

WATER MAZE VIDEO TRACKING

SOF-845

USER'S MANUAL

DOC-214

Rev. 2.2

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CHAPTER 1

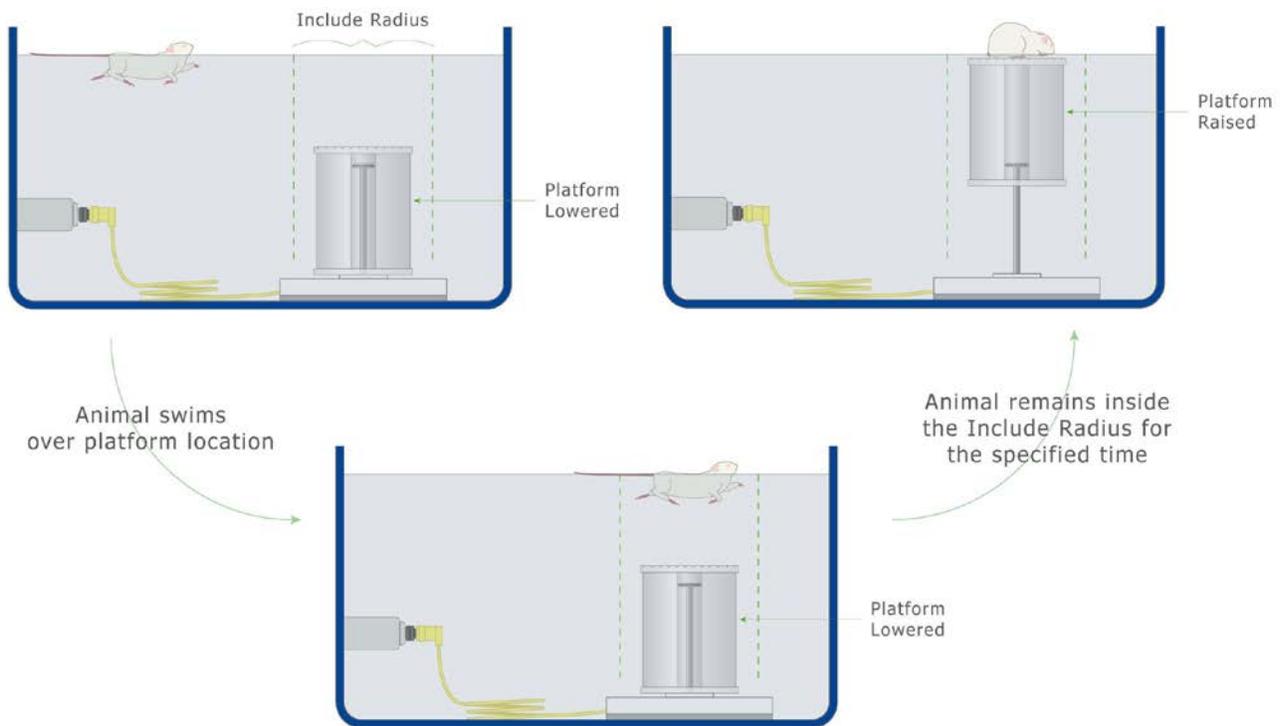
Introduction

System Overview

The MED Associates, Inc. Water Maze Video Tracking System uses a video camera to capture video of an animal swimming in the water maze. The Water Maze Video Tracking software uses this video to track the animal's swim path and analyze swim patterns. The video is stored on the computer. The Water Maze Video Tracking software features an intuitive database that allows full control and management of protocols and study design.

The MED Associates, Inc. Water Maze Video Tracking Software tracks the animal's location in the water maze. The software can be programmed to raise the On-Demand "Atlantis" Platform when the animal is within the Include Radius for a user-defined duration. This is illustrated in Figure 1.1.

Figure 1.1– Raising the On-Demand Platform Using the Water Maze Video Tracking Software



Key Terms

- **Dwell Time:** The amount of time that an animal must remain inside the **Include Radius** to raise the On Demand Platform.
- **Include Radius:** The radius within which an animal must dwell for a certain amount of time (see **Dwell Time**) to raise the On Demand Platform.
- **Moser's Zone:** A circle with a user-defined radius drawn around the location of the platform in training trials that are analyzed during **probe trials** for **platform crossings** (a.k.a. pass-throughs).
- **Platform Crossing:** Occurs in a probe trial when the animal's path traverses the precise location where the escape platform was positioned during training.
- **Probe Trial:** Trial in which the platform has been removed following training to assess the animal's search strategy.
- **Start Sections:** Number of sections that the pool is divided into. This number is user defined and can be used during data analysis to determine how much time the animal spent in each section.
- **Thigmotaxis:** The tendency of the animal to swim around the edge of the pool.
- **Training Trial:** Trial in which an animal is placed in the water maze and given a time to locate an escape platform.
- **Wishaw's Corridor:** User-defined rectangular zone from the start position to the platform.
- **Gallagher's Proximity:** The sum of the distance from the platform at each second during the trial divided by the number of seconds (i.e. average distance from the platform during the trial). This is an average measure of total distance from the platform during the trial. A correction procedure is used so that trial performance is relatively unbiased by the differences in distance to the goal from the various start locations at the perimeter of the pool. The correction is made by calculating the average swimming speed for each trial, and then the amount of time required to swim to the platform at that speed from the start location. This amount of time is subtracted from the total distance from the platform during the trial. By this method, scores obtained with proximity measure are designed to reflect search error; they represent deviations from a direct path to the platform.

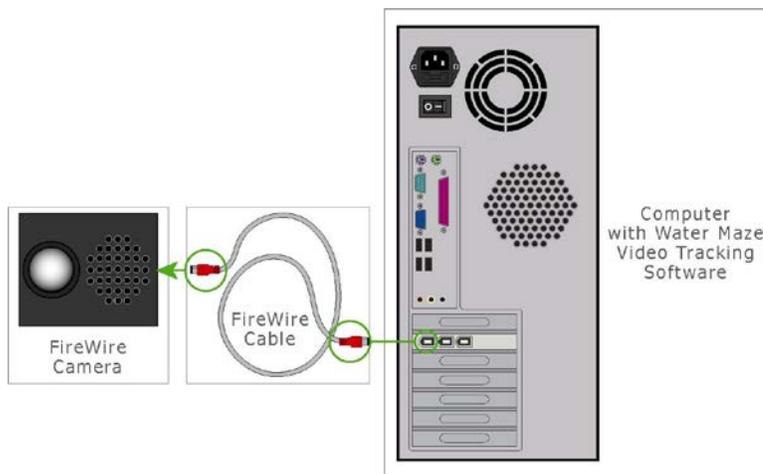
CHAPTER 2

Wiring the System

This chapter includes basic wiring instructions for the Water Maze System. If an On-Demand Platform is being used with the system, refer to the On-Demand Platform User's Manual (Part Number DOC-170) for detailed wiring instructions.

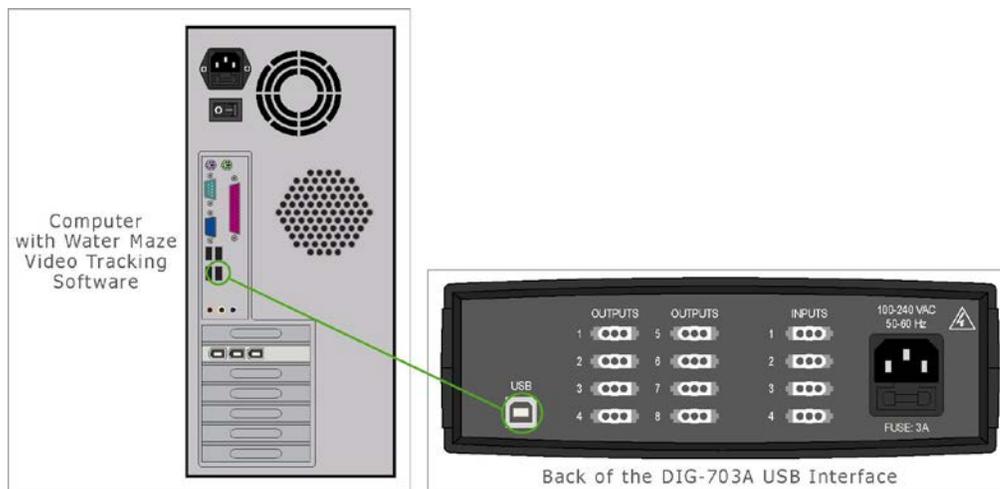
1. Using the included FireWire cable, connect the FireWire camera to the FireWire card on the back of the computer.

Figure 2.1 – Connect the Camera to the FireWire Card



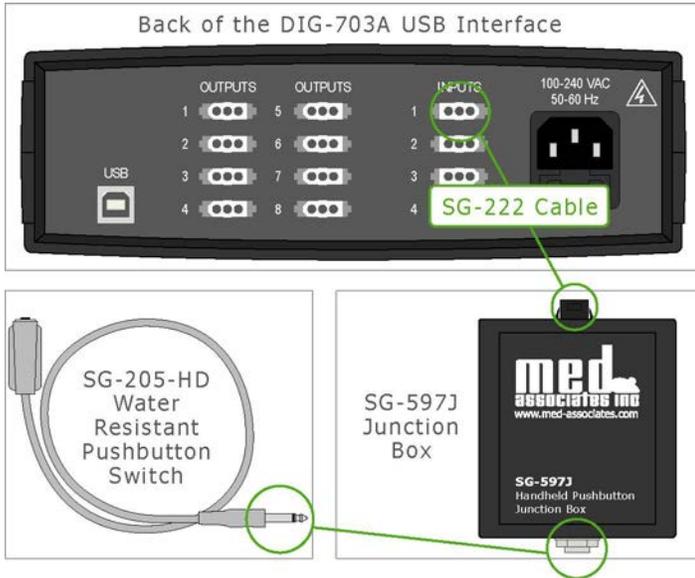
2. Using the included USB cable, connect any available USB port on the computer to the **USB** port on the back of the DIG-703A USB Interface.

Figure 2.2 - Connect the Computer to the USB Interface



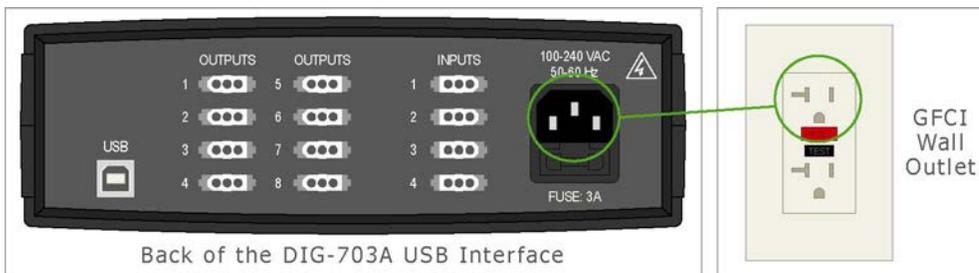
3. Connect the SG-205-HD Water Resistant Pushbutton Switch to the appropriate connector on the SG-597J Junction Box. Using the SG-222 cable, connect INPUT 1 on the back of the DIG-703A USB Interface to the appropriate connector on the SG-597J.

Figure 2.3 - Connect the Remote to Input 1



4. Connect the DIG-703A USB Interface to a GFCI wall outlet.

Figure 2.4 - Connect the Interface to GFCI Wall Outlet



CHAPTER 3

User Interface

Main Screen Menu Bar

If the cursor is held over a menu item, a description of its function will appear in the status bar. This is the menu bar that is accessible from the Main Screen.

File Menu

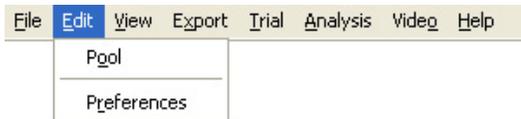
Figure 3.1 - File Menu



Menu Item	Description	For More Info
New	Create new project	Chapter 4, Starting a New Project
Open	Open existing project	Chapter 5, Opening an Existing Project
Select Project Wizard	Open the Select Project Wizard screen (Figure 4.1)	Chapter 4, Starting a New Project and Chapter 5, Opening an Existing Project
Exit	Close the application	N/A

Edit Menu

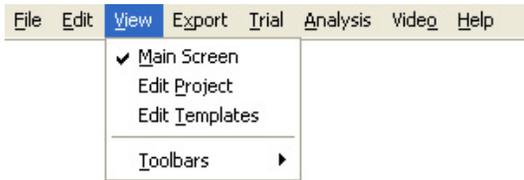
Figure 3.2 - Edit Menu



Menu Item	Description	For More Info
Pool	Open the Edit Pool Parameters screen (Figure 4.3)	Chapter 4, Editing Pool Parameters
Preferences	Open the Preferences screen (Figure 4.14)	Chapter 4, Setting Preferences

View Menu

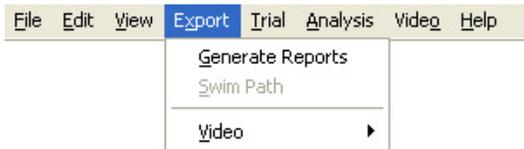
Figure 3.3 - View Menu



Menu Item	Description	For More Info
Main Screen	Open the Main Screen (Figure 4.26)	Chapter 4, Starting a Trial
Edit Project	Open the Editing Project Screen (Figure 4.15)	Chapter 4, Adding Animals to Project and Applying the Template to the Animals
Edit Templates	Open the Trial Templates Screen (Figure 4.18)	Chapter 4, Creating a Trial Template

Export Menu

Figure 3.4 – Export Menu



Menu Item	Description	For More Info
Generate Reports	Opens the Select Trials for Reporting Screen and allows the user to generate reports using data from completed trials (Figure 6.1)	Chapter 6, Generating Reports
Swim Path	Opens the Export Options screen (Figure 6.2) and allows the user to export the swim path data.	Chapter 6, Exporting Swim Path
Video	Swim Path: Exports a video of the swim path Video with Swim Path: Exports a video of the video and the swim path	Chapter 6, Exporting Video

Trial Menu

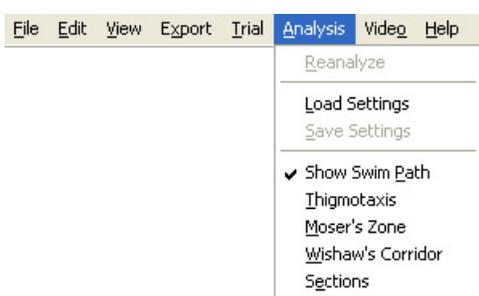
Figure 3.5 - Trial Menu



Menu Item	Description	For More Info
Start	Starts the trial	Chapter 4, Starting a Trial
Stop	Stops the trial	Chapter 4, Starting a Trial
Show All	Shows all of the trials on the Trial List on the Main Screen	Chapter 4, Starting a Trial
Rerun	Rerun the trial	Chapter 5, Rerunning a Trial
Edit Animal's Position	Edit the animal's position during the trial	Chapter 5, Editing the Animal's Position

Analysis Menu

Figure 3.6 – Analysis Menu



Menu Item	Description	For More Info
Reanalyze	Reanalyze the trial data	Chapter 5, Changing Analysis Settings
Load Settings	Load the analysis settings	Chapter 5, Loading Analysis Settings
Save Settings	Save the analysis settings	Chapter 5, Saving Analysis Settings
Show Swim Path	Show the animal's swim path during the trial	Chapter 4, Starting a Trial
Thigmotaxis	View or change the default Thigmotaxis setting	Chapter 4, Thigmotaxis
Moser's Zone	View or change the default Moser's Zone setting	Chapter 4, Moser's Zone
Wishaw's Corridor	View or change the default Wishaw's Corridor setting	Chapter 4, Wishaw's Corridor
Sections	View or change the Sections settings	Chapter 4, Modify Pool Settings

Video Menu

Figure 3.7 - Video Menu



Menu Item	Description	For More Info
Configure Camera	Opens the Calibrate Camera screen (see Figure A.2 – Calibrating the Camera)	Appendix A
Camera Name	Selects the default camera	N/A

Help Menu

Figure 3.8 - Help Menu



Menu Item	Description	For More Info
About Water Maze	Displays the software revision and copyright information (Figure 3.9)	N/A

Figure 3.9 - About Screen

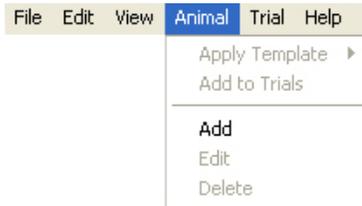


Edit Project Menu Bar

Most of the menu items on the Edit Project menu bar are the same as those on the Main Screen; the only exceptions are the Animal and Trial menus, shown below.

Animal Menu

Figure 3.10 - Animal Menu

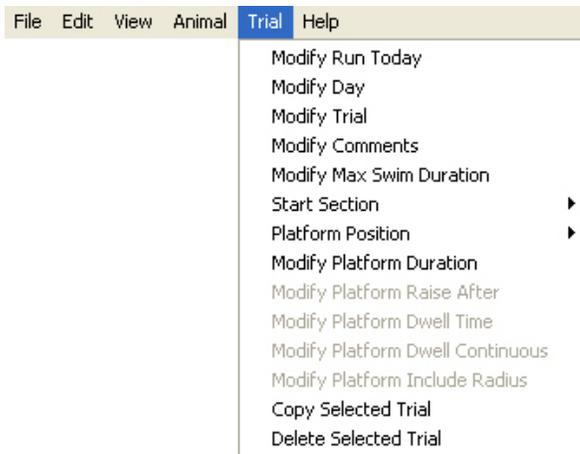


Menu Item	Description	For More Info
Apply Template	Apply a template to the selected animal	Chapter 4, Applying the Template to the Animals
Add to Trials	Adds a new trial for the selected animal	Chapter 4, Template Wizard
Add	Add an animal	Chapter 4, Adding Animals to Project
Edit	Open the Edit Animal screen	Chapter 4, Adding Animals to Project
Delete	Delete the selected animal	

Trial Menu

The items on the Trial Menu allow the user to make changes to individual trials from the Trial Templates screen (Figure 4.21). This menu can also be viewed by right-clicking on a trial. See **Chapter 4, Creating a Trial Template** for more information.

Figure 3.11 - Trial Menu

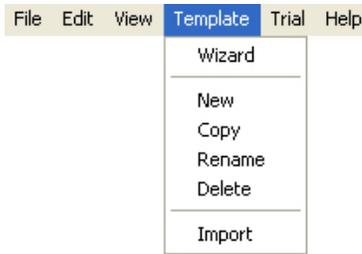


Edit Templates Menu Bar

Most of the menu items on the Trial Templates menu bar are the same as those on the Main Screen; the only exceptions are the Template and Trial menus. The Template Menus is shown below and the Trial menu is explained above in the Edit Project Menu Bar section.

Template Menu

Figure 3.12 - Template Menu



Menu Item	Description	For More Info
Wizard	Open the Template Wizard (Figure 4.19)	Chapter 4, Creating a Trial Template
New	Add a new template to the template list on the Trial Templates screen (Figure 4.21)	Can also be accessed by right-clicking a trial template
Copy	Copy the highlighted trial template	Can also be accessed by right-clicking a trial template
Rename	Rename the highlighted trial template	Can also be accessed by right-clicking a trial template
Delete	Delete the highlighted trial template	Can also be accessed by right-clicking a trial template
Import	Import a trial template from another project	

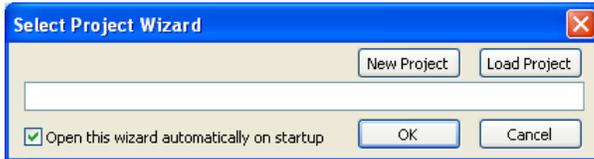
CHAPTER 4

Starting a New Project

Naming or Selecting Project

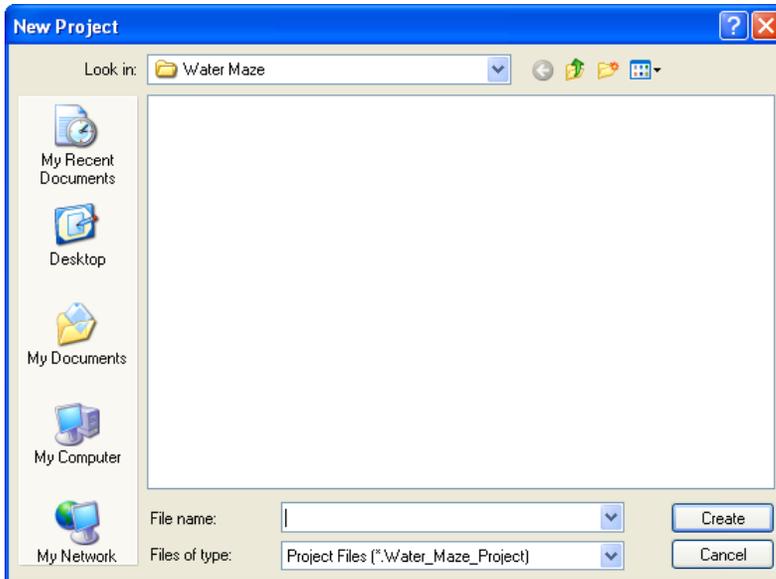
Begin a new project by double clicking on the Water Maze Tracking Software shortcut on the desktop. The Select Project Wizard, shown below, will appear. Click on **New Project** and the screen shown in Figure 4.2 will appear.

Figure 4.1 - Select Project Wizard



Enter the desired file name in the **File name** field and click **Create**. The screen Edit Pool Parameters screen shown in Figure 4.3 will appear.

Figure 4.2 - New Project Screen

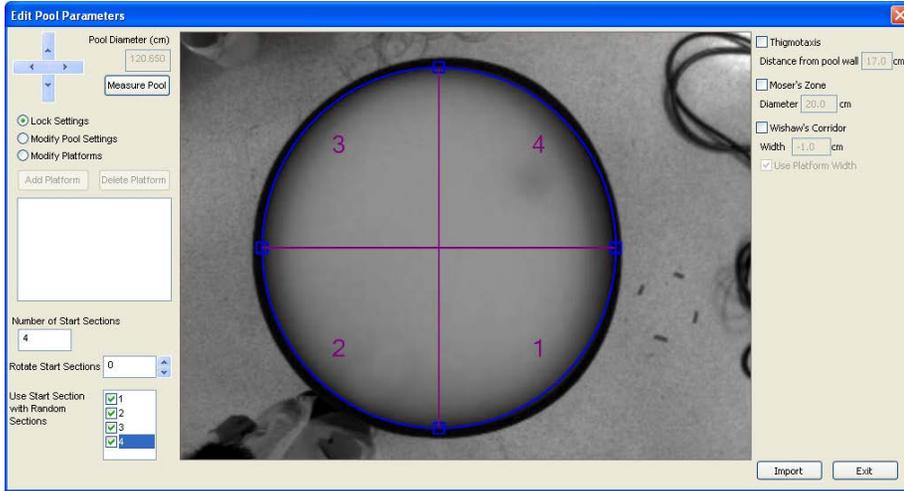


Editing Pool Parameters

Modify Pool Settings

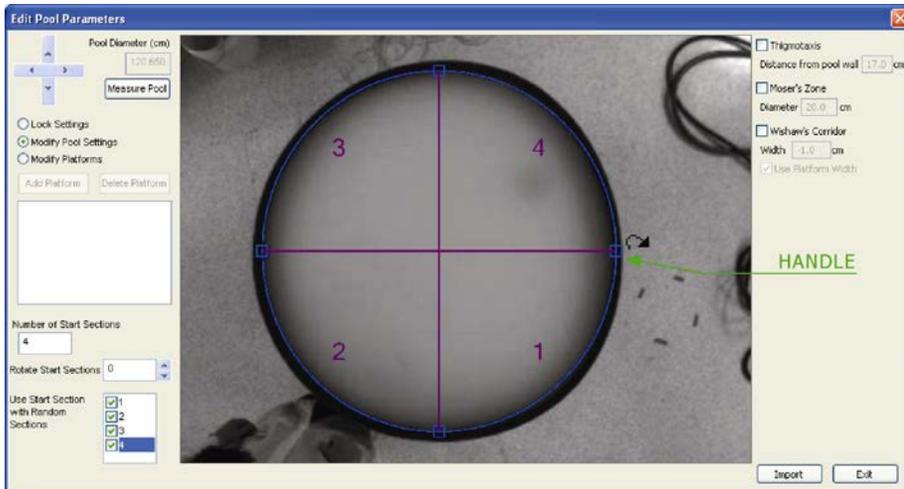
From the screen shown in Figure 4.3, click **Modify Pool Settings** to enable the pool settings options. The screen will appear as shown in Figure 4.4.

Figure 4.3 – Edit Pool Parameters Screen with Settings Locked



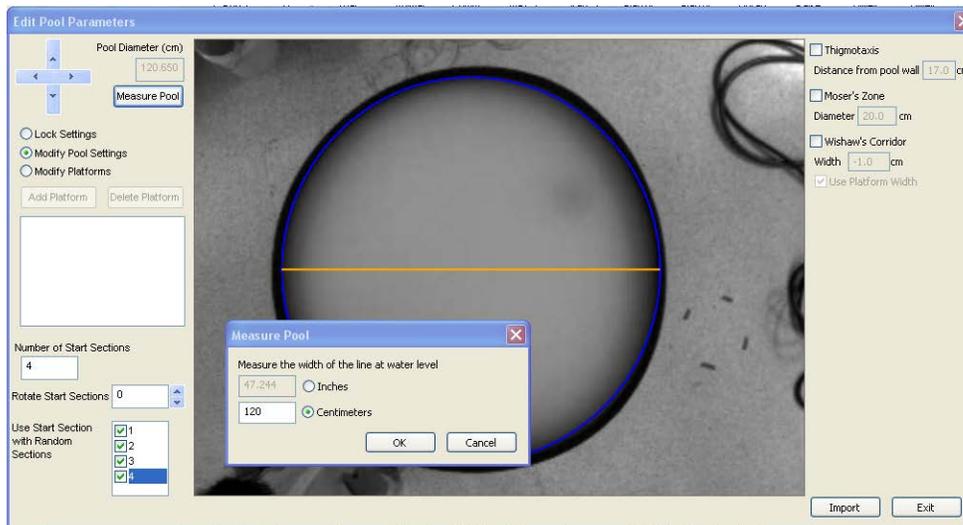
The pool boundary is user defined and is indicated by the blue bounding circle. This bounding circle should be adjusted until it is just inside the edges of the water surface. Adjust the pool boundary by placing the cursor over a handle until it turns to a , then clicking and dragging. The circle can be rotated by placing the cursor close to a handle until it changes to a . It can be moved by placing the cursor inside the circle until it changes to a , then click and drag the circle to the desired location or using the <, >, ^, v buttons in the screen's upper left corner.

Figure 4.4 – Modify Pool Settings



Once the pool boundary is in the desired location, click the **Measure Pool** button and the Measure Pool dialog shown in Figure 4.5 will appear. Measure the pool diameter at the water level as indicated by the orange line on the screen, then enter this measurement, and click **OK**.

Figure 4.5 - Measure Pool



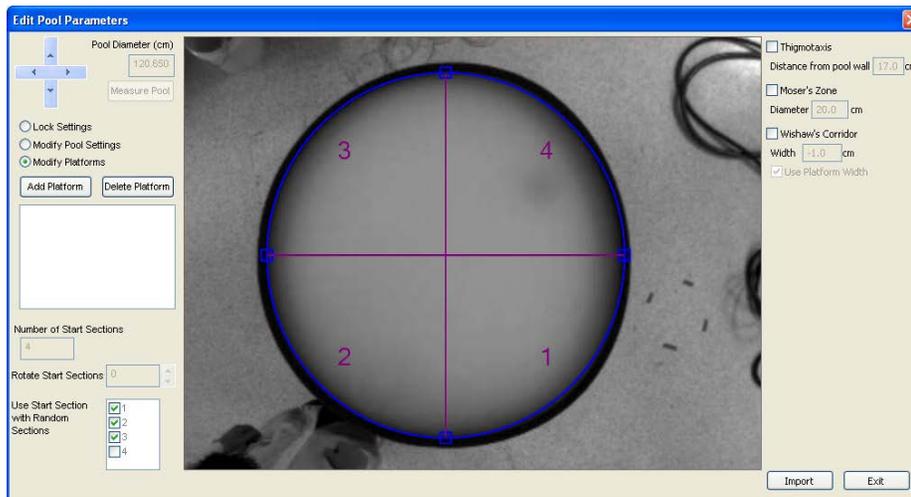
Enter the number of **Start Sections** (see the **Key Terms** section of this manual). The Start Sections are indicated in purple. The Start Sections can be rotated by entering a value (in degrees) in the **Rotate Start Sections** field. Next, select which Start Sections to include in the selection of Random Sections. Generally, every section but the one containing the platform should be selected.

Modify Platforms

Click **Modify Platforms** to enable the platform settings options. The screen will appear as shown in Figure 4.6. Click **Add Platform** and the Add Platform Name dialog shown in Figure 4.7 will appear.

NOTE: At least one platform must be added in order for data analysis to function properly.

Figure 4.6 - Modify Platform Settings



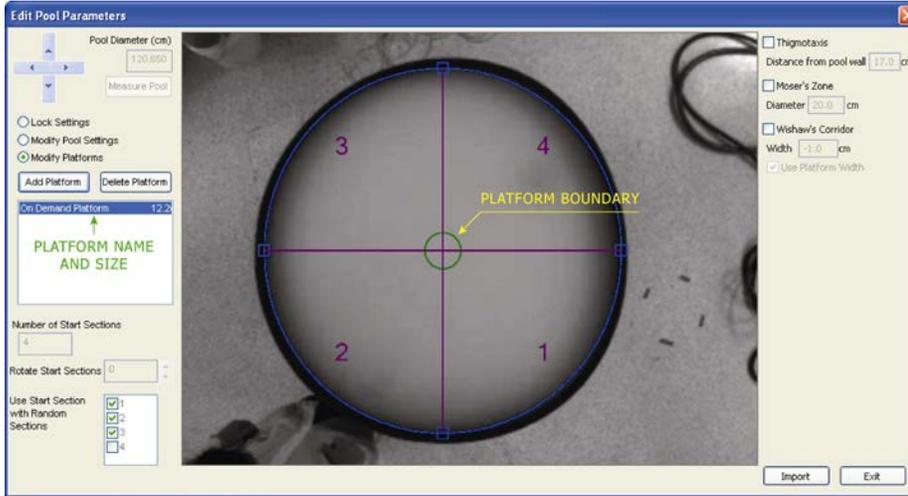
Enter the desired platform name and click **OK**. The screen will appear as shown in Figure 4.8.

Figure 4.7 - Add Platform Name



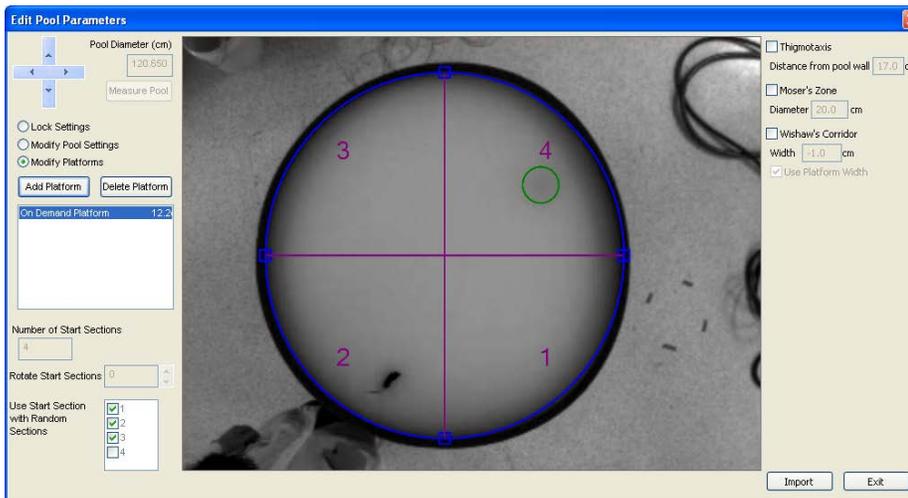
The green circle that appears in the center of the screen represents the platform boundary. Place the cursor inside the circle until it changes to a , then click and drag the green circle is directly over the platform location, as shown in Figure 4.9.

Figure 4.8 - Move Platform Boundary Location



The size of the green platform boundary circle can be adjusted by placing the cursor over the perimeter of the circle until it changes to a , then clicking and dragging until the green platform boundary circle is the desired size. The name and diameter of the platform will be displayed on the left side of the screen. The size of the platform is calculated using the pool diameter value entered by the user. If the pool diameter was entered incorrectly, this will affect the platform diameter calculation. Multiple platforms may be added at this time.

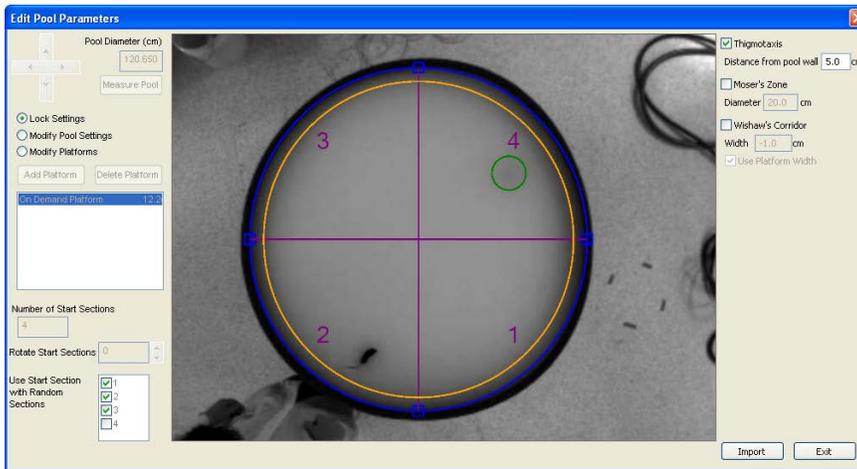
Figure 4.9 - Platform Boundary in Correct Location



Thigmotaxis

To view or change the default Thigmotaxis setting, check the **Thigmotaxis** checkbox. The default setting will be indicated on the screen by an orange circle, as shown in Figure 4.10. This value can be changed by entering a value (in cm) in the **Distance from pool wall** field, or by placing the cursor over the perimeter of the orange circle until it changes to a \leftrightarrow , then clicking and dragging until the circle is the desired distance from the pool wall.

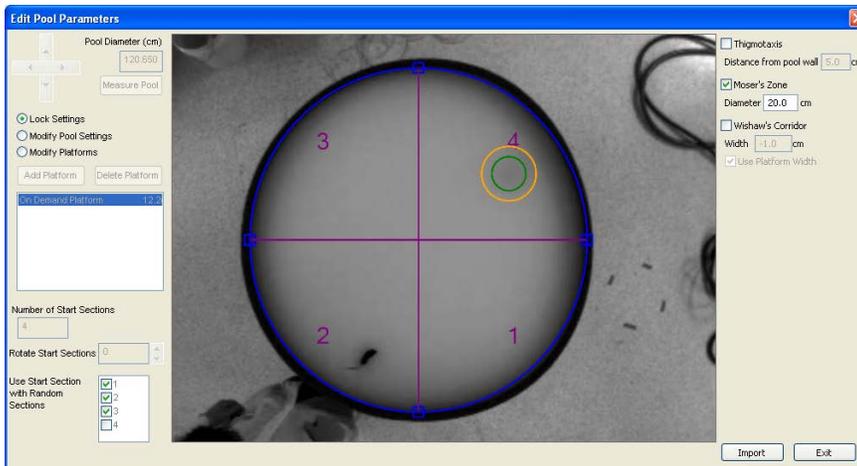
Figure 4.10 - Default Thigmotaxis Setting



Moser's Zone

To view or change the default Moser's Zone setting, check the **Moser's Zone** checkbox. The default setting will be indicated on the screen by an orange circle, as shown in Figure 4.11. This value can be changed by entering a diameter (in cm) in the **Diameter** field, or by placing the cursor over the perimeter of the orange circle until it changes to a \leftrightarrow , then clicking and dragging until the circle is the desired diameter.

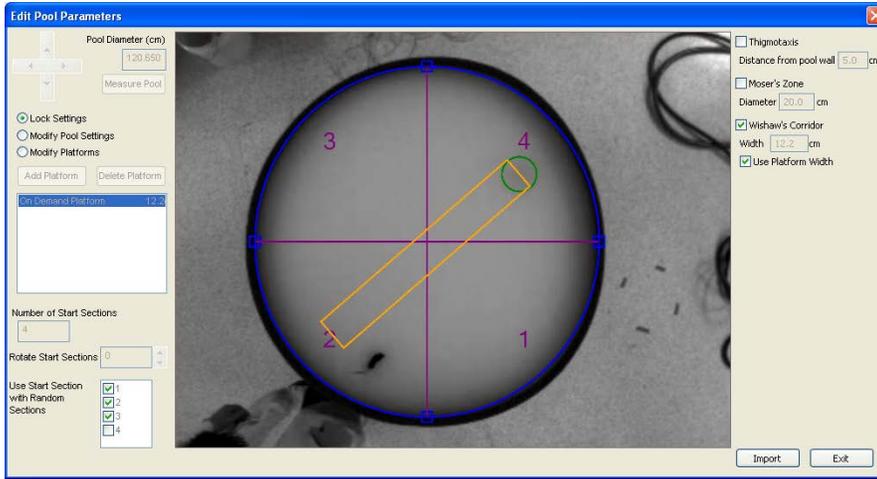
Figure 4.11 - Default Moser's Zone Setting



Wishaw's Corridor

To view or change the default Wishaw's Corridor setting, check the **Wishaw's Corridor** checkbox. The default setting will be indicated on the screen by a white rectangle, as shown in Figure 4.12. Enter the corridor width (in cm) in the **Width** field or select the **Use platform width** checkbox.

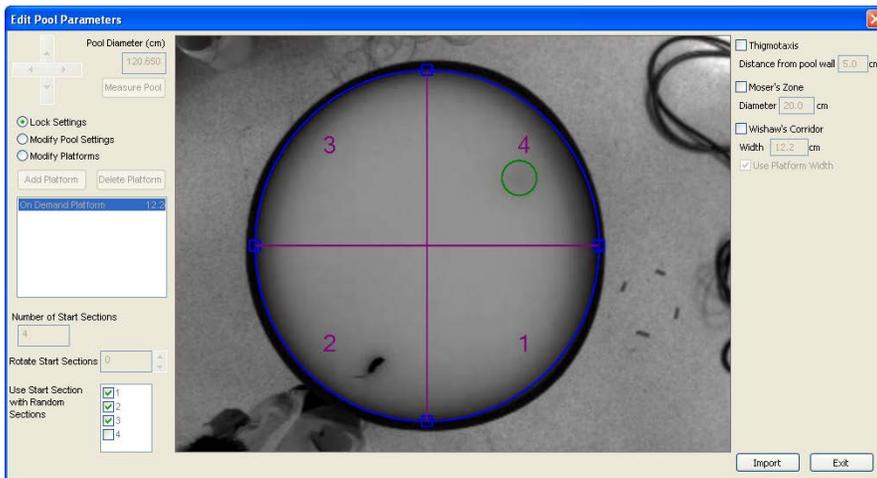
Figure 4.12 - Wishaw's Corridor Default Setting



Save Pool Parameters

To save the pool parameters and continue setting up the experiment, select **Lock Settings** and click **Exit**, as shown in Figure 4.13. The screen Editing Project screen, shown in Figure 4.15, will appear.

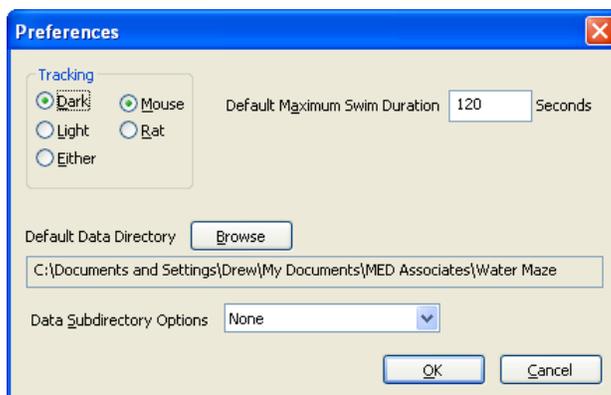
Figure 4.13 - Lock Pool Settings and Exit



Setting Preferences

Prior to starting a trial, set the tracking preferences and video file storage location by selecting **Edit | Preferences**. The screen shown in Figure 4.14 will appear. Select the color and species of animal that will be run in order to optimize the tracking algorithm. It is recommended that the "Either" option be selected only if both dark and light colored animals will be used in the same project. After verifying the Maximum Swim Duration and the Data Directory, click **OK** to save and close. If at any time during the project the color or species of animal changes, it is recommend that the Preferences settings be changed accordingly.

Figure 4.14 - Preferences Screen



Adding Animals to Project

To begin adding animals, click the **Add Animal** button on the Editing Project screen. This will open the Add Animal screen, shown in Figure 4.16.

Figure 4.15 - Editing Project Screen

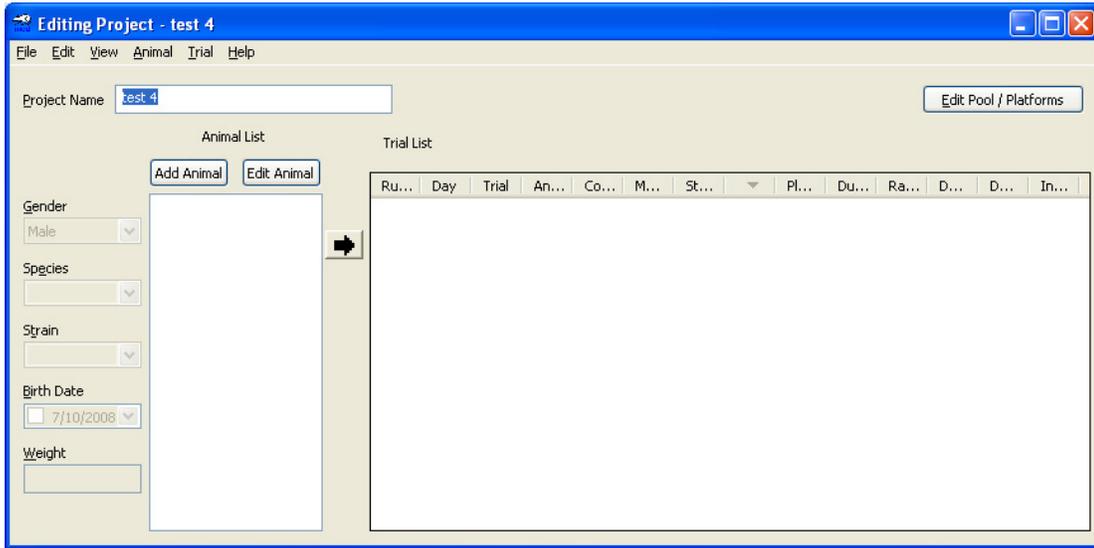
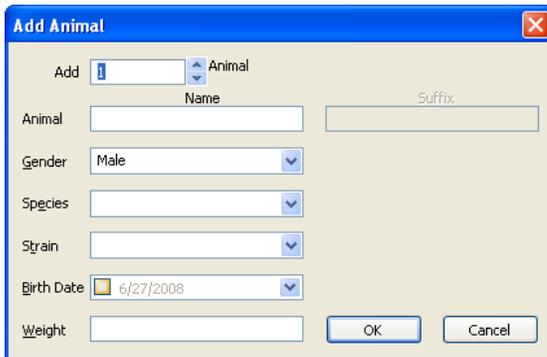


Figure 4.16 - Add Animal



The following information may be entered in the Add Animal screen. The only required field is number of animals.

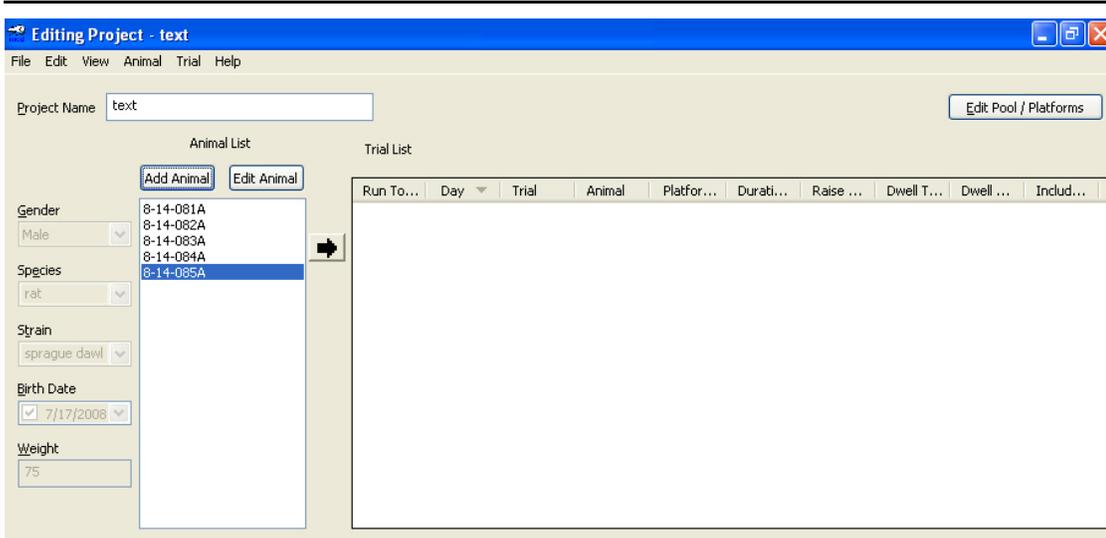
Add **Animals:**

Enter the number of animals to add. Note that if more than one animal is added at once, they will all have the same gender, species, strain, birth date and weight. **NOTE:** This is the only required field on the screen, all other fields are optional.

- Animal Name/Prefix:** Enter the desired animal name. This will appear on the Animal List on the Edit Project screen. If more than one animal is being added the animals will be named using the Prefix, then the number, then the Suffix. If only one animal is being added, the animal will be named using "Name" only. To produce the animal names shown in Figure 4.17 the date was entered in the Prefix field and the letter A was entered in the suffix field.
- Suffix:** Enter the desired suffix. This field is only enabled if more than one animal is being added.
- Gender:** Select male or female.
- Species:** Select mouse or rat.
- Strain:** Enter the animal strain.
- Birth Date:** Enter the animal birth date.
- Weight:** Enter the animal's weight.

Once all of the necessary information has been entered, click **OK** to return to the Editing Project screen. The animals that were added will appear on the animals list, as shown in Figure 4.17.

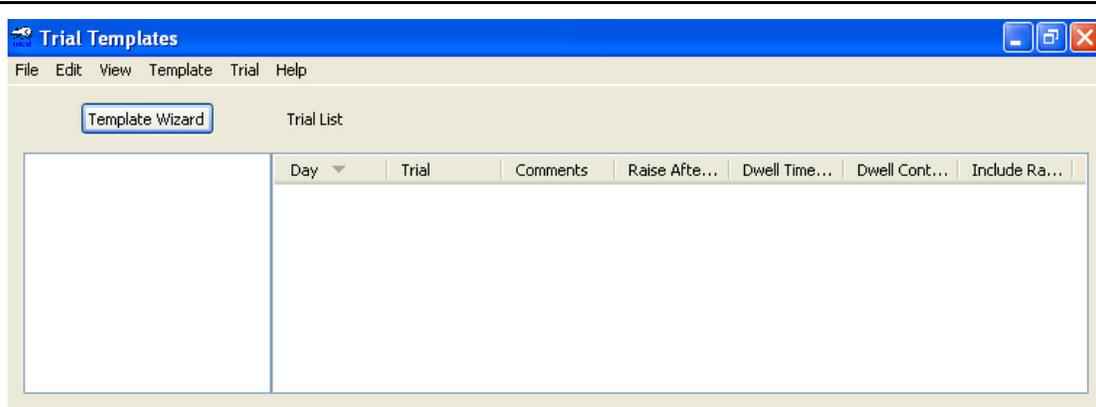
Figure 4.17 – Editing Project Screen with Animals Added



Creating a Trial Template

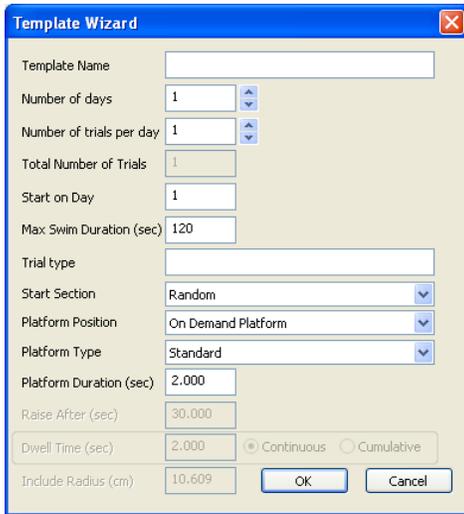
A template is a trial format that will be used for each animal. To create a Trial Template screen click **View | Edit Templates**. The Trial Templates screen shown in Figure 4.18 will appear. Click the **Template Wizard** button and the screen shown in Figure 4.19 will appear.

Figure 4.18 - Trial Templates Screen



Template Wizard

Figure 4.19 - Template Wizard



The following information must be entered into the Template Wizard screen:

- Template Name:** User defined Template Name.
- Number of days:** Number of days that the project will run.
- Number of trials per day:** Number of trials per day, per animal.
- Start on Day:** Enter the day to begin this template.

- Max Swim Duration (sec):** Enter the maximum amount of time that the animal can be in the pool.
- Trial Type:** Enter the type of trial (for example, Training or Testing).
- Start Section:** Select the Start Section (1, 2, 3 or 4 or Random) in which the animal will be placed at the beginning of the trial. Random selection will randomly select from the sections enabled on the Edit Pool Parameters screen.
- Platform Position:** Select the platform that is being used. This list will display the platforms added on the Edit Pool Parameters screen.
- Platform Type:** Select the type of platform from the pulldown menu. The options are Standard, On-Demand or Null. The Null setting should be used when the platform is not being used in the pool, but its location should still be defined in software.
- Platform Duration (sec):** Enter the amount of time that the animal must remain on the platform before the trial is considered complete.
- Raise After (sec)*:** Enter the amount of time that should pass before the On-Demand platform is raised even if the animal hasn't been inside the include radius during the trial.
- Dwell Time (sec)*:** Enter the amount of time that the animal must spend inside the include radius before the platform is raised.
- Continuous*:** The dwell time must be consecutive seconds.
- Cumulative*:** The dwell time will be cumulative seconds. E.g. the dwell time is set to 2 seconds. If the animal is inside the Include Radius four times for 0.5 second each time, the On-Demand platform will be raised.
- Include Radius (cm)*:** Enter the radius within which an animal must dwell for a certain amount of time (see **Dwell Time**) to raise the On Demand Platform. This radius is centered over the On-Demand Platform.

* These options only enabled if **On-Demand** is selected from the Platform Type pulldown menu.

Once all of the necessary information has been entered, click **OK** to return to the Trial Templates screen. An example of a completed Template Wizard is shown in Figure 4.20. This screen would result in the Trial Template screen shown in Figure 4.21. Review the trial information. To make corrections click the **Template Wizard** button again. If it is correct, click **View | Edit Project** to return to the Editing Project screen.

To customize individual trials, right click on the desired trial, as shown in Figure 4.22. Or, select the trial and open the **Trial** menu (Figure 3.11).

Figure 4.20 – Example Template Wizard

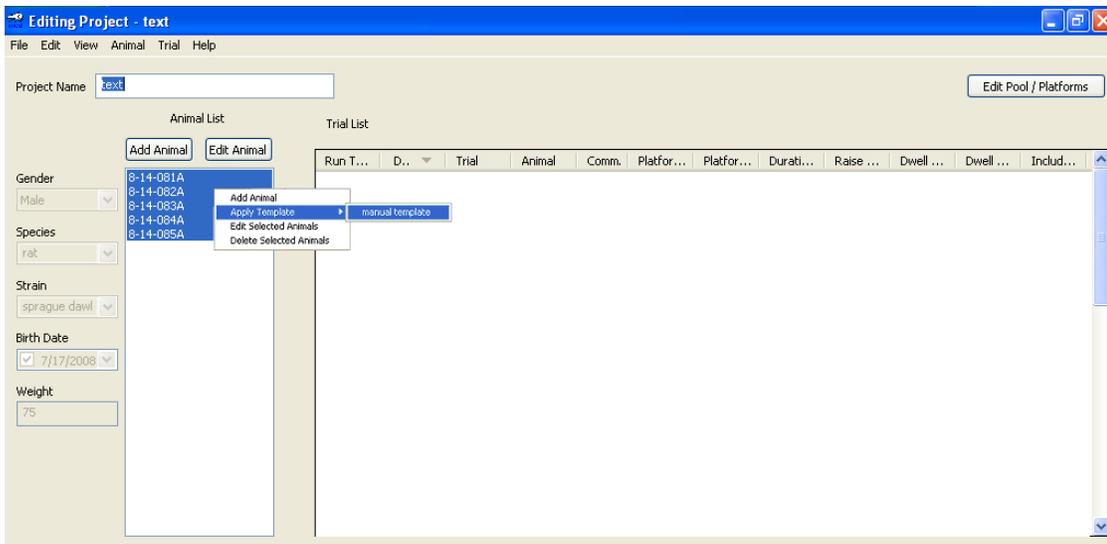
Figure 4.21 – Example Trial Templates Screen

Day	Trial	Comments	Max Swim ...	Start Section	Platform N...	Platform T...	Duration (...)	Raise Afte...	Dwell Time...	Dwell Cont...	Inclu...
1	1	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
1	2	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
1	3	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
1	4	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
1	5	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
1	6	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
1	7	Testing	120	4	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
1	8	Testing	120	4	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
1	9	Testing	120	4	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
1	10	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
2	1	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
2	2	Testing	120	4	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
2	3	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
2	4	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
2	5	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
2	6	Testing	120	4	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
2	7	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
2	8	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
2	9	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
2	10	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
3	1	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
3	2	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
3	3	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
3	4	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
3	5	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
3	6	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
3	7	Testing	120	4	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
3	8	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
3	9	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
3	10	Testing	120	4	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
4	1	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
4	2	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
4	3	Testing	120	4	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
4	4	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
4	5	Testing	120	4	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
4	6	Testing	120	4	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
4	7	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
4	8	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
4	9	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
4	10	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
5	1	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
5	2	Testing	120	4	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
5	3	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
5	4	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
5	5	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
5	6	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
5	7	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
5	8	Testing	120	2	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
5	9	Testing	120	4	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200
5	10	Testing	120	3	platform 1	On Demand	2.000	30.000	2.000	Yes	12.200

Applying the Template to the Animals

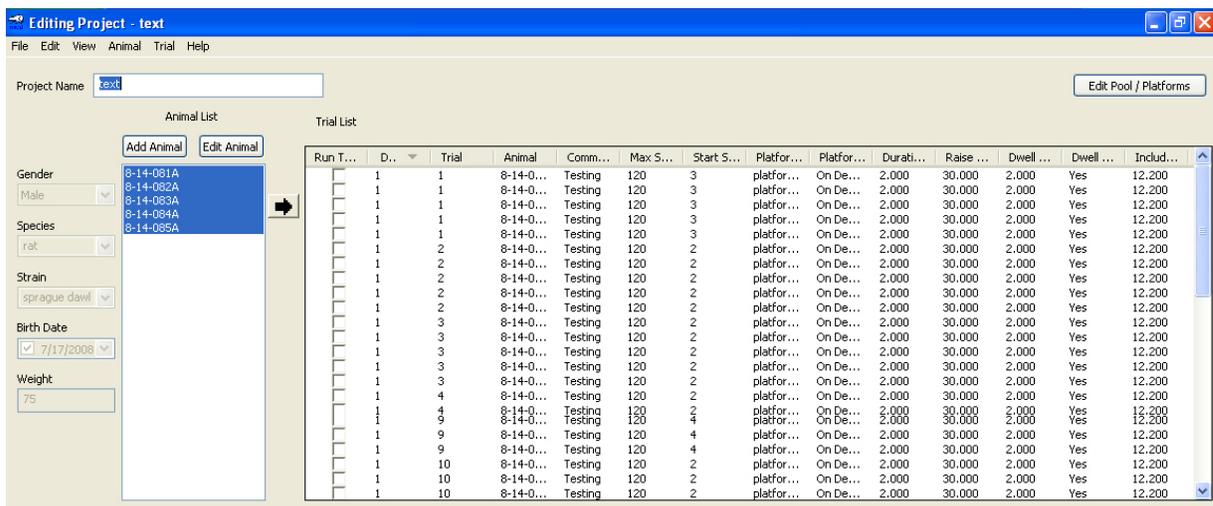
Select the animals from the list to apply the template to. To select all the animals on the list, click on the animal at the top of the list, then hold down the shift key and click the animal at the bottom of the list, or click any animal in the list, and press Ctrl+A. Right click on the highlighted animal(s) or click the Animal menu and the menu items shown in Figure 4.23 will appear.

Figure 4.23 – Apply Template to Selected Animals



Select **Apply Template**, and then select the template to apply to the animals. The Trial List will then be populated with the trial information, as shown in Figure 4.24.

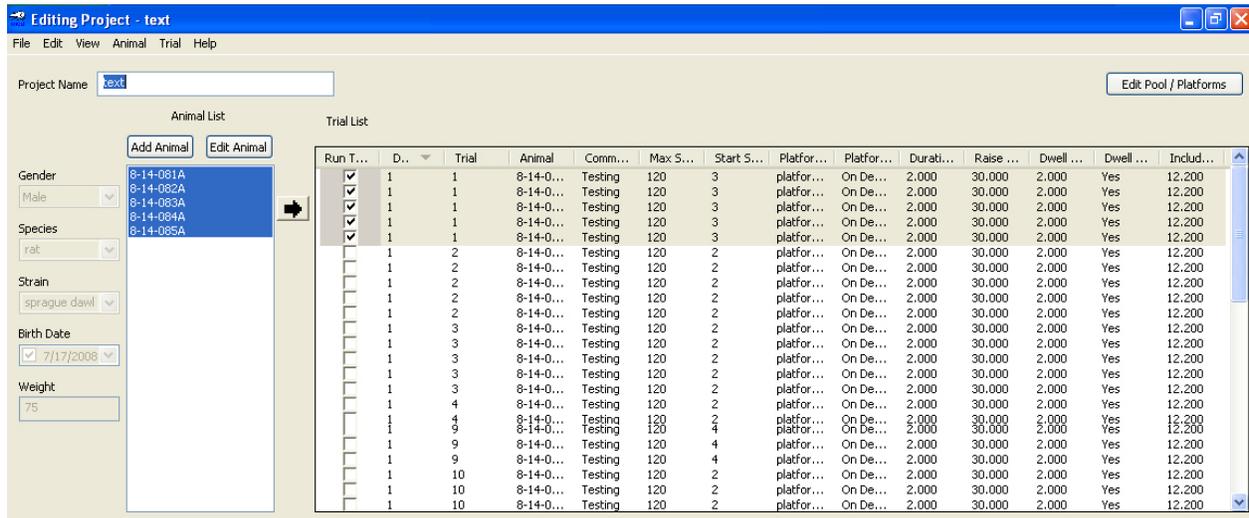
Figure 4.24 – Trial List Populated



Select the trials to run today. To select a contiguous section of multiple trials, click on the trial at the top of the list, then hold down the shift key and click the trial at the bottom of the list. To select all trials, click any trial and press Ctrl+A. To select individual trials, hold the Ctrl key and click each desired trial to highlight blue.

In the example shown in Figure 4.25 the first trials on Day 1 are selected. Right click a blue highlighted trial, or open the **Trial** menu and choose **Modify Run Today**. The Run Today (leftmost) column will have the checkboxes filled for the selected trials. After picking the trials to run today, click **View | Main Screen** and the screen shown in Figure 4.26 will appear.

Figure 4.25 - Trials Selected



Starting a Trial

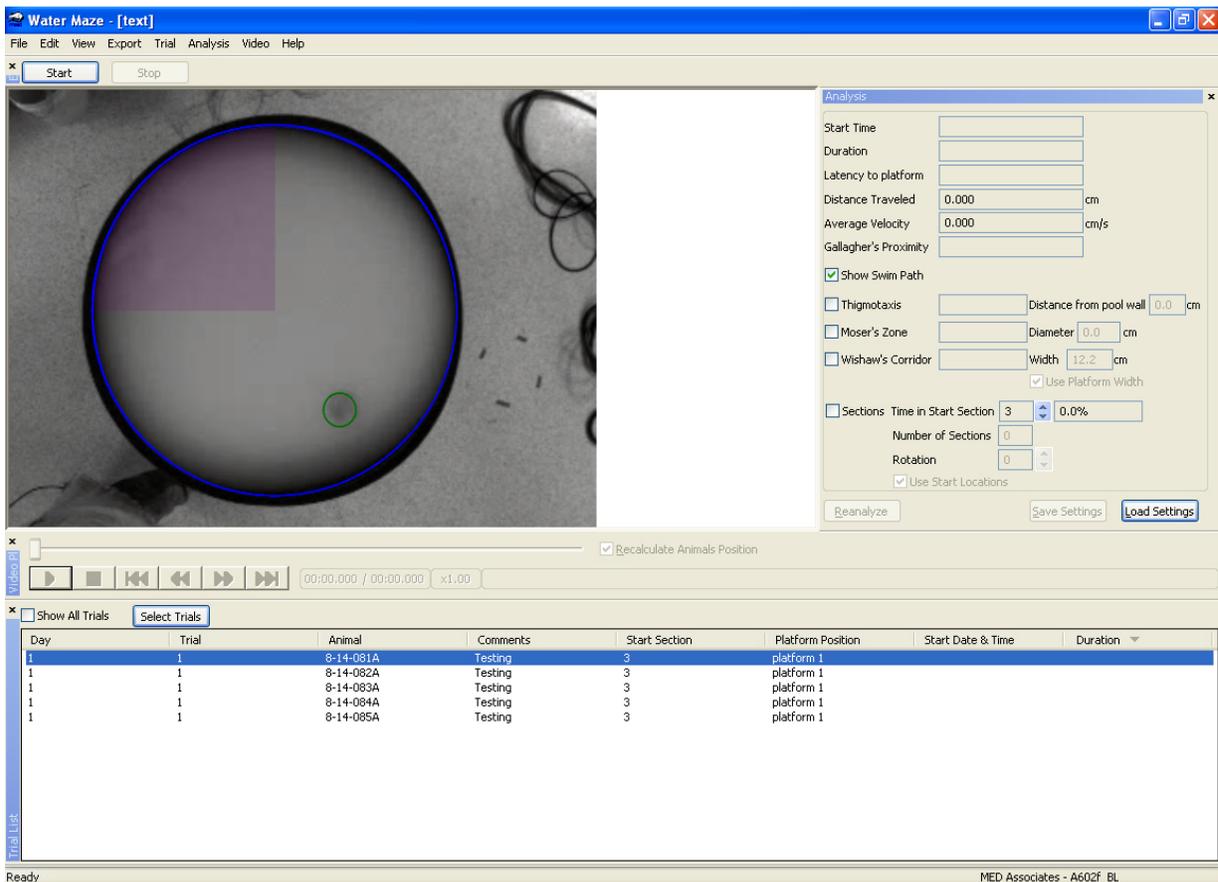
Select **View | Main Screen** then highlight (in blue) the trial to run on the Trial List, as shown in Figure 4.26. Place the animal in the pool inside the start section, which is highlighted in purple. Once the researcher is outside of the pool boundary, click the **Start** button or press the remote pushbutton (Figure 2.3). Once the trial is started a red + indicates where the software has determined the animal's location to be. The Start Time field will be filled in with the current date and time and the trial will be highlighted in red. If the **Show Swim Path** checkbox is filled a red line will trail the animal, indicating its swim path.

The trial will automatically stop when either the animal remains on the platform for the user defined Platform Duration or when the user defined Max Swim Duration has been met. Clicking the **Stop** button or pressing the remote pushbutton (Figure 2.3) will also end the trial.

The trial will be highlighted in yellow once it is complete and the next trial will automatically be highlighted in blue. This allows the user to run every trial simply by pressing the remote pushbutton. A completed trial will also have a "Start Date & Time" and a "Duration" in the Main Screen's Trial List. On the Editing Project screen completed trials will be highlighted in yellow.

Once a trial has been completed the user can play back the video. Also, analysis settings can be modified and reports can be generated detailing the experiment data and the analysis results.

Figure 4.26 - Main Screen with Trials

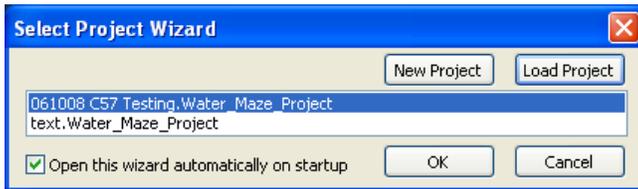


CHAPTER 5

Opening an Existing Project

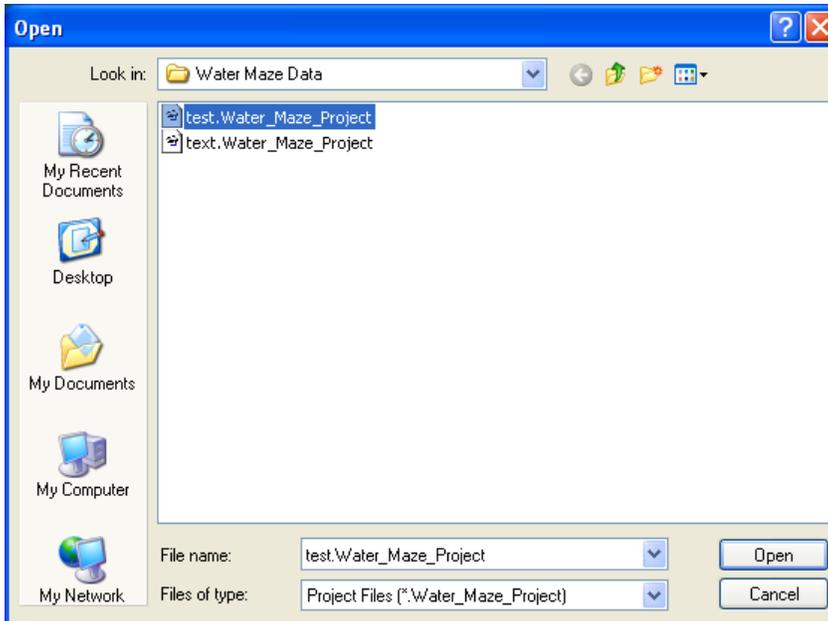
To open an existing project, open the software application and the Select Project Wizard screen shown in Figure 5.1 will appear. Clicking **File | Select Project Wizard** will also access this screen. Recently opened projects will be listed on the Select Project Wizard screen; other projects can be accessed by clicking the **Load Project** button, which will open the Open File screen shown in Figure 5.2.

Figure 5.1 – Select Project Wizard



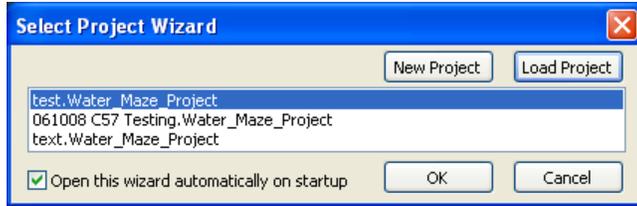
Highlight the desired project and click **Open**. The Select Project Wizard will appear again, as shown in Figure 5.3.

Figure 5.2 – Open File



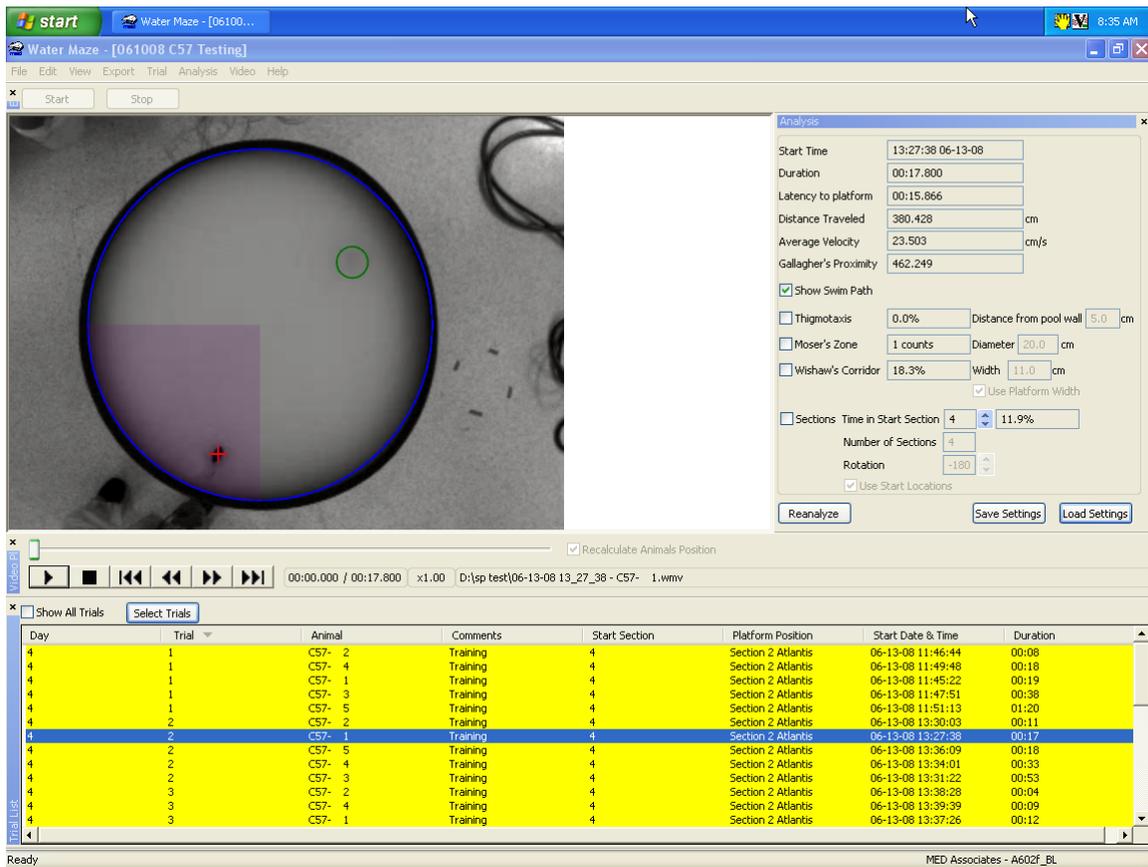
The desired project will now appear on the Select Project Wizard list. Highlight the desired project and click **OK**. The main screen will appear as shown in Figure 5.4.

Figure 5.3 – Select Project Wizard with Desired Project



Highlight a trial to display the corresponding Analysis data and settings.

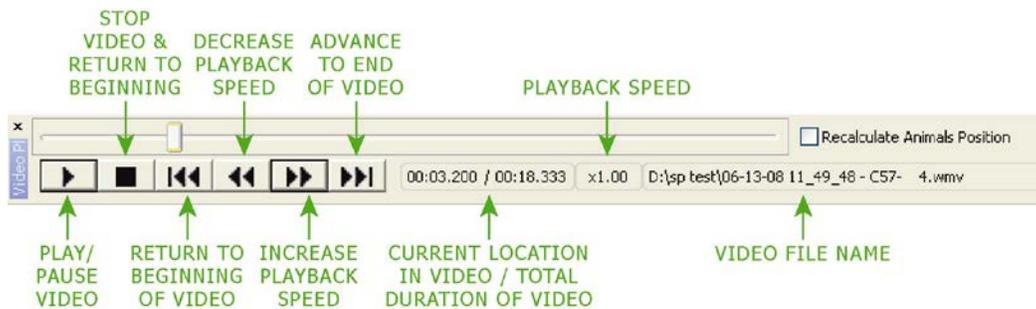
Figure 5.4 – Main Screen with Opened Existing Project



Video Playback Controls

Use the buttons shown in Figure 5.5 to control a file's video playback. To advance one frame at a time, click on the slider bar and the slider will turn from green to yellow, as shown. The left and right arrow keys on the computer keyboard may now be used to advance the video one frame at a time. The Page Up and Page Down keys on the computer keyboard can be used to advance once second at a time. The video playback speed can be adjusted using the Increase/Decrease Playback Speed keys indicated below.

Figure 5.5 - Video Playback Controls Labeled



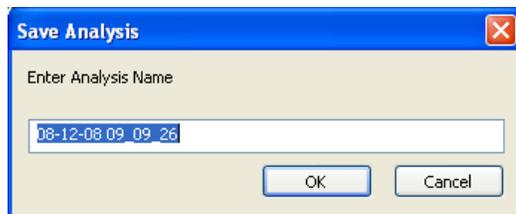
Changing Analysis Settings

The Show Swim Path, Thigmotaxis, Moser's Zone, Wishaw's Corridor and Sections settings used to analyze the data of a completed project can be changed and the data can be reanalyzed using the new settings. To alter an analysis parameter, e.g. the Moser's Zone diameter, fill the check box next to the parameter in the Main Screen's Analysis window. This will enable the parameter's edit box for adjustment. After changing an analysis setting, press the **Reanalyze** button to recalculate the percentage or counts.

Saving Analysis Settings

To save new analysis settings, click the **Save Settings** button and the Save Analysis screen shown in Figure 5.6 will appear. Enter the desired Analysis Name and click **OK**. These settings will be applied to the entire project.

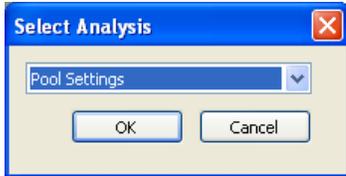
Figure 5.6 – Save Analysis



Loading Analysis Settings

To load previously saved analysis settings, click the **Load Settings** button and the Select Analysis screen shown in Figure 5.7 will appear. Select the analysis settings to apply to the project from the pulldown menu and click **OK**. The settings entered in the Edit Pool Parameters screen (see the **Editing Pool Parameters** section of this manual) are named Pool Settings.

Figure 5.7 – Select Analysis Screen



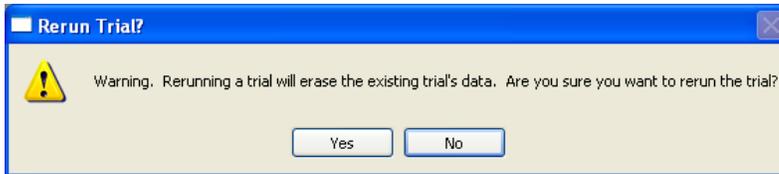
Reanalyzing a Trial

To apply the new analysis settings to a completed trial, highlight the desired trial and click the **Reanalyze** button. The data will be reanalyzed and displayed using the new analysis settings.

Rerunning a Trial

If for any reason the data recorded during a trial is incorrect, for example if the trial was started prematurely, the trial can be rerun. The data recorded will be deleted and replaced with new data. To rerun a trial, highlight the desired trial and select **Trial | Rerun**. The prompt shown in Figure 5.8 will appear. Click **Yes** to proceed.

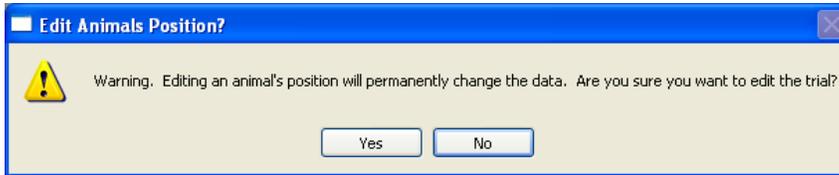
Figure 5.8 - Rerunning Trial Prompt



Editing the Animal's Position

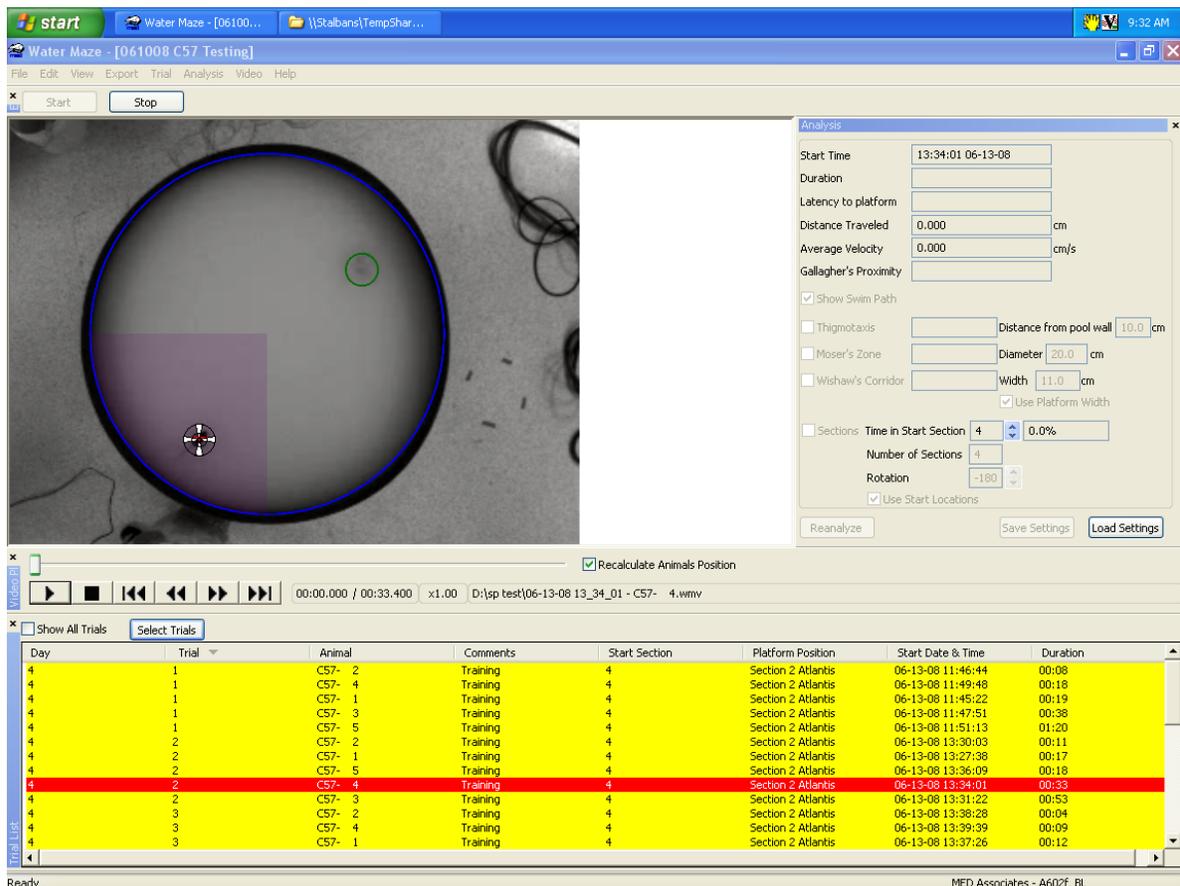
If the animal was not properly tracked during a trial, its position can be edited. Highlight the completed trial to be edited and select **Trial | Edit Animal's Position**. The confirmation prompt shown in Figure 5.9 will appear. Click **Yes** to proceed and the main screen will appear as shown in Figure 5.10.

Figure 5.9 - Editing Animal's Position Prompt



The selected trial will be highlighted in red. There are two editing modes. If the **Recalculate Animal's Position** checkbox is checked the software will automatically relocate the animal. If it is unchecked the user may set the animal's location for each frame.

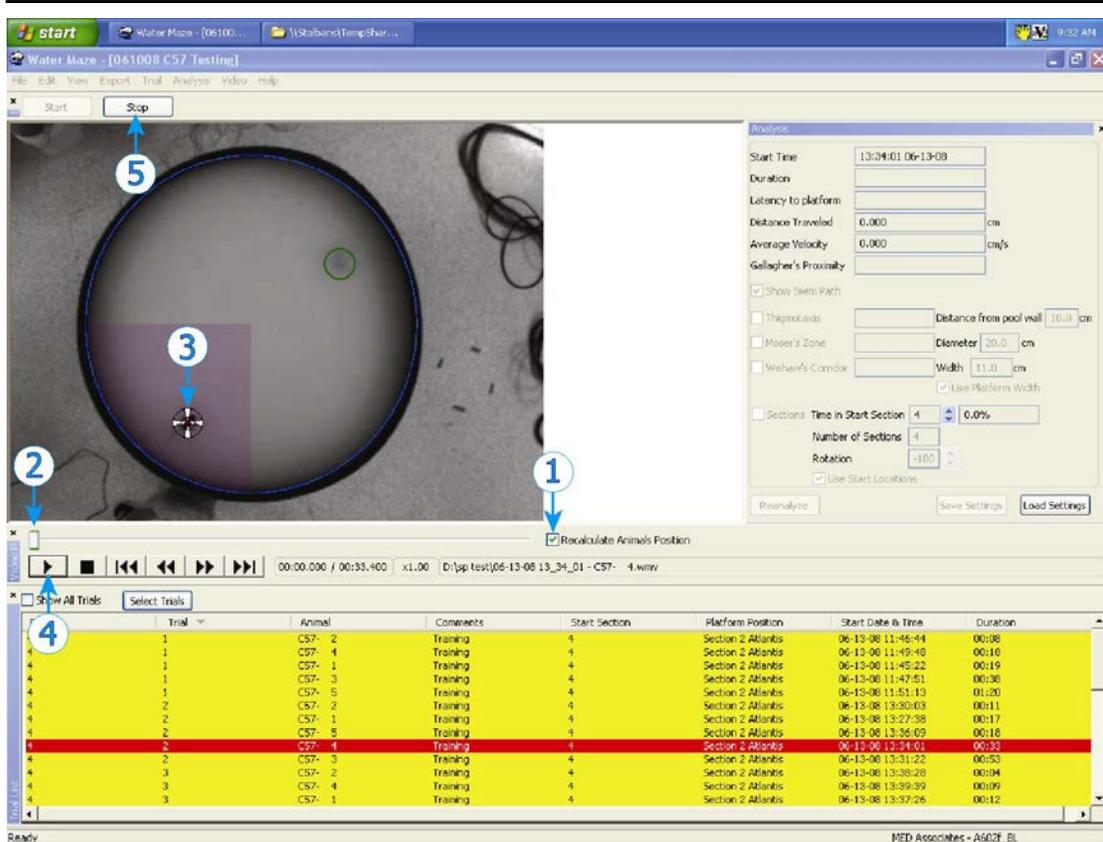
Figure 5.10 – Edit Animal's Position



Automatically Recalculating the Animal's Position

Refer to Figure 5.11 when completing the following steps. Check the **Recalculate Animals Position** checkbox (1). Use the slider bar to locate the place in the video to begin retracking the animal (2). Click on the animal (3) then click the play button (4). When the video is complete, click the **Stop** trial button (5). The animal's position should now be properly tracked.

Figure 5.11 - Automatically Recalculating Animal's Position



Manually Recalculating the Animal's Position

To manually recalculate the animal's position, uncheck the **Recalculate Animals Position** checkbox. Use the slider bar to locate the frame in the video to retrack the animal and click on the animal. This will replace the animal's location data for this frame only. To retrack the animal in the next frame, click on the slider bar and use the left and right arrow keys on the computer keyboard to advance the video one frame at a time. Click on the animal in each frame where the animal's location data should be replaced. When done, click the **Stop** trial button. The animal's position should now be properly tracked.

CHAPTER 6

Exporting Data

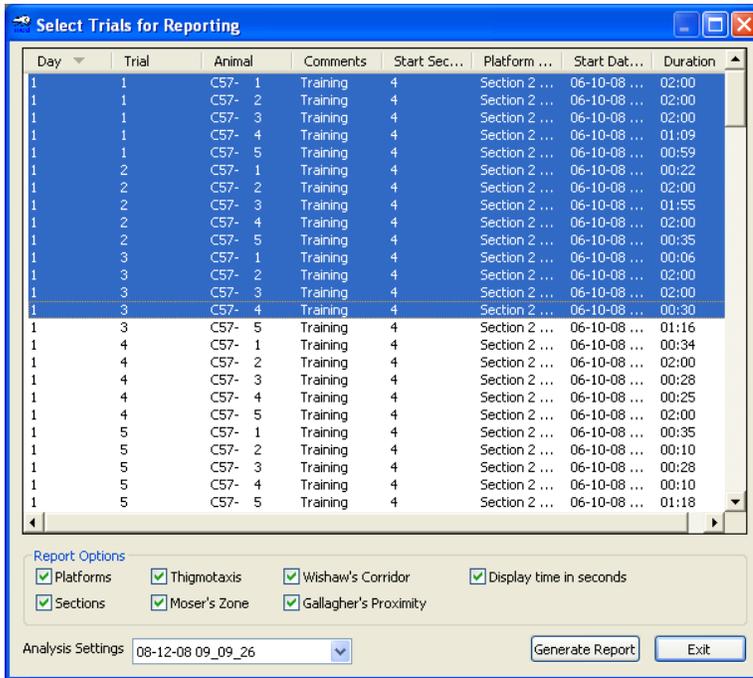
Generating Reports

To generate reports select **Export | Generate Reports**. The Select Trials for Reporting screen shown in Figure 6.1 will appear. Note that only completed trials will appear on this list.

Select the Report Options at the bottom of the screen. The information included in the report depends on the report options enabled. If Display Time in Seconds is unchecked the time will be displayed in MM:SS format and if it is checked, all times will be in seconds (e.g. 2 minutes, 11 seconds will appear as 131 sec).

Highlight the desired trials (use Ctrl + A to select all), and then select the Analysis Settings to apply to the exported data. Then click **Generate Report**. The Export screen shown in Figure 6.2 will appear.

Figure 6.1 – Select Trials for Reporting Screen



Exporting Options

Select the Format and Destination for the exported file. The options are as follows:

Format:

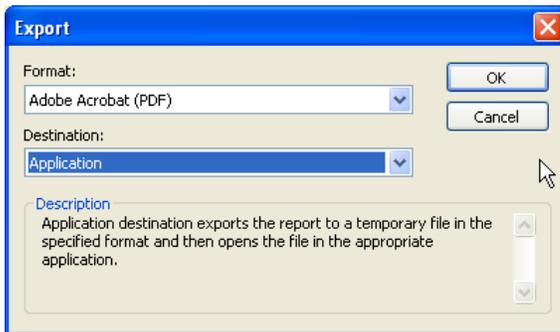
Adobe Acrobat (PDF):	Creates .pdf file that can be opened in Adobe Acrobat.
Comma Separated Values (CSV):	Creates .csv file that is useful when viewed in Microsoft Excel™ or other spreadsheet program.
Tab Separated Text (TTX):	Creates .ttx file that is useful when viewed in Microsoft Excel™ or other spreadsheet program.

Destination:

Application:	Opens the file in the appropriate application.
Disk File:	Opens a prompt to select a filename and storage location.
Printer:	Opens a prompt to select the printer and print settings.

Once the Format and Destination selections have been made, click **OK** to proceed. An example report is shown in Figure 6.3. It was generated using the PDF format.

Figure 6.2 – Export Options



Example Report in PDF Format

The information included in the report depends on the report options enabled on the Select Trials for Reporting screen (Figure 6.1). In the example below, all of the options were enabled. Therefore the data for Platforms, Sections, Thigmotaxis, Moser's Zone, Wishaw's Corridor and Gallagher's Proximity are all included in the report. Also Display Time in Seconds was enabled, so the Trial Duration is displayed in seconds rather than HH:MM:SS format.

Figure 6.3 - Example PDF Report

Water Maze Report
 Project Name: 061008 C57 Testing

***** Day 1, Trial 1, Animal C57- 1 *****

Filename: 06-10-08 13_33_09 - C57- 1.wmv
 Trial: 1
 Day: 1
 Animal: C57- 1
 Comments: Training
 Maximum Swim Duration: 120.000
 Start Section: 4

Platform Name	Type	Duration	Raise After	Dwell Time	Dwell Continuous	Include Radius
Section 2 Atla	Standard	2.000	-	-	-	-

Start Time: 6/10/2008 1:33:09PM
 Duration: 120.000
 Latency: 0.000
 Distance Traveled (cm): 2,211.36
 Average Velocity(cm/s): 18.43
 Analysis Settings: 08-12-08 09_09_26

Section	Time	Percent
1	29.400	24.5%
2	23.333	19.4%
3	15.000	12.5%
4	52.333	43.6%

Thigmotaxis
 Distance (cm): 5.03 Time: 55.467 Percent: 46.2%

Moser's Zone
 Distance (cm): 20.00 Time: 2.733 Percent: 2.3% Counts: 3

Wishaw's Corridor
 Width (cm): 11.43 Time: 5.800 Percent: 4.8%

Gallagher's Proximity: Failed to reach platform

Example Report in CSV / TTX Format

Reports generated using CSV or TTX format can be viewed in Microsoft Excel™ and will appear as shown in Figure 6.4. Again, the information included in the report depends on the report options enabled on the Select Trials for Reporting screen (Figure 6.1).

Figure 6.4 - Example Report in CSV Format

	A	B	C	D	E	F	G	H	I	J	K	L
1	Trial Filename	Trial Number	Trial Start Day	Animal's Name	Trial Comments	Maximum Swim Duration	Start Section	Trial Start Date	Duration	Latency to Platform	Distance (cm)	Average
2	06-10-08 13_33_09 - C57- 1.wmv	1	1	C57- 1	Training	02:00.0	4	6/10/2008 13:33	02:00.0	00:00.0	2211.359	18.4
3	06-10-08 13_38_25 - C57- 2.wmv	1	1	C57- 2	Training	02:00.0	4	6/10/2008 13:38	02:00.0	00:00.0	2265.845	18.6
4	06-10-08 13_47_23 - C57- 3.wmv	1	1	C57- 3	Training	02:00.0	4	6/10/2008 13:47	02:00.0	00:00.0	1949.387	16.2
5	06-10-08 13_52_06 - C57- 4.wmv	1	1	C57- 4	Training	02:00.0	4	6/10/2008 13:52	01:09.0	01:07.1	1361.747	20.2
6	06-10-08 13_54_48 - C57- 5.wmv	1	1	C57- 5	Training	02:00.0	4	6/10/2008 13:54	00:59.6	00:57.7	1104.256	18.9
7	06-10-08 13_57_51 - C57- 1.wmv	2	1	C57- 1	Training	02:00.0	4	6/10/2008 13:57	00:22.5	00:20.5	562.587	27.2
8	06-10-08 13_59_11 - C57- 2.wmv	2	1	C57- 2	Training	02:00.0	4	6/10/2008 13:59	02:00.0	00:00.0	2613.046	21.7
9	06-10-08 14_02_29 - C57- 3.wmv	2	1	C57- 3	Training	02:00.0	4	6/10/2008 14:02	01:55.7	01:07.7	2118.725	18.6
10	06-10-08 14_07_08 - C57- 4.wmv	2	1	C57- 4	Training	02:00.0	4	6/10/2008 14:07	02:00.0	00:00.0	2283.744	19.0
11	06-10-08 14_10_52 - C57- 5.wmv	2	1	C57- 5	Training	02:00.0	4	6/10/2008 14:10	00:35.8	00:10.6	687.698	20.2
12	06-10-08 14_13_15 - C57- 1.wmv	3	1	C57- 1	Training	02:00.0	4	6/10/2008 14:13	00:06.3	00:04.4	130.927	28.6
13	06-10-08 14_14_33 - C57- 2.wmv	3	1	C57- 2	Training	02:00.0	4	6/10/2008 14:14	02:00.0	00:17.7	2467.844	20.5
14	06-10-08 14_18_21 - C57- 3.wmv	3	1	C57- 3	Training	02:00.0	4	6/10/2008 14:18	02:00.0	00:00.0	1898.4	15
15	06-10-08 14_22_32 - C57- 4.wmv	3	1	C57- 4	Training	02:00.0	4	6/10/2008 14:22	00:30.8	00:28.9	655.263	22.6
16	06-10-08 14_24_03 - C57- 5.wmv	3	1	C57- 5	Training	02:00.0	4	6/10/2008 14:24	01:16.4	01:14.5	1536.674	20.6
17	06-10-08 14_27_33 - C57- 1.wmv	4	1	C57- 1	Training	02:00.0	4	6/10/2008 14:27	00:34.6	00:27.3	865.014	26.3
18	06-10-08 14_29_22 - C57- 2.wmv	4	1	C57- 2	Training	02:00.0	4	6/10/2008 14:29	02:00.0	01:41.2	2169.723	18.0
19	06-10-08 14_33_11 - C57- 3.wmv	4	1	C57- 3	Training	02:00.0	4	6/10/2008 14:33	00:28.5	00:26.5	513.494	19.2
20	06-10-08 14_34_46 - C57- 4.wmv	4	1	C57- 4	Training	02:00.0	4	6/10/2008 14:34	00:25.5	00:23.6	521.685	22.0
21	06-10-08 14_36_22 - C57- 5.wmv	4	1	C57- 5	Training	02:00.0	4	6/10/2008 14:36	02:00.0	00:00.0	2243.136	18.6

Exporting the Swim Path

The swim path can be exported in either Adobe Acrobat (.pdf) or Microsoft Excel™ (.xls) formats. The swim path is translated into data points that are represented as polar coordinates that are named **Radius** and **Angle**. The radius is the distance, in centimeters, from the center of the pool and the angle is in radians. This is represented in the diagram in Figure 6.5.

To export the swim path select **Export | Swim Path**. An Export Options screen similar to the one shown in Figure 6.2 will appear. Select the Format and Destination as described in the Exporting Options section of this manual, then click **OK**.

An example swim path report in PDF format is shown in Figure 6.6.

Figure 6.5 - Diagram of Radius and Angle Values

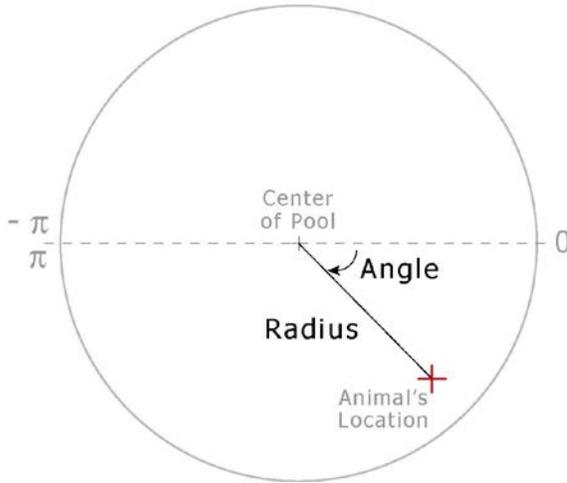


Figure 6.6 - Example Swim Path Report in PDF Format

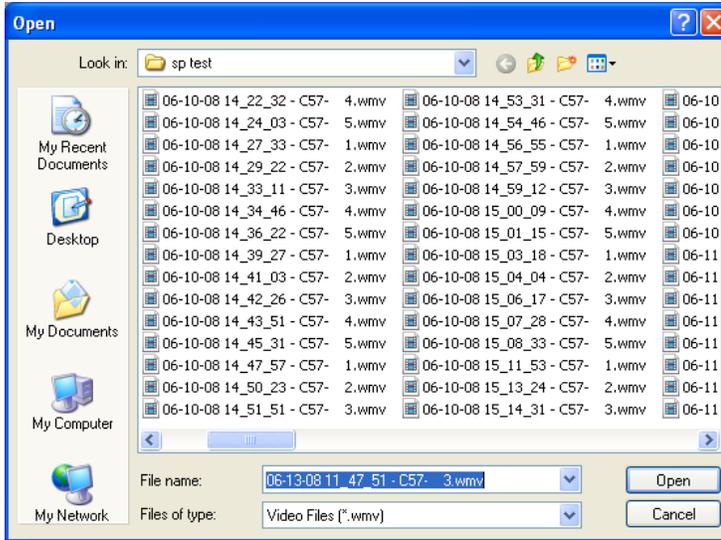
<u>time (ms)</u>	<u>radius (cm)</u>	<u>angle</u>
0.00	55.33	2.50
66.67	53.50	2.49
133.33	53.02	2.49
200.00	51.58	2.47
266.67	51.49	2.45
333.33	51.10	2.46
400.00	50.50	2.42
466.67	50.01	2.39
533.33	50.43	2.38
600.00	51.28	2.36
666.67	51.28	2.36
733.33	51.28	2.36
800.00	51.71	2.37
866.67	52.57	2.36
933.33	53.00	2.35
1,000.00	53.43	2.36
1,066.67	53.00	2.35
1,133.33	53.86	2.36
1,200.00	53.86	2.35

Exporting Video

Exporting Swim Path

To export the swim path of a trial to a video file, select **Export | Video | Swim Path**. The screen shown in Figure 6.7 will appear. Select the desired video file and click **Open**.

Figure 6.7 – Open Video File



The screen shown in Figure 6.8 will appear. Select the destination folder, enter a file name and click **Save**. When the video file is opened and played it will appear as shown in the Microsoft Windows Media Player™ example in Figure 6.9.

Figure 6.8 - Enter a Video File Name

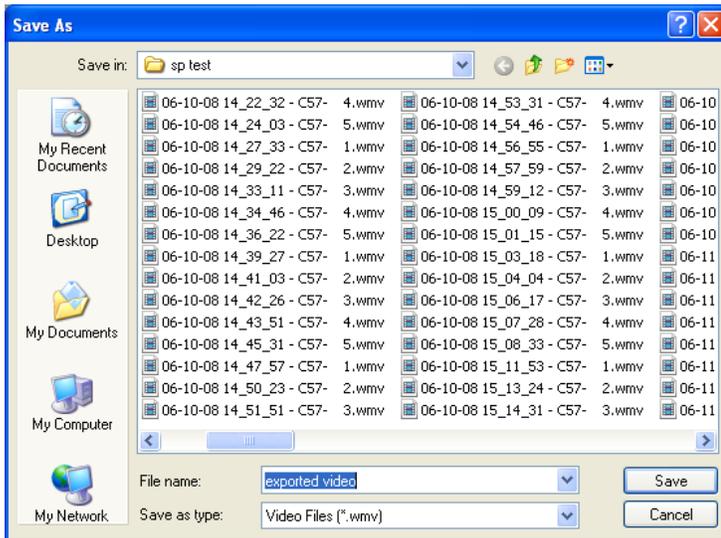
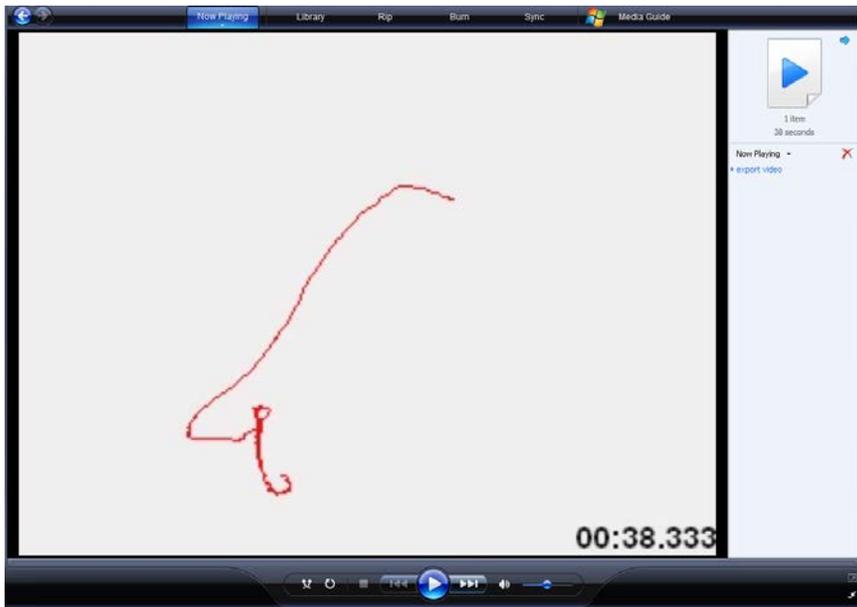


Figure 6.9 – Example Exported Swim Path Video



Exporting Video with Swim Path

To export the video with swim path of a trial to a video file, select **Export | Video | Video with Swim Path**. The screen shown in Figure 6.7 will appear. Select the desired video file and click **Open**. Then the screen shown in Figure 6.8 will appear. Enter a file name and click **Save**. When the video file is opened and played it will appear as shown in the Microsoft Windows Media Player™ example in Figure 6.9.

Figure 6.10 - Example Export Video with Swim Path Video



APPENDIX A

Configuring the Camera

Adjusting Camera Zoom, Focus and Aperture

Open the Water Maze Video Tracking software application and click **View | Main** Screen. To adjust the camera focus or zoom, loosen the thumbscrew on the ring, and make the necessary adjustment. Once proper image clarity is achieved, tighten the thumbscrew on the ring. It is recommended that the lens aperture in the maximal open position.

Figure A.1 - Focus and Aperture Rings on Video Lens



Calibrating the Camera

Open the Water Maze Video Tracking software application. Click **View | Main** Screen, then click **Video | Configure Camera** and the screen shown in Figure A.2 will appear. With the main screen in the background, the camera image will be visible.

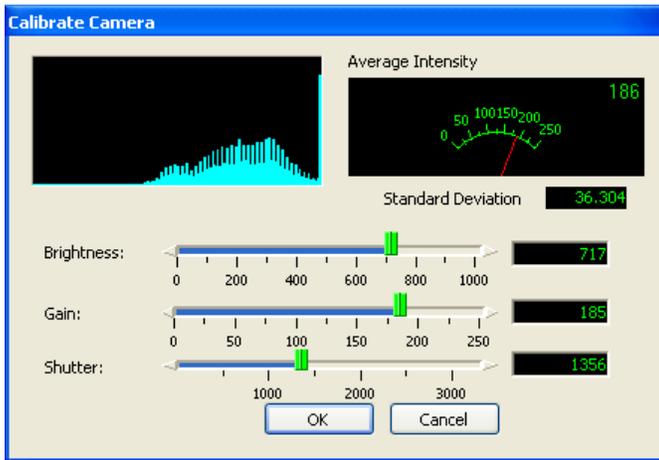
The Brightness, Gain and Shutter settings will depend on whether the software will be tracking a light animal on a dark background or a dark animal on a light background. In both cases it is desirable to have maximum contrast between the animal and the pool.

The grayscale histogram on the Calibrate Camera screen contains video data from inside the pool boundary only, and does not include the video inside the platform boundary.

The camera calibration options are as follows:

- **Brightness:** Adjusts the black level of the camera.
- **Gain:** A multiplier for the camera sensor signal output
- **Shutter:** Determines how long the camera sensor is exposed during each frame capture.

Figure A.2 – Calibrating the Camera

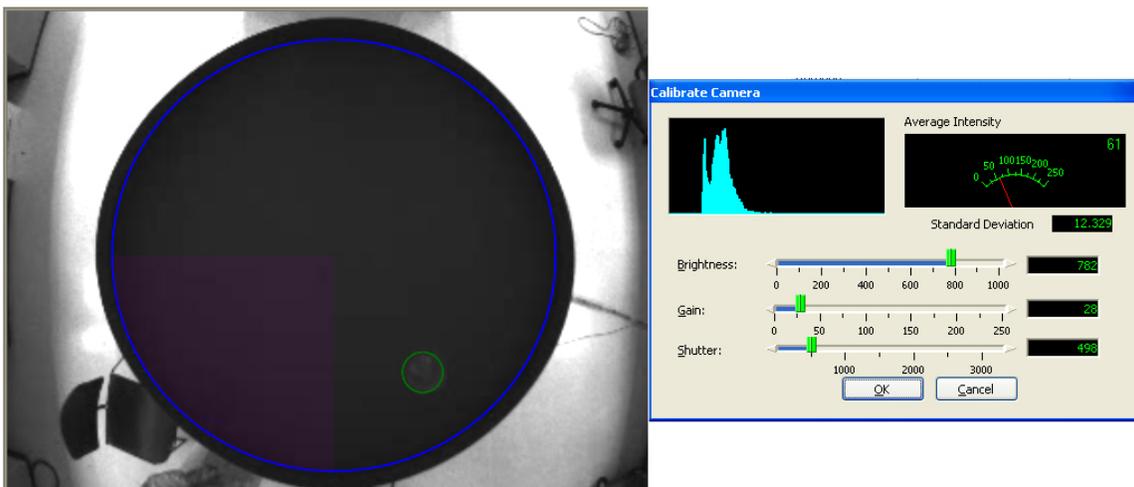


NOTE: It is important to note that these steps are MEANT TO BE USED AS A GUIDELINE and that fine-tuning may still be necessary. The Brightness, Gain and Shutter may need adjusting based on the color of the animal.

Tracking a Light Animal on a Dark Background

When tracking a light animal on a dark background the image should be slightly underexposed, as shown in Figure A.3. This means that the grayscale histogram on the Calibrate Camera screen should be shifted to the left. The example below illustrates settings that may be desirable.

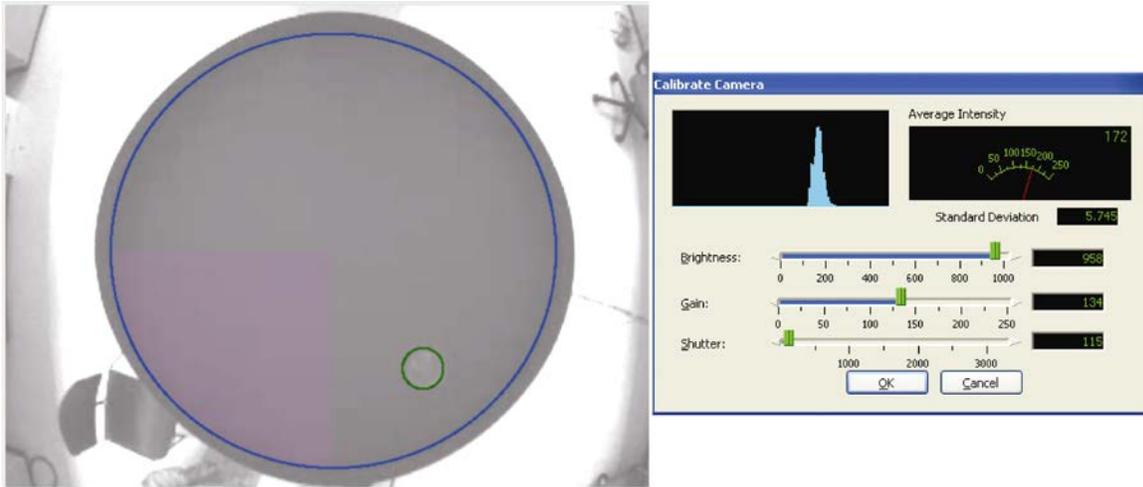
Figure A.3 – Example Settings for Tracking a Light Animal on a Dark Background



Tracking a Dark Animal on a Light Background

When tracking a dark animal on a light background the image should be slightly overexposed, as shown in Figure A.4. This means that the grayscale histogram on the Calibrate Camera screen should be shifted to the right. The example below illustrates settings that may be desirable.

Figure A.4 - Example Settings for Tracking a Dark Animal on a Light Background



APPENDIX B

Driver and Software Installation

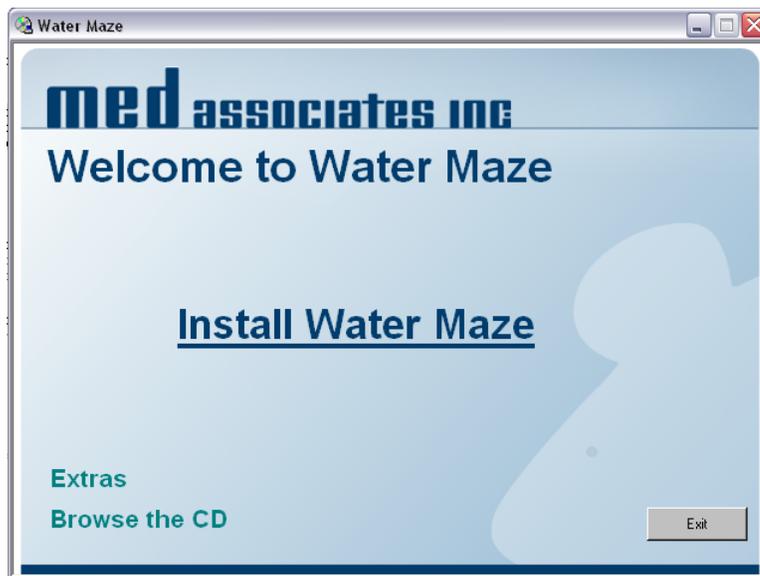
NOTE: Software installation requires a password that is issued during software registration.

If the computer being used was purchased as part of the Water Maze Video Tracking system from MED Associates, the driver and software installation was completed at the factory. If the computer was not purchased from MED Associates, follow the instructions to install the hardware drivers and software programs.

Before beginning the installation, phone, fax or e-mail Med Associates with the registration information in order to receive the software installation password. This password will be necessary during the installation process.

Insert the Water Maze Video Tracking CD into the CD-ROM drive. The screen shown in Figure B.1 will appear. Click **Install Water Maze** and the screen shown in Figure B.2 will appear.

Figure B.1 - Water Maze Video Tracking CD Main Screen



Begin installing the drivers and software by clicking **Install**. Complete the steps to install the drivers and software, entering the desired User Name and Company as well as the password when prompted.

Successful installation of each item will be indicated by a green check mark, and a red X will indicate an unsuccessful installation. Once the drivers and software have successfully been installed, the screen shown in Figure B.3 will appear.

Figure B.2 - Driver and Software Installation Checklist



Driver and software installation has been successfully completed. Click **Finish** to close this screen.

Figure B.3 - Driver and Software Installation Complete

