

# Animal Disease Spread Model

ADSM Administration



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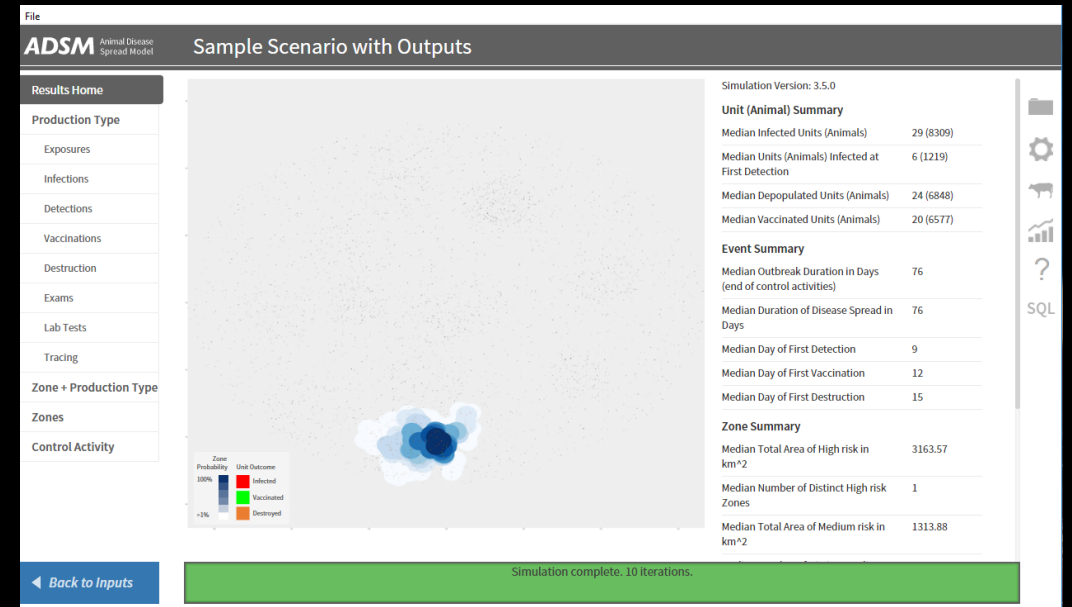
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# Document Conventions

The following conventions are used throughout the training modules:

Other **TRAINING MODULES** in this series will be referred to using all capital letters, bold face, italics, and underline.

*Rhetorical questions* and *extra notes* will be in orange italics.

Conventions applying to the ADSM application are:

Navigation tabs on right and Admin panels on left are designated with an underline. Examples are Project Panel or Population tab.

Items with an action on click, such as [Apply] Button or [Save As] icon are enclosed in square brackets.

*Parameter fields* (inputs) are in blue italics and *Variables* (outputs) are in green italics.

Navigation Tabs > *Parameter field* indicates to go to the given navigation tab to find the given field.

Hyperlinks appear in bright green type with underline <http://navadmc.github.io/ADSM/>

# ADSM Administration



There are several administrative actions that can modify the ADSM application. Some of this functionality is visible in the application. Other features are behind the scenes in supporting ADSM processes.

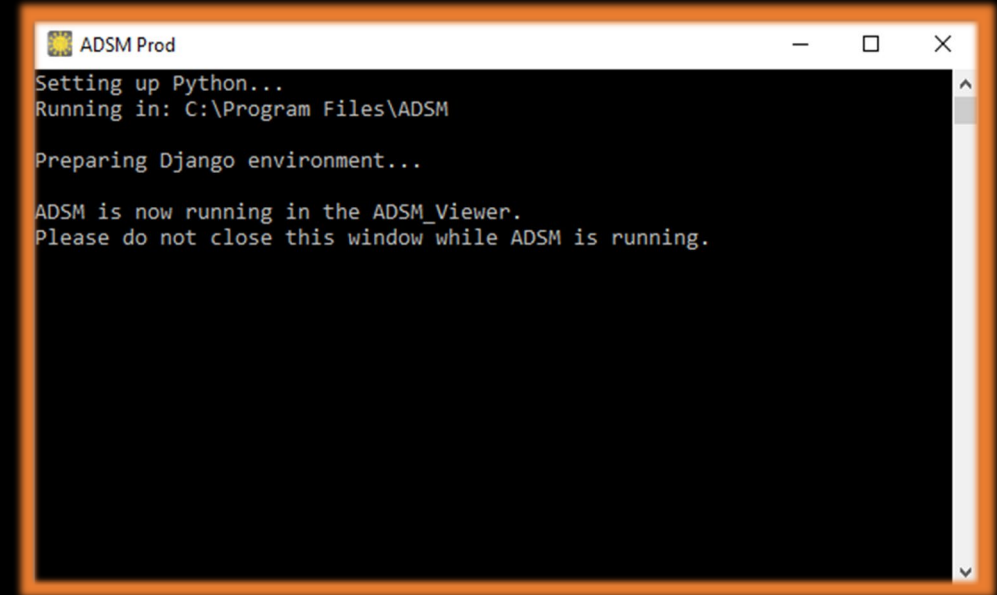
These actions can be useful as you become more familiar with ADSM.





A command window will be opened in a separate tab when ADSM is open.

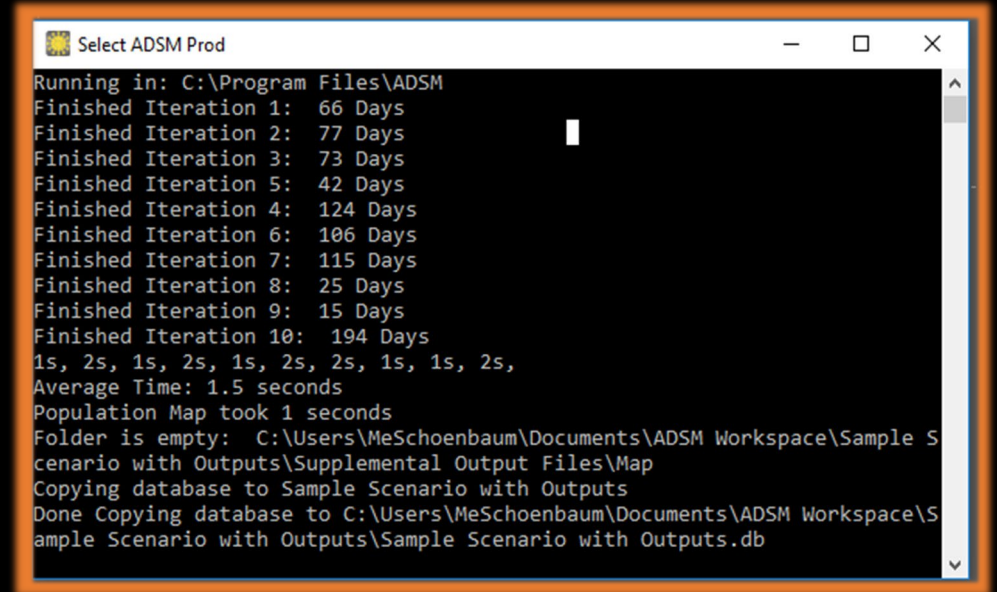
The command window gives a real-time update of the system status. Don't close the window while ADSM is running, as it will close the scenario. Minimize the command window if needed.



```
ADSM Prod
Setting up Python...
Running in: C:\Program Files\ADSM

Preparing Django environment...

ADSM is now running in the ADSM_Viewer.
Please do not close this window while ADSM is running.
```



```
Select ADSM Prod
Running in: C:\Program Files\ADSM
Finished Iteration 1: 66 Days
Finished Iteration 2: 77 Days
Finished Iteration 3: 73 Days
Finished Iteration 5: 42 Days
Finished Iteration 4: 124 Days
Finished Iteration 6: 106 Days
Finished Iteration 7: 115 Days
Finished Iteration 8: 25 Days
Finished Iteration 9: 15 Days
Finished Iteration 10: 194 Days
1s, 2s, 1s, 2s, 1s, 2s, 2s, 1s, 1s, 2s,
Average Time: 1.5 seconds
Population Map took 1 seconds
Folder is empty: C:\Users\MeSchoenbaum\Documents\ADSM Workspace\Sample S
scenario with Outputs\Supplemental Output Files\Map
Copying database to Sample Scenario with Outputs
Done Copying database to C:\Users\MeSchoenbaum\Documents\ADSM Workspace\S
ample Scenario with Outputs\Sample Scenario with Outputs.db
```

- Scenario Description
- Population
- Disease
- Disease Progression
- Assign Progression
- Disease Spread**
- Review Disease Spread
- Controls on
- Control Protocol
- Vaccination Triggers
- Vaccination Rings
- Vaccination Global
- Destruction Global
- Assign Protocols
- Zones
- Validate Scenario ▶

## Create Disease Spreads

### ▼ Direct Spread

Cattle > Cattle + ×

Swine > Swine + ×

[+ New Direct Spread](#)

### ▼ Indirect Spread

Cattle > Cattle + ×

Cattle > Swine + ×

Swine > Cattle + ×

Swine > Swine + ×

[+ New Indirect Spread](#)

### ▼ Airborne Spread

Cattle source + ×

Swine source + ×

[+ New Airborne Spread](#)

#### Name\*

Cattle > Cattle

#### Subclinical units can infect others

Indicates if **Subclinical** units of the source type can spread disease.

#### Use fixed contact rate

Use a fixed contact rate or model contact rate as a mean distribution.

#### Contact rate\*

0.3

Mean baseline contact rate (in outgoing contacts/unit/day)

#### Infection probability\*

0.05

example: 0.37 = 37%

The probability that a contact will result in disease transmission.

#### Distance distribution\*

Indirect contact distance

Defines the shipment distances for **direct** or **indirect contact** models.

#### Movement control\*

Unrestricted movement

To manage the possibility of closing without saving, ADSM requires an [Apply] at the end of every Navigation tab when changes have been made. Apply is on the bottom of every form.

On some screens, the slider becomes red to indicate that a save is needed, especially when the [Apply] button requires a scroll down to see.

A message also appears in the top right of the application as a reminder to save.

- Scenario Description
- Population
- Disease
- Disease Progression
- Assign Progression
- Disease Spread
- Review Disease Spread
- Controls on
- Control Protocol
- Vaccination Triggers
- Vaccination Rings
- Vaccination Global
- Destruction Global
- Assign Protocols
- Zones
- Zone Effects
- Assign Effects
- Output Settings

*view the population*

*The name of the current scenario*

*Close this overlay*

*Edit the different*

The ADSM overlay gives a quick glance at the administrative sections to help get you started. The overlay, shown here in blue, will be on the first time you open ADSM. Use the stacked files in the upper right to toggle off this feature.

The overlay can only be turned on while in the Scenario Description tab.

*Check and make sure everything is entered correctly and run the simulation*



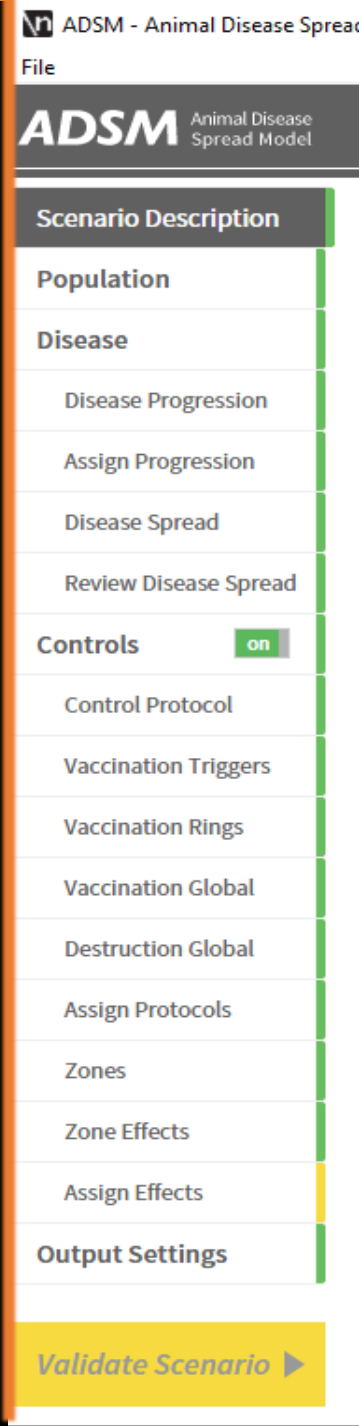


The parameterization of a scenario happens in the navigation tabs. A scenario breaks down into 3 main components for input into the simulation:

- ⚙ Population
- ⚙ Disease Parameters
- ⚙ Control Parameters

The user inputs parameters into the Disease and Control components to simulate disease spread and control within the Population.

Specific trainings cover each portion of the navigation tabs in greater detail. In this training, we will focus on administrative settings.



Depending on the type of question you are trying to answer, you can modify these main components and do comparisons:



For example, changing the Population and keeping all the other parameters would let you evaluate if the disease and control strategy behaves differently in other geographical areas that might have varying animal densities.



Another method could be keeping the Population and Disease parameters the same and changing Control parameters to see the effect of a different control strategy on an outbreak.

Working through the parameters that feed into a model provides a useful exercise in understanding all the complexities to consider when preparing an emergency outbreak response plan.

Scenario Description

Population

Disease

Disease Progression

Assign Progression

Disease Spread

Review Disease Spread

Controls

on

Control Protocol

Vaccination Triggers

Vaccination Rings

Vaccination Global

Destruction Global

Assign Protocols

Zones

Zone Effects

Assign Effects

Output Settings

Validate Scenario ▶



Error checking and validation are used throughout the application.



Mariposa Ranch Watusi

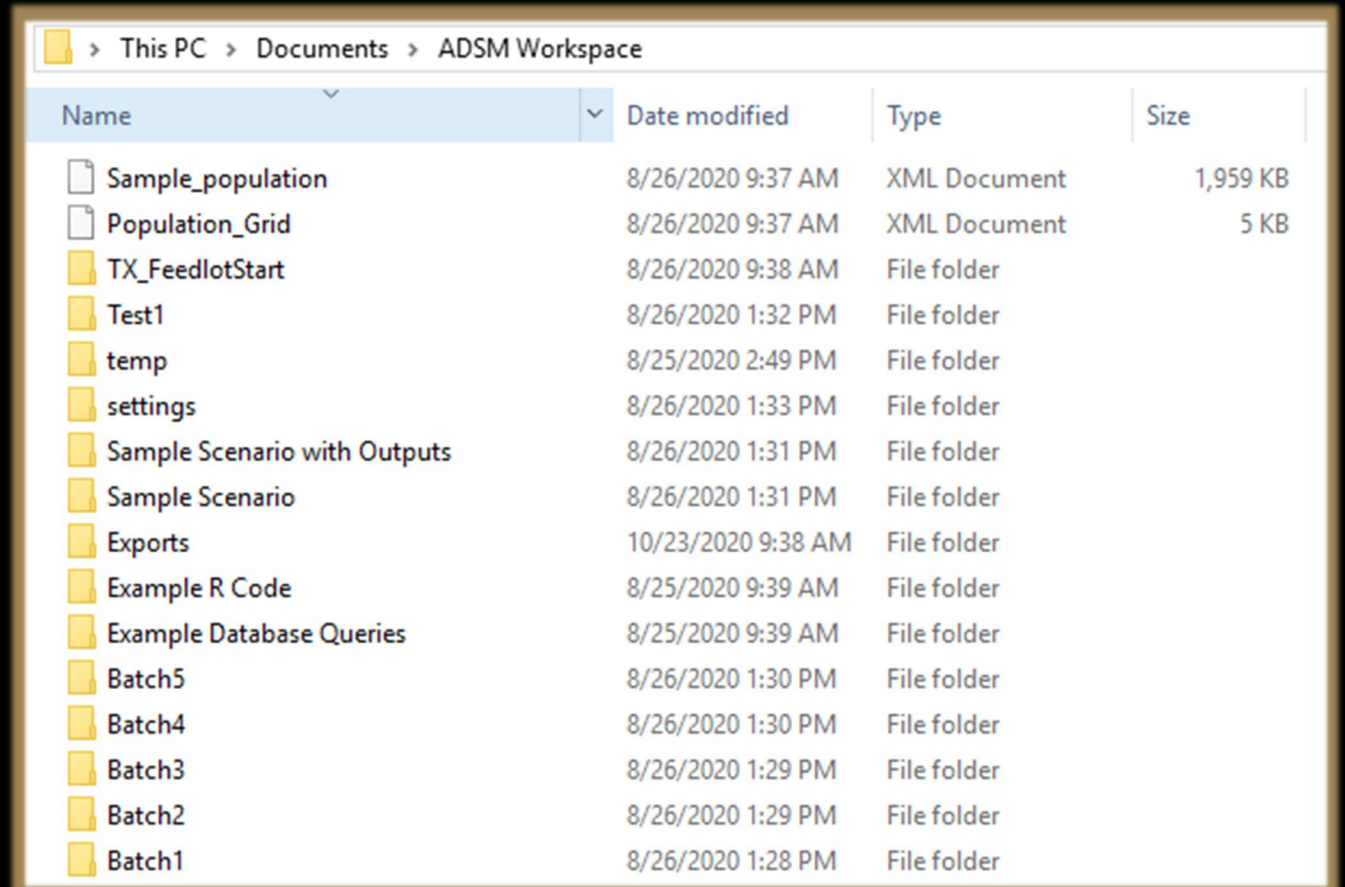
# ADSM Workspace





The ADSM Workspace is the file location that will contain both the scenarios and the results. The user can select this file location. A portable drive (USB flash drive) can be used for the ADSM Workspace file location.

The ADSM Workspace is different than the location of the programming code that runs the application. This file location is selected by the user.



Name	Date modified	Type	Size
Sample_population	8/26/2020 9:37 AM	XML Document	1,959 KB
Population_Grid	8/26/2020 9:37 AM	XML Document	5 KB
TX_FeedlotStart	8/26/2020 9:38 AM	File folder	
Test1	8/26/2020 1:32 PM	File folder	
temp	8/25/2020 2:49 PM	File folder	
settings	8/26/2020 1:33 PM	File folder	
Sample Scenario with Outputs	8/26/2020 1:31 PM	File folder	
Sample Scenario	8/26/2020 1:31 PM	File folder	
Exports	10/23/2020 9:38 AM	File folder	
Example R Code	8/25/2020 9:39 AM	File folder	
Example Database Queries	8/25/2020 9:39 AM	File folder	
Batch5	8/26/2020 1:30 PM	File folder	
Batch4	8/26/2020 1:30 PM	File folder	
Batch3	8/26/2020 1:29 PM	File folder	
Batch2	8/26/2020 1:29 PM	File folder	
Batch1	8/26/2020 1:28 PM	File folder	



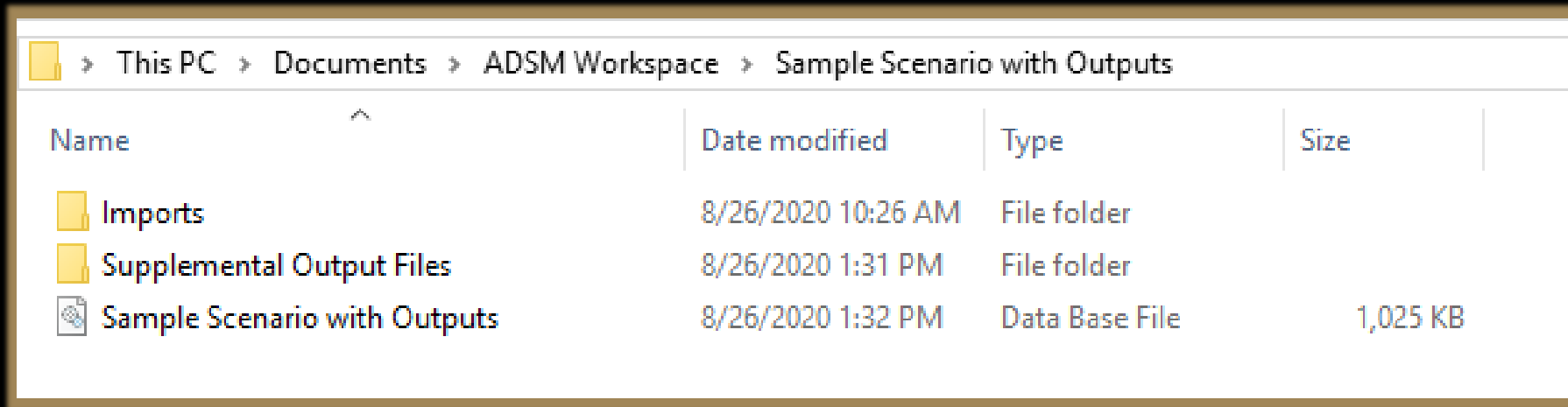
The ADSM Workspace has these folders:

- ⚙ Individual Scenarios
- ⚙ Example Database Queries
- ⚙ Example R code
- ⚙ Exports
- ⚙ Settings



Each Scenario folder will contain:

- ⚙ The actual database file for the scenario, as a .db file
- ⚙ Supplemental Output Files
- ⚙ Imports



The screenshot shows a Windows File Explorer window with the address bar displaying the path: This PC > Documents > ADSM Workspace > Sample Scenario with Outputs. The main area shows a table of files and folders.

Name	Date modified	Type	Size
Imports	8/26/2020 10:26 AM	File folder	
Supplemental Output Files	8/26/2020 1:31 PM	File folder	
Sample Scenario with Outputs	8/26/2020 1:32 PM	Data Base File	1,025 KB

The Example folders have code snippets that can be used to manipulate ADSM outputs. Each folder has a README.txt file with additional details. Don't save your code into the Example files, as they are updated when the application updates.











The Exports folder will contain items that have been exported from an ADSM scenario. These items, either Population files or Function files, allow you to easily transfer portions of one scenario to another scenario using Import functionality.

Population files can be exported from the Population panel in either .xml format or .csv format.

Population files can be imported as part of a new scenario, or by using the Replace Population functionality on the Population Navigation tab.

Population Production Type    

Swine (460 units)    

Cattle (3497 units)    

[+ define new production type](#)

Production Type Groups

[+ define new group](#)

[Export Population as XML](#)

[Export Population as CSV](#)

The exported population will be saved in a folder titled "Exports" in your workspace folder.

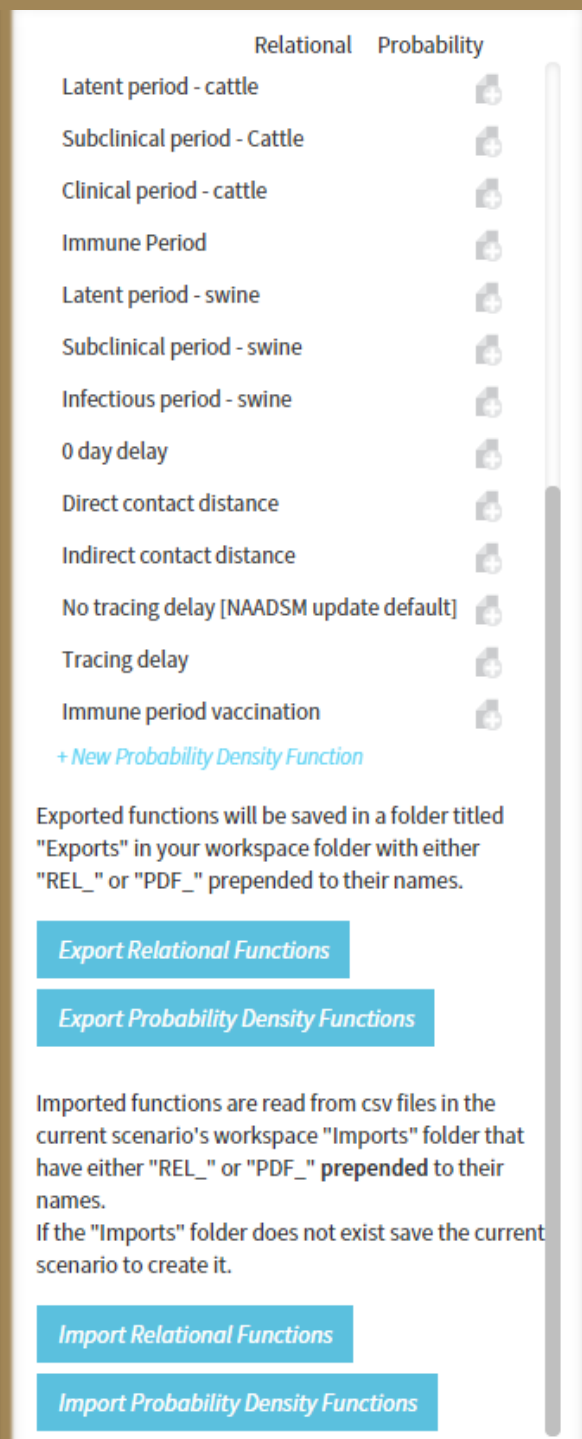




Function files can be exported from the Functions panel. These files are exported as a .csv format, which a user can edit and are in the Exports folder at the root of the ADSM Workspace.

Function files can be imported from the Functions panel. It will be necessary to copy the desired set of functions from the main Exports folder and move them into the destination scenario's Import folder. This allows you to customize the functions that you wish to transfer into the destination scenario.

If you choose to open and edit either type of export, pay close attention to leave them in the same format as they started in. For example, do not delete a line and leave a blank space. Don't save the file into an Excel format.



The screenshot shows a software interface with a list of functions. The list is organized into two columns: 'Relational' and 'Probability'. Each function name is followed by a small icon of a person. The functions listed are:

- Latent period - cattle
- Subclinical period - Cattle
- Clinical period - cattle
- Immune Period
- Latent period - swine
- Subclinical period - swine
- Infectious period - swine
- 0 day delay
- Direct contact distance
- Indirect contact distance
- No tracing delay [NAADSM update default]
- Tracing delay
- Immune period vaccination

Below the list is a link: [+ New Probability Density Function](#)

Exported functions will be saved in a folder titled "Exports" in your workspace folder with either "REL\_" or "PDF\_" prepended to their names.

[Export Relational Functions](#)

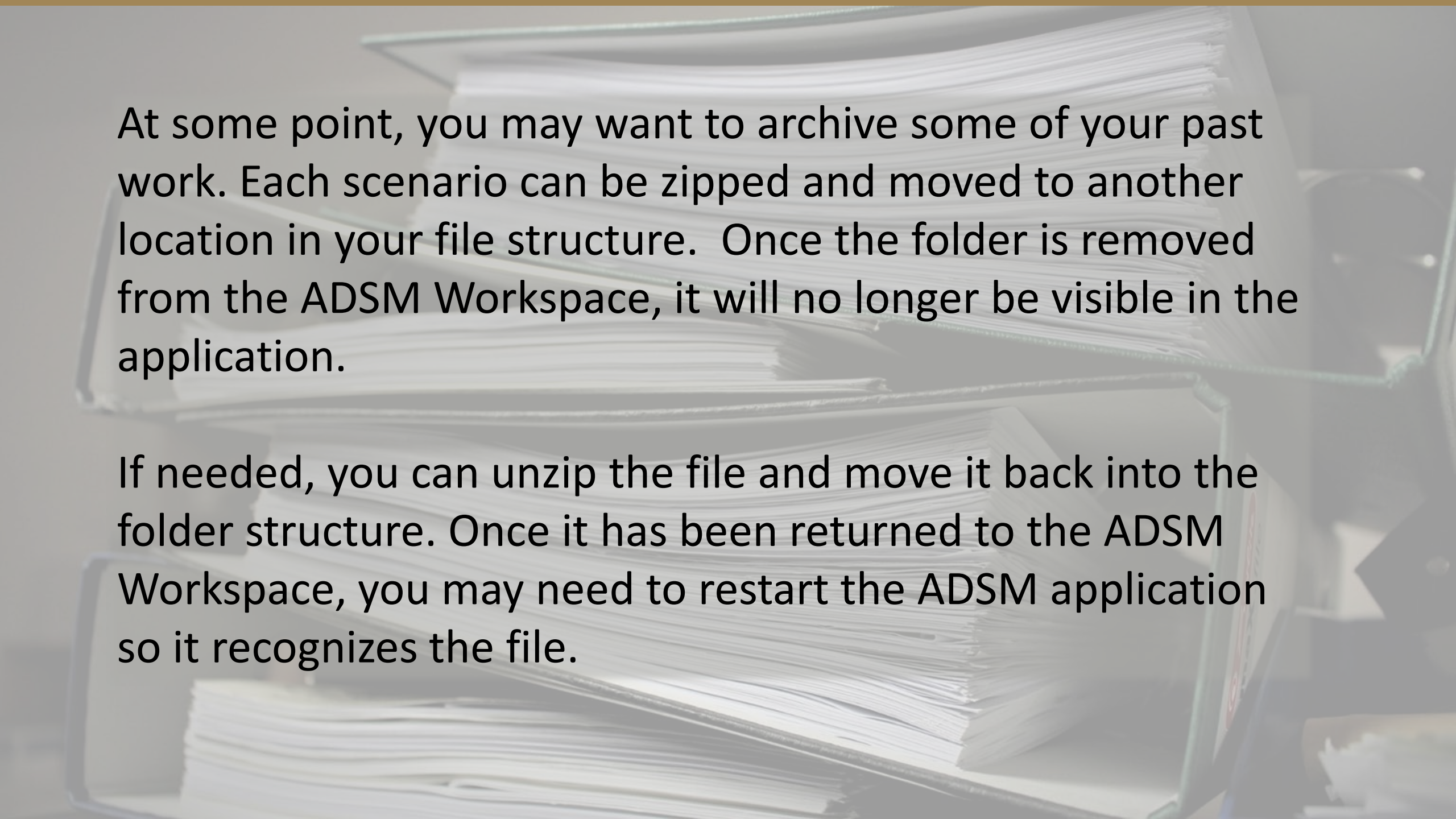
[Export Probability Density Functions](#)

Imported functions are read from csv files in the current scenario's workspace "Imports" folder that have either "REL\_" or "PDF\_" prepended to their names.

If the "Imports" folder does not exist save the current scenario to create it.

[Import Relational Functions](#)

[Import Probability Density Functions](#)

A background image showing a desk with a binder, papers, and a pen. The text is overlaid on this image.

At some point, you may want to archive some of your past work. Each scenario can be zipped and moved to another location in your file structure. Once the folder is removed from the ADSM Workspace, it will no longer be visible in the application.

If needed, you can unzip the file and move it back into the folder structure. Once it has been returned to the ADSM Workspace, you may need to restart the ADSM application so it recognizes the file.

# Administrative Panel

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# The Administrative Panel contains:

- ⚙ Project Panel
- ⚙ Settings Panel
- ⚙ Production Type Panel
- ⚙ Functions Panel
- ⚙ Documentation Panel
- ⚙ SQL Panel

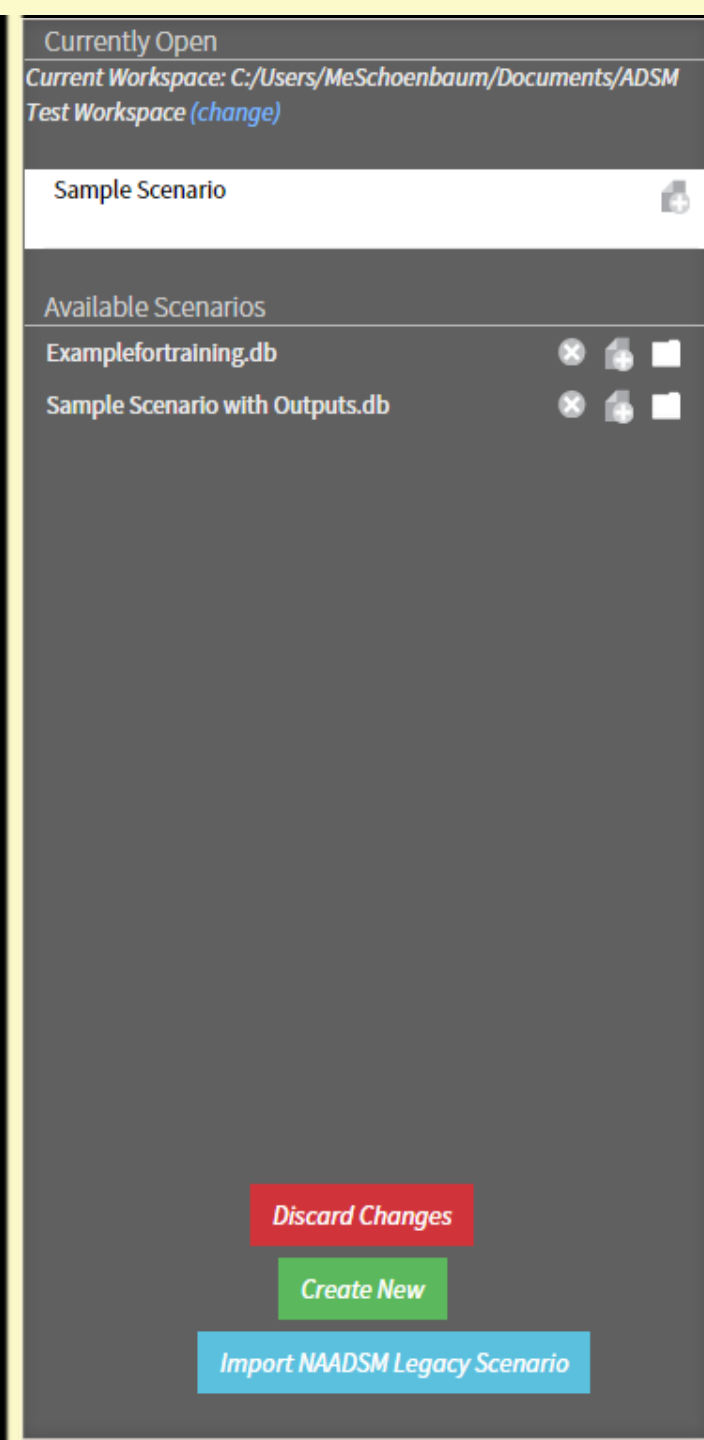


SQL

# The Project Panel:

- ⚙️ Opens a different scenario
- ⚙️ Duplicates (Save As) a current scenario
- ⚙️ Creates a new, empty scenario
- ⚙️ Imports a NAADSM 3.2.XX scenario
- ⚙️ Deletes a scenario
- ⚙️ Allows user to discard all changes
- ⚙️ Shows ADSM Workspace location
- ⚙️ Allows change of ADSM Workspace location

*The scenario files stored in the ADSM Workspace show up on the list in the Project Panel.*





# The Settings Panel:

- ⚙ Shows current application version
- ⚙ Toggles on/off help text
- ⚙ Allows access to Advanced Panel

*The Advanced Panel allows setting of the random seed, which is not recommended unless there is a need to reduce the stochasticity of the model. Instructions to change the random seed are in the wiki.*

<https://github.com/NAVADMC/ADSM/wiki/Changing-the-Random-Seed>

## Application Settings

You are running...

3.5.10.6

No updates are available.

Show inline help text and hints

Please Cite

ADSM Development Team 2019. Animal Disease Spread Model 3.5.10.6





[Advanced Panel](#)











SQL

# The Production Type Panel:

- ⚙️ Provides overview of parameterization using Status Lights
- ⚙️ Creates a new production type
- ⚙️ Creates a new production group
- ⚙️ Exports the population file (.xml or .csv)

Population Production Type    

Swine	(460 units)				
Cattle	(3497 units)				

[+ define new production type](#)

Production Type Groups

[+ define new group](#)

[Export Population as XML](#)

[Export Population as CSV](#)

The exported population will be saved in a folder titled "Exports" in your workspace folder.



Production type groups are a new concept in ADSM and are used as a vaccination trigger. This group allows the user to trigger vaccination to start when disease spreads into more than one industry.



Farrow to finish  
Nursery pigs  
Farrow to wean  
Pigs – small operations  
Pigs - backyard

} Swine

Feedlot – small  
Feedlot – large  
Cow-Calf  
Dairy – small  
Dairy - large

} Cattle



Goats – dairy  
Goats – meat  
Sheep

} Small Ruminants

# The Functions Panel:

- ⚙ Provides a list of relational functions
- ⚙ Provides a list of probability density functions
- ⚙ Allows addition and deletion of functions
- ⚙ Allows export of functions by type
- ⚙ Allows import of functions by type

The screenshot shows a software interface for managing functions. At the top, there are tabs for 'Assign', 'Relational', and 'Probability'. Below the tabs, there is a list of functions. The 'Relational' tab is active, showing a list of functions including 'moderate risk movement', '+ New Relational Function', and a dropdown menu for 'Probability Density Function'. The dropdown menu lists various functions such as 'Latent period - cattle', 'Subclinical period - Cattle', 'Clinical period - cattle', 'Immune Period', 'Latent period - swine', 'Subclinical period - swine', 'Infectious period - swine', '0 day delay', 'Direct contact distance', 'Indirect contact distance', 'No tracing delay [NAADSM update default]', 'Tracing delay', and 'Immune period vaccination'. Below the list, there are two buttons: 'Export Relational Functions' and 'Export Probability Density Functions'. At the bottom, there is a text block explaining that exported functions will be saved in the current scenario's workspace folder with either 'REL\_' or 'PDF\_' prepended to their names. Below this text, there are two more buttons: 'Import Relational Functions' and 'Import Probability Density Functions'. On the right side of the interface, there is a vertical toolbar with icons for a folder, a gear, a location pin, a bar chart, a question mark, and the text 'SQL'.

# Individual Functions:

- ⚙ Show a visualization of the input
- ⚙ Allows export of visualized image
- ⚙ Holds the function parameters
- ⚙ Allows duplication (Edit, Variant)
- ⚙ Allows update (Edit, Overwrite)
- ⚙ Shows where function is assigned in scenario
- ⚙ Allows deletion of function if not assigned to a parameter (Edit, Overwrite, Delete)

*It is important that you don't delete a function that the simulation is using; therefore, the application will not allow it to happen (Edit, Overwrite, Delete Disabled).*

Relational Probability

0.25 -  
0.20 -  
0.15 -  
0.10 -  
0.05 -  
0.00 -

0 1 2 3 4 5 6 7 8

Days

Click on the graph to download the highest possible resolution.

Name\*  
Latent period - cattle

X axis units\*  
Days

Notes

Equation type\*  
Triangular

Min  
0.0

Mode  
3.0

Max  
9.0

Referenced by:  
Cattle Reaction

Back Edit

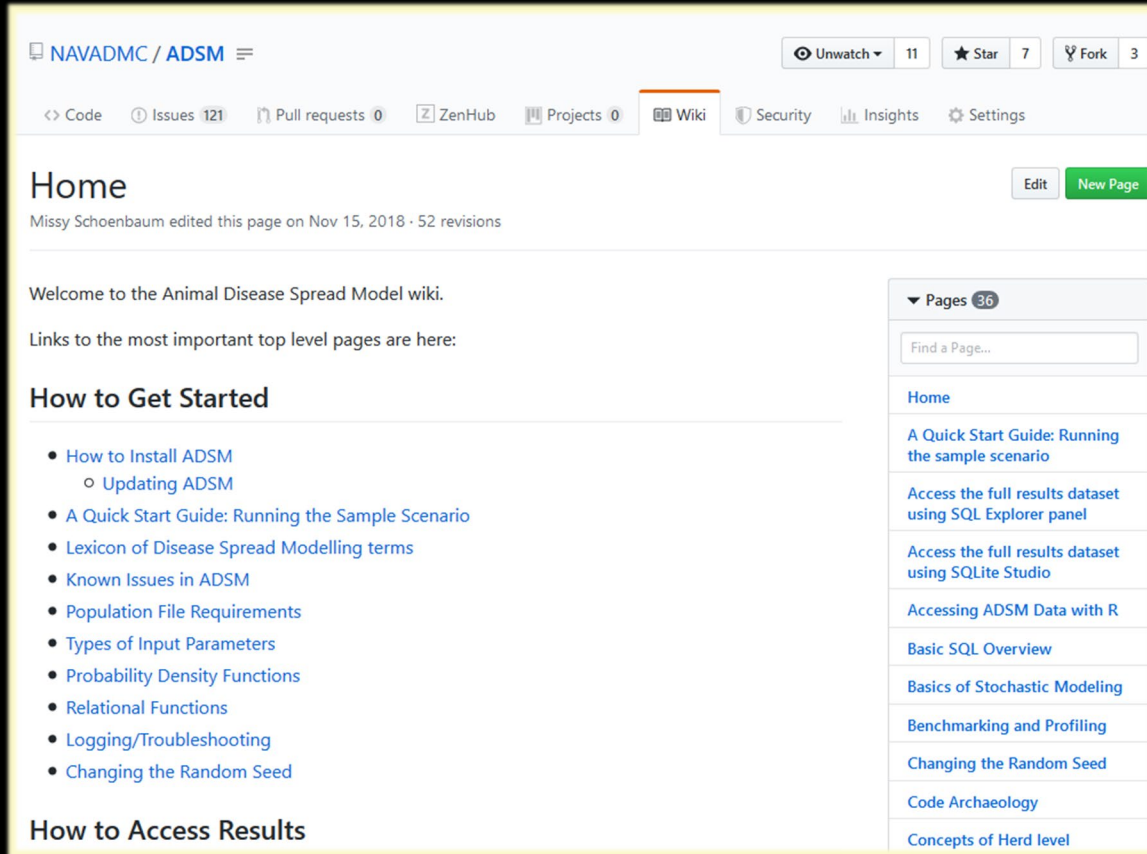
Icon	Label
Folder	
Settings	
Cattle	
Bar Chart	
Help	
SQL	



# The Documentation Panel:

Provides links to help documentation

Provides links to ADSM wiki



The screenshot shows the GitHub repository page for NAVADMC / ADSM. The 'Wiki' tab is selected, displaying the 'Home' page. The page includes a navigation bar with options like Code, Issues (121), Pull requests (0), ZenHub, Projects (0), Wiki, Security, Insights, and Settings. The main content area features a 'Home' section with a welcome message and a list of links to important top-level pages. A sidebar on the right lists 36 pages, including 'Home', 'A Quick Start Guide: Running the sample scenario', 'Access the full results dataset using SQL Explorer panel', 'Access the full results dataset using SQLite Studio', 'Accessing ADSM Data with R', 'Basic SQL Overview', 'Basics of Stochastic Modeling', 'Benchmarking and Profiling', 'Changing the Random Seed', 'Code Archaeology', and 'Concepts of Herd level'.

## ADSM Documentation

Helpful links...

[Quick Start Guide](#)

[Model Specifications](#)

[Basics of Stochastic Modeling](#)

[Lexicon of Disease Spread Modelling Terms](#)

[PDF Overview](#)

[PDF White Paper](#)

[Results Overview](#)

[Data Dictionary](#)

Refer to the [wiki](#) for additional information



SQL

# The SQL Panel:



Opens SQL Editor

Here's an example query to try on the SQL window. Cut and paste the text into the SQL window, then click Save & Run.

The screenshot shows the 'New Query' window in the ADSM SQL Explorer. The window has a title bar with 'ADSM SQL Explorer', 'New Query', 'Playground', and 'Logs'. Below the title bar, there are two input fields: 'Title' with the text 'Production Type with descriptive name' and 'Description' with the text 'Query to link Production Type name to population file, instead of showing only numeric ID'. Below these fields is a large text area labeled 'SQL' containing the following code:

```
1 | -----  
-- Sample Query: Production Type with descriptive name  
-- Date: 3/19/2015  
-- Notes: where clause 1=1 allows for easy editing of clauses  
-- -- allows for line to be commented (omitted)  
-----  
SELECT u.User_notes, pt.name, -- description name, not an identifier  
u.initial_state, u.initial_size, u.Latitude, u.Longitude  
FROM ScenarioCreator_unit u  
JOIN ScenarioCreator_productiontype pt  
ON u.production_type_id = pt.id  
-- Example of WHERE clause  
WHERE 1=1 AND u.initial_state = 'L' ORDER BY 2,1
```

At the bottom of the window, there are three buttons: 'Save & Run', 'Show Schema', and 'Format'.

*Recall that example queries are packaged in the ADSM Workspace, Example Database Queries folder.*

# Importing from NAADSM



A map of North America showing Canada, the United States, and Mexico. The map is color-coded: Canada is green, the United States is yellow, and Mexico is orange. Major cities and geographical features are labeled. The title 'NAADSM Focus' is overlaid on the top left of the map.

# NAADSM Focus

NAADSM and therefore ADSM were originally designed for North America, to simulate the highly contagious diseases that are of interest to users based in Canada, the United States, and Mexico.

If you have scenarios created in NAADSM, you may be able to import your past work. You can import scenarios that were created in version 3.2.XX of NAADSM into ADSM. You cannot import scenarios that were created in NAADSM version 4 into ADSM. ADSM does not contain some of the functionality that was implemented in 4.X.XX. The ADSM Development Team does not manage NAADSM.

If you are new to modeling, starting in ADSM may be an easier option to learn. ADSM features newer technology and an updated user interface.



# NAADSM Import

Importing from NAADSM into ADSM requires two files that can be exported from NAADSM.

- ⚙️ Open the NAADSM scenario
- ⚙️ From the File menu, choose Export Scenario
- ⚙️ The Export Scenario window will open
- ⚙️ Check both the
  - Export scenario parameters file
  - Export list of units
- ⚙️ At the bottom of the page, browse to find the location to export the files. Hit [Export].

*Name the files for clarity, such as My\_pop.xml and My\_para.xml.*

Export scenario

**Files to export:**

Export scenario parameters file

Export list of units

**Scenario parameters:**

Include output specification for NAADSM/SC

Iteration end condition:

End of outbreak (including all control activities)

End of active disease phase

First detection

Specific day

Scenario parameters file:

Browse...

**List of units:**

Units file:

Browse...

Export Cancel

# Use the Project Panel to import the NAADSM Legacy Scenario.

Import NAADSM Legacy Scenario

⚙️ A prompt will ask for a new file name

⚙️ Select the parameter file using

⚙️ Select the population using

⚙️ Use [Apply] to start import process

The screenshot shows the ADSM (Animal Disease Spread Model) LegacyImportTest interface. On the left is a vertical navigation pane with the following sections: Scenario Description, Population, Disease, Controls, and Output Settings. The 'Disease' section is currently selected. The main content area is titled 'LegacyImportTest' and contains two required fields: 'Parameters xml\*' and 'Population xml\*'. Each field has a 'Choose File' button and a 'No file chosen' status. Below these fields is a descriptive paragraph: 'An XML parameters file generated by the legacy NAADSM program from File > Export Scenario...' and 'The population XML to match the parameters file. This population should contain Production Types that match the names in the scenario file.' At the bottom of the main area are 'Cancel' and 'Apply' buttons.

*The import is unable to estimate how long the process may take. The ADSM Development Team tests with a 400,000-unit population take about 20 minutes.*

## *What if I want a new population instead of the old project population?*

For the import process, ADSM needs to match up with the previous production types. If you need to change population:

- ⚙️ Import following the previous instructions
- ⚙️ Use the [Replace population]
- ⚙️ Production Types are not required to match on a replace action



# What's Next?

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**Join the flock!**

**Learn more about ADSM or try an example**

ADSM is currently available at <https://github.com/NAVADMC/ADSM/releases/latest>

Try the sample scenario

<https://github.com/NAVADMC/ADSM/wiki/A-Quick-Start-Guide:-Running-the-sample-scenario>

Read the wiki pages link

<https://github.com/NAVADMC/ADSM/wiki>

**Additional training materials will be posted at**

**<http://navadmc.github.io/ADSM/>**

Training includes:

Overview

Populations and Production Types

Getting Started

Disease Parameters

Control Parameters

Output Settings and Run

Results

Detailed Evaluation of Results - Verification and Validation

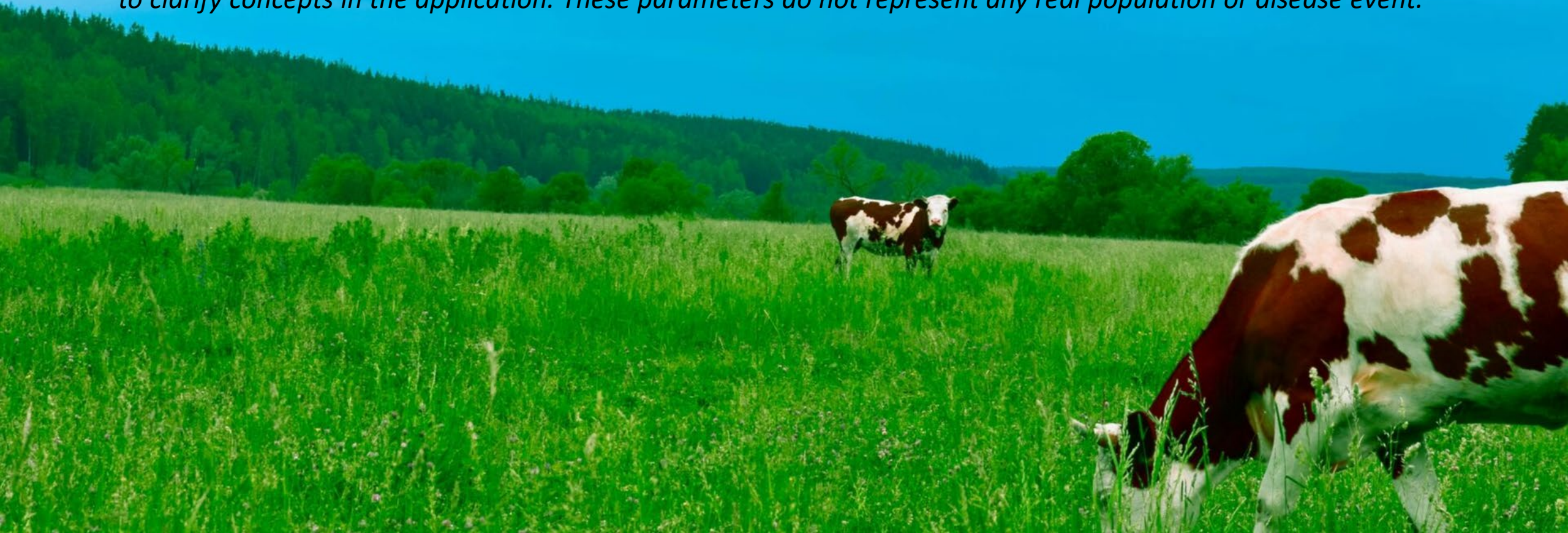
Vaccination Strategy

Administration





*The outcome of an ADSM simulation (as with any computer simulation model) depends heavily on the quality of the scenario input parameters, the assumptions of the modeler who created the scenario, and the capabilities and limitations of the model framework itself. The utility of disease models like those created with ADSM critically depends on input and interpretation of experts familiar with the behavior of disease within populations, and with the limitations, assumptions, and output of the model. While ADSM is available as a service to animal health communities, the ADSM team does not necessarily endorse results obtained with the ADSM application or any conclusions drawn from such results. Note that the parameters provided in the Sample Scenario are simple examples to clarify concepts in the application. These parameters do not represent any real population or disease event.*





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**Photo credits**

Canva.com

Mariposa Ranch Watusi

Joy Way Farm

Pinecroft Farms, Woodstock CT, Mariah Chapman

Dr. Melissa Ackerman



**Animal Science**