

HEC-ResSim 3.3 Tech Notes

February 2021

INTRODUCTION

HEC-ResSim 3.3 has been a long time coming. In fact, we, the HEC-ResSim development team, decided to skip the release of HEC-ResSim 3.2 in favor of focusing our efforts on ResSim 3.3. That was a good decision at the time but it delayed the public release even further. This means that there are a number of new features, enhancements to existing features, and other improvements that we want to bring to your attention. These **Tech Notes** are our way of giving you a “heads up” about those changes that you should be especially aware of when moving an existing model to this version of HEC-ResSim.

1 WATERSHED LOCATIONS AND THE “BASE” FOLDER

Watershed Locations, to ResSim, are *named* pointers to places on your computer where you want to store your watersheds. They are NOT pointers to the watershed itself. In *prior* versions of ResSim, when you created a **watershed location**, ResSim would create an additional folder named “base” in the location you identified. Then, when you created a watershed, ResSim would put the watershed in the base folder at the watershed location.

For example, if you had a watershed location named “My Watersheds” and it was pointing to D:\CurrentProjects, then when you created a new watershed called AmericanRiver in “My Watersheds” the path to the *watershed* would be D:\CurrentProjects\base\AmericanRiver.

In ResSim 3.3, **watershed locations** are now referred to as **shortcuts**. And, the *requirement* for the “base” folder has been removed. You may now move existing watersheds out of the base directory, or you can leave them in base. If you choose to leave your folder structures unchanged, then when you create your **watershed locations (shortcuts)** in ResSim 3.3, be sure to include the base folder in the path each **watershed location (shortcut)** points to.

2 OPENING A WATERSHED

In prior versions of ResSim, the Open Watershed dialog would ask you to select the *watershed location* in which you stored the watershed you want to open. After you selected a *watershed location*, it would then provide you with a picklist of watersheds that it finds in that location.

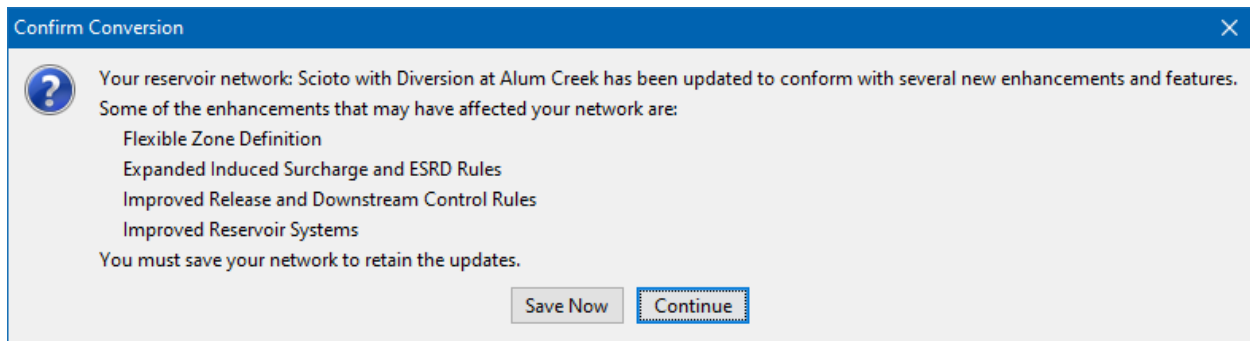
In ResSim 3.3’s Open Watershed dialog, *watershed locations* act like *shortcuts* (thus the name change) to take you to a folder where you can find watersheds. But, the Open Watershed dialog no longer gives you a picklist of watersheds. Instead, it expects you to browse into your watershed’s folder to find and select (open) the watershed’s **.wksp** file.

To describe how to open a watershed, we’ll use the AmericanRiver watershed example from the section above. To open the AmericanRiver watershed, you would select **Open Watershed** from the ResSim **File**

menu, then click on the “My Watersheds” shortcut in the **Open Watershed** dialog’s **Shortcuts** list. The dialog will then show you all the watershed folders in the “My Watershed” location. You must then browse into the AmericanRiver folder (double-click on it) in the Open Watershed dialog’s browser. The files and folders in the root folder of the AmericanRiver watershed will be then be listed in the browser. Select the AmericanRiver.wksp file and click **Open**.

3 NETWORK FORMAT CHANGES – TO SAVE OR NOT TO SAVE

As you probably know, your reservoir network files contain the physical and operational data that define your model. Well, as we add or enhance features in ResSim, the format and content of these files may change. Since changes to the network files are usually *not* backward compatible – meaning that you should not use an older version of ResSim to open a network which was written by a newer version that changed the format or content – we added a warning message to appear each time ResSim opens an older network with a version that wants to change the format. The warning message usually looks something like this:



When you see this message, it means that ResSim’s network loader noticed that the network it just opened was in an older (or different) format than the current version. ResSim thinks it loaded the data without issue, but now wants to save it in the new (current) format. By selecting **Save Now**, you are acknowledging that you accept the changes and DO want to proceed with the **Save** to the new format. Selecting **Continue** means that you do NOT want the **Save** to occur *until you initiate it* and that you just want to look around. Be aware that if you see this message in the Simulation module, even if you select **Continue**, your network *WILL be saved* if you **compute** the currently active alternative (the alternative that initiated the message when it loaded).

4 NETWORK AND NETWORK ELEMENT PROPERTIES IMPORTER

The Network Importer, although revised to handle most of the new features of ResSim 3.3, still follows its original *wizard* methodology to query you for the source watershed and network. As such, it still relies on the use of watershed locations to find the source watersheds you can choose from. Therefore, before using the **Importer**, be sure the watershed from which you want to import a network (or the element properties of a network) is located in a **watershed location (shortcut)** that you have identified in the current version of ResSim. To create or edit a **watershed location**, open the **Options** editor from the ResSim **Tools** menu and go to the **Shortcuts** tab.

5 IF-BLOCK ENHANCEMENTS

The original implementation of IF-Block creation and management in ResSim had a few quirks that gave users trouble when trying to define complex IF-Blocks. While trying to address some of the reported issues, we discovered that the storage of *nested* IF-Blocks was the source of many of the problems. This section is a description of what was fixed and what to expect with this new version.

5.1 WHAT WAS FIXED

Most of the creation and management of IF-Blocks was functional and behaved well, until you tried to use an existing IF-Block within another IF-Block. If you tried this, you would get a new COPY of the selected IF-Block instead of a “link” to the original, which means that if you made a change in the copy, that change would NOT show up in the original IF-Block. Even worse was that it was not always apparent that you had a copy instead of a link to the original. *Usually* the copy of the IF-Block would be named after the original IF-block but with the string “(copy)” appended on the end, but *some* of the copies carried the exact same name as the original IF-Block, so you couldn’t tell that they were not the same as the original. *And*, the copies (with or without the string “(copy)” appended to the name) did **not** appear in the **Use Existing** or **Delete** list of IF-Blocks so you couldn’t tell that the IF-Blocks were multiplying. This issue of copies and more copies made it appear that some of the IF-Block editing features were not working – options like **Rename** and **Delete**.

5.2 HOW IT WAS FIXED

The format in which IF-Blocks are stored and the way they are referenced were changed so that all IF-Blocks, whether or not they are nested within another IF-Block, are created and referenced the same way. A few additional management features were also added including **Duplicate** and **Add/Remove From All Zones**. In addition, a converter was created to manage the migration of IF-Blocks from the old format to the new one.

5.3 WHAT TO EXPECT

When you open an older network in which one or more of your reservoirs has one or more IF-Blocks defined in it, those IF-Blocks will be converted to the new format. In addition, there may exist in your current network more instances (copies) of a given IF-Block than you were aware of, so the IF-Block converter includes code that will **rename** each copy of an IF-Block (*with the same name*) by appending a number (counter) to the original name. This renaming of the various copies of your IF-Blocks will not “break” your network, but it may have the side effect of making your operation sets look different because of the renamed IF-Blocks.

5.4 RECOMMENDATIONS

- 1) (Always) Back up your watershed before opening with a new version of ResSim
- 2) After opening the watershed and a specific network with the new version, review each operation set in each reservoir carefully, *especially* any and all IF-Blocks.

- a. For each IF-Block that now has a number in parenthesis appended to the name (for example “Is Pool Rising(2)”), review the IF-Block in situ *and* review the list of IF-Blocks in the **Use Existing Conditional Block** dialog.

Tip: This review/comparison can be accomplished by adding one or more of the “duplicate” IF Blocks into a zone then doing a line by line, expression by expression, rule by rule comparison. It may be tedious – but necessary if you want to clean out the duplicates and the incomplete or incorrect copies of your IF-Blocks using the following steps.
- b. Identify one of the IF-Blocks that is correctly defined – *this is usually the one that was already being used in the operation set.*
- c. Give the *correct* IF-Block a **new name**.
- d. Replace all other instances of that IF-Block throughout your operation sets with the *correct* one. But, **BE CAREFUL** – you may have two (or more) IF-Blocks that were almost the same, but not quite, in your operation sets and you may have done that *on purpose* so don’t change things just for the sake of “cleanup”. If there really SHOULD be two different If Blocks, be clear when re-naming the two different IF-Blocks so that it is obvious that their differences were intentional.
- e. As appropriate, delete any true duplicate if blocks or any incomplete or incorrect ones. Your final objective is for your “Use Existing If Block” list to include only IF-Blocks that you are actually using somewhere in your operation sets and to have no IF-Blocks with an appended number in their name (unless that’s part of YOUR naming scheme, not ResSim’s addition).

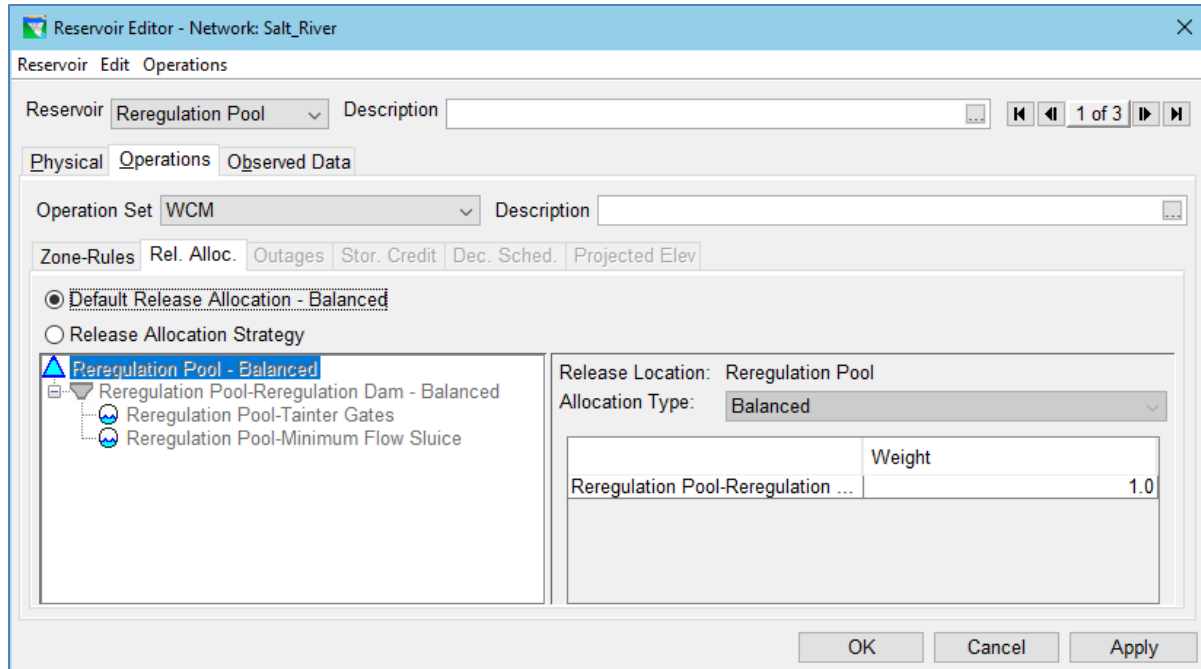
6 RELEASE ALLOCATION

Release Allocation is a feature in ResSim that allows you, the user, to tell ResSim how to divvy up the release among the available outlets. In prior versions of ResSim, if you didn’t activate the **Release Allocation** option in your Operation Set(s), then the **Rel. Alloc.** tab in the Operations editor would be greyed out and ResSim would use a default, evenly “balanced” allocation of the release to the outlets.

6.1 WHAT WAS CHANGED

In the current version, the Release Allocation tab is *always* active. If you have not specified a user-defined allocation scheme, then the default, evenly balanced allocation will be shown as the “selected” allocation scheme. This change, making the Release Allocation tab always active, was done so that the release allocation scheme was more obvious to the user, even if it is just set to the default.

In the figure below, the new version of the Release Allocation tab shows a radio button with the “Default Release Allocation - Balanced” option selected and the outlet hierarchy tree greyed-out. This means that a user-specified allocation scheme or “strategy” was not defined and the model is using the default evenly balanced scheme. To define your own allocation scheme, switch the radio button to **Release Allocation Strategy**, then select the outlet group you want to change in the tree and make the appropriate changes in the edit panel.

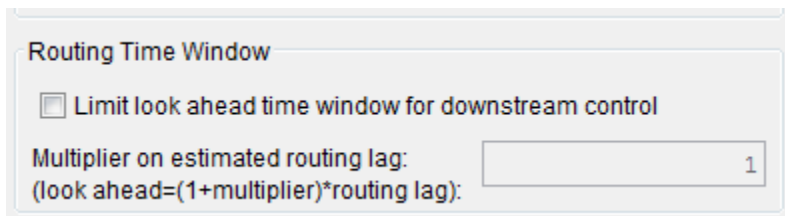


7 DOWNSTREAM CONTROL OPERATION AND SYSTEM OPERATION

During the development of HEC-ResSim version 3.1, we began an effort to improve the effectiveness of the operation for downstream constraints logic. As part of that effort, we added an Advanced Options dialog to the downstream control rule editor to allow you to select and tweak the method that the logic uses for making attenuation adjustments and to turn on or off or limit the impact of Rate of Change rules on the downstream operation. The improvement effort to the downstream control operation has continued with ResSim 3.3 and expanded into parallel and tandem system operation, including system hydropower. In ResSim 3.3, the changes we made are primarily related to how the downstream and system operations account for routing and are mostly behind the scenes, but we added a couple new options to allow you to influence the routing computations.

7.1 DOWNSTREAM CONTROL

In the **Advanced Options** dialog of the Downstream Control rule editor, we added a new section titled Routing Time Window. As illustrated in the figure below, this option allows you to define a limit on the routing time window that ResSim iterates across to determine an appropriate release to meet a specific downstream or system constraint.



We added this option when users began using the non-linear routing methods (like Modified Puls) more often and noticed that, under some conditions, the downstream control operation was “controlling the release when it didn’t need to.” It didn’t take long for us to realize that “under some conditions” the method that ResSim uses to determine the routing time window was producing routing time windows that were excessively long, which caused us to add the new option to limit the routing window. Further tips for analyzing and adjusting downstream control operations are being collected in a white paper that will soon be available on the HEC website.

8 VARIABLE LAG & K ROUTING METHOD

In HEC-ResSim version 3.1, we fielded our initial implementation of the Variable Lag & K Routing method. Through user feedback, we subsequently learned that our implementation inadequately addressed the potential volume loss issue that can occur in the variable lag routing computations. With this release, we have revised the implementation of this routing method to better address the volume loss issue. If you have a model that uses the Variable Lag and K routing method, you should review the results from your Lag & K reaches carefully to validate any differences.