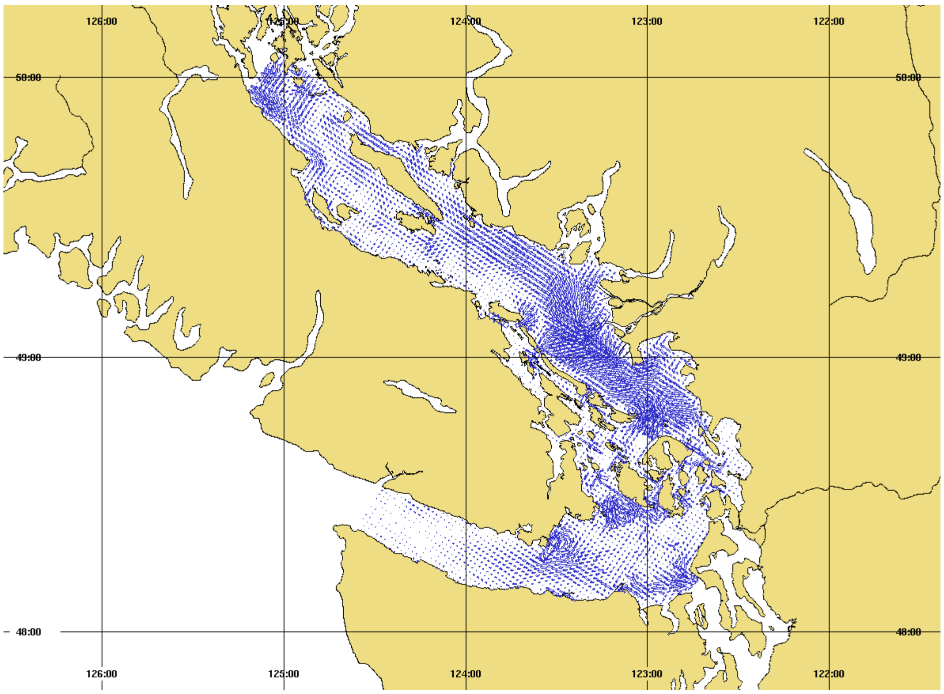

Figure 9.13: The GF7 tidal grid region

9.11.1.3 Tidal Grids for the Bay of Fundy/Gulf of Maine

Tidal data for the Bay of Fundy and Gulf of Maine are based on a numerical model – for further details, refer to the CANSARP V5.0 Technical Manual.

The model domain covers the entire Bay of Fundy and Gulf of Maine out to the continental shelf, as well as a portion of the Scotian Shelf and the area south of Cape Cod. This area is subdivided into five smaller grids, as shown in Figures 9.14 through 9.18.

There are no seasonal grids for the Bay of Fundy as currents in the region are not strongly dominated by seasonal change in coastal runoff.

Caution: *The original numerical model included the effects of the drying bank region in the inner part of the Bay of Fundy. However, CANSARP considers these regions to be always covered by water and computes vectors for these areas. Controllers should exercise caution when assigning SRUs to these areas.*

> ***Note:*** *Because of strong tidal currents in the northern region of the Scotian shelf, there will be a significant change in the drift of a search object as it moves from the tidal grid region into the neighbouring sea current grid or vice versa.*

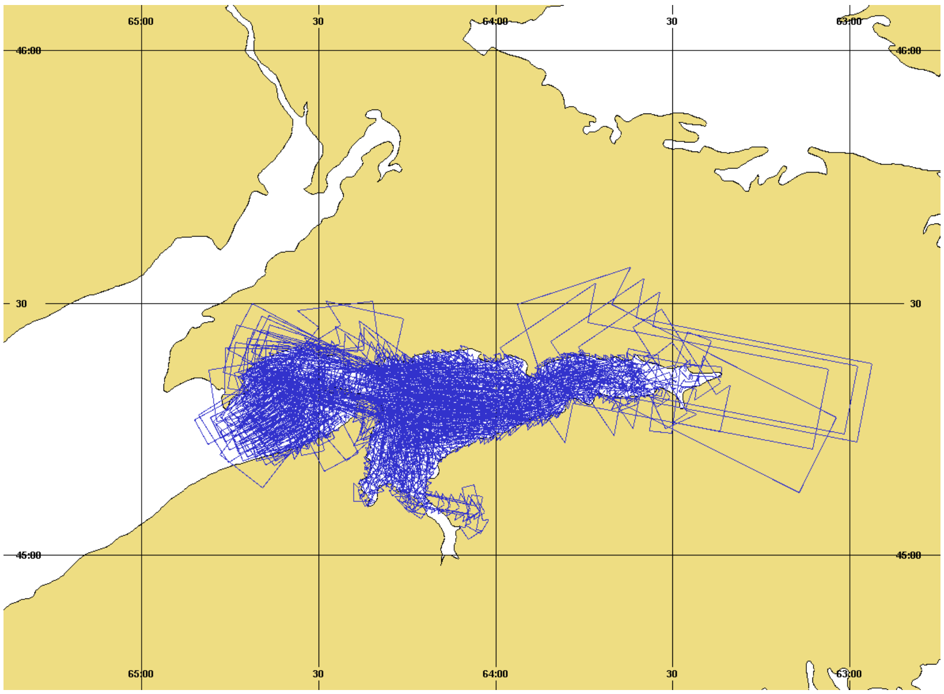

Figure 9.14: The Fundy1 tidal grid region

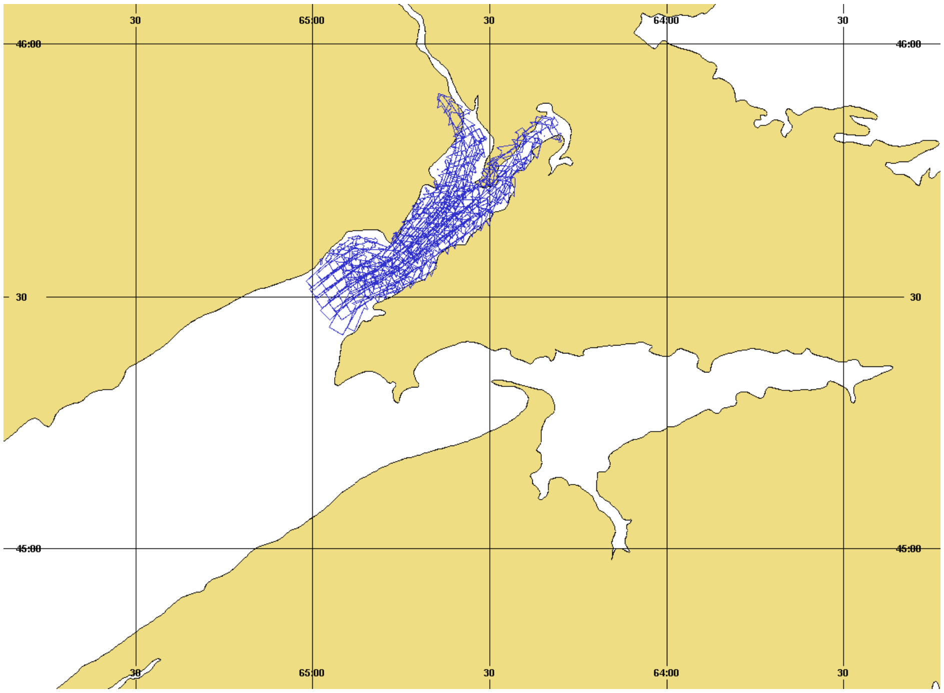

Figure 9.15: The Fundy2 tidal grid region

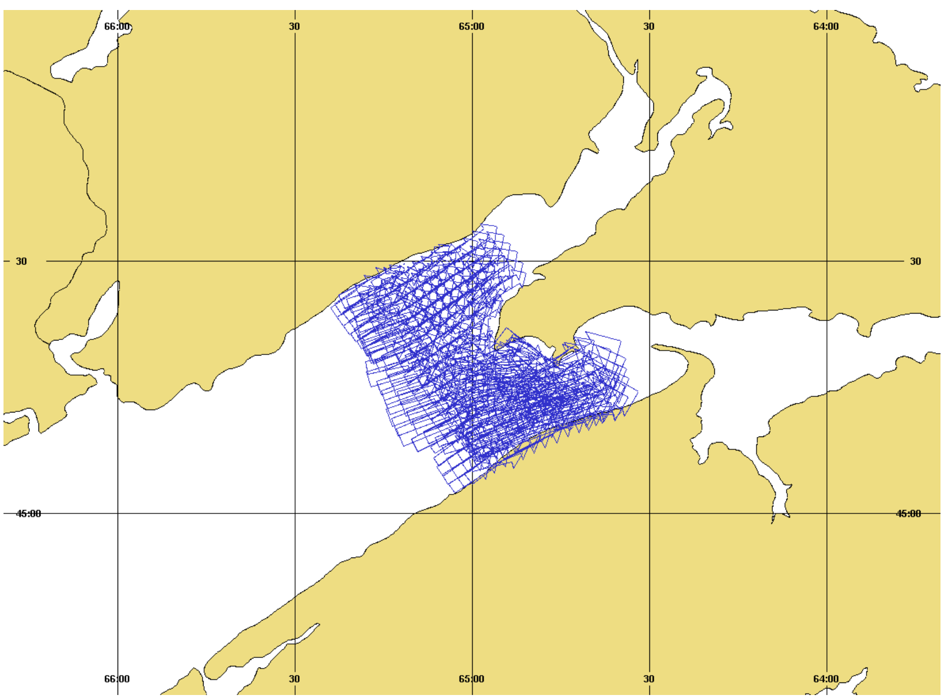

Figure 9.16: The Fundy3 tidal grid region

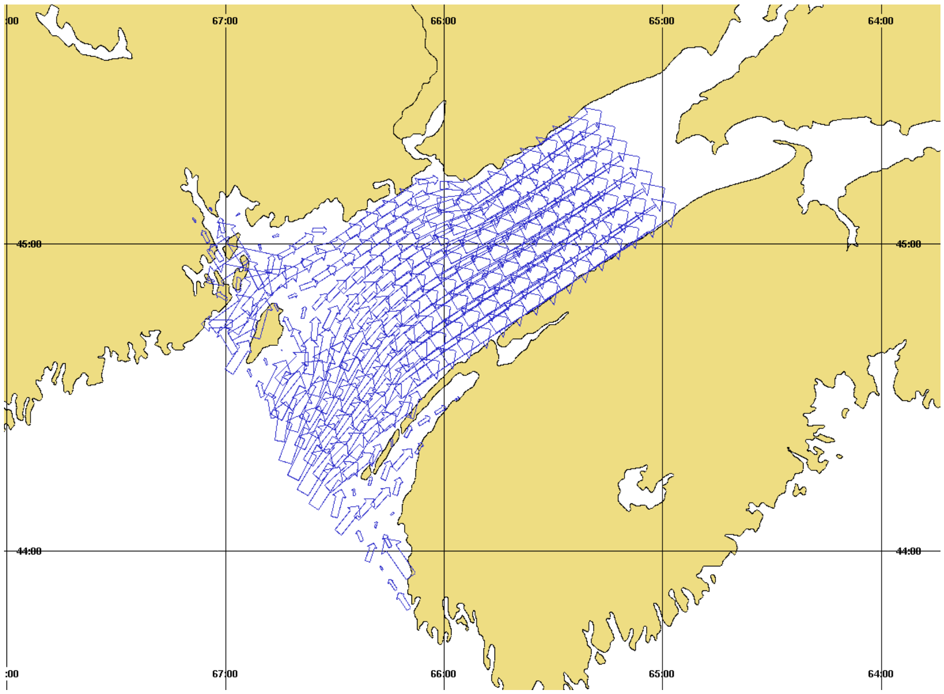

Figure 9.17: The Fundy4 tidal grid region

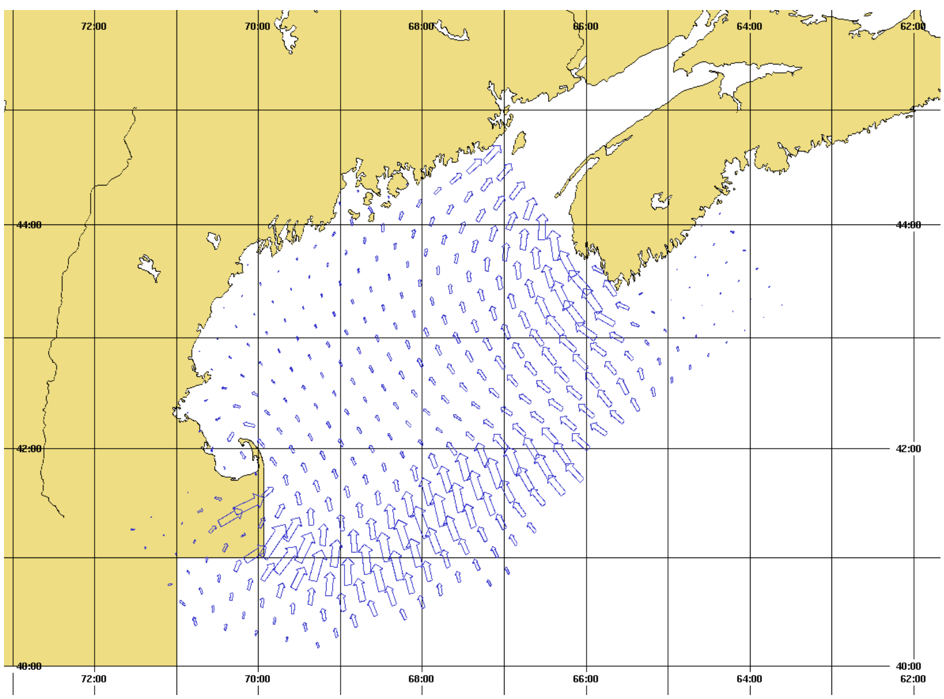

Figure 9.18: The Fundy5 tidal grid region

9.11.1.4 Tidal Grids for the Gulf of St. Lawrence

Figure 9.19 shows the St_Lawrence.win tidal grid, which is used in the region during the winter months. The St_Lawrence.sum grid covers the same geographic region but the data changes to reflect seasonal differences in currents.

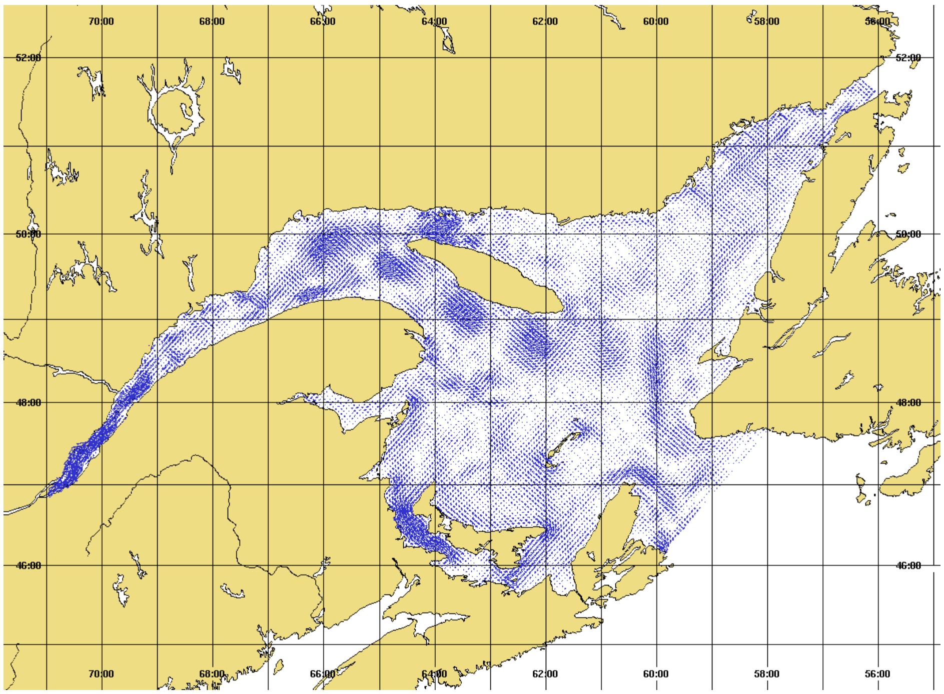

Figure 9.19: The Gulf of St. Lawrence tidal grid region

9.11.1.5 Displaying Tidal Grids on the Canvas

The tidal grids shown in Figures 9.15 through 9.19 are only displayed on the canvas if a search object is located within their geographic boundaries. To view a particular tidal grid on the canvas, first turn on Tidal Currents in the display options sidebar and then add a search object in the geographic region covered by the grid. To view more than one tidal grid at a time, add search objects in each region.

When tidal grids are displayed on the canvas, you may see how the tidal data changes over short periods of time by advancing the scenario clock in 15 minute increments and then refreshing the screen.

9.11.2 The Tidal Models tab of the Current Manager – Overriding the Default Grid

There is usually no need to specify which tidal grids to use in drift calculations; CANSARP automatically selects tidal grids depending on the location of search objects and the time period of the drift. You may, however, override the default selection by choosing another on the Tidal Currents tab of the Current Manager:

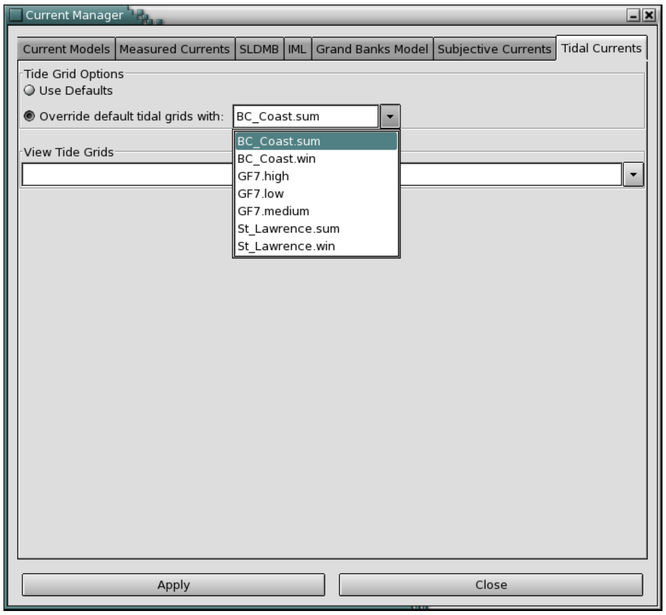

Figure 9.20: The Current Manager's Tidal Models tab, with tidal grids menu expanded

To use an alternate tidal grid in place of the default, first select the **Override Default Tidal Grid With:** button to activate the drop down menu to its right. When the menu becomes active , click on the down arrow to expand the drop down menu as shown in and then select the grid you wish to use. Only those grids with seasonal variations are listed; although there are multiple Bay of Fundy tidal grids, only one grid applies at any given longitude and latitude regardless of season.

If the selected grid covers the geographic region of the drift, it will be used instead of the default selection; otherwise the default will still be used. For example, if the search objects are located off the east coast of Vancouver Island and a Bay of Fundy tidal grid is selected, CANSARP will continue to use the GF7 grid appropriate for the time of year.

To revert to using the internally selected grid, select the Use Defaults radio button. This will grey out the **Override Default Tidal Grid With:** field, indicating that the tidal grid displayed in the field is no longer overriding the default selection.

9.11.2.1 Viewing Tidal Grids in the Current Manager

You may view the tidal grid diagrams on the Tidal Currents tab of the Current Manager without placing search objects within the tidal regions. To do so, simply select the grid you wish to display from the View Tide Grids menu as shown in Figure 9.10.

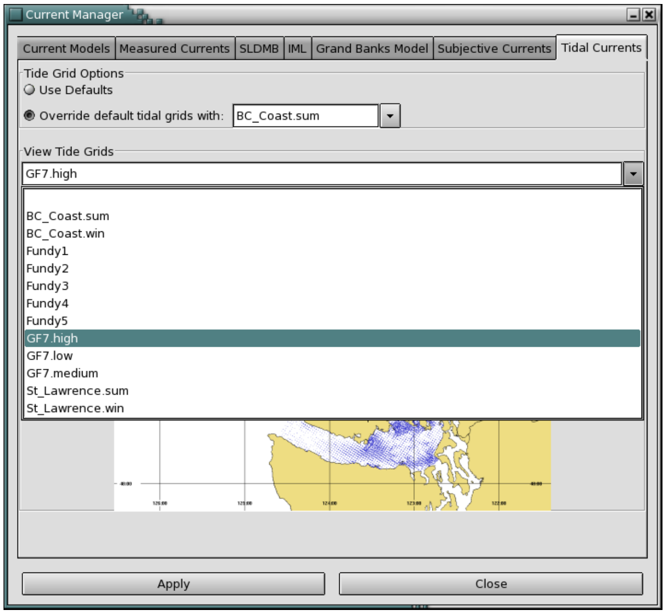

Figure 9.21: Tidal grids may be viewed on the Tidal Currents tab of the Current Manager

To clear the tidal grid diagram, select the blank line at the top of the drop down menu.

9.12 Sea Current Data Models (Static)

CANSARP's static sea current models produce current grids for portions of the east and west coast and for four of the Great Lakes. CANSARP also includes the International Ice Patrol (IIP) model which covers the region dominated by the Labrador current. As with tidal grids, some sea current grids have seasonal variations.

Because the sea current models are part of the program itself and the databases they rely on are installed directly on the CANSARP workstation, sea current data is always available within CANSARP.

Sea current data is additive with wind driven currents and subjective currents if they are set to additive mode. It is preempted by all other data types *including tidal currents*.

> *Note: Although each is an additive data type, tidal current data preempts sea current data in regions where tidal and sea grids overlap because tidal data is more dense and tidal effects are typically much stronger.*

9.12.1.1 <u>The West Coast Sea Current Grid</u>

The region covered by the west coast sea current model is shown in Figure 9.5. The grid shown is the winter grid, which is used from October to April; the summer grid is used from May to

September. These time frames are somewhat arbitrary, but are related to the wind regime along the coast.

The summer grid is appropriate for use when the mean wind on the west coast assumes a behaviour characterized by a high pressure system in the Gulf of Alaska and northwesterly winds along the coast. The winter grid should be used when the pressure system is characterized by a low pressure cell in the Gulf of Alaska and the typical wind along the coast has switched to a flow from the southeast. However, see Section 9.12.2.

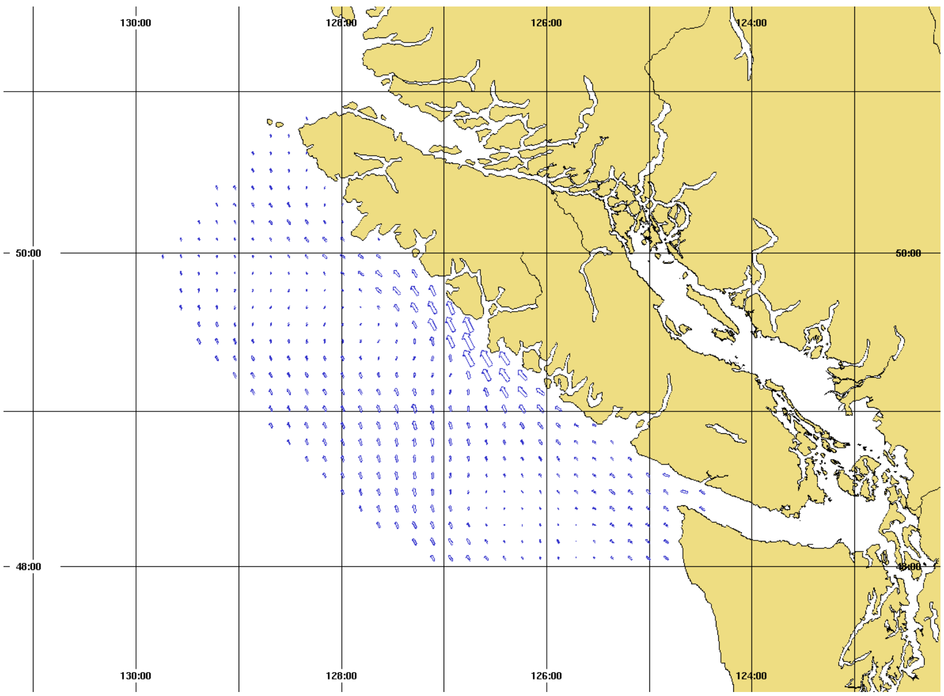

Figure 9.22: The west coast sea current grid

9.12.1.2 *The East Coast Sea Current Grid*

The region covered by the east coast sea current model is shown in Figure 9.28. The grid shown is the winter grid, which is used from October to April; the summer grid is used from May to September.

A number of different data sources were used to construct the east coast grid. Refer to the CANSARP V5.0 Technical Manual for more details on the construction of seasonal velocity fields.

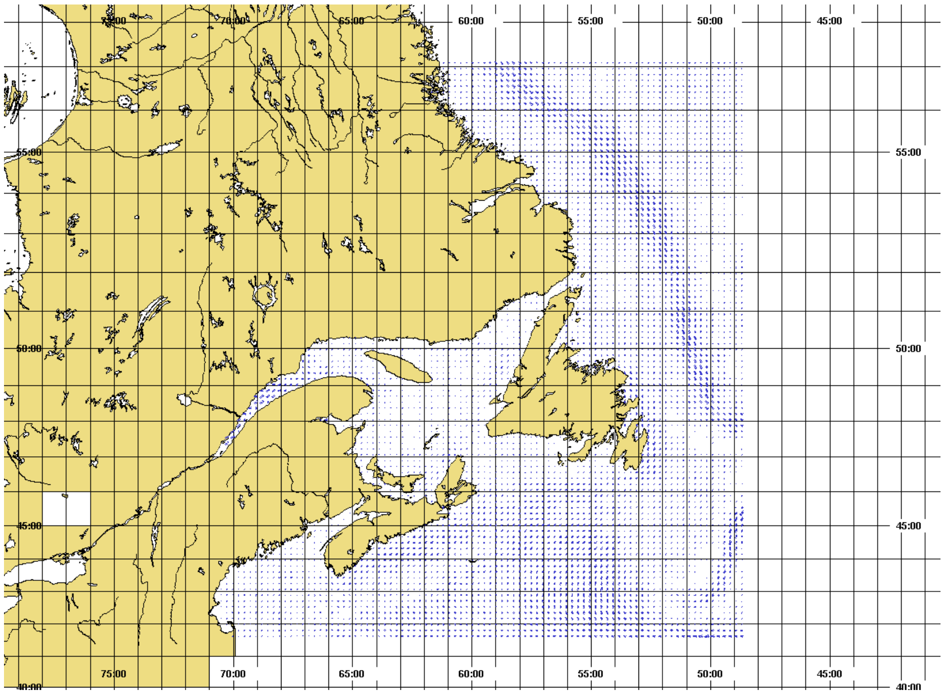

Figure 9.23: The east coast sea current grid

9.12.1.3 The International Ice Patrol (IIP) Current Grid

The International Ice Patrol (IIP) prepares sea current data based on an ongoing program of drifter tracking. This data has been incorporated into CANSARP's east coast sea current model but is also available in a separate grid, shown in Figure 9.27.

This model is valid at any time of the year as there is little seasonal variability reported for the Labrador Current which dominates the IIP database. Refer to CANSARP V5.0 Technical Manual for more details on this subject.

> ***Caution**: When the IIP grid is used, surface wind driven currents **should not be used**, as their effect is already incorporated into the grid.*

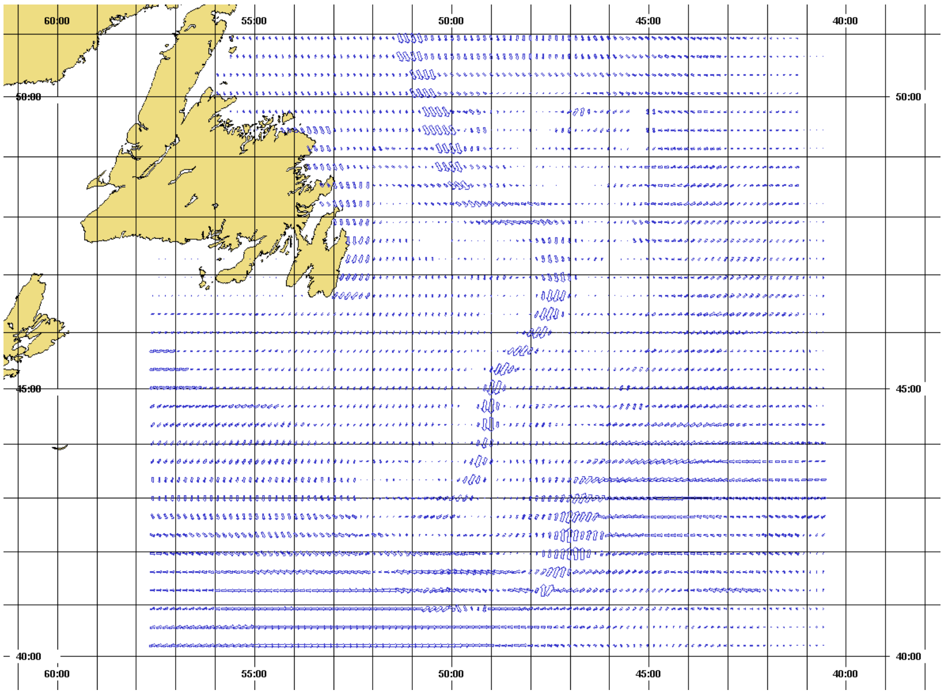

Figure 9.24: The International Ice Patrol (IIP) sea current grid

9.12.1.4 The Great Lakes Sea Grids

The grids for Lakes Erie, Huron, Ontario and Superior are shown in Figures 9.25 through 9.26. There are no seasonal variants for these regions.

> ***Caution**: The Great Lakes sea grids are included in CANSARP for completeness, but their origin and quality have not been verified.*

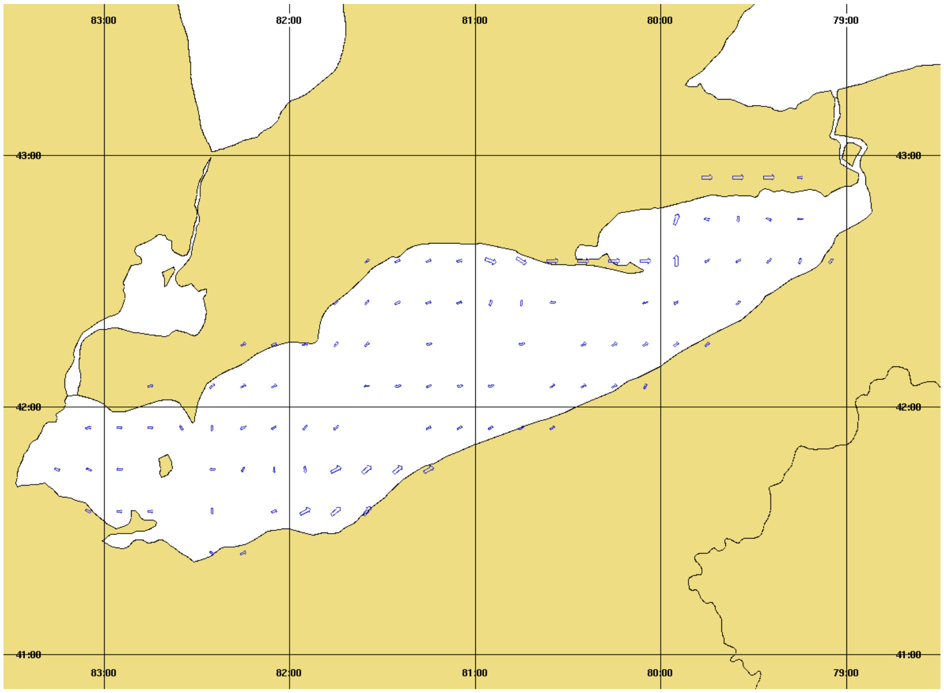

Figure 9.25: The Lake Erie sea current grid

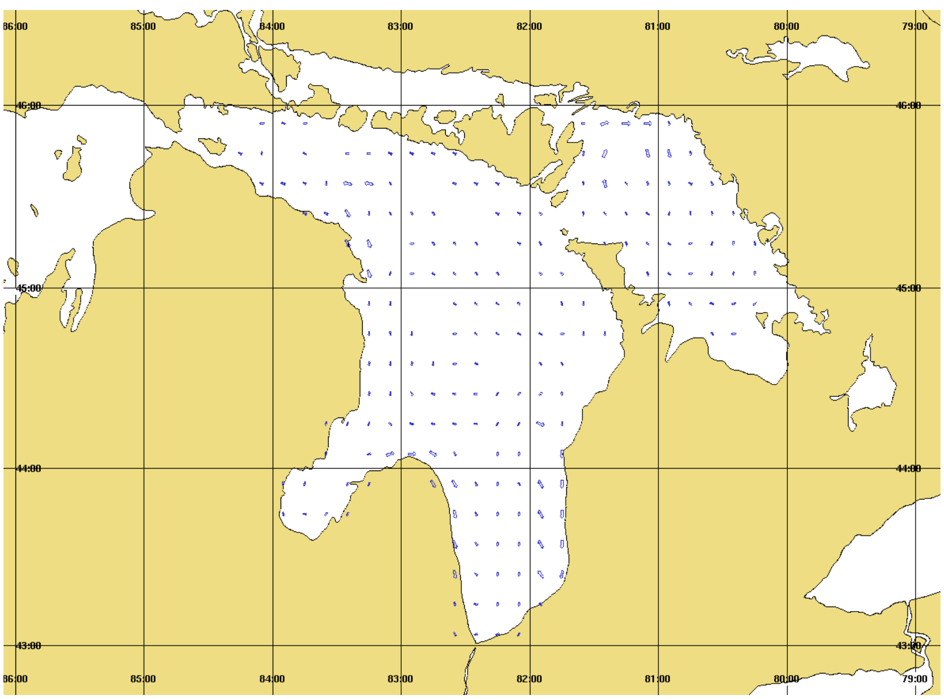

Figure 9.26: The Lake Huron sea current grid

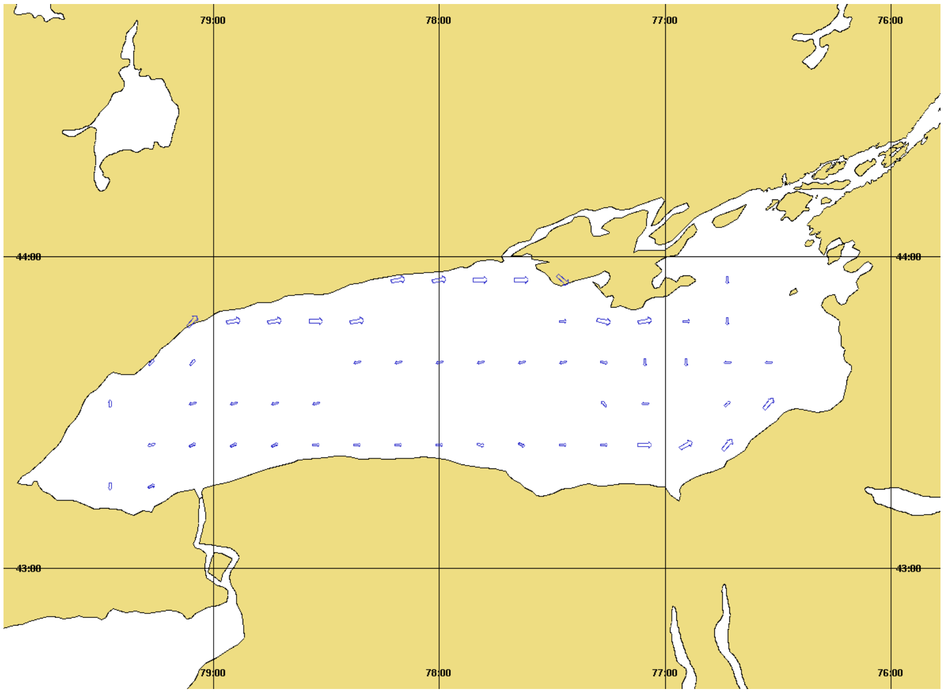

Figure 9.27: The Lake Ontario sea current grid

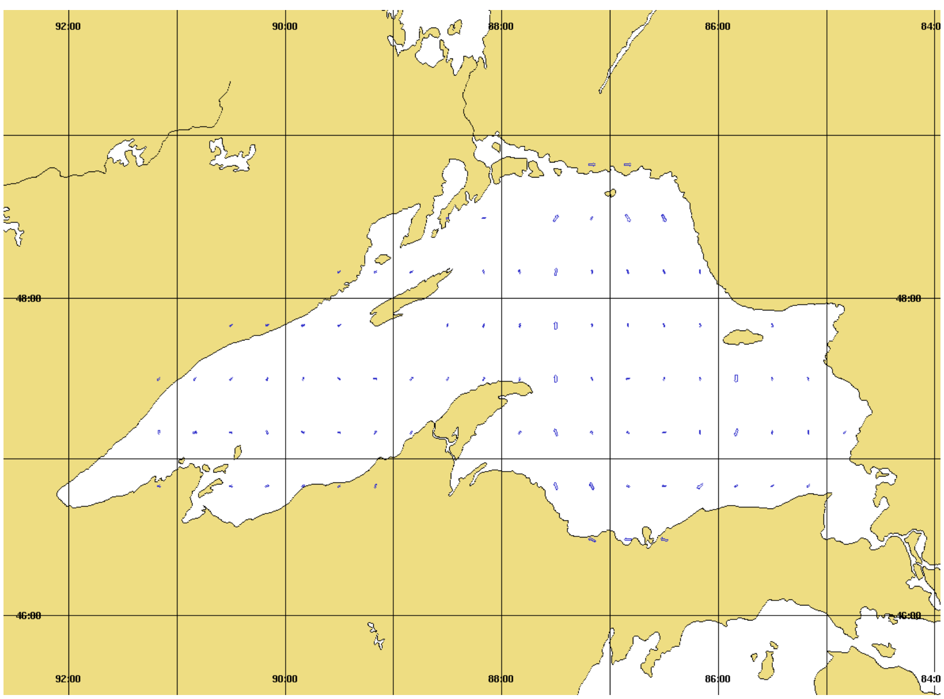

Figure 9.28: The Lake Superior sea current grid

9.12.2 Overriding Default Sea Currents

CANSARP automatically selects the appropriate sea grid to use in calculations depending on the location of search objects and the date of the drift. As of CANSARP 5.0 version 4.9.5.28, there is no way to override the internal selection of sea current grids.

> *In future versions of CANSARP, the Current Manager will include a Sea Currents tab that will function very much like its Tidal Currents tab. When this is added, it will be possible to override the internal selection of sea current grids.*

9.12.2.1 Displaying Sea Grids on the Canvas

The sea grids shown in Figures 9.16 through 9.17 are only displayed on the canvas if a search object is located within their geographic boundaries. To view a particular sea grid on the canvas, first turn on Sea Currents in the display options sidebar and then add a search object in the geographic region covered by the grid. To view more than one sea grid at a time, add search objects in each region.

Chapter 10
Environmental Data: Wind Data and Models

In contrast to the many sources of current data, CANSARP uses wind data from only two sources in its drift calculations: data from the Canadian Meteorological Centre (CMC) and data entered directly by the user in the form of subjective winds. The CMC wind data, however, includes modeled historical data, modeled forecast data and also actual observations.

This chapter introduces these types of wind data and explains how they interact and influence drift. It also introduces the Wind Manager and how it is used to manipulate wind data and drift calculations.

In this chapter, you will learn

- What types of wind data are used by CANSARP
- How CMC wind data is acquired by the CANSARP workstation
- How to load and use CMC wind data
- What geographic regions are covered by each the CMC wind data model
- How to change the appearance of wind vectors on the canvas

- How to disable the use of CMC and subjective wind data in leeway and wind driven current calculations
- How to toggle the use of Ekman drift in calculations of wind driven current

10.1 Before you begin...

10.1.1 Data Priority

Unlike current data, all wind data has the same priority and none of it is preemptive. That is, CMC winds and subjective winds are combined when performing drift calculations, assuming neither one has been disabled.

10.1.2 Time Series Terminology

This chapter makes frequent use of terms defined in the *Before You Begin...* section of Chapter 8, specifically *time series* and *vector,* and *persistence*, *radius* and *range of influence*. You should be familiar with these terms before reading the rest of this chapter.

10.1.3 Entering and Modifying Time Series Data

All wind data shares the standard time series format discussed in *Chapter 8: Environmental Time Series Data And The Time Series Editor*. Although this chapter discusses when and how to use subjective winds, it does not go into detail about how to add them to a scenario, nor does it give details on using the Time Series Editor.

For detailed instructions related to working with data in the time series format, refer to Chapter 8. Specifically, you may wish to review the sections on adding, modifying and deleting time series before reading the rest of this chapter.

10.1.4 Leeway and Ekman drift

This chapter discusses how to turn leeway and Ekman drift on and off but does not go into detail about how they are used in drift calculations. For further information on these topics, please refer to *Chapter 11 : Drift And Search Area Determination.*

10.1.5 CANSARP 5.0 Technical Manual

This user manual introduces the CMC dynamic wind model only briefly. Further information, including technical details relating to its coverage and theoretical basis may be found in the separate *CANSARP V5.0 Technical Manual*.

10.2 Displaying Winds on the Canvas

In order for wind of any kind to appear on the canvas, the appropriate display option must be turned on in the display options sidebar.

When displayed on the canvas, wind vectors appear as feather icons that point downwind (the feathered end of the icon is upwind) superimposed upon an X. If an X appears without a feather, this indicates that the time currently displayed on the scenario clock falls outside the range of influence of the time series data at that location. See 8: Environmental Time Series Data and the Time Series Editor for further information about time series and their ranges of influence.

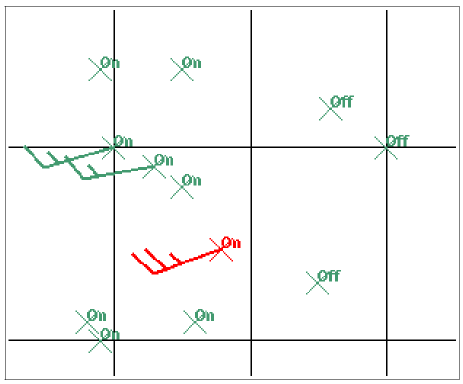

Figure 10.1: Display of wind vectors on the canvas. Note that the On/Off labels only appear when the Wind Manager is open.

The colour of the feather and the X correspond to the type of wind data, as indicated in Table 10.1:

Type of Data	***Colour***
Subjective Winds	Red
CMC Winds	Cornflower Blue

Table 10.1: Default colour of wind data icons

The number of barbs on the feather indicates the speed of the wind: no barb appears until wind speed is at least 2.5 knots; beyond that, each 5 knots adds half a barb to the feather. In this way, each feather indicates 10 knots on average and each half feather indicates 5 knots on average. For instance, a feather with two and a half barbs indicates that wind speed is at least 22.5 knots but no greater than 27.5, or 25 knots on average (the subjective wind in Figure 10.4, shown in red, is 25 kts). At extremely high wind speeds, increments of 50 knots are indicated by triangular barbs.

As well, when the Wind Manager is open, each wind vector is labeled either On or Off to indicate whether the vector is active or has been deactivated or disabled. In Figure 10.4, the three vectors on the right have been deactivated.

10.2.1.1 Changing the Appearance of Wind Icons

It is possible to change the colour and size of wind vectors in the Map Properties dialog box. To open this dialog box, select **Map Properties** from the View Menu, or click on the **Map Properties** button on the managers tool bar.

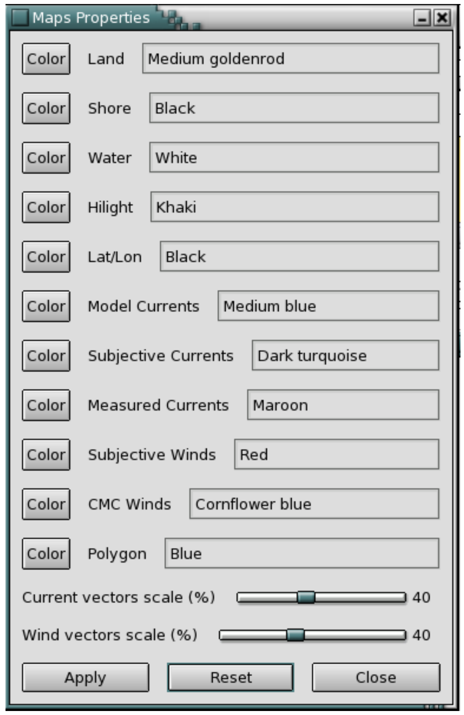

Figure 10.2: The Map Properties dialog box. Wind vectors are displayed at 40% by default but this may be adjusted.

To change the colour of a particular type of wind data, click the **Color** button to the left of the corresponding label and then select a new colour from the dialog box that appears.

To change the size of wind vectors, left click the blue slider labeled **Wind Vectors Scale (%)** at the bottom of the dialog box and, while holding down the mouse button, drag it to the left or right. Dragging it left will reduce the scale percentage; dragging it to the right will increase it. The larger the scale percentage, the larger the feather icons will appear.

You must click **Apply** to see the effect of either change on the canvas.

To reset the size and colour of all vectors, click the **Reset** button at the bottom of the window and then **Apply**.

10.3 The Wind Manager

Most operations relating to wind data are carried out via the Wind Manager. To open the manager, select **Wind Manager** from the Managers menu, click on the **Wind Manager** button on the managers toolbar, or press the F10 key while holding down the Ctrl key.

> *The Wind Manager overrides the default behaviour of clicking with the left mouse button on the canvas regardless of which tab is open. This is indicated in the status bar at the bottom left of the CANSARP window. See Section 10.3.2.2 for more information.*

10.3.1 The Wind Models Tab

The first time the Wind Manager is opened, its first tab is displayed.

The Wind Models tab lets you set how wind data should be used in drift calculations. The table displayed at the top of this tab is equivalent to the Wind Forces sidebar and changes made in either place are immediately reflected in the other.

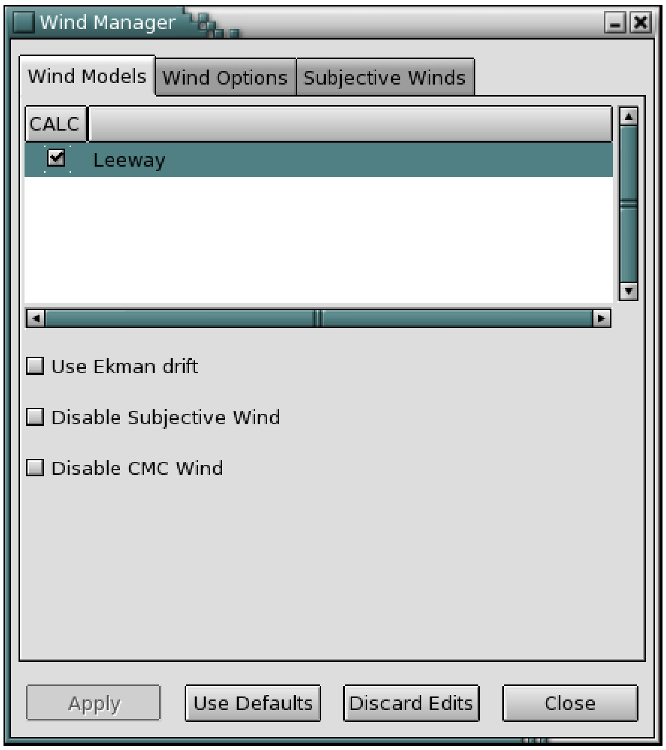

Figure 10.3: The Wind Options tab of the Wind Manager

If Leeway is selected in the table, the effects of leeway will be applied to each search object that has not specifically deactivated it. Refer to *Chapter 6: Search Objects And The Search Object Manager* and *Chapter 11: Drift And Search Area Determination* for further information. Leeway is turned on automatically whenever a subjective wind vector is added to the scenario or CMC winds are loaded.

The status of the check box labeled Use Ekman drift determines how Wind Driven Currents are calculated; by default, Ekman's method is not used. Refer to Chapter 11 for further information.

Finally, the Wind Models tab allows you to deactivate all subjective winds and/or CMC winds as a group. Wind data that is disabled is not used to calculate leeway or wind driven currents. To disable a category of wind data, click the check box to the left of the appropriate label. To re-enable it, click the check box a second time.

10.3.2 The Wind Options Tab

The Wind Options tab of the Wind Manager allows you to set various parameters related to all wind vectors, and to activate or deactivate multiple wind vectors at one time. It is also used to load CMC wind data into the scenario.

> *The* **Wind Region** *field is not used in CANSARP V5.0. Future versions of the program may use a high density wind field that could slow down calculations due to the density of the data. In an effort to keep calculations as fast as possible, this field will be used to specify the geographic region for which CMC data should be loaded so that only data necessary for calculations is read into the program.*

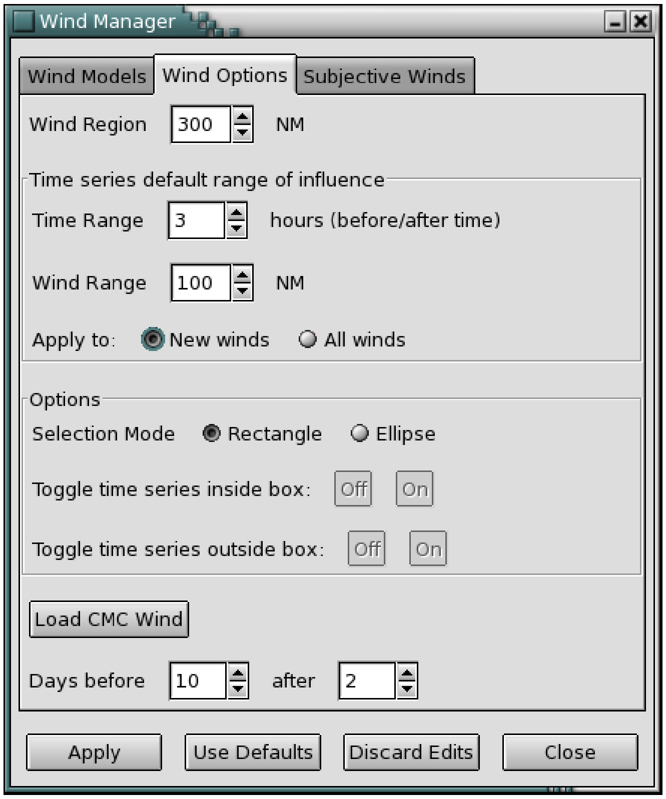

Figure 10.4: The Wind Options tab of the Wind Manager, showing default values

10.3.2.1 Time Series Default Range of Influence

This section of the Wind Options tab sets the default range of influence for all wind vectors that are added or loaded into the scenario: the **Time Range** field sets the persistence of the winds and the **Wind Range** field sets their radius of influence. These values are used for CMC wind data loaded into the scenario and also to fill the corresponding fields of the Time Series Editor when a new subjective wind is added. The range of influence of an individual vector may be changed in the Time Series Editor as usual (see 8).

The persistence of all wind vectors is initially set to +/- 3 hours because CMC Analyzed/Forecast data is updated every 6 hours. The radius of influence is initially set to 100 NM because CMC Analyzed/Forecast winds are spaced approximately 120 NM apart: a radius of influence of 100 NM ensures sufficient overlap between data points to prevent gaps in wind data without creating so much overlap that calculations are slowed unduly. If the radius is reduced to the point that wind vectors do not overlap, a search object may drift into a region for which there is no wind available. If this happens, leeway cannot act upon the object, nor can wind driven currents be calculated.

To change the default range of influence, select the text in the **Time Range** and/or **Wind Range** fields and change it to the desired value(s). To apply this change only to winds added or loaded after the change is made, select the **New Winds** radio button. To apply it to all winds, including those previously added or loaded into the scenario, select the **All Winds** radio button. In either case, you must click **Apply** at the bottom of the window before this change takes effect.

To reset the Time Range and Wind Range fields to the values last applied, click the **Discard Edits** button at the bottom of the window. To reset them to their original default values, click the **Use Defaults** button.

10.3.2.2 Deactivating and Reactivating Groups of Wind Vectors

The Options section of the Wind Options tab allows you to activate or deactivate groups of wind vectors selected by geographic proximity. See Section 8.6 for an example of when and why this feature is important.

To select wind vectors, click the left button of the mouse on the canvas and, while holding the button down, drag the mouse to draw a bounding line around the vectors. If the radio button labeled **Rectangle** is selected in the Wind Options tab, clicking and dragging in this manner draws a bounding box on the canvas. If the **Ellipse** radio button is selected instead, clicking and dragging in this manner draws a bounding ellipse. The boundary does not disappear when you release the mouse button so you may change the boundary from rectangle to ellipse or vice versa after it is drawn.

Once a boundary is drawn, you may manipulate the vectors inside it and/or the vectors outside of it. For instance, to turn deactivate the vectors *inside* the boundary, click the **Off** button to the right of the **Toggle Time Series Inside Box:** label. To activate the vectors *outside* the boundary, click the **On** button to the right of the **Toggle Time Series Outside Box:** label.

Once these adjustments are made, you must **Apply** your changes.

10.3.2.3 Loading CMC Winds

The bottom portion of the Wind Options tab relates to loading CMC winds into the scenario. See Section 10.4.3 for further information.

10.3.3 The Subjective Winds Tab

This tab functions exactly like the Measured Currents tab of the Current Manager. For further information, refer to Section 10.6.

10.4 CMC Winds

The bulk of the wind data used by CANSARP comes from the Canadian Meteorological Centre (CMC) in Dorval, Québec. It is downloaded onto the CANSARP workstation and can then be loaded into a scenario where it is used to calculate leeway and wind driven currents.

10.4.1 Types of Data: Analyzed, Forecast and Observed

The CMC provides the Coast Guard with two kinds of modeled wind data for use in CANSARP: analyzed data and forecast data. This is the same data used by the Institute Maurice Lamontagne and the Bedford Institute of Oceanography in their dynamic current models. Like those models, the CMC's wind model is based on actual observations and the CMC makes these actual observations available to the Coast Guard as well.

10.4.1.1 Analyzed/Forecast Data

Analyzed winds are the output of the Global Environmental Multiscale (GEM) model, the primary model used by the CMC for all its analysis and forecasting. Based on actual observations from weather stations and other sources, this model is able to fill in data for points where no observations have been made. This analyzed data is produced every six hours.

The GEM model uses the same actual to predict wind speed and direction up to 48 hours in advance. This forecast data is produced every 12 hours.

Although they are slightly different, both types of wind data identified as ANAL/FCST when opened in the Time Series Editor.

10.4.1.2 Observed Data

In addition to the analyzed and forecast output of the GEM model, the CMC makes the actual observations used as inputs into the model available to the Coast Guard. These observations come from the CMC's own weather stations as well as vessels that transmit weather data to the CMC, and may be updated as often as once an hour.

Observed data is identified with the call sign or ID of the weather station or vessel that provided it when opened in the Time Series Editor.

10.4.1.3 CMC Wind Data Grid

Generally speaking, the CANSARP workstation downloads analyzed and forecast data from the CMC on a two degree grid. Specifically, it downloads data at one point for every two degrees of longitude and latitude, assuming that these positions are not on land. If a point of land interrupts this two degree grid in such a way that no data points are within one degree of coastal waters, an additional data point has been requested to fill in the gap. This grid covers the Great Lakes and other locations specifically requested but does not generally cover rivers or smaller inland bodies of water.

To request that additional analyzed/forecast data points be included in downloads from the CMC, contact the CANSARP Maintenance Officer at the Canadian Coast Guard College.

All observed data from the same regions are downloaded. That is, observed data is not restricted to the two degree grid. This results in a higher density of wind data in regions with high vessel traffic.

10.4.2 Acquisition of CMC Data

As mentioned, new observed data is available from the CMC as often as hourly, whereas new analyzed data is produced every six hours and new forecast data is produced every 12 hours.

To ensure newly available data is acquired as quickly as possible, the CANSARP workstation in each RCC queries the CMC servers hourly. When new data does become available, it is downloaded to the workstation. If there is an interruption of service at the CMC or a problem with the data acquisition system, new data may not be downloaded to the CANSARP workstation and therefore may not be available within CANSARP.

Newly acquired wind data may be loaded into the scenario in the usual fashion as soon as it has been downloaded (refer to Section 10.4.3).

10.4.2.1 The Watchdog

You may determine how recently new wind data was acquired by checking the Watchdog.

To open the watchdog, select **Watchdog** from the Managers Menu, or click the **Watchdog** button on the Managers toolbar. The time at which data of each type was most recently acquired appears in the fields to the right of the corresponding labels.

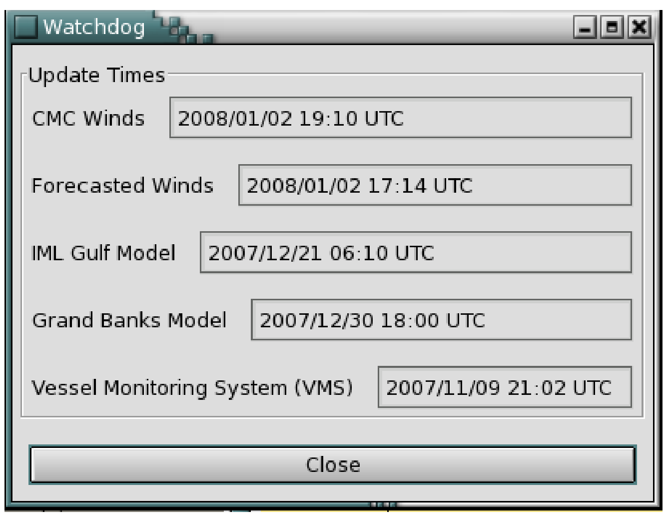

Figure 10.5: The Watchdog indicates how recently external data has been acquired

10.4.2.2 Historical Wind Data

Historical wind data, both observed and analyzed, is available going back as far as the fall of 1993, though some RCCs keep less historical data on their local systems. If necessary, historical data missing from a local system may be requested from the Coast Guard College.

Note that the Watchdog cannot tell you if historical wind data is available. To determine whether data is available for a historical drift, you must turn on the display of CMC winds in the display options sidebar and then load the data for the given time period. If no wind vectors appear on the canvas, no data is available.

10.4.3 Loading CMC Wind Data into a Scenario

To load CMC Wind Data, open the Wind Options tab of the Wind Manager. To do so, select **Wind Manager** from the Managers Menu, press the **Wind Manager** button the Managers button bar or press the F10 key while holding down the Ctrl key. Once the manager is open, switch to its **CMC Model** tab if it is not already visible.

The persistence and radius of influence of CMC wind data is set by the time series default range of influence. See Section 10.3.2.1 for more information.

Before loading the data, you must also specify which dates you wish to load data for. By default, the time span is 10 days prior to the date which currently appears on the scenario clock and 2 days after. You may change these settings by selecting the value(s) in the **Days Before** and/or **After** fields and changing them as desired. These fields are always relative to the scenario clock, so verify that the scenario clock is set to the appropriate date before loading the data.

Once the default range of influence and the date range have been set, click the **Load** button to load the data into the active scenario.

> ***Caution****: If you change the default range of influence or the Days Before or After fields and then load CMC wind data before clicking* **Apply***, the new settings are not used.*

Once CMC wind data is downloaded, a field of wind vectors as described in Section 10.2 will appear on the canvas if there is data available for the specified time period.

> ***Note:*** *CMC winds will not replace subjective winds already added to the scenario. If a CMC wind time series has the same latitude and longitude as a subjective wind,* ***it will not be loaded****.*

> *Downloading CMC winds automatically turns on Wind Driven Currents in the Current Forces sidebar and Leeway in the Wind Forces sidebar. If there is data available for the given frame of time, CMC Winds will also automatically turn on in the Display Options sidebar.*

10.4.3.1 Reloading CMC Wind Data

If new CMC wind data is acquired while CANSARP is running, you may begin using the newly acquired data by reloading winds. To reload CMC winds, follow the same procedure as for loading it initially as described in Section 10.4.3.

> ***Note**: If you reload the data, any deleted vectors are restored if there is no subjective wind vector at the same position. Any modified wind vectors that have become subjective winds are NOT replaced with the original CMC vector. See Section 10.4.3.2 for more information.*

10.4.3.2 Modifying CMC Wind Data

Because CMC wind data is in the standard time series format, it can be opened and edited in the Time Series Editor as described in *Chapter 8: Environmental Time Series Data And The Time Series Editor*. Specifically, you may deactivate or delete individual CMC time series after the data has been loaded. If you suspect that a time series contains incorrect data, consider deactivating or deleting the time series rather than modifying it.

> *Although CMC wind data can be modified in the Time Series Editor, doing so is not recommended as there is no indication afterwards that the data used in drift calculations is not the same as that downloaded from BIO. Modifications should be limited to activating or deactivating individual vectors.*

> *Making any change to a CMC wind time series **automatically converts the data into a subjective wind**; the time series will behave in all ways as a subjective wind rather than a CMC wind thereafter. This means it will only be displayed when the Subjective Winds display option is selected, it will be activated or deactivated according to the rules for Subjective Winds, and if CMC winds are reloaded, the time series will not be reset to its original values.*

10.4.4 Disabling or Re-enabling CMC Wind Data

You may disable all CMC wind data by opening the Wind Models table of the Wind Manager and clicking the check box labeled **Disable CMC Wind**. When CMC winds are disabled, no CMC wind data is used in the calculation of leeway or wind driven currents, regardless of the individual time series' activation status and all CMC wind vectors visible on the canvas are labeled Off.

To re-enable CMC winds, click the check box a second time so that the check mark disappears.

10.5 Subjective Winds

Because wind data has no priority and no type of wind data preempts another, subjective winds are analogous to both measured currents and subjective currents. They are used to represent on scene, real time observations in which the user has high degree of confidence, as well as for data from other sources, such as estimated conditions, information from charts, or prior knowledge of the search area.

> ***Note****: The methods for adding subjective winds to a scenario are covered in* Chapter 8: Environmental Time Series Data And The Time Series Editor.

> *Adding a subjective wind to the scenario automatically turns on Wind Driven Currents in the Current Forces sidebar, Leeway in the Wind Forces sidebar and Subjective Winds in the Display Options sidebar.*

10.6 The Subjective Winds tab of the Wind Manager

Once subjective winds time series have been added to the scenario, they appear in the table on the Subjective Winds tab of the Wind Manager.

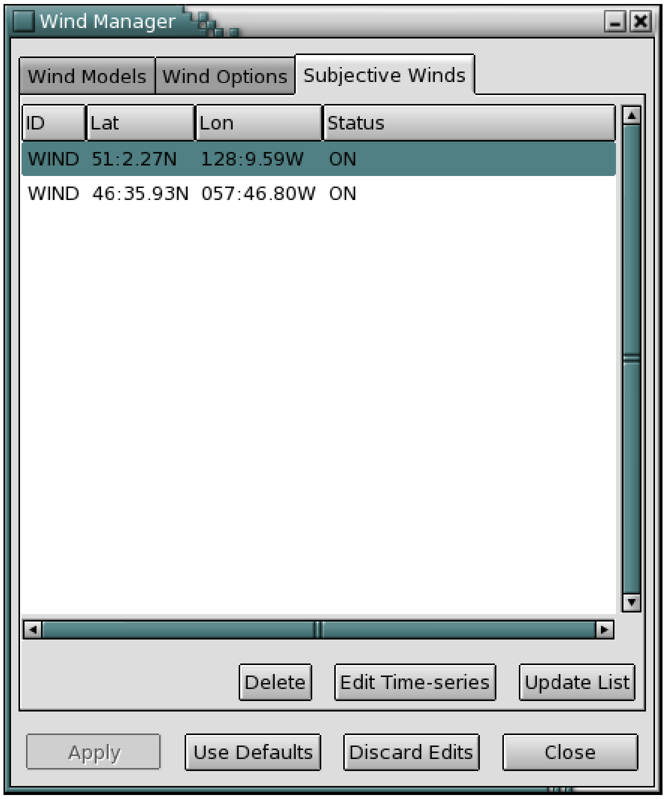

Figure 10.6: The Subjective Currents tab of the Wind Manager

The table that comprises the bulk of this tab displays all of the subjective winds that have been added to the scenario. As indicated by the column headings, the table displays each time series' ID, its position, and its activation status (see Chapter 8).

If the Wind Manager is open when a new subjective wind is added to the scenario, the new wind will not immediately appear in the table; likewise, if the manager is open when a subjective wind is deactivated or deleted, this change is not immediately reflected in the table. If the table appears incomplete or out of date, click the **Update List** button at the bottom right to update it.

10.6.1 Editing a Subjective Wind

To edit a particular subjective wind time series in the Time Series Editor, select it in the table and then click the **Edit Time-series** button. Alternately, you may left click on the wind's icon on the canvas.

See Chapter 8 for further information on editing winds in the Time Series Editor.

10.6.2 Deleting Subjective Winds

To delete a particular subjective wind entirely, select it in the table and then click the **Delete** button.

To discard *all* subjective winds from the active scenario, select **Discard** from the File Menu and then select **Subjective Winds** from the submenu that appears.

10.6.3 Disabling and Re-enabling Subjective Wind Data

You may disable all subjective wind data by opening the Wind Models table of the Wind Manager and clicking the check box labeled **Disable Subjective Wind**. When subjective winds are disabled, no subjective wind data is used in the calculation of leeway or wind driven currents, regardless of the individual time series' activation status and all subjective wind vectors visible on the canvas are labeled Off.

To re-enable subjective winds, click the check box a second time so that the check mark disappears.

10.7 Case Study: Wind patterns on the west coast of British Columbia

The fjords on the west coast of British Columbia provide an example of when turning on or off regions of wind vectors is critical. Consider an example of the CMC wind data for part of the area, shown in Figure 10.2.

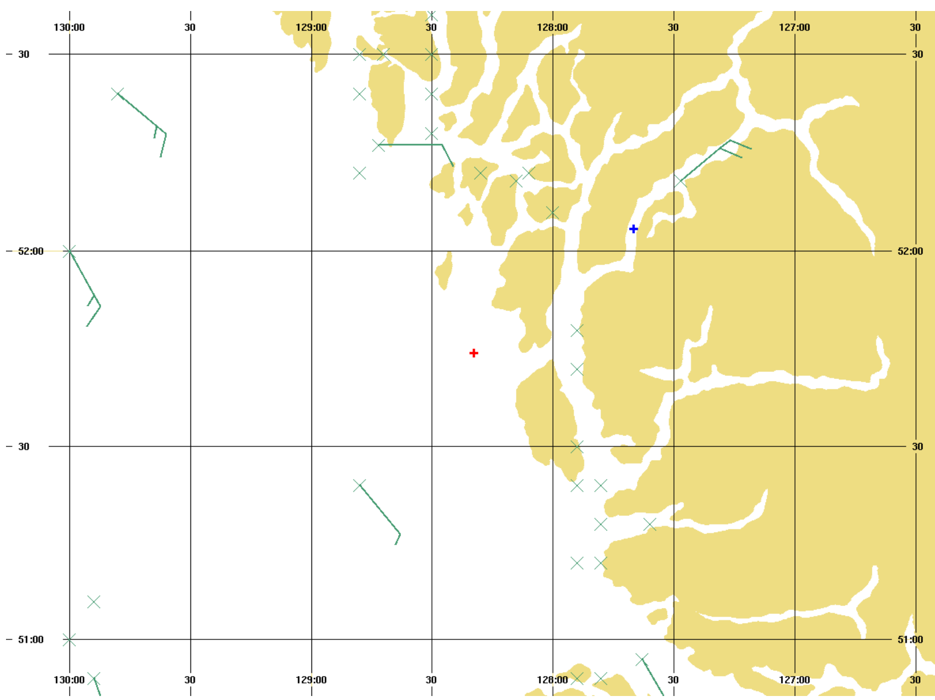

Figure 10.7: CMC wind data for a region on the west coast of British Columbia. The shore colour has been turned off and the vectors are enlarged to show detail. Compare the wind vectors in the fjords with those off the coast.

The interpolated wind field (refer to 11) produced when all the CMC data shown in Figure 10.2 is active is shown in Figure 10.8.

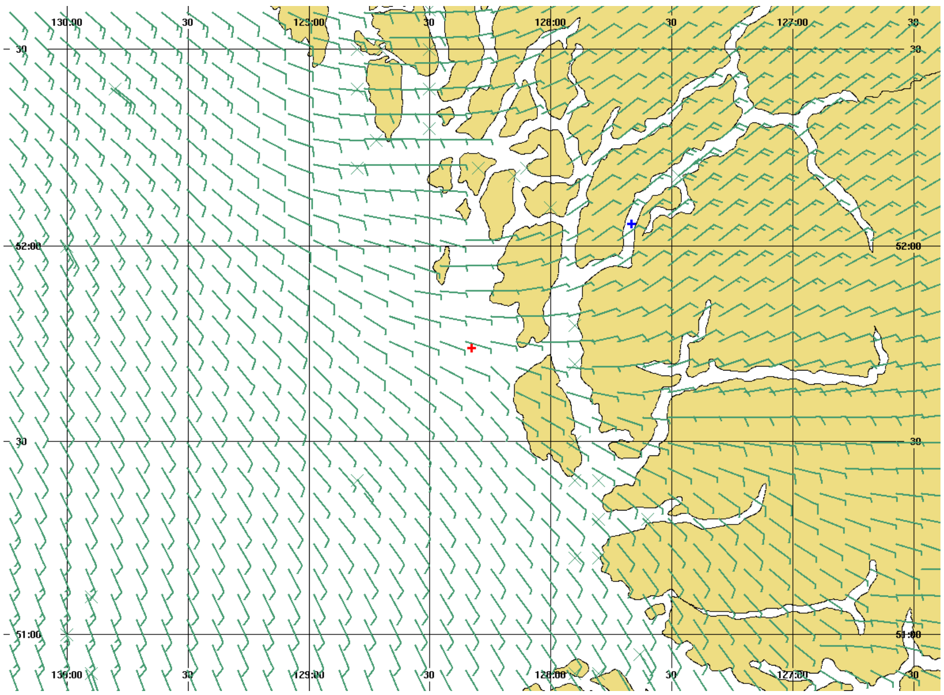

Figure 10.8: The interpolated wind field produced when all CMC data is active.

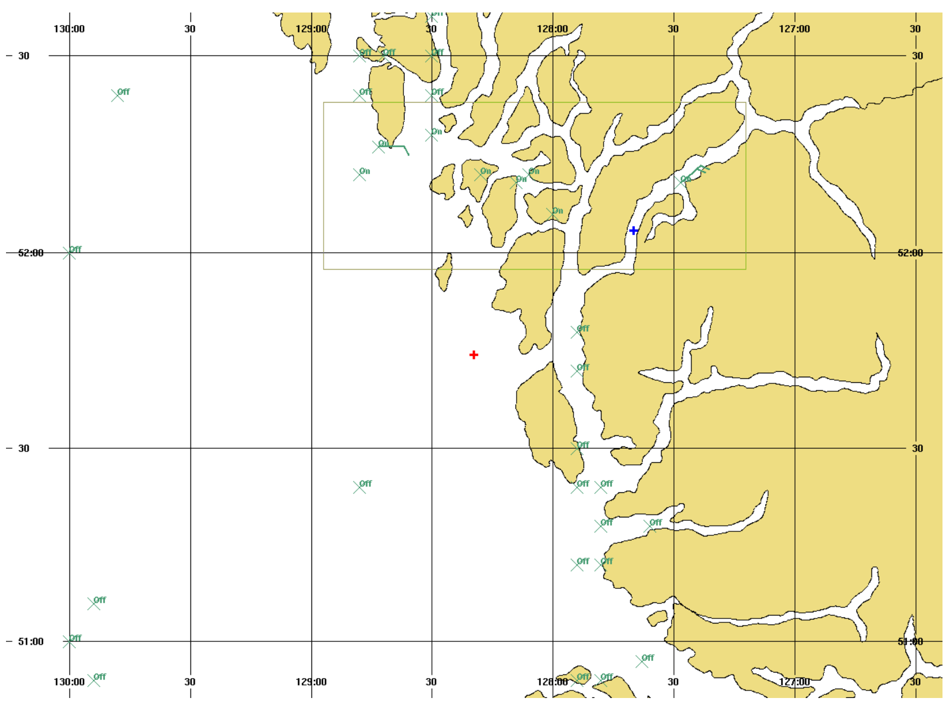

Figure 10.9: A bounding box around the coastal wind vector and that in the fjord. Note that the Wind Manager must be open for the bounding box or the On/Off status of wind vectors to be displayed.

However, given the topology of the region, the offshore winds clearly should not affect the blue search object. In this case, it is appropriate to use only the onshore winds in drift calculations. In Figure 10.9, a bounding box has been drawn around only those vectors and, using the buttons on the Wind Options tab of the Wind Manager, the vectors outside the box have been turned off.

Winds turned off in this way do not contribute to the interpolated wind field. The interpolation field produced by the vectors turned on in Figure 10.9 is shown in Figure 10.10. Notice how the vectors have changed direction since Figure 10.8.

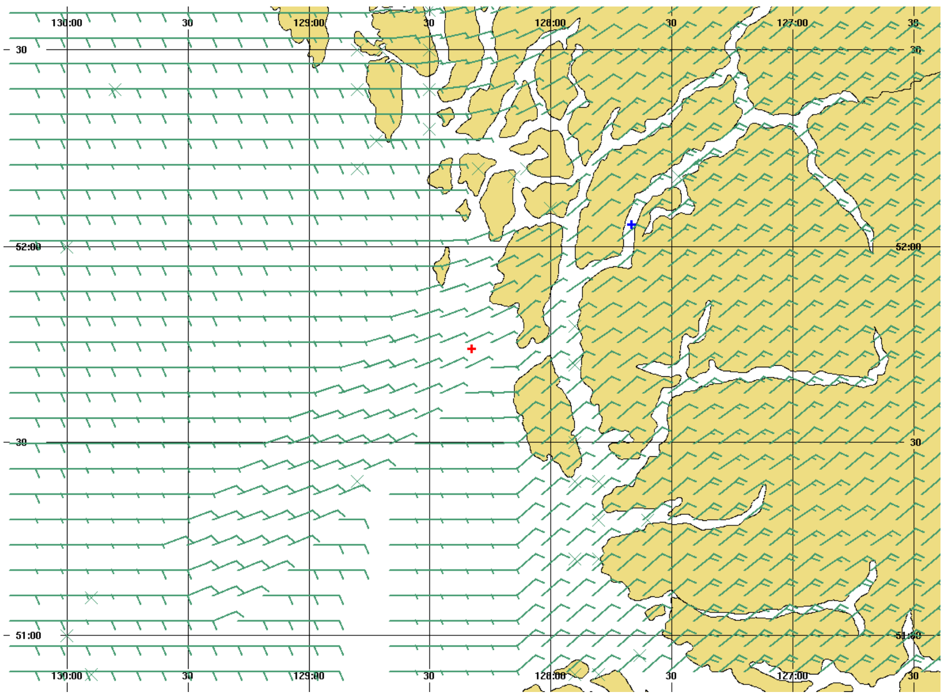

Figure 10.10: The interpolated wind field based only on the winds active in Figure 10.2.

This wind field is appropriate for drift calculations pertaining to search objects located in the fjord, but obviously not for search objects offshore. If it is determined that the onshore winds should not influence the red search object in Figure 10.2, a bounding box may be drawn as in Figure 10.9 and those vectors inside the box turned off instead of those outside. In this case, the interpolated wind field in Figure 10.11 is produced instead.

In this case, the situation is opposite that in Figure 10.9: the vectors inside the bounding box are off and those outside are on. Compare the vectors in the vicinity of the red search object in particular. This may be a more appropriate wind field to use for offshore search objects depending on their proximity to the outflow of the winds passing down the fjords.

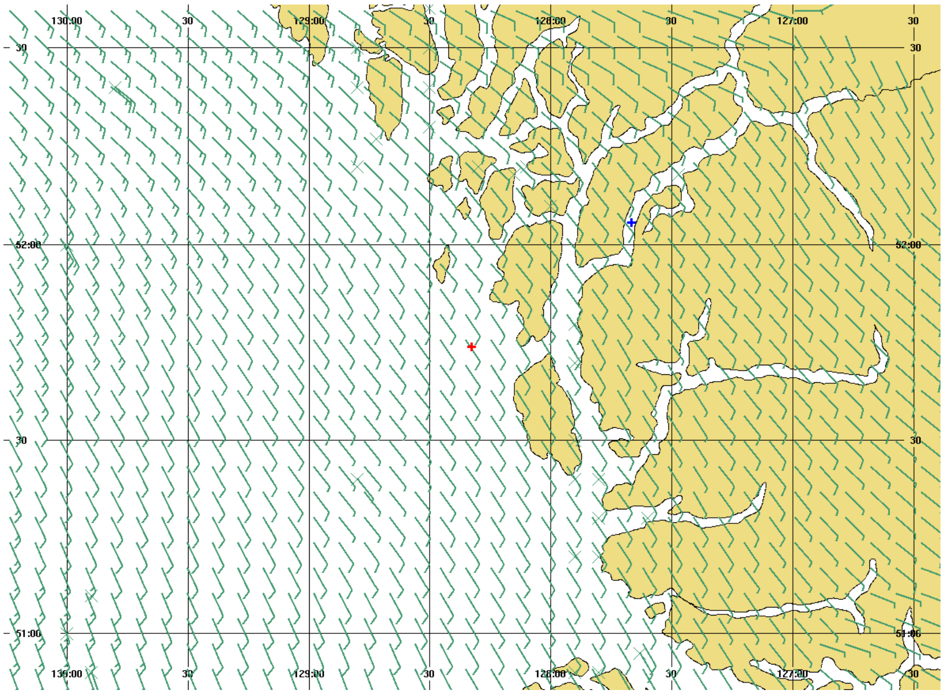

Figure 10.11: he interpolation field based on winds outside the boundary shown in Figure 10.2. In this case, the vectors within the bounding line are off and those outside are on. Compare the vectors near the red search object to those near the object in Figure 10.8.

Chapter 11
Drift and Search Area Determination

11.1 Selecting Drift Forces

11.1.1 Current Forces (preemptive vs. additive)

11.1.2 Leeway

In the context of CANSARP, leeway is the effect of wind on the exposed portion of a search object. When leeway is used in drift calculations, this effect is applied to certain search objects in addition to the effects of currents.

All objects other than PIW have some degree of leeway; default parameters depend on type of object and are set automatically in SOM.

Individual objects may be set to ignore the effects of leeway (search object manager), or leeway may be turned off for all search objects (sidebar/wind manager).

Adding any wind data to the scenario turns leeway on in the sidebar.

Leeway calcs consider all winds added to a scenario that haven't been disabled or deactivated. Individual vectors may be deactivated or CMC and/or Subjective Winds may be disabled as a group.

11.1.3 Wind Driven Currents

Assuming it has wind data to work with, CANSARP is able to calculate the effects of wind on surface winds. Wind driven currents are not technically a type of wind data but rather the inclusion of an additional mathematical formula based on local winds into drift calculations. See the next chapter, Environmental Data: Wind Data and Models, for more details on how this is accomplished. The discussion of wind driven currents in this chapter is limited to whether it is appropriate to combine this extra calculation with various wind types.

Note that, in the case of additive currents, it is up to the user to decide whether or not wind driven currents are added to the calculation. Preemptive models never use wind driven currents.

11.1.4 Ekman Method of WDC Calculation

11.1.5 Interpolation

11.2 Performing a Drift

11.2.1 Datum Time

11.2.2 Project Forward

11.2.3 Reverse Drifts

11.2.4 Changing the Scenario Clock and Redrifting

11.2.5 Deactivated Search Objects Don't Drift

11.3 Displaying Drifts

11.3.1 Drift Tracks

11.3.2 Drift Errors (15 mins)

11.3.3 Don't Clear Drift Tracks

11.3.4 Drift Track Starting Times

11.4 The Search Area Polygon

11.4.1 The Polygon Manager

11.4.2 Probability of Detection

Chapter 12
Effort Allocation: SRUs and the SRU Manager

After search objects have been drifted and the search area has been determined, resources may be allocated to conduct a search of that area. CANSARP uses the SRU Manager to handle most operations related to Search and Rescue Units (SRUs).

In this chapter, you will learn

- How to use the SRU Manager to add search and rescue units to a scenario
- How to add SRUs into a scenario from the SRU Database
- How to duplicate or delete SRUs from a scenario
- How the fields of the SRU Manager's Details tab describe an SRU and a particular search
- How the fields of the SRU Manager's Calculations tab affect an SRU's search pattern
- How to use the Transit Editor

12.1 Before you begin...

This chapter deals with adding SRUs to a scenario but not with manipulating search patterns. For information on search patterns, see *Chapter 13 – Effort Allocation: Search Patterns*.

12.2 The SRU Manager

Most operations related to SRUs are carried out via the SRU Manager. To open the manager, choose SRU Manager from the Managers menu, click on the SRU Manager button on the managers tool bar, or type F11 while holding down the Control key.

The SRU list at the top of the manager window contains all the SRUs that have been added to the scenario. This list displays each SRU's name and the time and position of its commence search point (CSP). Immediately below the list are buttons that allow you to add new SRUs, or duplicate or delete an existing SRU.

Below the SRU list and buttons are two tabs that contain the details related to each SRU and the various parameters used to calculate its initial search pattern. The information displayed in the tabs' fields corresponds to the SRU that is currently selected in the SRU list. Likewise, the Pattern Type field below these tabs displays the type of pattern the selected SRU will use and the Edit button to the right of the tab allows you to manipulate the SRU's search pattern directly.

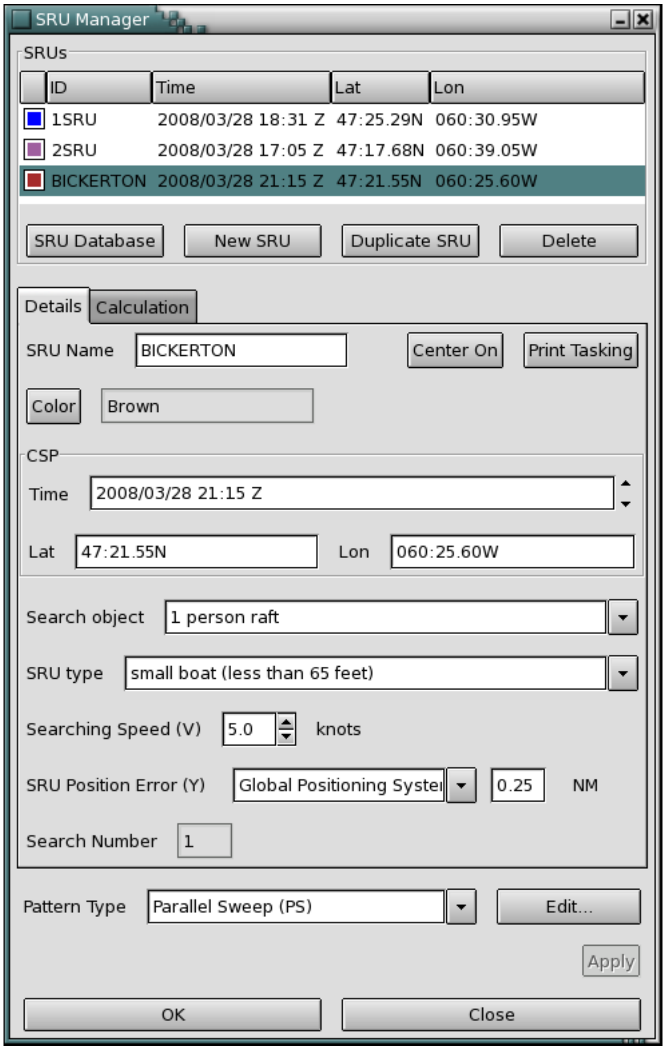

Figure 12.1: The SRU Manager window with Details tab displayed

12.2.1 Details Tab

The Details tab (shown in Figure 12.1) displays the characteristics of the SRU currently selected in the SRU list and the type of search object it is looking for. To select an SRU, left click on its line in the list.

12.2.1.1 SRU Name

The SRU's name identifies which SRU is selected in the SRU list. It also appears in reports and the SRU's tasking form, and in the SRU's icon when its search pattern is minimized (refer to Section 12.8). The name may contain letters, numbers and other characters but spaces are replaced with the underscore character. It cannot be more than 20 characters; names longer than this will be truncated when you click **Apply**. More than one SRU can have the same name, although this may lead to confusion.

When an SRU is added from the SRU Database, its name is set automatically. Otherwise, CANSARP assigns each new SRU the same name: New_SRU. While it is not strictly necessary to rename SRUs, it is a good idea to change each SRU's name to something unique and meaningful to make it easier to tell them apart, especially in reports or when minimized.

> ***Hint****: It may be helpful to put distinguishing characters at the beginning of an SRU's name rather than the end because only the first few characters of an SRU's name are displayed in its icon and in the SRU list. For example, the names Hercules1, Hercules2, and Hercules3 will all look the same when minimized, whereas 1Hercules, 2Hercules, 3Hercules will be easier to distinguish.*

To change the SRU name, highlight the text in the **SRU Name** field and replace it with another name.

12.2.1.2 Colour

CANSARP automatically assigns each SRU a different colour that is used for the SRU's search pattern and for its icon when it is minimized. Although CANSARP attempts to pick a colour that isn't already used by an SRU or search object, sometimes the colour selected may be very similar to one already in use. As well, some colours do not appear well on certain screens or print well on certain printers. For these reasons, it may be desirable to change an SRU's colour.

To change the colour of an SRU, click the **Color** button. A dialog box will appear with a list of colours, as shown in Figure 12.2.

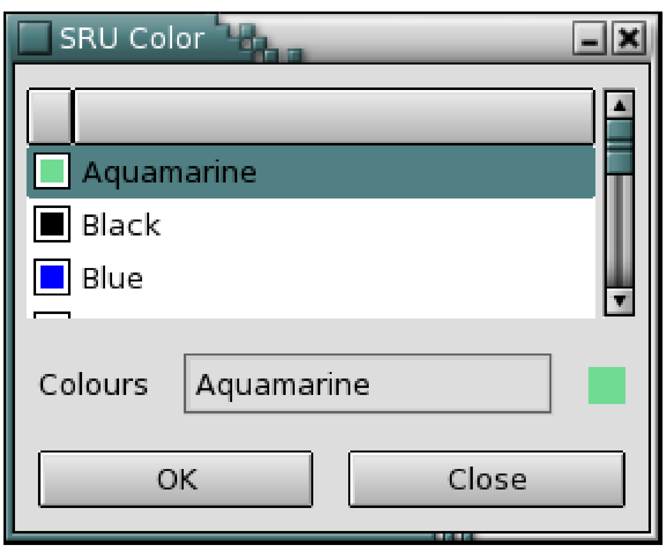

Figure 12.2: The SRU Colour dialog box

Select a new colour from the list by left clicking on it. The chosen colour will appear in the field at the bottom of the dialog box. When the colour you wish to use is selected, click the **OK** button. The dialog box will close and the new colour will appear next to the Color button in the SRU Manager. You must click **Apply** for the change to take effect.

12.2.1.3 CSP (Lat, Lon and Time)

The **Lat**, **Lon** and **Time** fields display the position and time of the selected SRU's CSP. The information in these fields is also displayed in the table at the top of the manager window and in the Pattern Editor when the SRU's pattern is edited.

To change the SRU's CSP, select the information in any of these fields and replace it. You must click **Apply** for any change to these values to take effect; changing the latitude and/or longitude will move the SRU's pattern on the canvas but will not reset it. Changing its time does not affects its search pattern.

12.2.1.4 Search Object Type

The **Search Object Type** field indicates the type of search object that the selected SRU is searching for, which is used to determine various parameters such as weather factor and speed factor, and therefore also contributes to the calculation of sweep width. Since the presence or lack of a drogue has no impact on these values, there is no need or way to specify whether the SRU is searching for an object with a drogue.

An SRU is set to look for a *type* of search object but is not tied to any particular search object that has been added to the scenario, even if the SRU was added from the Search Object Manager via the Allocate SRU button.

If an SRU is looking for more than one search object, its search object type should be set to the object with the narrowest sweep width. If, for example, a single SRU is looking for a large ship and also persons in the water, its type should be set to PIW. This will yield an initial search pattern with a coverage appropriate for the PIWs, who will be much more difficult to spot than the larger ship.

To change the type of search object, click on the small arrow button to the right of the **Search Object Type** field to expand the drop down menu of types and select one from the list. Because sweep width depends on search object type, changing the search object type resets the SRU's search pattern.

12.2.1.5 SRU Type

The **SRU Type** field indicates the type of SRU performing the search and, in the case of aircraft, the altitude of the SRU. This setting is used to determine initial speed settings, speed factor and therefore sweep width, and also aircraft correction factor (refer to Section 12.2.2.6).

To change the type of SRU, click on the small arrow button to the right of the **SRU Type** field to expand the drop down menu of types and select one from the list. Changing the SRU type resets the SRU's search pattern.

If an SRU aircraft type is chosen that flies at an altitude for which there is insufficient visibility (determined by comparison with the value in the **Visibility** field of the Scenario Manager), a warning box appears. CANSARP still allows the use of the given type of SRU, but the warning must be acknowledged by clicking **OK** to close this box. Each time the given SRU is selected, including when the SRU Manager is opened, CANSARP will warn again about the lack of visibility.

12.2.1.6 Searching Speed (V)

The **Searching Speed** field indicates the speed at which the vessel or aircraft will travel while searching. Note that this is not the same as its transit speed, i.e. the speed at which it can travel to and from the search area. Searching speed determines, among other things, sweep width, total track length (with on-scene time) and initial track spacing.

The searching speed of a vessel defaults to 5.0 knots and must fall into the range of 1.0 to 50.0 knots. The searching speed of a helicopter defaults to 50.0 knots and must fall into the range of 30.0 knots and 500.0 knots. The searching speed of a fixed wing aircraft defaults to 140.0 knots and must fall into the range of 30.0 knots and 500.0 knots.

To change the SRU's search speed, select the value in the Searching Speed and replace it, or use the small arrows to the right of the field to increase or decrease it.

Changing the searching speed resets the SRU's search pattern.

12.2.1.7 SRU Position Error (Y)

The **SRU Position Error** fields display the SRU's navigation method and the error associated with it. An SRU's position error contributes to the size of the minimax circles drawn around every search object but not to the smaller circles drawn around individual particles that form the arc of probability. If more than one SRU has been added to the scenario, the largest SRU position error is used for all search objects and the others are ignored.

An SRU's navigation system defaults to GPS and its error to the 0.25 NM appropriate for that type but this information can be changed by selecting a different navigation method from the left drop down menu, which will enter an appropriate value into the right error field, or by entering a new value directly into the error field.

12.2.1.8 Search Number

The search number field indicates the search number as set in the Scenario Manager. This value is used to determine any factors that depend on search number for all SRUs added to a scenario.

12.2.1.9 Additional Buttons

Clicking on the **Center On** button will recentre the canvas on the selected SRU. This is useful if an SRU has been added from the SRU Database and is positioned at its home base.

Clicking on the **Print Tasking** button prepares the tasking form for the selected SRU.

12.2.2 Calculations Tab

The Calculations tab of the SRU Manager (shown in Figure 12.3) deals with many of the variables used to calculate an initial search pattern for the selected SRU. These variables include those related to sweep width and track spacing and time available on scene as well as the requested coverage factor.

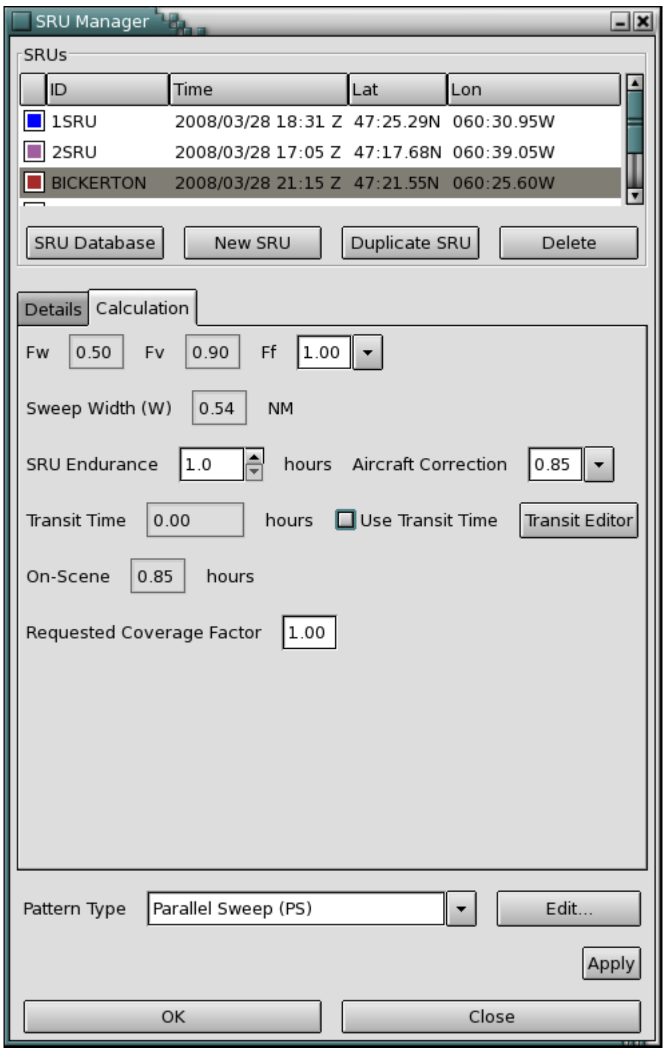

Figure 12.3: The SRU Manager window with Calculation tab displayed

12.2.2.1 Weather Factor (Fw)

Weather factor is calculated internally according to *Figure 7D-11 Weather Condition Factor* of the

National SAR Manual, and is based on the SRU's search object type (set on the Details tab, see Section 12.2.1) and the sea state set in the Scenario Manager.

Weather factor is used in the calculation of sweep width and therefore initial track spacing. This value cannot be modified directly.

12.2.2.2 Speed Factor (Fv)

Speed factor is calculated internally according to *Figure 7D-12 Search Aircraft Speed Correction Factor* of the National SAR Manual or interpolated for speeds above those shown in the table. The value is only calculated for aircraft; for vessels, it is set to 1.0 in order to eliminate its effect.

Speed factor is used in the calculation of sweep width and therefore initial track spacing. This value cannot be modified directly.

12.2.2.3 Fatigue Factor (Ff)

Fatigue factor indicates the sharpness of the crew aboard the SRU. This value defaults to 1.0 to eliminate its effect but should be set to 0.8 when the crew is likely fatigued.

> *According to the National SAR Manual, the "crew will be fatigued if they have been involved in a search for an extended period, and they may exhibit signs of fatigue which include: missed communications; problems with memory; irritability; and increased time to complete tasks or make decisions." (NSM, Chapter 7, p 62).*

Fatigue factor is used in the calculation of sweep width and therefore initial track spacing. Changing the fatigue factor will recalculate sweep width and track spacing and will therefore reset the SRU's search pattern. To change it, select one of the suggested values from the **Fatigue Factor** drop down menu or enter a new value between 0.1 and 1.0 into the field and then click **Apply**.

12.2.2.4 Sweep Width (W)

Sweep width is calculated internally according to the formula $W = W_u \times F_w \times F_f \times F_v$ and uses the values in the **Weather Factor**, **Speed Factor** and **Fatigue Factor** fields as well as the uncorrected sweep width tables in *Annex 7D – Sweep Width Tables* of the National SAR Manual (Figures 7D-1 through 7D-9).

This value is used with requested coverage factor to determine initial track spacing in search patterns. It cannot be modified directly but any change that alters an SRU's sweep width will reset its search pattern as well.

12.2.2.5 SRU Endurance

The value in the **SRU Endurance** field indicates the total number of hours for which an SRU can be tasked. The SRU's transit time is subtracted from this value and the result is multiplied by the the aircraft correction factor to determine on scene endurance which is the amount of time the SRU has available to actually traverse its search pattern.

When using the Transit Editor, the value in the **SRU Endurance** field should include transit time. If you know the transit time, it may be easier to simply subtract it from the SRU's total endurance and enter the result into the **SRU Endurance** field rather than using the Transit Editor. Similarly, if you know the amount of time the SRU expects to have on scene, enter this value into the **SRU Endurance** field and refrain from using the Transit Editor. For more information on the Transit Editor, see Section 12.9.

To change the SRU's endurance, select the value in the field and replace it with another value between 1.0 and 100.0 or use the arrows to the right of the field to increase or decrease the value shown. Changing the SRU's endurance resets its search pattern.

You must click **Apply** before a change to the SRU's endurance will take effect.

12.2.2.6 Aircraft Correction Factor

The aircraft correction factor is multiplied by the SRU's total endurance to determine the amount of time on scene that can actually be spent traversing a search pattern. The aircraft correction factor accounts for the fact that aircraft must make wide turns outside the search area at the end of each leg to change direction and also allows them some time to circle back to investigate potential sightings.

The aircraft correction factor is automatically set to 0.85 for helicopters and fixed wing aircraft. For vessels, it is set to 1.0 to eliminate its effect. It may be changed to any value between 0.05 and 2.0. Altering an SRU's aircraft correction factor recalculates its on scene endurance and therefore resets its search pattern.

You must click **Apply** before a change to the aircraft correction factor will take effect.

12.2.2.7 On-Scene Endurance

On-scene endurance is the amount of time an SRU has on scene to actually traverse a search pattern. It is calculated by multiplying the SRU's total endurance in the **SRU Endurance** field by the aircraft correction factor and then subtracting its transit time, if any.

12.2.2.8 Transit Time

An SRU's transit time is subtracted from its total endurance before the result is multiplied by the aircraft correction factor to determine on scene endurance. If you know the transit time, simply subtract it from the SRU's total endurance and enter the result into the SRU Endurance field rather than using the Transit Editor.

If you know the SRU's origin and its final destination after concluding its search but not the time required to travel to and from the scene, you may use the Transit Editor to calculate its transit time. In this case, the result will be displayed in the Transit Time field.

Transit Time cannot be modified directly. To modify it either adjust the SRU Endurance field (refer to Section 12.2.2.5) or use the Transit Editor (refer to Section 12.9). In either case, changing the SRU's transit time alters its time on scene and therefore resets its search pattern.

12.2.2.9 Requested Coverage Factor

Coverage factor is a measure of search effectiveness or quality and is the ratio between sweep width and track spacing. The requested coverage factor is used to determine the track spacing of an SRU's initial search pattern. This value defaults to 1.0, which leaves no gaps or uncovered area within the pattern. If time or resources are limited, this number may be reduced as far as 0.05; if the area is small and excess resources are available, it may be increased to as much as 2.0.

> ***Note**: Only the parallel sweep and expanding square search patterns make use of requested coverage factor.*

You must click **Apply** before a change to the requested coverage factor will take effect. Changing it will reset the SRU's search pattern.

12.2.3 Pattern Type

The **Pattern Type** field is visible at the bottom of the SRU Manager window regardless of which tab is displayed above it and indicates type of search pattern the SRU is to use. To change the pattern type, click the arrow to the right of the **Pattern Type** field and select another type from the drop down menu that appears and then click **Apply**.

To open an SRU's search pattern in the Search Pattern Editor, click the **Edit** button to the right side of the field. See *Chapter 13 – Effort Allocation: Search Patterns* for details on editing search patterns.

12.3 Adding a New SRU

To add a new SRU from the SRU Manager, click the **New SRU** button below the list of SRUs; this adds a new SRU to the scenario and adds a corresponding search pattern to the canvas. The new SRU will be named “New_SRU” and its colour will be assigned automatically. The same colour is used to display the search pattern, which defaults to a parallel sweep track optimized for the initial parameters described previously and outline in Table 12.1.

If there is already at least one search object, the new SRU's commence search point (CSP) will be located at the first search object's latitude and longitude and its search object type will be set to that of the first search object. If no search objects have been added to the scenario yet, the new SRU will be positioned at the centre of the canvas and its search object type is set to PIW.

In either case, the other fields of the details and calculations tabs are filled in with the same initial values, which are also used to determine an initial parallel sweep track for the SRU:

Parameter	***Default Initial Value***
Type	Fixed wing, 300 feet altitude
Search Speed	140 knots
Navigation System	GPS
Position Error	0.25 NM
Search Pattern Type	Parallel sweep
Fatigue Factor (Ff)	1.00
SRU Endurance	1.00 hours
Aircraft Correction factor	0.85
Requested Coverage	1.00

Table 12.1: A generic SRU's default values

The SRU's initial sweep width, track spacing and total track length are calculated based on these values and the other values calculated internally, such as weather factor and speed factor. These parameters are discussed in Sections 12.2.1 and 12.2.2.

12.3.1 Adding a New SRU from the SRU Database

You may also add a new SRU by selecting one that has previously been added to the SRU database. In this case, the parameters listed in Table 12.1 will be set according to the information in the database instead of to the default values.

To add an SRU from the database, click the SRU Database button. This will open the SRU Database Resources window:

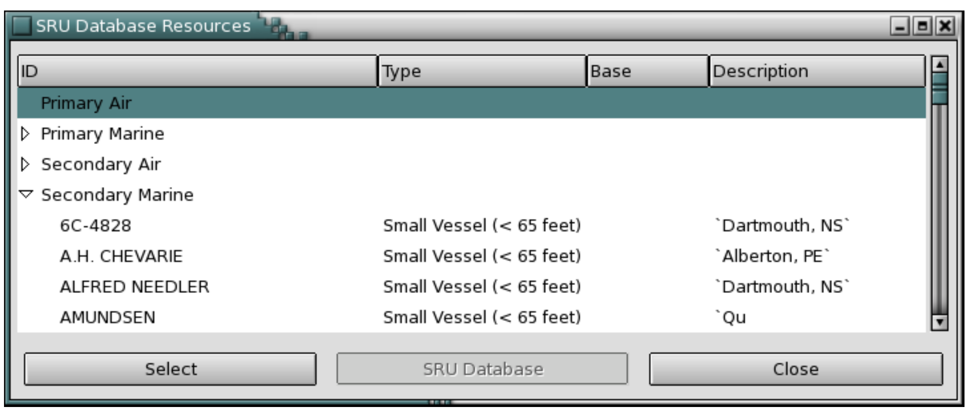

Figure 12.4: The SRU Database window with the list of Secondary Marine resources expanded.

This window displays a list of SRU categories that can be expanded to show the individual SRUs each contains. For example, in Figure 12.4, the Secondary Marine category has been expanded so that four SRUs are visible. The ID, type, base and a brief description are displayed for each SRU in the list.

> ***Note:*** *SRUs will only appear in the SRU Database if they have previously been added to the database by the CANSARP administrator and that the database of resources may vary from one RCC to another. New resources may only be added to the database when CANSARP is running in admin mode.*

To add a particular SRU to a scenario, select it in the list, then click the **Select** button and then the **Close** button. The selected SRU will now appear in the SRU list in the SRU Manager and the fields of the Details and Calculation tabs will be filled automatically with the values entered into the database for the selected SRU. You should check to make sure the database settings for the SRU apply in the given situation and modify any parameters as circumstances require.

When added from the SRU database, an SRU's CSP will be set to the first search object in the search object list if there is one. If there is not, the SRU will be located at its home base.

> ***Hint:*** *If you add an SRU from the database and aren't sure where it was positioned, click the* **Center On** *button to recentre the canvas on the selected SRU.*

12.3.2 Adding an SRU from the Canvas Menu

To add a new SRU from the canvas menu instead of the SRU Manager, right click at the SRU's intended position and select **Allocate SRU** from the canvas menu when it appears. This has the same effect as using the **New SRU** button except that the new SRU will be positioned at the point where you clicked rather than at the first search object or the centre of the canvas. SRUs cannot be added from the SRU Database from the canvas menu.

12.3.3 Adding an SRU from the Search Object Manager

You may also add an SRU for a particular search object by selecting that object in the Search Object Manager and then clicking on the **Allocate SRU** button located below the search object list. This has the same effect as adding the SRU from the SRU Manager, except that the new SRU will have the same position as the search object, the SRU's type will be set to that of the search object, and its search speed may vary from the default 140 knots; again, these values will be used to determine the initial search pattern.

> ***Caution:*** *SRUs are not tied to a specific search object in the Search Object Manager. If an SRU is allocated from within the Search Object Manager, its search object type is set to the search object currently selected, but no link is created between the two. If that search object is later modified or deleted, it will have no effect on the SRU.*

12.4 Duplicating an SRU

You may duplicate an existing SRU by clicking the **Duplicate SRU** button below the SRU list in the SRU Manager. This makes an exact copy of the SRU, including its transit points (see Section 12.9) and its search pattern, except that a different colour is assigned to the new SRU. You may then change any of the new SRU's parameters as described in Sections 12.2.1 and 12.2.2 if desired.

> ***Hint:*** *The new SRU will have the same name as the original. It may be helpful to change its name to something unique so that it is easier to tell the two apart in the SRU list, in printed reports and SRU tasking forms, and when both are minimized on the canvas.*

12.5 Deleting an SRU

To delete an SRU, select it in the SRU list by left clicking on it and then click the **Delete** button. Alternately, you may right click on the SRU's search pattern or icon and select **Delete SRU** from the canvas menu when it appears.

> ***Caution****: If more than one search pattern covers the position on which you right click, the SRU that appears first in the SRU list will be manipulated. This is usually the pattern on the bottom of the stack rather than the one visible on top. For this reason, you should avoid deleting stacked SRUs via the canvas menu.*

12.6 Modifying an existing SRU

Once an SRU has been added, many of its parameters may be modified. If a field in the Details or the Calculation tab is greyed out, it is a read-only field containing a variable that is calculated internally based on information entered in other places. The fields that are not read-only may be modified directly by the user.

To change one or more parameters of a given SRU, open the SRU Manager and then select the particular SRU in the list at the top of the manager window by left clicking on it. Alternately, you may right click on the SRU's search pattern or icon and select **Edit SRU** from the canvas menu when it appears. This will open the SRU Manager with the given SRU already selected. In either case, the selected SRU's parameters will be displayed in the various fields of the Details and Calculation tabs.

Any changes made to the editable fields of the SRU Manager will only take effect once the **Apply** button is clicked. If you close the SRU Manager without applying a change, you will be prompted to Apply the change before the window closes. If you wish to discard your changes, close the window without applying them.

> ***Note:*** *Applying any change that affects sweep width, on scene endurance or search pattern type will reset an SRU's search pattern to one optimized for the new values.*

12.7 Deleting an SRU

To delete an SRU, select it in the list at the top of the SRU Manager window and then click the **Delete SRU** button. Alternatively, you may right click on the SRU's search pattern on the canvas or on its minimized icon and select **Delete SRU** from the canvas menu when it appears.

> ***Note:*** *If the SRU just deleted had a larger SRU position error than any remaining SRUs, you must refresh the screen to display the new, smaller minimax circle. See Section 12.2.1.7 for more information.*

12.8 SRUs and the Canvas Menu

To add a new SRU from the canvas menu, right click at the SRU's intended position and select **Allocate SRU** from the canvas menu when it appears. This has the same effect as using the **New SRU** button in the SRU Manager (see Section 12.3) except that the new SRU will be positioned at the point where you clicked rather than at the first search object or the centre of the canvas.

To delete an SRU from the canvas menu, right click on the SRU's search pattern and then select **Delete SRU** from the canvas menu when it appears.

To open the SRU Manager with a particular SRU selected so that it may be modified, right click on the SRU's search pattern and then select **Edit SRU** from the canvas menu when it appears.

> ***Caution****: If more than one search pattern covers the position on which you right click to open the canvas menu, the SRU that appears first in the SRU list, usually the pattern on the bottom of the stack rather than the one visible on top, will be manipulated. For this reason, you should avoid deleting stacked SRUs via the canvas menu and should check to make sure that the SRU you wish to modify is the one selected when the SRU Manager opens.*

To minimize an SRU's search pattern from the canvas menu, right click on the search pattern and select **Minimize Pattern** from the canvas menu when it appears. See the *Before You Begin...* section of *Chapter 13 – Effort Allocation: Search Patterns* for further information on minimizing search patterns.

> ***Hint****: If an SRU has been minimized, you may use the canvas menu to manipulate it by right clicking on its icon instead of its search pattern.*

12.9 The Transit Editor

The Transit Editor can be used to estimate an SRU's time on scene and transit time to and from the scene when its position before the search and its destination after the search are known but the time required to travel to and from the search area is not.

> ***Hint:*** *If the time required for an SRU to travel to and from the scene* ***is*** *known, simply subtract this time from the SRU's endurance on the Calculations tab of the SRU Manager and do not use the Transit Editor.*

Calculation of transit time depends on the location of the SRU's CSP, so the pattern should be moved to the correct location before transit time is calculated.

> ***Note****: Calculating a transit time recalculates the SRU's on scene endurance time, which in turn resets the SRU's pattern. If you plan to use the Transit Editor, you should calculate the transit time* ***before*** *modifying the SRU's search pattern.*

To open the Transit Editor, first select the SRU for which you wish to calculate a transit time in the SRU Manager, then switch to the Calculations tab if necessary and click the **Transit Editor** button. To calculate the SRU's transit time, follow the instructions in each of the following subsections.

12.9.1 SRU Start Point / Home Base

The SRU Start Point / Home Base region of the Transit Editor displays the latitude and longitude of the SRU's original position before traveling to the search area and the time at which it leaves this location. If the transit time is up to date (see previous note), the remaining fields in this region indicate the distance from the starting point to the CSP and the time required to travel this distance at the transit speed set at the bottom of the editor window.

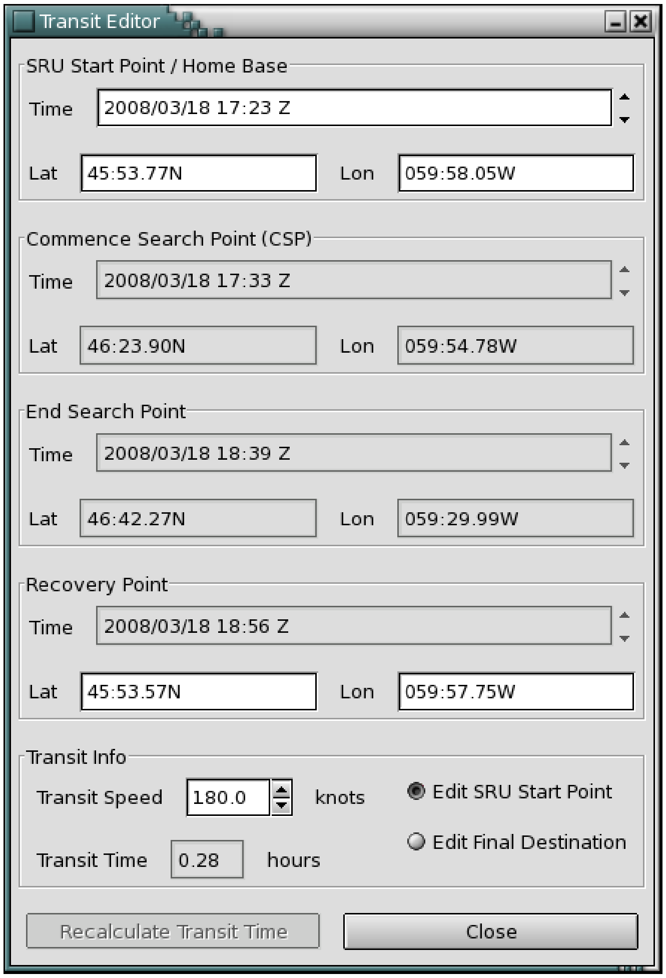

Figure 12.5: The Transit Editor

To set the SRU's starting point position, enter a latitude and/or longitude into the **Lat** and/or **Lon** fields in the SRU Start Point / Home Base region. Alternately, you may set the position with the mouse by first making sure the **Edit SRU Start Point** radio button is selected at the bottom of the editor window and then clicking on the canvas at your chosen position.

12.9.1.1 Start Point Time and CSP

When an SRU is first opened in the Transit Editor, its starting time and CSP time are the same. Whenever a transit time is recalculated for the SRU, its starting time stays constant and its CSP is adjusted to account for the time required to travel from the Start Point to the CSP at the speed displayed in the **Transit Speed** field at the bottom of the Transit Editor window. This change to CSP is immediately reflected in the SRU manager as well. The SRU's End Search Point time and Recovery Point time are also recalculated in the same fashion.

You may change the SRU's starting point time by entering a new value into the **Time** field within the Start Point / Home base region of the Transit Editor. Doing so will adjust the CSP time, End Search Point time and Recovery Point time as well once the transit time is recalculated.

12.9.2 Commence Search Point

The Commence Search Point region of the Transit Editor displays the latitude and longitude of the SRU's CSP and the time at which it will arrive at this position. These fields are set automatically by the values in the SRU Manager and cannot be changed within the Transit Editor itself.

> ***Note:*** *Changing an SRU's CSP outside of the Transit Editor invalidates any previously calculated transit time and so automatically turns off the Use Transit Time option in the SRU manager for the given SRU.*

12.9.3 End Search Point

The End Search Point region of the Transit Editor displays the latitude and longitude of the SRU's End Search Point at the time at which it will arrive at this position. These fields are set automatically and cannot be changed except by manipulating the search pattern itself.

> ***Note:*** *Manipulating an SRU's search pattern may invalidate any previously calculated transit time and so automatically turns off the Use Transit Time option in the SRU manager for the given SRU.*

12.9.4 Recovery Point

The Recover Point region of the Transit Editor displays the latitude and longitude of the SRU's final destination after traversing its search pattern, and the time at which it will reach this location traveling from its ESP at the speed displayed in the Transit Speed field at the bottom of the editor window. If the transit time is up to date (see earlier note), the remaining fields in this region indicate the distance from the ESP to the recovery point and the time required to travel this distance at the transit speed.

To set the SRU's recovery point position, enter a latitude and/or longitude into the **Lat** and/or **Lon** fields in the SRU Recovery Point region. Alternately, you may set the position with the mouse by first making sure the **Edit Final Destination** radio button is selected at the bottom of the editor window and then clicking on the canvas at your chosen position.

12.9.5 Transit Speed

An SRU's transit speed is the speed at which it will travel to and from the scene rather than the speed it will travel while traversing its search pattern. This value defaults to the SRU's search speed so will likely need to be increased. It can be changed to anything from 1 to 1500 knots by entering a new value into the field or by using the arrows to the right of the field to increase or decrease the value shown.

12.9.6 Recalculating Transit Time

Once a start point, recovery point and transit speed are set for the SRU, you must click the **Recalculate Transit Time** button at the bottom of the editor window to actually calculate the time required to travel to and from the scene. When you do so, the **Recalculate Transit Time** button will grey out, indicating that the values in all of the editor's various fields are up to date.

Recalculating the transit time will also automatically turn on the **Use Transit Time** check box in the SRU Manager and enter the transit time into the **Transit Time** field beside it. This value will be subtracted by the SRU's corrected endurance (see Section 12.2.2.6) to determine its on scene endurance. Recalculating an SRU's transit time also resets its search pattern to one optimized for its new on scene endurance.

12.9.7 Transit Time Recalculation Required

If the **Recalculate Transit Time** button at the bottom of the Transit Editor window is activated (i.e. not greyed out), the calculated times and distances in the editor's read-only fields may no longer be valid. In addition to happening whenever a change is made to one of the editable fields in the Transit Editor, this condition may be triggered by changes made elsewhere in the program. For example, moving a search pattern to a new position or changing the SRU's endurance invalidates a previously calculated transit time.

As well, when a change is made to an SRU's details or search pattern that invalidates a previously determined transit time, the words “Recalculation Required” will flash at the bottom of the SRU Manager's Calculation tab whether or not the Transit Editor is open.

To make sure that the information displayed in the Transit Editor's fields is current, recalculate the transit time whenever the **Recalculate Transit Time** button is activated but be warned: doing so will reset the SRU's search pattern.

In some cases when a previously calculated transit time is unusable, such as when the SRU's endurance is reduced to less time than required to travel to and from the scene, the **Use Transit Time** check box may be deactivated and the value of the **Transit Time** field on the SRU Manager's Calculations tab reset to 0. When this happens, the SRU Start Point and Recovery Point values are left unchanged in the Transit Editor window to facilitate recalculation of its transit time.

12.9.8 The Transit Time Paradox

Calculating a transit time recalculates the SRU's on scene endurance time, which in turn resets the SRU's pattern. If you plan to use the Transit Editor, you should calculate the transit time before modifying the SRU's search pattern so that your modifications are not lost..

However, modifying the SRU's search pattern in such a way that its CSP, ESP or time on scene is altered means that a previously calculated transit time is no longer valid. If the change is not significant, the estimated transit time will likely still be useful. If it is significant, however, and you are relying on the Transit Editor to determine time on scene or on scene endurance, it might be wise to measure the new transit distance with the linear range ruler and use this distance and the SRU's transit speed to calculate the actual transit time and time on scene and compare it to the estimated values.

Alternately, you could save the scenario, recalculate the transit time and make note of the new estimate and time on scene and then reload the SRUs by selecting **Reload** from the File menu and then **SAR Units** from the menu of scenario components when it appears. Once the SAR Units are reloaded, subtract the estimated transit time from the SRU's total endurance, enter this new value into the **SRU Endurance** field on the Calculations tab of the SRU Manager and the new CSP time on scene into the **Time** field on the Details tab, and do not use the Transit Editor to calculate transit time.

Chapter 13
Effort Allocation: Search Patterns

CANSARP provides four types of search patterns for each SRU: parallel sweep, expanding square, sector search and custom track. The custom track pattern editor may be used to define any type of search pattern but is most commonly used for trackline return, trackline non-return and coastal crawl patterns as described in the National SAR Manual.

In this chapter, you will learn

- How to set an SRU's search pattern type
- How to minimize an SRU's search pattern
- How to open an SRU's search pattern in the Search Pattern Editor
- How to manipulate an SRU's search pattern with the mouse
- How to manipulate an SRU's search pattern via the keyboard
- The differences between the various search pattern types
- How to use the Custom Track Pattern Editor to create a custom search pattern
- How to use the Custom Track Pattern Editor to create a coast crawl pattern

13.1 Before you begin...

13.1.1 Setting Pattern Type

All new SRUs default to using a parallel sweep search pattern. To change the SRU's pattern to another type, select it in the SRU List at the top of the SRU Manager window and then choose another pattern type from the **Pattern Type** drop down menu at the bottom of the manager window.

13.1.2 Minimizing an SRU's pattern

To reduce clutter on the canvas, you can minimize individual SRUs so that their search patterns are not displayed. This is also known as "iconifying" them. Minimizing an SRU removes its pattern from the canvas and creates an icon in the bottom left corner of the canvas window to represent it instead. When a pattern is minimized, you may right click on the SRU's icon and use the canvas menu just as if you'd clicked on its pattern.

To minimize a single SRU, double left click on its pattern on the canvas or right click once on the pattern and select **Minimize Pattern** from the canvas menu when it appears. To maximize it again, left click once on its icon.

To minimize all SRUs at once, type F4 while holding down the Control key. This same key combination will maximize all SRUs again.

13.2 The Search Pattern Editor

To modify an SRU's search pattern, you must open it in the Search Pattern Editor. This is true whether you plan to modify it with the mouse or the keyboard.

There are three ways to open an SRU's search pattern in the Search Pattern Editor: by left clicking on its pattern on the canvas; by right clicking on its pattern (or on its icon, if minimized) and selecting **Edit Pattern** from the canvas menu when it appears; or by opening the SRU Manager, selecting the given SRU, and then clicking the **Edit** button at the bottom of the manager window.

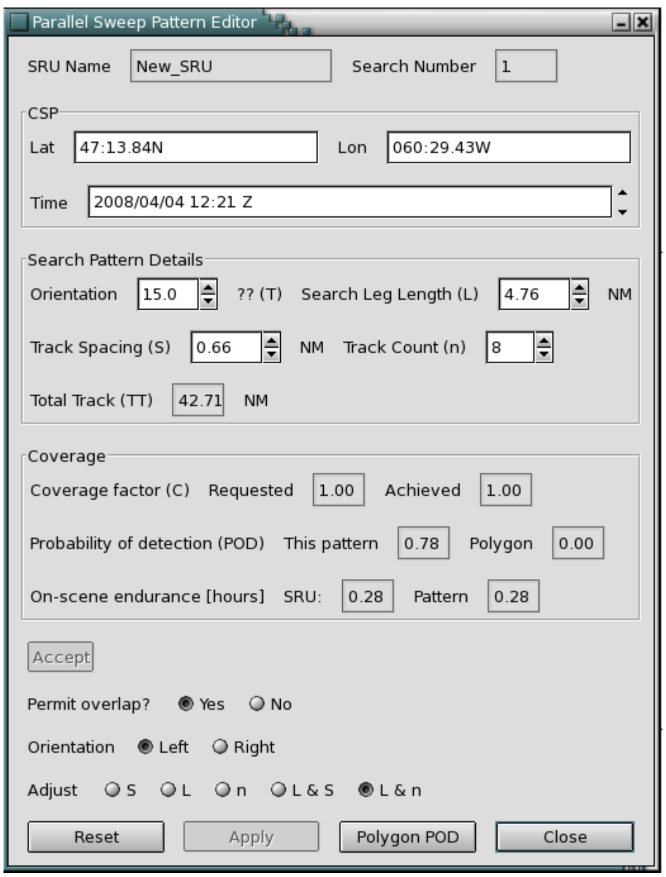

Figure 13.1: The Parallel Sweep Search Pattern Editor. Note that other types of patterns look slightly different when opened in the Search Pattern Editor.

Only one Search Pattern Editor window of any type (parallel track, sector search, expanding square, or custom track) may be open at a time. If the Search Pattern Editor is already open when you open another search pattern, the first Search Pattern Editor window will close.

Figure 13.1 shows the Parallel Sweep Search Pattern Editor. The two read only fields at the top of the editor window display the SRU's name (set in the SRU Manager) and the search number (set in the Scenario Manager). Below this are four regions which are common to all pattern types, although their contents may vary from one type to the next.

13.2.1 Search Pattern CSP

Every search pattern type has a CSP region that contains three fields related to the SRU's commence search point (CSP): **Lat**, **Lon** and **Time**. These are initially set according to the information in the corresponding fields of the SRU Manager, but may be modified from the keyboard. Changes to a pattern's CSP are reflected in the SRU Manager as well.

> ***Caution:*** *Changing an SRU's CSP invalidates a previously calculated transit time, so the SRU's on scene endurance may no longer be accurate. When you move an SRU, consider whether or not the change will have a significant impact on its transit time.*

13.2.2 Search Pattern Details

Each search pattern type has a slightly different combination of fields in this region of the Search Pattern Editor. See the description of the individual search patterns later in this chapter.

13.2.3 Search Pattern Coverage

The Coverage region of the Search Pattern Editor describes the effectiveness of the individual SRU as well as the combined effectiveness of all the SRU that have been added to the scenario.

All types of search patterns share the same six fields, as described below. These fields are read only and are either filled in with information set in other managers or with values calculated internally.

13.2.3.1 Coverage Factor – Requested and Achieved

Coverage factor is the ratio between track spacing and sweep width. The **Coverage Factor Requested** field displays the value set in the SRU Manager (see *Chapter 12 – Effort Allocation: SRUs And The SRU Manager*) and is used to calculate an initial track spacing whenever the SRU's search pattern is reset. When requested coverage factor is 1.0, the initial track spacing will be equal to the SRU's sweep width.

The value in the **Coverage Factor Achieved** field indicates the search pattern's actual track spacing to sweep width ratio, which may be different from the coverage factor requested in the SRU manager if the pattern has been modified. When a search pattern's track packing is altered, whether by entering a new value via the keyboard or by stretching it with the mouse, the ratio between it and the SRU's sweep width will change as well.

> ***Note:*** *Coverage factor cannot be calculated for a Custom Track pattern, so its Achieved value is simply set to 1.0. The achieved coverage factor for Sector Search patterns is calculated using the mid-leg track spacing.*

13.2.3.2 Probability of Detection – This Pattern

The value in the Probability of Detection (POD) **This Pattern** field indicates the effectiveness of the individual SRU. It is calculated based on the SRU's achieved coverage factor and the search number as described in *Section 5.26 – Probability Of Detection* and *Figure 5-3 – Coverage Factor Vs. Probability Of Detection* of the National SAR Manual. The individual SRU's POD is *not* based on the search area polygon or on any other SRUs in the scenario.

13.2.3.3 Probability of Detection – Polygon

If a search area polygon has been added to the scenario, CANSARP can calculate a Polygon POD. This Polygon POD is a measure of the combined coverage of the search area polygon by all the SRUs added to the scenario.

This Polygon POD is calculated as follows:

- The individual POD for each SRU is calculated.
- Each SRU's individual POD is multiplied by the proportion of the search area polygon that its search pattern covers (in terms of area searched) to produce a scaled POD that ignores parts of the search pattern that are outside the polygon.
- The scaled PODs for all SRUs are summed together, accounting for regions where multiple search patterns overlap.

To calculate the Polygon POD, click the **Polygon POD** button at the bottom of the Search Pattern Editor. The resulting sum will be displayed in the Probability of Detection - **Polygon** field.

> ***Caution:*** *Polygon POD is* ***not the same*** *as the cumulative POD calculated in the manual method, nor does it relate to the POD of repeated searches.*

13.2.3.4 On-Scene Endurance – SRU and Pattern

The On-scene Endurance – **SRU** field indicates the amount of time an SRU has available on scene, as calculated in the SRU Manager (refer to Section 12.2.2.7 of *Chapter 12 – Effort Allocation: SRUs And The SRU Manager*). The On-scene Endurance – **Pattern** field indicates the amount of time required for the SRU to actually traverse the search pattern.

Whenever a search pattern is reset, it is recalculated to maximize but not exceed the SRU's endurance. If the search pattern is modified via the mouse or keyboard in such a way that the time required to traverse the pattern exceeds the SRU's endurance, the phrase **"> AVAILABLE"** will flash next to the **Accept** button below the Coverage region as a warning that endurance has been exceeded. To acknowledge the warning, click the **Accept** button. The text will stop flashing but remain visible until the pattern is changed in such a way that the Pattern endurance does not exceed the SRU's time on scene.

13.2.4 Overlap vs. Non-overlap

Another feature common to some search pattern types is the ability to allow or disallow overlapping with other search patterns.

By default, CANSARP allows search patterns to overlap one another on the canvas. You may choose to change this behaviour, however, as may be desirable in the case of two aircraft flying near one another at the same altitude. Turning off the ability to overlap also allows you to use the mouse to make two patterns abut one another and ensure that there are no gaps left between them without the duplication of effort that would result from having their patterns overlap.

To turn off the overlap option for an SRU, open the Search Pattern Editor and click on the **No** radio button to the right of the **Permit Overlap?** label. In order to prevent two patterns from overlapping, overlap must be disabled *for both patterns*. In this way, two aircraft may be prevented from overlapping one another but still be allowed to overlap with vessels below them.

> ***Hint:*** *If two patterns are already overlapping, you will not be able to disable overlapping for them both. You must first move one so that the two do not overlap, and then disable overlapping.*

> ***Note:*** *If the CSP of a pattern for which overlapping has been disabled is changed via the keyboard in such a way that it now overlaps another pattern for which overlapping has been disabled, overlapping will be reenabled for the pattern that was moved.*

> *As of CANSARP 5.0, overlap may only be turned off for Parallel Sweep and Expanding Square patterns.*

13.3 Editing Search Patterns Graphically with the Mouse

Search patterns may be manipulated graphically by using the mouse to drag, rotate, or stretch the pattern. The pattern must still be opened in the Search Pattern Editor in order to be manipulated in this way.

> ***Hint:*** *When manipulating any search pattern with the mouse,* ***you must always use the middle mouse button.***

Changes made to a search pattern with the mouse are applied and reflected in the Search Pattern Editor immediately.

13.3.1 Moving a Search Pattern with the Mouse

To move a search pattern, middle click and hold anywhere within the pattern's boundary, then drag it to the desired location. This works for every type of search pattern.

13.3.2 Stretching a Search Pattern with the Mouse

To stretch a search pattern, middle click and hold *outside* the boundaries of the pattern near one of its edges, and drag the mouse. This has different effects depending on the type of search pattern as described in the sections on each type of pattern later in this chapter.

13.3.3 Rotating a Search Pattern

To rotate a search pattern, middle click and hold outside the boundaries of the search pattern near one of its *corners or end points*, and then drag the mouse to spin the pattern. Sector search patterns rotate about their centre point; all other patterns rotate about the corner opposite the one near which you clicked.

> ***Hint:*** *You don't need to click very close to the pattern to stretch or rotate it and clicking farther away will avoid moving the pattern by accident. However, clicking fairly close to the pattern will make it easier to control whether you're dragging a side (stretching the pattern) or a corner (rotating the pattern).*

13.3.4 Rotating Patterns via Keyboard and Mouse

When rotated with the mouse, search patterns rotate about the opposite corner (except sector searches, which rotate about their centre point). Most search patterns may also be rotated via the keyboard by changing the value in the **Orientation** field of the Search Pattern Editor. When this is done, a search pattern rotates about its CSP rather than a corner point.

> ***Caution:*** *This difference in rotation points means that the two methods of rotating a search pattern do not cancel each other out. That is, rotating a search pattern by first one method and then the other does not necessarily return the pattern to its original position but rather can "walk" it across the canvas. The Parallel Sweep Search Pattern (SS)*

Figure 13.2 shows a typical parallel sweep pattern in the Search Pattern Editor.

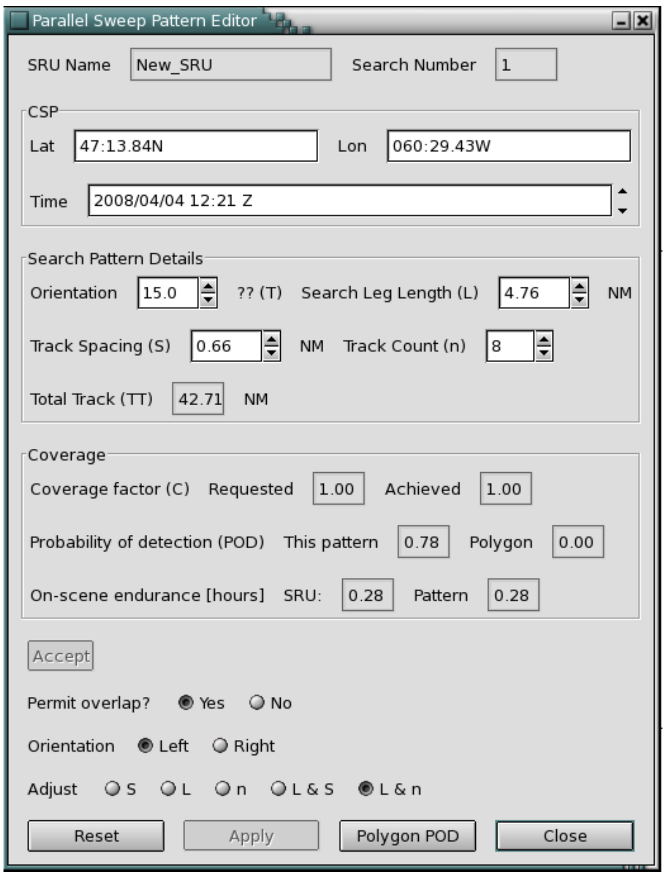

Figure 13.2: The Parallel Sweep Pattern Editor

13.3.5 Parallel Sweep – Search Pattern Details

A parallel sweep pattern has four editable fields and one read-only field in its Search Pattern Details region:

- The **Orientation** field indicates the bearing of the pattern's first search leg. An SRU traversing this pattern will leave from the CSP at this heading.
- The **Search Leg Length (L)** field indicates the length of each search leg. An SRU traversing

this pattern will travel this distance before turning to the right or left to cross the track spacing to the next search leg.

- The **Track Spacing (S)** field indicates the distance between search legs.
- The **Track Count (n)** field indicates the number of search legs in the pattern.
- The **Total Track (TT)** field indicates the total length of the search pattern.

Editing any of these fields via the keyboard affects only the field(s) that were directly modified. The values in unmodified editable fields are preserved and Total Track (TT) is recalculated. If the new total track length exceeds the SRU's on scene endurance, the phrase **"> AVAILABLE"** will flash below the Coverage region of the pattern editor, as described in Section 13.2.3.4.

13.3.6 Parallel Sweep – Additional Options

A parallel sweep pattern has two additional options: overlap and orientation. These options are adjusted via the radio buttons near the bottom of the editor window.

The **Orientation Right/Left** option determines the direction of creep, i.e. the direction the SRU will turn at the end of its first search leg. If **Right** is selected, the SRU will turn right (relative to its heading, not the canvas) at the end of its first search leg. If **Left** is selected, it will turn left instead.

The **Permit Overlap?** option determines whether or not the the search pattern may overlap with others on the canvas. If **On** is selected, the pattern is allowed to overlap with other patterns, including those for which overlapping has been disabled. If **Off** is selected, the pattern will not be able to overlap with other patterns for which overlapping has also been disabled. See Section 13.2.4 for further information on overlapping.

13.3.7 Stretching a Parallel Sweep Pattern with the Mouse

When a parallel sweep pattern is stretched with the mouse (see Section 13.3.2), the result depends on which of the adjustment options is selected at the bottom of the Search Pattern Editor window. To choose between these options, simply click the radio button to the left of the option you wish to use.

13.3.7.1 Adjust S (Track Spacing)

When **Adjust S** is selected, stretching a search pattern with the mouse will increase or decrease the distance between search legs. All other parameters are left unchanged, and total track length is recalculated.

When this option is selected, you will only be able to stretch a pattern in the direction of creep. Stretching it in the opposite direction (against its creep) will affect the track spacing but will extend or contract the pattern in the direction of creep, leaving its right/left orientation and CSP unchanged. Stretching it in the direction of its orientation will have no effect.

13.3.7.2 Adjust L (Search Leg Length)

When **Adjust L** is selected, stretching a search pattern with the mouse will increase or decrease the length of its search legs. All other parameters are left unchanged, and total track length is recalculated.

When this option is selected, you will only be able to stretch a pattern in the direction of its orientation, i.e. the heading of its first search leg Stretching it in the opposite direction will affect the length of search legs but will extend or contract the pattern in the direction of the first search leg, leaving its CSP unchanged. Stretching it in the direction of its creep will have no effect.

13.3.7.3 Adjust n (Track Count)

When **Adjust n** is selected, stretching a search pattern with the mouse will increase or decrease the number of search legs. All other parameters are left unchanged, and total track length is recalculated.

When this option is selected, you will only be able to stretch a pattern in the direction of creep. Stretching it in the opposite direction (against its creep) will affect the number of search legs but will extend or contract the pattern in the direction of creep, leaving its right/left orientation and CSP unchanged. Stretching it in the direction of its orientation will have no effect.

13.3.7.4 Adjust L & S (Search Leg Length and Track Spacing)

When **Adjust L & S** is selected, stretching a search pattern with the mouse will affect both search leg length and track spacing, leaving total track length and all other parameters unchanged.

If the pattern is stretched in direction of creep, track spacing is increased or decreased, and search leg length is extended or contracted as required to keep the total track length constant.

If the pattern is stretched in the direction (or opposite direction from) its first search leg's orientation, search leg length is increased or decreased and track spacing is expanded or contracted as required to keep the total track length constant.

13.3.7.5 Adjust L & n (Search Leg Length and Track Count)

When **Adjust L & n** is selected, stretching a search pattern with the mouse will affect both search leg length and track count, leaving total track length and all other parameters unchanged.

If the pattern is stretched in direction of creep, track count is increased or decreased, and search leg length is extended or contracted as required to keep the total track length constant.

If the pattern is stretched in the direction (or opposite direction from) its first search leg's orientation, search leg length is increased or decreased and the number of search legs is reduced or increased as required to keep the total track length constant.

Figure 13.3 shows a typical parallel sweep pattern on the canvas.

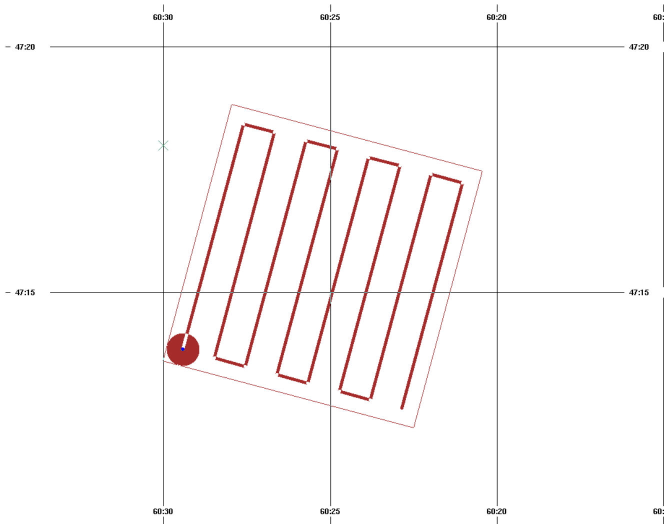

Figure 13.3: A typical parallel sweep search pattern

13.4 The Expanding Square Search Pattern (SS)

13.4.1 Expanding Square – Search Pattern Details

Figure 13.4 shows a typical expanding square pattern in the Search Pattern Editor:

An expanding square pattern has three editable fields and one read-only field in its Search Pattern Details region:

- The **Orientation** field indicates the bearing of the pattern's first search leg. An SRU traversing this pattern will leave from the CSP at this heading.
- The **Track Spacing (S)** field indicates the distance between search legs.
- The **Turn Count (n)** field indicates the number of times the SRU must turn to traverse the pattern.
- The **Total Track (TT)** field indicates the total length of the search pattern.

Changing either track spacing or total track length from the keyboard leaves the other value unchanged and recalculates the number of turns required. Changing both at once also recalculates the turn count.

If the new total track length exceeds the SRU's on scene endurance, the phrase **"> AVAILABLE"** will flash below the Coverage region of the Search Pattern Editor, as described in Section 13.2.3.4.

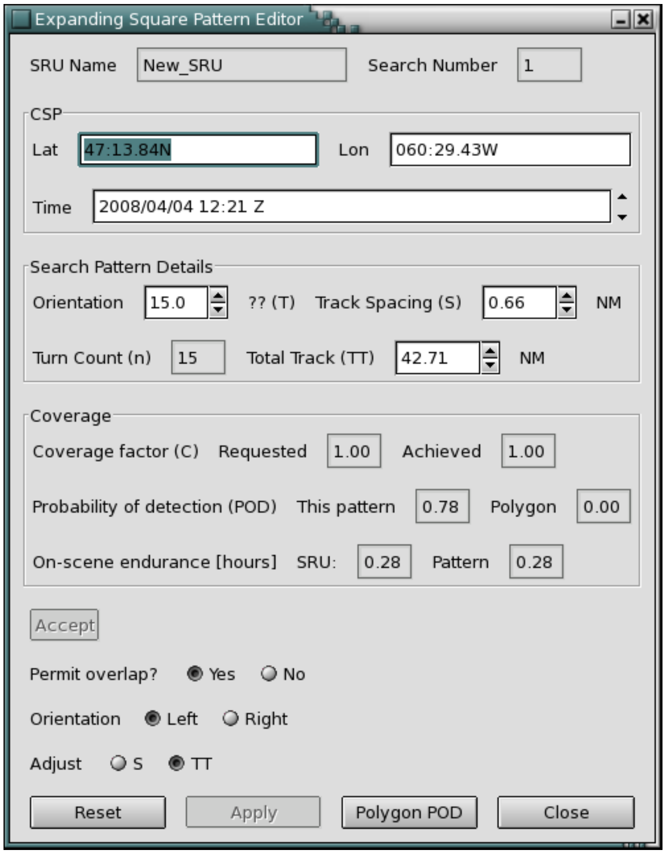

Figure 13.4: The Expanding Square Pattern Editor

13.4.2 Expanding Square – Additional Options

An expanding square pattern has two additional options: overlap and orientation. These options are adjusted via the radio buttons near the bottom of the editor window.

The **Orientation Right/Left** option determines the direction of creep, i.e. the direction the SRU will turn at the end of each search leg. If **Right** is selected, the SRU will turn right (relative to its heading, not the canvas) at the end each leg; if **Left** is selected, it will turn left instead.

The **Permit Overlap?** option determines whether or not the the search pattern may overlap with others on the canvas. If **On** is selected, the pattern is allowed to overlap with other patterns, including those for which overlapping has been disabled. If **Off** is selected, the pattern will not be able to overlap with other patterns for which overlapping has also been disabled. See Section 13.2.4 for further information on overlapping.

13.4.3 Stretching an Expanding Square Pattern with the Mouse

When an expanding square pattern is stretched with the mouse (see Section 13.3.2), the result depends on which of the adjustment options is selected at the bottom of the Search Pattern Editor window. To choose between these options, simply click the radio button to the left of the option you wish to use.

13.4.3.1 Adjust S (Track Spacing)

When **Adjust S** is selected, stretching a search pattern with the mouse will increase or decrease the distance between search legs. Total track length (TT) is preserved, and the turn count is recalculated.

13.4.3.2 Adjust TT (Total Track)

When **Adjust TT** is selected, stretching a search pattern with the mouse will increase or decrease the length of its search legs. All other parameters are left unchanged, and total track length is recalculated.

Figure 13.5 shows a typical expanding square pattern on the canvas.

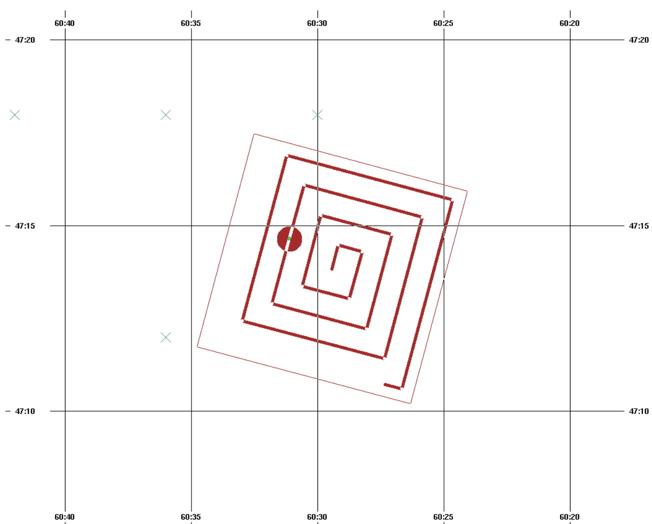

Figure 13.5: A typical expanding square search pattern

13.5 The Sector Search Pattern (VS)

Figure 13.6 shows a typical sector search pattern in the Search Pattern Editor.

13.5.1 Sector Search – Search Pattern Details

A sector search pattern has two editable fields and four read-only fields in its Search Pattern Details region:

- The **Orientation** field indicates the bearing of the pattern's first search leg. An SRU traversing this pattern will leave from the CSP at this heading.

- The **Search Leg Length (L)** field indicates the length of each search leg. In a sector search, this is the distance from the centre of the search pattern to the perimeter.

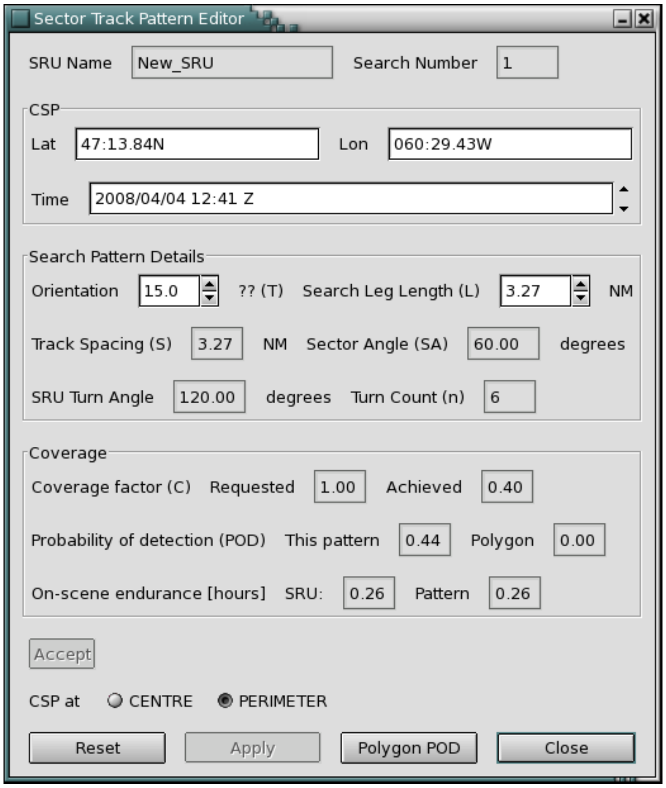

Figure 13.6: The Sector Track Pattern Editor

- The **Track Spacing (S)** field indicates the distance between search legs. This is the same distance as the search leg length.
- The **Sector Angle (SA)** field indicates the interior angle of each turn the SRU makes along the track. This is always 60°.
- The **SRU Turn Angle** field indicates the angle at which the SRU must turn relative to its current heading. This is always 120°.
- The **Turn Count (n)** field indicates the number of times the search pattern crosses the center point of the pattern. This is always 6.

Changing the search leg length recalculates track spacing and total track length. If the new total track length exceeds the SRU's on scene endurance, the phrase **"> AVAILABLE"** will flash below the Coverage region of the Search Pattern Editor, as described in Section 13.2.3.4.

13.5.2 Sector Search – Additional Options

A sector search pattern has one additional option: CSP. This option is adjusted via the radio buttons near the bottom of the editor window.

The **CSP at Centre/Perimeter** option determines the location of the CSP. If **Centre** is selected, the pattern is drawn with the CSP located at the centre point of the pattern, i.e. the location at which all the search legs cross. If **Perimeter** is selected, the pattern is drawn with the CSP on the perimeter, so that the SRU will travel at the given bearing towards the centre point on the first search leg.

13.5.3 Stretching a Sector Search Pattern with the Mouse

When a sector search pattern is stretched with the mouse (see Section 13.3.2), the length of each search leg is increased or decreased.

Figure 13.7 shows a typical sector search pattern on the canvas.

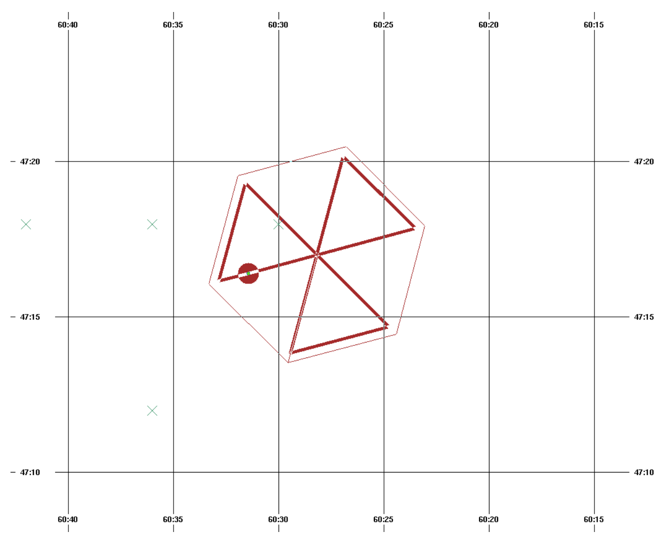

Figure 13.7: A typical sector search pattern

13.6 The Custom Track Search Pattern

A custom track search pattern is essentially a series of points on a track, much like a track line (see *Chapter 7: Track Lines And The Trackline Manager*). It can be used to create any kind of pattern but is most often used to represent trackline return, trackline non-return and coast crawl patterns.

Because of the unique nature of a custom track pattern, the Search Pattern Editor has a number of additional fields when a custom track pattern is opened.

> ***Note:*** *When working with a Custom Track, the* **Lat** *and* **Lon** *fields in the CSP region at the top of the Search Pattern Editor simply mirror the values in the* **Lat** *and* **Lon** *fields above the list of points near the bottom of the editor window. Changing the CSP* **Lat** *and* **Lon** *fields will have no effect. In the rest of this section, references to the* **Lat** *and* **Lon** *fields refer to the fields immediately above the list of points, not those in the CSP region.*

One example of a Custom Track Pattern Editor is shown in Figure 13.8.

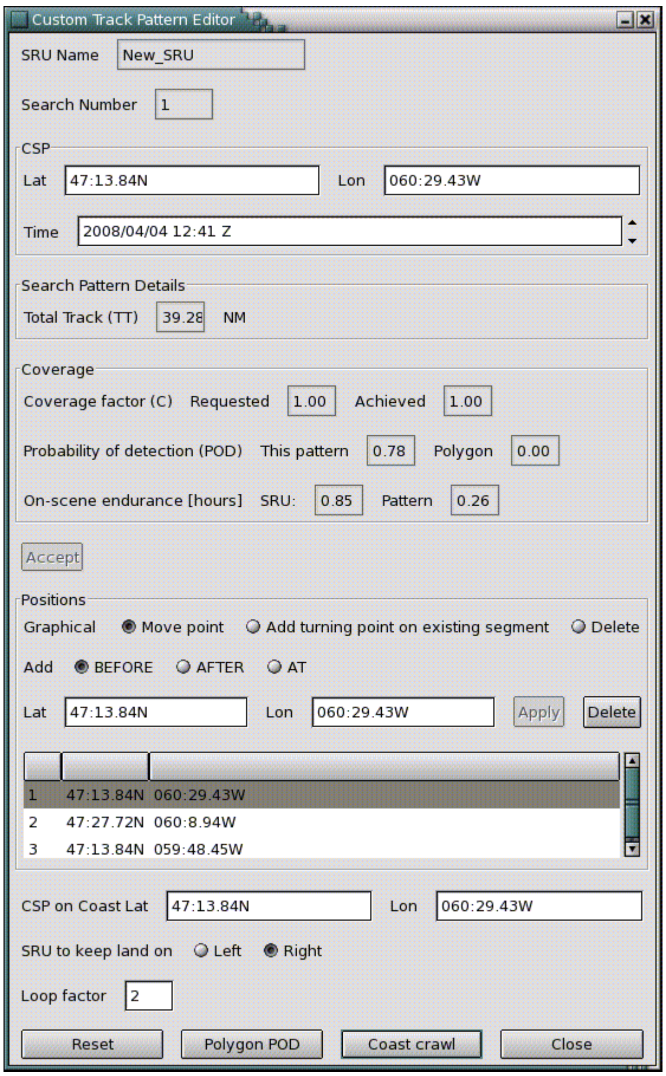

Figure 13.8: The Custom Track Pattern Editor

13.6.1 Custom Track – Search Pattern Details

A custom track pattern has only one field in its Search Pattern Details region: **Total Track (TT)**.

This field displays the total length of the custom track and is not editable.

13.6.2 Manipulating a Custom Track Search Pattern

When a search pattern is first changed to a custom track, it will be drawn as a line consisting of two line segments as shown in Figure 13.9.

The total length of the line is determined by the SRU's searching speed and its time on scene. The line will extend from the CSP at a 45° angle for half the line's length, then turn 90º at an interior point and continue for the rest of its length at that bearing.

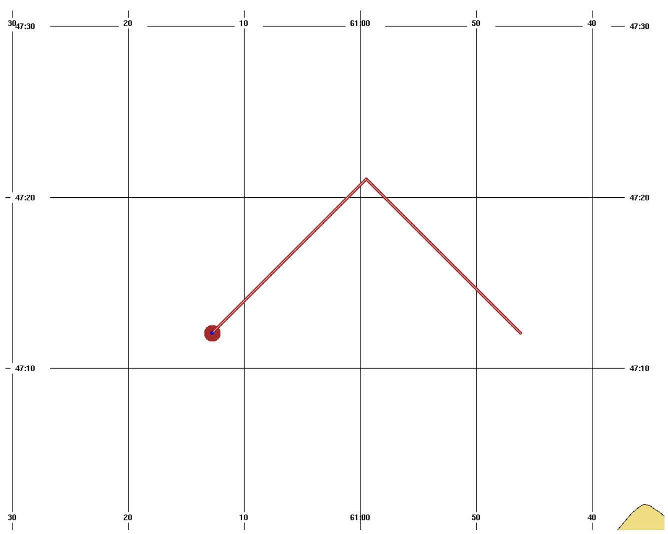

Figure 13.9: The initial state of a custom track search pattern

The points that make up the custom track are listed in a table in the Positions region near the bottom of the editor window. The buttons above this table can be used to add new points via the keyboard or mouse, or to modify or delete existing points.

13.6.2.1 Adding a New Point via the Keyboard

To add a new point to a custom track via the keyboard, first decide which existing point it will go before or after and select that point in the table. Next, select the **BEFORE** or the **AFTER** radio button immediately above the **Lat** and **Lon** fields as appropriate. When adding a point to the beginning of the line, select the first point and then **BEFORE**. When adding a point to the end of the line, select the last point and then **AFTER**. Finally, enter the latitude and longitude of the new point into the **Lat** and **Lon** fields above the list of points and then click the **Apply** button to the right of those fields.

13.6.2.2 Moving a Point via the Keyboard

To move an existing point on a custom track via the keyboard, select that point in the table. Next, select the **AT** radio button above the **Lat** and **Lon** fields and then enter the new latitude and/or longitude into the fields and click **Apply**.

13.6.2.3 Deleting a Point via the Keyboard

To delete an existing point on a custom track via the keyboard, select that point in the table and then click the **Delete** button.

13.6.2.4 Adding a New Point with the Mouse

To add a new interior point (i.e. a point between two existing points) to a custom track using the mouse, first select the **Add Turning Point On Existing Segment** radio button at the top of the Positions region of the editor window. Next, point the mouse at the line segment to which you wish to add the point, and *middle click on the line* and hold down the mouse button. Finally, drag the mouse to move the point to its new position.

To add a new end point, it is easiest to add a new interior point to the first or last line segment and drag it to the desired end position, and then delete the first or final point as appropriate (see Section 13.6.2.3).

13.6.2.5 Moving a Point with the Mouse

To move an existing point on a custom track via the keyboard, first select the Move Point radio button at the top of the Positions region of the editor window. Next, point the mouse at the point on the line that you wish to move, and *middle click on the point* and hold down the mouse button. Finally, drag the mouse to move the point to its new position.

> ***Hint:*** *When adding or moving points to a custom track search pattern with the mouse, it is extremely helpful to have markers located on the canvas at the end and turning points. See the tutorial at the end of this manual for an example.*

13.6.3 Using the Custom Track Pattern for a Coast Crawl

The remaining buttons at the bottom of the Custom Track Search Pattern Editor allow you to create a coast crawl search pattern.

> ***Note:*** *This use of the Custom Track is ideal for calculating how far along the coastline a particular SRU can search within the time it has available but is not well suited to actually tasking an SRU, as it produces a long series of closely spaced turning points.*

When working with a Coast Crawl pattern, the **Lat** and **Lon** fields in the CSP region at the top of the Search Pattern Editor merely reflect the values in the **CSP On Coast Lat** and **Lon** fields at the bottom of the editor window. Changing the CSP **Lat** and **Lon** fields will have no effect.

Similarly, the **Apply** button has no effect on a Coast Crawl pattern – instead, you must use the **Coast Crawl** button at the bottom of the window to apply any changes and recalculate the pattern.

13.6.3.1 Creating a Coast Crawl Pattern

The first step is creating a coast crawl track is to move the CSP to the point on the coast where the pattern should begin. This is most easily accomplished by dragging the custom track line with the mouse, as described in Section 13.3.1.

> ***Hint:*** *The CSP must be no farther from shore than the SRU's sweep width. When the SRU's search object type is set to PIW, this distance is very short, so it may be helpful to zoom in to the maximum extent when moving the CSP.*

Once the CSP has been moved to the desired location, click the **Coast Crawl** button to calculate the coast crawl pattern. Figure 13.10 shows a typical coast crawl pattern on the canvas.

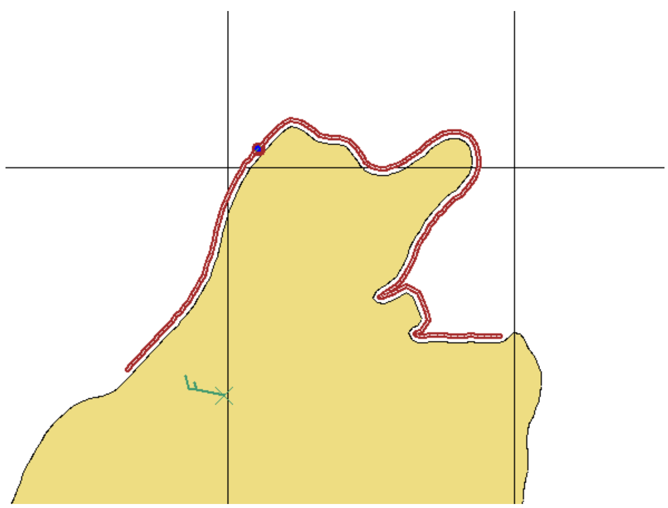

Figure 13.10: A typical coast crawl search pattern

13.6.3.2 Circumnavigating an Island

If the pattern completely circumnavigates an island and there is time left in the SRU's on-scene endurance, you will be asked whether or not the pattern should continue to retrace its path until the SRU's entire endurance is consumed.

13.6.3.3 Coast Crawl Pattern Options

A coast crawl pattern has two additional options: SRU to keep land on left or right, and loop factor.

The **SRU To Keep Land On Left/Right** option determines which direction the SRU will travel along the coastline.

Track smoothing is controlled by the value in the **Loop Factor** field at the bottom of the Custom Track Pattern Editor window. Loops in the search track that are smaller than or equal to the loop factor times the width of the track will be removed. This value defaults to 2 and in practice it should be kept small, between 0 and 4. A value of 0 in this field turns off smoothing completely; that is, no loops at all will be removed. Negative numbers are not allowed.

Chapter 14
Printing, Reports and the Logging System

14.1 Print Scenario

To print a copy of the active scenario, select **Print Scenario** from the File Menu or type Ctrl-F12. This brings up the **Print Scenario** dialog box:

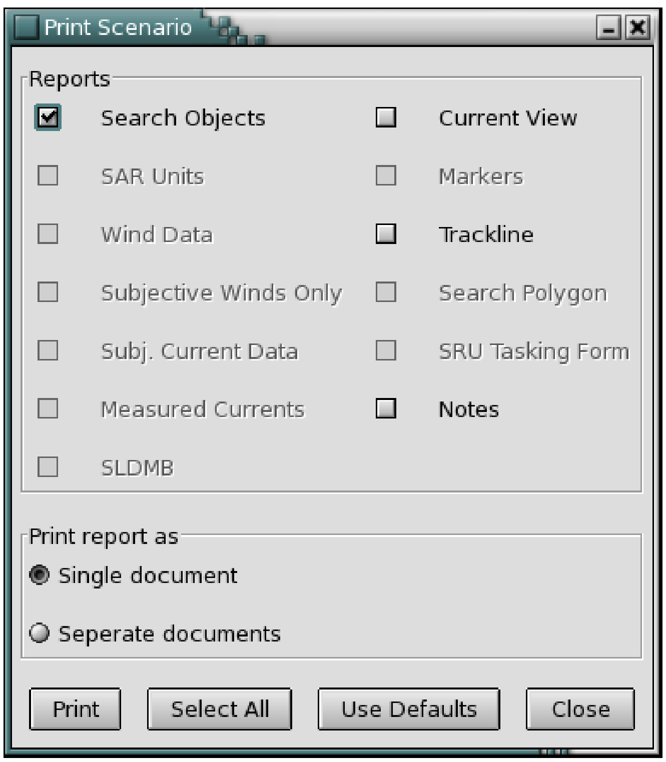

Figure 14.1: The Print Scenario dialog box

All but two of these reports are identical to those produced by the Reports Editor (see Section XX.XX). The two exceptions are *Current View* and *Subjective Winds Only*, which are available only through the Print Scenario feature. *Current View* prints a screen shot of the canvas at its current position and zoom level, including all map elements currently displayed upon it. *Subjective Winds Only* prints wind vector data for all user entered and modified winds that impact drift calculations. This includes both subjective winds and CMC winds that have been modified. See 10: Environmental Data: Wind Data and Models for more information on user modified winds.

If data is available to produce a report, its name appears in bold in the dialog box; if a report's name is greyed out, there is no data available to produce it.

> *Wind and current vectors are only included in reports if they impact drift calculations; vectors added to the scenario that do not affect drift are not included in reports. The wind and current data reports will not be available in the* **Print Scenario** *dialog box even if you have added vectors to the scenario if none of those vectors impact drift.*

To select a report for printing, click on the check box to the left of the its name. If multiple reports are selected, you may choose to print them as separate documents or compiled into a single document. Once the reports you wish to print are selected, click **Print** to send the reports to the printer.

> *The Current View and the Notes reports always print as separate documents. If you select one of these reports in addition to other reports, you will need to confirm printing of each separate report.*

14.2 Notes Editor

14.3 Reports Editor

14.4 SRU Tasking Forms

14.5 Log M anager

14.5.1 Scenario Log

14.5.2 Case Log

14.5.3 System Log

Chapter 15
Additional Tools and Advanced Topics

15.1 Administrator Mode

15.1.1 Modifying SRU Database

15.1.2 Modifying Default Views

15.2 Advanced Display Options

15.2.1 Chart Editor

15.2.2 View Editor

15.3 ASTRO

Tutorial: Fishing Vessel Zebellos (Trackline Overdue)

The Zebellos exercise is used in the Maritime Search Planning (MSP) course to teach manual search planning in the trackline overdue situation. This tutorial will walk you through the steps of planning the same search using CANSARP.

In this tutorial, you will learn:

- How to use markers to facilitate working with search patterns
- How to use a variety of tools to zoom in and out and pan around on the canvas
- How to save a new view and load previously saved views
- How to use both the linear and variable range ruler
- How to use the Trackline Manager to define a trackline and deploy search objects
- How to add subjective currents and winds to a simulation
- How to use marine charts
- How to allocate a resource from the SRU database or allocate a new SRU and adjust it as required
- How to manipulate a custom track search pattern
- How to use the Sweep Width and Body of Water Searched display options to evaluate search coverage
- How to turn off leeway divergence so that CANSARP produces a single drift track as in the manual method

How to use this tutorial

This tutorial is divided into several sections of related steps. Each section is prefaced with an explanation of the procedures to come: why the steps are performed and what they are meant to achieve. Additional explanations are inserted into the procedures themselves to further clarify certain steps.

All the text in this font are instructions for you to follow. If an instruction appears *in italics*, the instruction is expanded upon in the following sub-steps. For instance, steps 6.2.1 through 6.2.5 explain how to perform step 6.2.

If the instructions branch at some point, a box like this one will indicate which step(s) to follow in different situations. Follow only those steps which apply to your particular situation.

Scenario:

On June 9th at 2000 (UTC), JRCC Victoria is informed that a trawler, the ZEBELLOS (20 m) is overdue at Egg Island (51º15'N, 127º50'W). The vessel was last reported departing anchorage at Nissen Bight, position 50º48.5'N, 128º18.8'W at 09/2500 (UTC). At that time, the intention of the skipper was to set course for Nahwitti Bar fairway buoy and then direct to 0.5 M east of Egg Island. The average speed made good on these courses is estimated at 9 knots.

On scene conditions

On scene conditions are reported as:
Visibility: 20 M
Sea state: 1 m swell

Environmental Data

The average total water current (TWC) at the following points is estimated as:

Nissen Bight: 333ºT at 1.0 kn
Nahwitti Bar Fairway Buoy: 280ºT at 1.5 kn
Egg Island: 240ºT at 2.0 kn

Average surface winds are reported as: NW (315ºT) at 15 kn

Effort Allocation

The CCGC Cape Sutil, presently off Cape Scott, can be tasked to conduct a visual search for the fishing vessel starting at 2000 (UTC).

Type: 47 foot lifeboat
Maximum speed: 25 kn
Search speed: 15 kn
Crew: 4 (rested)

Assumptions

As in the manual exercise, certain assumptions are made: that the Sutil's position at 20:00 is the CSP and that Nissen Bight is within 6 NM of this position so it is not necessary to extend the datum before the search commences, that the Zebellos is navigating by GPS, and that winds and currents remain constant throughout the search.

Marine Chart

In the manual exercise, the search plan is plotted on chart 3605 Quatsino Sound to Queen Charlotte Strait. In CANSARP, this chart has the ID 360501. It will be used to locate the SRU's starting point and the Nahwitti Bar fairway buoy, as well as to compare the CANSAR results with those of the manual method.

Step by step instructions for planning this search using CANSARP

You will begin the search plan by starting CANSARP, logging in as the active SMC, and then changing the view to Vancouver Island where the incident occurred. If you do not have a view of Vancouver Island saved, instructions are provided for creating one.

1 Start CANSARP...

1.1 Double click on **CANSARP** icon on desktop to launch program

1.2 Enter your name in the dialog box that appears and click **APPLY**

2 Create a new case...

2.1 Open the File Menu and select **New Case/Scenario** or click the **New Case** button on the toolbar

2.2 Enter case number (e.g. Tutorial-Zebellos) in the **Case Number** field

2.3 Enter scenario name (e.g. Plan1) in the **Scenario Name** field

2.4 Click **OK**

2.5 Set scenario clock to LKP: 2007/06/09 15:00 Z

3 Change view (if default view is not Vancouver Island)...

3.1 Open the View Menu and select **Load View**

> *If Vancouver Island appears in the list of saved views at the top of the window, complete the rest of step 3 and then skip step 4. Otherwise, go directly to step 4.*

3.2 Select Vancouver Island in the table at the top of the window

3.3 Click **Load**

3.4 Click **Close**

4 Create a new saved view of Vancouver Island...

4.1 Close the Load View dialog box

4.2 Zoom all the way out so that the entire country is visible...

4.2.1 Select **View Editor** from the View Menu or click the **View Editor** button on the managers toolbar

4.2.2 Right click on the up arrow to the left of the **Scale** field. This selects the maximum ratio available, which corresponds to the minimum zoom factor

4.2.3 Click **Apply** and then **Close**

4.3 Pan and zoom to Vancouver Island...

4.3.1 Click the **Pan Tool** (the hand) on the toolbar to select it

4.3.2 Click and drag to the right until the west coast is visible on the canvas

4.3.3 Click the **Zoom To Tool** (the magnifying glass) on the toolbar to select it

4.3.4 Click and drag a box around Vancouver Island

4.3.5 Click the **Default Pointer Tool** on the toolbar to select it

4.4 Save the current view...

4.4.1 Select **Save View As...** from the View Menu

4.4.2 Enter the name Vancouver Island in the dialog box that appears and click **Save**

5 Set on scene conditions...

5.1 Open the Managers Menu and select **Scenario Manager**

5.2 Enter 20 in the **Visibility** field

5.3 Enter 1.0 in the **Sea State** field

5.4 click **OK**

The rest of the search plan is made easier if important locations are marked on the canvas in advance. The next few steps add markers for the vessel's route (Nissen Bight, Nahwitti Buoy, and Destination) to use when adding the vessel's track line and one for the Sutil's starting point to use when manipulating the search pattern.

Because the scenario outline gives the lat and lon of Egg Island but not the vessel's actual destination, this point will be determined using the variable range ruler. The location of the Nahwitti Bar fairway buoy is determined by consulting the marine chart for the region.

The Nissen Bight, Nahwitti Buoy and Destination markers will also be used when adding environmental data, as the measurements provided are from these same locations.

6 Add markers...

6.1 Open the Managers Menu and select **Markers Manager** or click the **Markers** button on the toolbar

6.2 Add a marker at Nissen Bight...

6.2.1 Enter Nissen Bight in the **Label** field

6.2.2 Enter 50:48.5N in the **Lat** field and 128:18.8W in the **Lon** field

6.2.3 Click **New Marker**

6.2.4 Turn off **Show Date And Time**

6.2.5 Click **Apply**

6.3 Add a marker at Egg Island...

6.3.1 Enter Egg Island in **Label** field

6.3.2 Enter 51:15N in **Lat** field and 127:50W in **Lon** field

6.3.3 Click **New Marker**

6.3.4 Turn off **Show Date And Time**

6.3.5 Click **Apply**

6.4 Close the marker tool

6.5 Add a marker at the vessel's destination (.5 NM east of Egg Island)...

6.5.1 Shift the canvas view to the Egg Island marker...

6.5.1.1 Click on the **Re-centering Tool** on the toolbar to select it

6.5.1.2 Left click on Egg Island marker to recenter the canvas view on marker

6.5.1.3 Open the View Menu and select **View Editor**

6.5.1.4 Right click on the down arrow to the right of the **Scale** field. This automatically enters the minimum value in the field – in this case, the maximum zoom level.

6.5.1.5 Click **Apply**

6.5.1.6 Close the View Editor

6.5.1.7 Still using the re-centering tool, left click on the Egg Island marker again to center canvas view on marker if necessary

6.5.1.8 Click on the **Default Pointer Tool** button on the toolbar to turn off the Re-centering tool

6.5.2 Use the Variable Range Ruler tool to help position the Destination marker...

6.5.2.1 Click on **Variable Range Ruler Tool** button on toolbar

6.5.2.2 Left click on the Egg Island marker and drag until the circle's radius is 0.5 NM

6.5.2.3 Leave the Variable Range Ruler window open so the circle stays on the canvas

6.5.2.4 Reopen the Marker tool

6.5.2.5 Left click on right edge of the circle, directly east of Egg Island marker (this should be at 51:15.0N, 127:49.20W)

6.5.2.6 Click **New Marker** in marker tool to add a marker at that position

6.5.3 Change the marker's **Label** to Destination

6.5.4 Adjust its **Lat** and **Lon** if necessary

6.5.5 Turn off **Show Date And Time**

6.5.6 Click **Apply**

6.6 Hide the Egg Island marker to avoid confusion in later steps...

6.6.1 Select Egg Island marker in the marker list

6.6.2 Turn off **Show Label**

6.6.3 Turn off **Show Symbol**

6.6.4 Click **Apply**

6.7 Close the marker tool and the variable range ruler tool

6.8 Add a marker at the Nahwitti Bar fairway buoy...

6.8.1 Reload Vancouver Island view (see step 3)

6.8.2 Click on the **Magnifying Glass Tool** on the toolbar

6.8.3 Using magnifying glass tool, left click and drag to draw a box around the Destination and Nissen Bight markers. Make the box as small as possible while still including both markers.

6.8.4 Click on the **Default Pointer Tool** on the toolbar to turn off the Magnifying Glass tool

6.8.5 Turn on **Marine Charts** in the display options sidebar

6.8.6 Confirm that Chart #360501 (Quatsino Sound to/) is visible on the canvas...

6.8.6.1 Open the Managers Menu and select **Chart Manager** or click on the **Chart Manager** button on the managers toolbar

6.8.6.2 If Chart #360501 is not selected, click the checkbox to the left of its ID

6.8.6.3 Turn off all other marine charts

6.8.6.4 Turn on **Lock Currently Displayed Maps**

> ***Note**: If Chart #360501 does not appear in the Chart Manager's list of charts, close the manager and zoom out slightly, then reopen the manager. The Manager only lists charts available at the current scale and closer zoom factors. Even with charts locked you may find that another chart appears in place of #360501 when you zoom in or out or pan around the canvas. If this happens, reopen the manager and select the correct chart again.*

6.8.6.5 Click **Apply**

6.8.6.6 Click **Close**

6.8.7 Locate Nahwitti Bar fairway buoy on the marine chart (west of Hope Island)

6.8.8 Right click on the canvas at the location of the Nahwitti Bar fairway buoy

6.8.9 Choose **New Marker** from canvas menu

6.8.10 Change the marker's **Label** to Nahwitti Buoy

6.8.11 Turn off **Show Date And Time**

6.8.12 Click **Apply**

6.9 Add a marker for the Sutil's starting point...

6.9.1 Locate Cape Scott on the marine chart (a point of land west of Nissen Bight)

6.9.2 Left click on the canvas in the Scott Channel off Cape Scott

6.9.3 Click **New Marker** in marker tool to create a new marker at that location

6.9.4 Change the marker's **Label** to SRU Starting Point

6.9.5 Turn off **Show Date And Time**

6.9.6 Change the marker's icon to make it easier to tell apart from the others...

6.9.6.1 Click the **Change Symbol** button

6.9.6.2 Click on an appropriate SRU icon

6.9.6.3 Click **OK**

6.9.7 Click **Apply**

6.10 Close the marker tool

6.11 Turn off **Marine Charts** in the display options side bar

The next step in the process is to add a trackline that indicates the Zebellos' intended course, using the Nissen Bight, Nahwitti Buoy and Destination markers created in the previous steps. Tracklines are drawn with the left and right mouse buttons as described below. If you have problems while drawing the trackline, you may find it easier to clear it entirely and start fresh than to correct the problems.

7 Add the trackline...

7.1 Confirm that the scenario clock time matches the vessel's LKP (2007/06/09 15:00 Z)

7.2 Open the Trackline Manager

7.3 Click the **By Speed** radio button in the Mode section if it is not already selected

7.4 Set the **Search Object Speed** to 9 knots

7.5 Draw the track line...

7.5.1 Left click on Nissen Bight marker to begin trackline

7.5.2 Left click on Nahwitti Buoy marker to continue trackline

7.5.3 Right click on Destination marker to end line

*7.5.4 Adjust the **Lat** and **Lon** of the trackline's waypoints if necessary...*

7.5.4.1 Left click on a waypoint in the waypoint list to select it

7.5.4.2 Modify its **Lat** and/or **Lon** fields to match markers

7.5.4.3 Click **Apply**

7.5.5 Once track line is correct, select the **Lock Track Line** radio button. This will prevent you from accidentally changing or moving it with the mouse.

Once the trackline is added, it can be used to deploy search objects. In this case, search objects are deployed at each of the waypoints.

> ***Hint:*** *The scenario outline describes the Zebellos as being 20 meters long but the search object types in CANSARP are listed in feet. If you have access to a web browser, you can quickly convert meters to feet (and perform many other useful conversions) using Google's search engine. To do so, simply enter "20 meters in feet" in Google's search field. The result should be displayed directly below the field even before you hit Return; if you do hit Return, it will appear at the top of Google's search results instead. This same technique is used later in step 11.6.5.*

The Trackline Manager can add the initial navigational fix error to all the search objects but, because the DR error changes at each waypoint, the DR error must be adjusted manually. You will use the linear range ruler to calculate the DR distance and the Search Object Manager to apply it to each search object.

8 Deploy the search objects from the Trackline Manager...

8.1 If the Trackline Manager is not open, reopen it

8.2 Switch to the Deploy Search Objects tab (the 2nd tab)

8.3 Select "power boat 66-90 ft" search object type (20m = 65.6 ft) in the no drogue (left) list by clicking on the leftmost box next its name. The left check box beside each search object's name selects or deselects it. The right check box determines whether it is displayed on the canvas.

8.4 Click on Deploy Search Objects **At Waypoints** if it is not already selected

8.5 Enter 0.25 in **Fix Error** field

8.6 Click **Deploy Search Objects**

8.7 Close Trackline Manager

Now that the search objects have been deployed, environmental data must be added to the simulation in order to calculate where they will drift – without winds or currents to push them, the search objects will not move. The next section leads you through the process of adding the current and wind data given in the scenario outline. The current data is entered as subjective rather than measured currents because the outline indicates that they are estimates.

The scenario outline provides three pieces of current data and one piece of wind data. Normally, currents and winds are reported for a particular time and have a range of influence of three hours before and after that point in time. In this case, however, there is no mention of the time of the readings and there is only the one piece of environmental data for each of the locations and so the assumption is that winds and currents remain constant throughout the time frame of the search. Therefore, these data will be given a range of influence *time* that covers the entire search: +/- 12 hours rather than the default +/- 3 hours. The normal range of influence *radius* for each piece of data (10 NM for currents and 100 NM for winds) is sufficient to cover the regions the objects will drift through, so they are not changed.

9 Add environmental data...

9.1 Add Nissen Bight current...

9.1.1 Right click on the canvas somewhere near the Nissen Bight marker

9.1.2 Select **Add Subjective Current** from the canvas menu

9.1.3 Enter 330 in **Degrees** field and 1.0 in **Knots** field

9.1.4 Change Range of Influence **Time** to 12 hours

9.1.5 Click **Apply** to add vector to time series

9.2 Add Nahwitti Buoy current...

9.2.1 Right click on the canvas somewhere near the Nahwitti Buoy marker

9.2.2 Select **Add Subjective Current** from the canvas menu

9.2.3 Enter 280 in **Degrees** field and 1.5 in **Knots** field

9.2.4 Change range of influence **Time** to 12 hours

9.2.5 Click **Apply** to add vector to time series

9.3 Add Egg Island current...

9.3.1 Right click on the canvas somewhere near the Destination marker

9.3.2 Select **Add Subjective Current** from the canvas menu

9.3.3 Enter 240 in **Degrees** field and 2.0 in **Knots** field

9.3.4 Change range of influence **Time** to 12 hours

9.3.5 Click **Apply** to add vector to time series

9.3.6 Click **Close**

9.4 Add Average Winds...

9.4.1 Right click somewhere in the center of the search region (a little way NW of Nahwitti Buoy marker, for instance)

9.4.2 Select **Add Subjective Wind** from the canvas menu

9.4.3 Enter 315 in **Degrees** field and 15 in **Knots** field

9.4.4 Change Range of Influence **Time** to 12 hours

9.4.5 Click **Apply** to add vector to time series

9.4.6 Click **Close**

Next, you must select which drift forces (both current and wind) CANSARP will use when performing drift calculations.

There are no measured currents or SLDMB data in this scenario, so these forces may be left on or turned off without changing the results. Likewise, the dynamic current models do not apply in this region, so they may also be left on or turned off without effect.

The current data provided in the scenario outline represents total water current (TWC) so there is no need to make use of CANSARP's static tidal or sea current models. Similarly, TWC already includes the effect of wind on the water itself so there is no need to add additional wind driven currents to the simulation. For these reasons, the subjective currents added to the simulation should preempt all three lower precedence current models. While it is not necessary to make subjective currents preemptive if wind driven, tidal and sea currents are turned off in the Current Forces sidebar, instructions are given for performing both actions.

Although TWC includes the effect of wind on the water, it does not include the effect of wind on the vessel itself. Therefore, the leeway wind force must be turned on. Note that CANSARP includes leeway divergence angles by default whereas the manual method used in the Zebellos exercise does not; see the section *Leeway Divergence In CANSARP And Manual Search Planning* at the end of this tutorial for a discussion of this difference and instructions for making CANSARP perform exactly like the manual method.

10 Select Drift Forces to use in calculations...

- 10.1 Turn on Subjective Currents in the Current Forces sidebar
- 10.2 Turn off all other forces in the Currect Forces sidebar
- 10.3 Turn on Leeway in the Wind Forces sidebar
- *10.4 Make Subjective Currents preemptive, not additive...*
  - 10.4.1 Open Current manager
  - 10.4.2 Switch to Subjective Currents tab
  - 10.4.3 Make sure that **Preemptive** is selected in bottom left corner
  - 10.4.4 Click **Close**

Now that the environmental data has been added to the simulation, you can begin drifting the search objects to determine the datum for the Sutil's estimated time on scene in each of the three locations.

The Sutil will begin its search at 2000 (UTC), so the first step is to advance the scenario clock that far and determine the first search object's datum. Next, you will determine the distance from this point to the general area of the second search object's search region to calculate the time required for the Sutil to reach that area. With that information, you will continue to drift the second object and, using the same procedure, the third.

At each stage, you will add markers to the canvas at the centre of the arc of probability (the “SAR sausage”) for each datum to use later when modifying a custom track search pattern for the Sutil to follow.

11 Drift Search Objects...

11.1 Advance scenario clock 5 hours to 20:00Z (SRU time on-scene) and refresh screen to calculate drift

11.2 Mark centre of arc of probability for first search object (Nissen Bight)...

11.2.1 Zoom in on first arc of probability...

11.2.1.1 If first search object's arc of probability is not entirely visible, click the **Zoom Out Tool** on the toolbar once or twice until it is

11.2.1.2 Select the **Magnifying Tool** from the toolbar

11.2.1.3 Left click and drag to draw a box around the minimax circle surrounding the first search object's drift to zoom to that region

11.2.1.4 Select the **Default Pointer Tool** from the toolbar

11.2.2 Right click on the canvas in the centre of the arc of probability

11.2.3 Choose **New Marker** from canvas menu

11.2.4 Change marker **Label** to TD1 (total drift #1)

11.2.5 Change marker **Time** to 2007/06/09 20:00Z if necessary

11.2.6 Change marker symbol...

11.2.6.1 Click **Change Symbol**

11.2.6.2 Choose the blue dot icon

11.2.6.3 Click **OK**

11.2.7 Click **Apply**

11.2.8 Close marker tool

11.3 Use Linear Ruler to estimate time required to reach second search object's search area...

11.3.1 Zoom or pan as required so that the SRU Starting Point marker and the first and second search objects' drift regions are visible

11.3.2 Open **Linear Ruler Tool**

11.3.3 Left click on the SRU Starting Point marker

11.3.4 Left click on the TD1 marker

11.3.5 Right click in the approximate centre of the second search object's arc of probability and note the total **Range** in the linear range ruler tool (approximately 15 NM)

11.3.6 Estimate the Sutil's travel time from its origin to the second search object's search area: approximately 1 hour at searching speed of 15 kts.

11.3.7 Close the linear range ruler

11.4 Advance scenario clock 1 hour to 21:00Z and refresh screen to calculate drift

11.5 Mark centre of arc of probability for second search object (Nahwitti Buoy)...

11.5.1 Zoom in on second arc of probability...

11.5.1.1 If second search object's arc of probability is not entirely visible, click the **Zoom Out Tool** on the toolbar once or twice until it is

11.5.1.2 Select the **Magnifying Tool** from the toolbar

11.5.1.3 Left click and drag to draw a box around the minimax circle surrounding the second search object's drift to zoom to that region

11.5.1.4 Select the **Default Pointer Tool** from the toolbar

11.5.2 Right click on the canvas in the centre of the arc of probability

11.5.3 Choose **New Marker** from canvas menu

11.5.4 Change marker **Label** to TD2 (total drift #2)

11.5.5 Change marker **Time** to 2007/06/09 21:00Z if necessary

11.5.6 Change marker symbol...

11.5.6.1 Click **Change Symbol**

11.5.6.2 Choose the blue dot icon

11.5.6.3 Click **OK**

11.5.7 Click **Apply**

11.5.8 Close marker tool

11.6 Use Linear Ruler to estimate time required to reach third search object's search area...

11.6.1 Zoom or pan as required so that the second and third search objects' drifts regions are visible

11.6.2 Open Linear Ruler tool

11.6.3 Left click on TD2 marker

11.6.4 Right click in the approximate centre of the third search object's arc of probability and note the total **Range** in the linear range ruler tool (approximately 20 NM)

11.6.5 Estimate the Sutil's travel time from its origin to the second search object's search area: 20 NM at 15 kts = 80 minutes.

> ***Hint:*** *This is another opportunity to use Google's search engine calculator. Enter "20 nautical miles / 15 knots in minutes" into Google's search field and it will tell you how many minutes are required to travel the given distance at the given speed.*

11.6.6 Close the linear range ruler

11.7 Advance scenario clock 80 minutes to 22:20Z and refresh screen to calculate drift

11.8 Mark centre of arc of probability for third search object (Destination)...

11.8.1 Zoom in on third arc of probability...

11.8.1.1 If third search object's arc of probability is not entirely visible, click the **Zoom Out Tool** on the toolbar once or twice until it is

11.8.1.2 Select the **Magnifying Tool** from the toolbar

11.8.1.3 Left click and drag to draw a box around the minimax circle surrounding the third search object's drift to zoom to that region

11.8.1.4 Select the **Default Pointer Tool** from the toolbar

11.8.2 Right click on the canvas in the centre of the arc of probability

11.8.3 Choose **New Marker** from canvas menu10.2.3

11.8.4 Change marker **Label** to TD3 (total drift #3)

11.8.5 Change marker **Time** to 2007/06/09 22:20Z if necessary

11.8.6 Change marker symbol...

11.8.6.1 Click **Change Symbol**

11.8.6.2 Choose the blue dot icon

11.8.6.3 Click **OK**

11.8.7 Click **Apply**

11.8.8 Close the marker tool

Now that you've determined where each of the three search objects will drift given the environmental conditions, you can plot a course for the Sutil to follow during its search.

The first step is to allocate the Sutil as a resource available to use in the search. The Sutil is already defined in the SRU database but it needs some adjustments to match its description in the scenario outline. If the Sutil is not defined in the SRU database on your workstation, alternate instructions for adding the resource from scratch are provided as well.

Once the resource is allocated, the next step is to define its search pattern. Given the type of search object and type of SRU, the sweep width for this scenario is wide enough for the Sutil to cover the entire region in a single pass. For this reason, a custom track search pattern is used rather than a pattern with multiple legs.

Note that SRU endurance is not used in the calculations for a custom track search pattern, except to determine the pattern's original length. The default value of 36 hours for the Cape Sutil will produce a search pattern line that is much too long to manipulate easily on the canvas, so you will reduce its endurance to two hours to make the line shorter and easier to work with.

Once the search pattern is applied, it must be moved to cover the search regions appropriately. You will manipulated the pattern graphically, by clicking and dragging with the mouse on the canvas – the markers added in previous steps will facilitate arranging the search pattern in such a way that the search areas are well covered by the Sutil's course.

Note that, although the search pattern is similar to a trackline in appearance, it is manipulated like other search patterns: you must use the *middle* mouse button to manipulate it instead of the left mouse button, which simply selects it. When clicking on the pattern to manipulate it, be sure to click in the interior of the line – if you click at the very end of the line or just outside it, you will rotate the line rather than moving its nodes.

If you have problems manipulating the pattern and add or delete nodes by accident, it may be easier to reset the pattern entirely and start from scratch rather than try to fix it. If you have not yet closed the Pattern Editor, you can do this by clicking the Reset button at the bottom of the editor window. Otherwise, you will need to close the editor, change to a different pattern type, apply that change and then change back to the custom pattern type and apply to reset it.

12 Allocate the SUTIL resource and select custom track search pattern...

12.1 Turn off display of drift tracks in display options sidebar so markers are clearly visible...

12.2 Click on **Center On Search Objects Tool**

12.3 Pan slightly so that all the TD markers and the SRU Starting Point marker are visible on the canvas

12.4 Select **Default Pointer Tool**

12.5 Open the SRU Manager

12.6 Click **SRU Database**

12.7 Expand the Primary Marine list and scroll down to find CAPE SUTIL in the list.

> *If the Sutil is defined in the SRU database, continue to step 12.8 and then skip step 12.9. If it is not defined, skip step 12.8 and go directly to step 12.9.*

12.8 Add the Cape Sutil from the SRU Database

12.8.1 Click on CAPE SUTIL to select it

12.8.2 Click **Select**

12.8.3 Click **Close**

12.8.4 Change **Searching Speed (V)** to 15 knots

12.8.5 Change **SRU Position Error (Y)** to 0.25

12.9 Add the Cape Sutil from scratch...

12.9.1 Click **New SRU**

12.9.2 Change **SRU Name** to CAPE SUTIL

12.9.3 Change **SRU Type** to “small boat (less than 65 feet)”

12.9.4 Change **Searching Speed (V)** to 15 knots

12.10 Confirm that **Search Object Type** matches the Zebellos (power boat 66-90 ft)

12.11 Switch to Calculation tab

12.12 Change **SRU Endurance** to 2 hours

12.13 Change **Search Pattern Type** to Custom

12.14 Click **Apply**

13 Manipulate Custom Track Search Pattern...

13.1 Click **Edit** to open Custom Track Search Pattern Editor

13.2 Change CSP time to 2007/06/09 20:00 Z

13.3 Click **Apply** (sweep width disappears)

13.4 Confirm that the **Move Node** radio button is selected in the Positions section of the Custom Track Pattern Editor

13.5 *Using middle mouse button*, drag CSP from Nissen Bight to the SRU Starting Point marker

13.6 *Using middle mouse button*, drag the end point to the TD3 marker

13.7 *Using middle mouse button*, drag the middle waypoint (the bend) to the TD1 marker

13.8 In Custom Track Pattern Editor, select **Insert Node On Existing Segment** radio button

13.9 *Using middle mouse button*, click-and-hold on the custom track line between TD1 and TD3 markers, then drag to the TD2 marker before releasing the mouse button

13.10 Close the Pattern Editor

13.11 Close the SRU Manager

The final step is to determine whether or not the search pattern effectively covers the search area. Two tools will help you do this: the Sweep Width display option and the Body of Water Searched display option. Each has advantages and disadvantages, however.

The Sweep Width display option gives an indication of the region within the SRU's sweep width as it travels along its course. If a search object's minimax circle lies entirely within the sweep width, the area has been covered effectively. As time passes, however, the minimax circles continue to expand while the sweep width does not, so evaluating sweep width coverage in this way is only valid if the time on the scenario clock is close to the time when the SRU is actually within the given search area.

The Body of Water Searched display option fills in the regions of an object's arc of probability (its “SAR sausage”) that have been covered by the search. This body of water continues to expand as the scenario time advances, so it doesn't have the same drawback as the Sweep Width display option; however, it ignores the area of the minimax circle outside of the arc of probability.

14 Evaluate coverage of search area

14.1 Zoom out so that entire search plan region is visible

14.2 Turn on Drift Tracks display option in display options sidebar

14.3 Turn on Sweep Width display option in display options sidebar

14.4 Evaluate coverage of minimax circles within SRU's sweep width

You should see that the Cape Sutil's sweep width covers the entire arc of probability for all three search objects at 22:20. Note that the minimax circle of the first search object extends slightly beyond the Sutil's sweep width at this time, but recall that the SRU was in that location at 20:00 when the first search object's minimax circle was smaller.

14.5 Verify that the first search object's minimax circle was completely contained within the sweep width at its datum...

14.5.1 Set the scenario clock back to 20:00Z and refresh screen

14.5.2 Evaluate coverage of first search object's minimax circle at 20:00

14.6 Evaluate Bodies of Water Searched

14.6.1 Turn off Sweep Width in display options sidebar

14.6.2 Turn on Body of Water Searched in display options sidebar

14.6.3 Advance scenario clock to 22:20Z and refresh screen

You should see that the Cape Sutil's has covered the arc of probability for all three search objects.

Leeway divergence in CANSARP and manual search planning

When CANSARP calculates leeway, it considers four parameters: the leeway coefficient, a correcting factor, and left and right angles of divergence. The angles of divergence determine how far apart the drift tracks will spread and are responsible for producing the “SAR sausage” characteristic of CANSARP drift calculations. When leeway is calculated manually, however, angles of divergence are not considered and there is only a single drift track as a result. In order to make CANSARP match the results of the manual Zebellos exercise, the angles of divergence must be reduced to zero.

Note that this is not the same as turning off leeway entirely – leeway is used in the manual exercise so the other two leeway parameters, coefficient and correction, must be used in CANSARP to produce the same drift.

The next few steps should make CANSARP produce exactly the same results as the manual exercise. They redrift the search objects at the datum time for each one, this not without using leeway divergence. New markers are added to indicate new the total drift of each target so that you can compare the results to those of the manual exercise more easily.

NB: This version of the tutorial exercise is saved as Plan1-NoLD.

15 Turn off Leeway Divergence...

15.1 Open the Search Object Manager

15.2 Select the first search object

15.3 Locate the angle of divergence fields in the Leeway Parameters region of the manager window. They are labeled **º (left)** and **º (right)**

15.4 Set the value of both fields to 0

15.5 Click Apply

15.6 Repeat steps 15.2 through 15.5 for the second and third search objects

16 Redrift search objects and add markers...

16.1 Confirm that the scenario clock still reads 2007/06/09 22:20 Z and change it if necessary

16.2 Click **Refresh Screen** to redrift at the third object's datum time without leeway divergence

16.3 Add a marker for third search object's drift without leeway divergence...

16.3.1 Select the **Re-center View** tool

16.3.2 Click on the third search object's datum to center on that point

16.3.3 Select **View Editor** from the View Menu or click the **View Editor** button on the managers toolbar

16.3.4 Right click on the down arrow to the right of the **Scale** field to choose the smallest ratio (the maximum zoom factor)

16.3.5 Click **Apply** and then **Close**

16.3.6 Right click on the datum and select **New Marker** from the canvas menu

16.3.7 Change the marker icon to a red dot (see step11.2.6)

16.3.8 Change the marker **Label** to TD3 w/o divergence

16.3.9 Click **Apply**

16.3.10 Close the marker manager

16.4 Click the **Center On Search Objects** button on the toolbar

16.5 Change the scenario clock to 21:00 Z

16.6 Click **Refresh Screen** to redrift at the second object's datum time

16.7 Repeat Steps 16.3 to 16.4 for the second search object

16.8 Change the scenario clock to 20:00 Z

16.9 Click **Refresh Screen** to redrift the first search object without leeway divergence

16.10 Repeat Step 16.3 to 16.4 for the first search object

Now it should be possible to compare the total drift plotted on chart 3605 Quatsino Sound to Queen Charlotte Strait during the manual exercise with the positions of the new, red markers in CANSARP. It may be helpful to display chart #360501 again (see step 6.8.6) when making this comparison.

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