

Dam Decision Support Tool Instructions

Step-by-Step with Examples

Welcome! This set of instructions is designed to guide the user through the Dam Decision Support Tool and help the user troubleshoot, should problems arise.

1. Getting Started

Visit <http://dams-mcda.gsscdev.com> and you will see the following screen.

Dam Decision Support Tool

Login

Username

Password

[Sign in](#)

[Create an account](#)

[Lost password?](#)

You will need to create an account and password to logon. Clicking “Create an Account” will bring you to the following registration screen (below). **Tips:** Passwords cannot be too close to the username or any personal information. Passwords cannot be entirely numbers.

Dam Decision Support Tool

Register

Username

Required. 150 characters or fewer. Letters, digits and @/./+/-/_ only.

Group

Password

- Your password can't be too similar to your other personal information.
- Your password must contain at least 8 characters.
- Your password can't be a commonly used password.
- Your password can't be entirely numeric.

Now that you’ve created an account, you will be asked to log in. Enter your brand new username and password before clicking “Sign In”.

Dam Decision Support Tool

Login

Username

Password

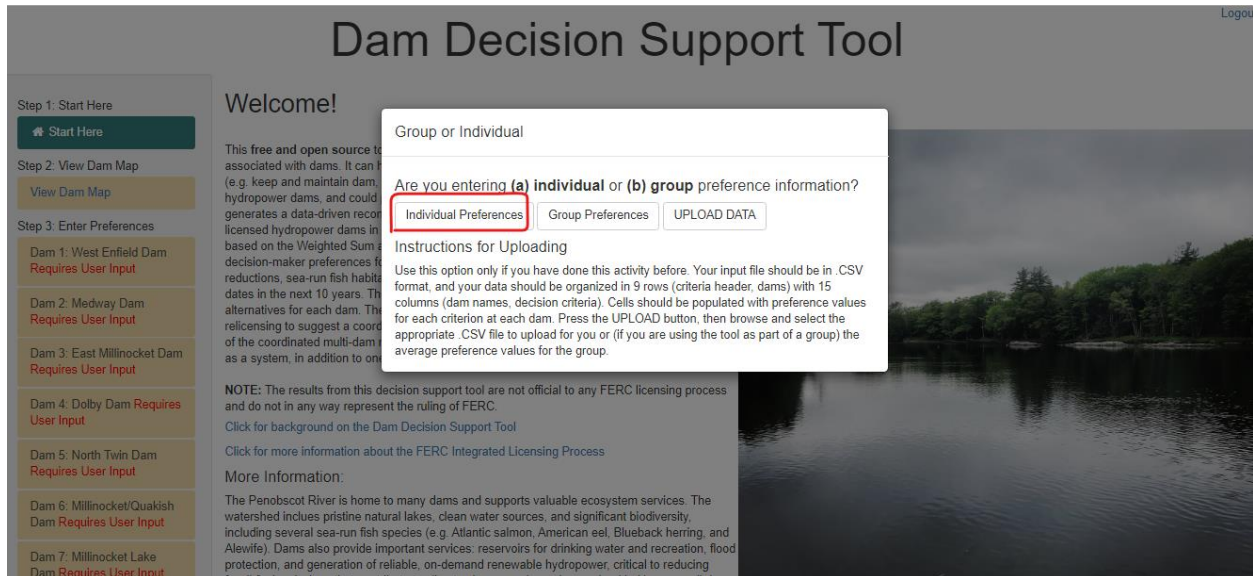
[Sign in](#)

[Create an account](#)

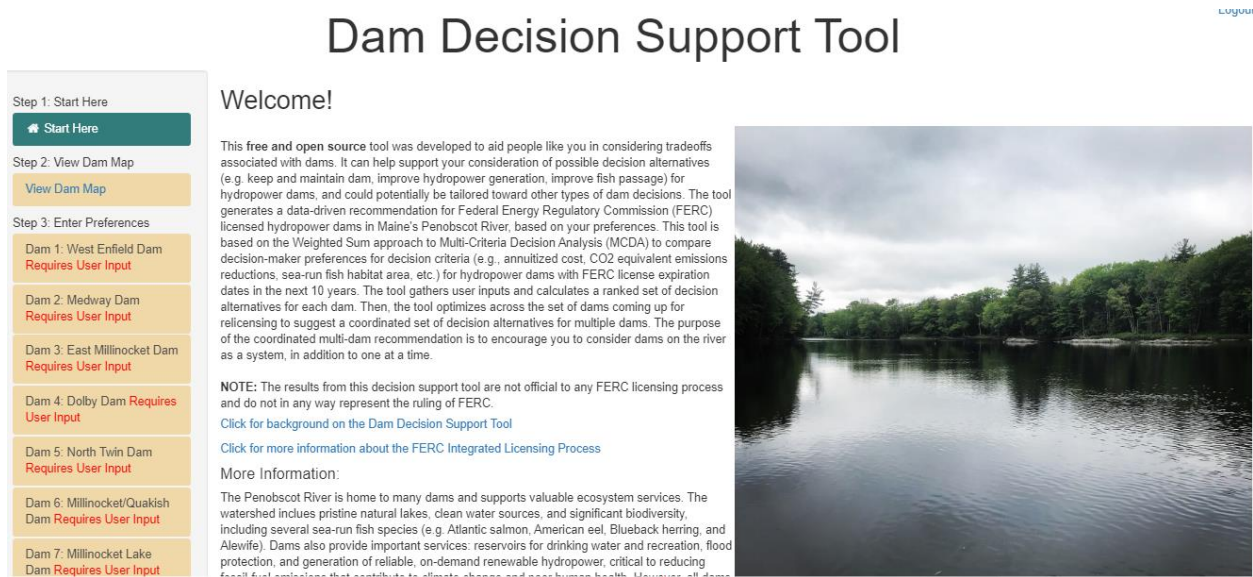
[Lost password?](#)

2. Enter Preferences

After you are signed in, this is the screen you will see (image below). The dialogue box will ask you whether you are entering individual or group preferences.



Unless you are working with a group or have done this activity before, you will select “Individual Preferences”. Then, begin with Step 1. Read through the page, click on links to open the Background on the Dam Decision Support Tool document or learn more about the FERC Integrated Licensing Process.



Now, Step 2. Click on “View Dam Map”. This page will orient you to the hypothetical, but realistic, context for the Dam Decision Support Tool in Maine’s Penobscot River. Eight dams, marked on the map in green, are coming up for relicensing in the next 10 years.

Dam Decision Support Tool

Step 1: Start Here

[Start Here](#)

Step 2: View Dam Map

[View Dam Map](#)

Step 3: Enter Preferences

Dam 1: West Enfield Dam
Requires User Input

Dam 2: Medway Dam
Requires User Input

Dam 3: East Millinocket Dam
Requires User Input

Dam 4: Dolby Dam
Requires User Input

Dam 5: North Twin Dam
Requires User Input

Dam 6: Millinocket/Quakish Dam
Requires User Input

Dam 7: Millinocket Lake Dam
Requires User Input

View Existing FERC Dams Map

Please consider the following dams on the Penobscot River. These non-federally owned dams are coming up for FERC relicensing within the next 10 years. These are the dams you will focus on for the rest of the activity. Note: although the Penobscot Mills Project dams are licensed together under a single FERC license, we separate them here for consistency. Hover over the dams on the map for more information on each site.

[Click for more information about dam decision alternatives](#)

[Click for more information about decision criteria](#)

[Click to download Dam Decision Matrices](#)

You may wish to refer to the resource links above and the watershed map below throughout the activity.

Toggle around in the map, zoom in or out, and move your cursor over the individual dam sites (as in the image below) to learn more about the dams.

Dam Decision Support Tool

Step 1: Start Here

[Start Here](#)

Step 2: View Dam Map

[View Dam Map](#)

Step 3: Enter Preferences

Dam 1: West Enfield Dam
Requires User Input

Dam 2: Medway Dam
Requires User Input

Dam 3: East Millinocket Dam
Requires User Input

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Requires User Input

Dam 5: North Twin Dam
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Dam 6: Millinocket/Quakish Dam
Requires User Input

Dam 7: Millinocket Lake Dam
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[Click for more information about dam decision alternatives](#)

[Click for more information about decision criteria](#)

[Click to download Dam Decision Matrices](#)

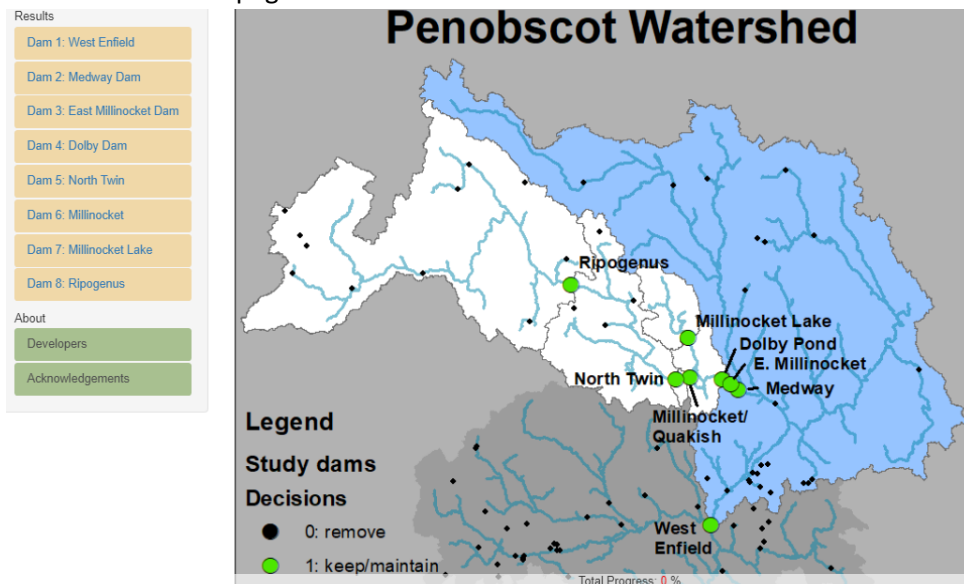
You may wish to refer to the resource links above and the watershed map below throughout the activity.

The “Click to learn more” links provide information about the different decision alternatives (e.g. keep and maintain dam, remove dam, improve fish passage), as well as decision criteria (e.g. sea-run fish habitat area, river recreation, annuitized project costs) that you will be asked to consider in Step 3. These PDFs will open in a new tab, where you can read or download the file. It is recommended that you read through these documents closely to learn more about decision criteria and alternatives before proceeding.

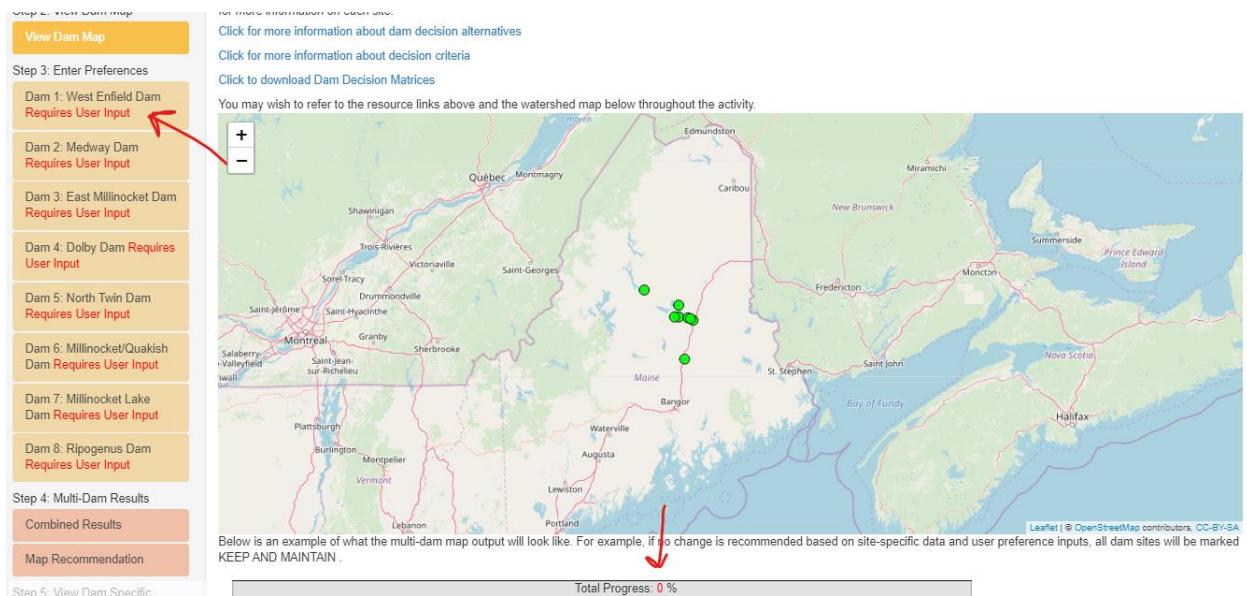
There is also a “Click to download” link that will download a Microsoft Excel Workbook (.xlsx) with data for each dam. This “Dam Data” file has a data value for each of 5 decision alternatives under each of 14 decision criteria. The metadata (or, data about the data) tab in the workbook describes where the data

come from (e.g. social/cultural criteria values are collected from a survey) or are calculated (e.g. reservoir storage is calculated using the cone volume method¹).

Scroll down on the page.

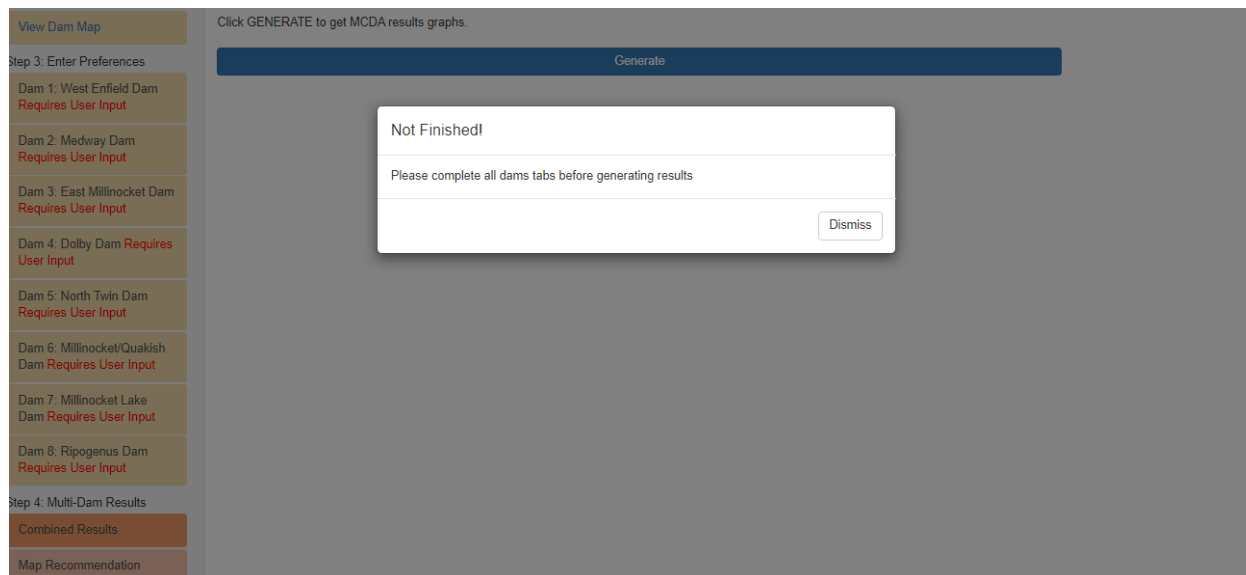


This map is an example of the kinds of output maps you will see in the results tabs to the left. Right now, the dams are marked “Keep and Maintain” because this is the “business as usual” case. Scroll back up to the first map (image below).



Notice the red arrows. Toward the left-hand side of the page are the individual dam tabs in Step 3. They are marked with red text that reads “Requires User Input”. As you enter your preferences for Dams 1-8, the Total Progress tracker at the bottom of the page will get closer to 100% (right now it is marked 0% because no preferences have been filled out), and the text that reads “Requires User Input” to “Complete”. You will need to complete all dam tabs before generating your results under Step 4. If you

try to generate the results without filling out preferences for all dams, you will see the following error message:



Moving on to Step 3, click Dam 1: West Enfield.

A screenshot of the 'West Enfield Dam (FERC No. P-2600)' preference input interface. The left sidebar shows 'Step 1: Start Here', 'Step 2: View Dam Map', and 'Step 3: Enter Preferences'. Under 'Step 3', 'Dam 1: West Enfield Dam' is highlighted in orange and marked 'Requires User Input', while the other seven dams are in grey. The main content area for Dam 1 includes a 'Start Here' button, a 'View Dam Map' button, and a 'Progress for Dam 1: 0 / 100' indicator. Below this, three decision criteria are listed with slider bars: 'Sea-Run Fish Habitat Area' (0 to 100), 'River Recreation' (0 to 100), and 'Reservoir Storage' (0 to 100). Each criterion has a brief description. At the bottom, a 'Total Progress: 0.0%' indicator is shown.

Move the slider bars to indicate your preference for the decision criteria for each given dam. You should set the slider bar to a position that represents the relative amount of preference you have for each decision criterion compared to others in the list. Once you have made your selections, click UPDATE at the bottom of the page when you are done moving the slider bars to mark this tab "Complete". Decision criteria ratings must sum to 100. The tracking indicator will help you keep track of the sum. Be aware that decision criteria are directly compensating (i.e., if the sum of all ratings is 100, then increasing the rating on one criterion requires another criterion rating to decrease to keep the sum equal to 100). For ratings, 0 = not at all important and 100 = extremely important.

For example, if you care only about fish habitat, move that slider bar to 100, and leave all others at zero. If you care about fish habitat and hydropower generation equally, move the slider bar for each to 50. Use the data table for each dam (e.g. “Click here to view Ripogenus Data”) to help you think about the importance of each decision criterion in the context of the specific dam site. The data table includes information on how the actual value of each decision criterion (for example, the actual sea-run fish habitat area) may change if different decision alternatives were implemented at the specific dam site. Whether these changes would be small or large may help inform how you choose to represent your preferences below with the slider bars. For example, if you are not sure how much importance you should put on Number of Properties, and the decision matrix shows Number of Properties will not change much for any of the decision alternatives, you may choose to put less or no importance on this criterion when moving the slider bars. **Click UPDATE at the bottom of each page to make sure your slider bar values get submitted for results generation in-app.**

In this example (image below), we have used equal preferences, or preference values that are evenly distributed (100 percentage points) across each of 14 decision criteria. Notice the Tracking Indicator, marked 100/100, and all dams marked **Complete**.

Step 1: Start Here
[Start Here](#)

Step 2: View Dam Map
[View Dam Map](#)

Step 3: Enter Preferences

- Dam 1: West Enfield **Complete**
- Dam 2: Medway Dam **Complete**
- Dam 3: East Millinocket Dam **Complete**
- Dam 4: Dolby Dam **Complete**
- Dam 5: North Twin Dam **Complete**
- Dam 6: Millinocket/Quakish Dam **Complete**
- Dam 7: Millinocket Lake Dam **Complete**
- Dam 8: Ripogenus Dam **Complete**

Step 4: Multi-Dam Results

Ripogenus Dam (FERC No. P-2572)

Please consider and rate your preference for the decision criteria listed below for Ripogenus Dam. [Download Dam Factsheet](#) or [Open in new tab](#).
 Move the slider bar for each decision criterion you care about to a position that represents the relative amount of preference you have for that decision criterion compared to others in the list. Once you have made your selections, click UPDATE at the bottom of the page when you are done moving the slider bars to mark this tab "Complete". [Click to view Ripogenus Data](#).

Warning: decision criteria ratings must sum to 100! The tracking indicator will help you keep track of the sum. Be aware that decision criteria are directly compensating (i.e., if the sum of all ratings is 100, then increasing the rating on one criterion requires another criterion rating to decrease to keep the sum equal to 100).

For ratings, 0 = not at all important and 100 = extremely important.
 Progress for Dam 8: 100 / 100

Sea-Run Fish Habitat Area

Sea-run fish habitat area is measured in hundreds of square meters. It is a proxy criteria estimated as possible upstream sea-run fish (Atlantic salmon, Alewife, Blueback herring, American eel) functional habitat (Roy et al., 2018).

Slider: 0 to 100, value set to 100.

River Recreation

River recreation is measured in square kilometers. It is the estimated downstream area of river that may increase or decrease with a dam decision alternative, represents functional area for whitewater recreation defined by Roy et al. (2018).

Slider: 0 to 100, value set to 100.

Reservoir Storage

Reservoir storage is measured in cubic kilometers. It is the estimated storage potential of the reservoir, based on its volume (Roy et al., 2018).

Slider: 0 to 100, value set to 100.

Total Progress: 100 %

Now that all dam tabs in Step 3 are complete, you may move on to Step 4: Multi-Dam Results.

3. Results

The Step 4: View Multi-Dam Results “Combined Results Tab” is where you can generate the results. First, you should click on the “Save” button to save your preferences. This option is helpful if you plan to use the Dam Decision Support Tool as a part of a group. Be advised that pressing “Save” a second time will overwrite your previous save. Click “Generate” to view the multi-dam results.

Step 1: Start Here

Start Here

Step 2: View Dam Map

View Dam Map

Step 3: Enter Preferences

Dam 1: West Enfield
Complete

Dam 2: Medway Dam
Complete

Dam 3: East Millinocket
Dam Complete

Dam 4: Dolby Dam
Complete

Dam 5: North Twin Dam
Complete

Dam 6: Millinocket/Quakish
Dam Complete

Dam 7: Millinocket Lake
Dam Complete

Dam 8: Ripogenus Dam
Complete

Multi-Dam Results

Saving your preferences will load them automatically when you visit again. If you are using group mode saving will add your preferences to the groups total. Saving again will overwrite the old save.

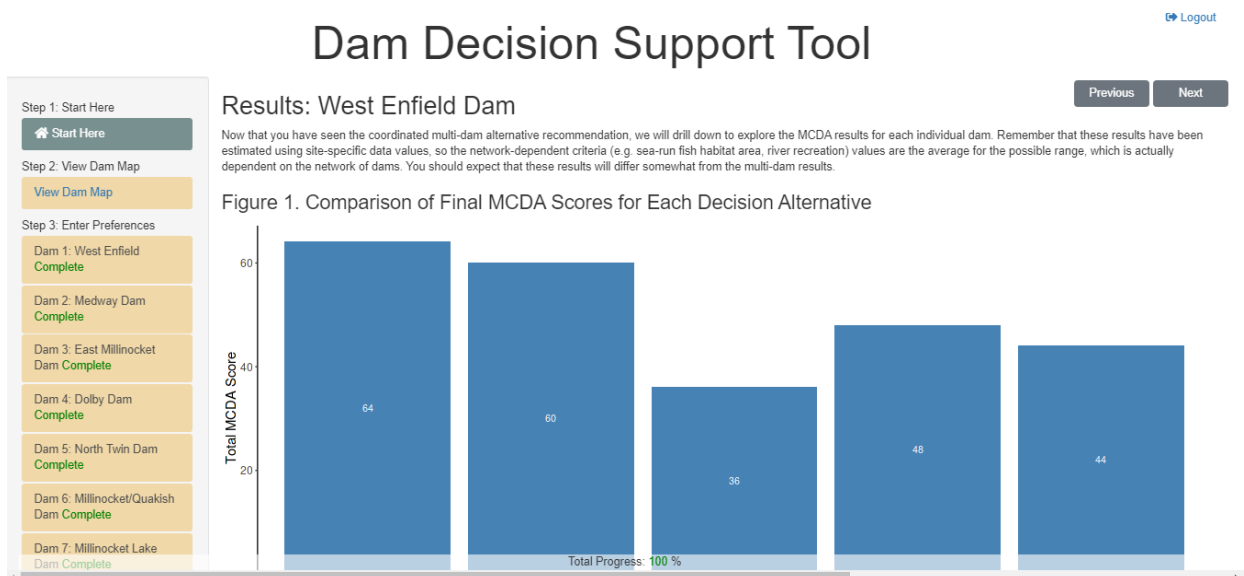
Save Preferences

Click GENERATE to get MCDA results graphs.

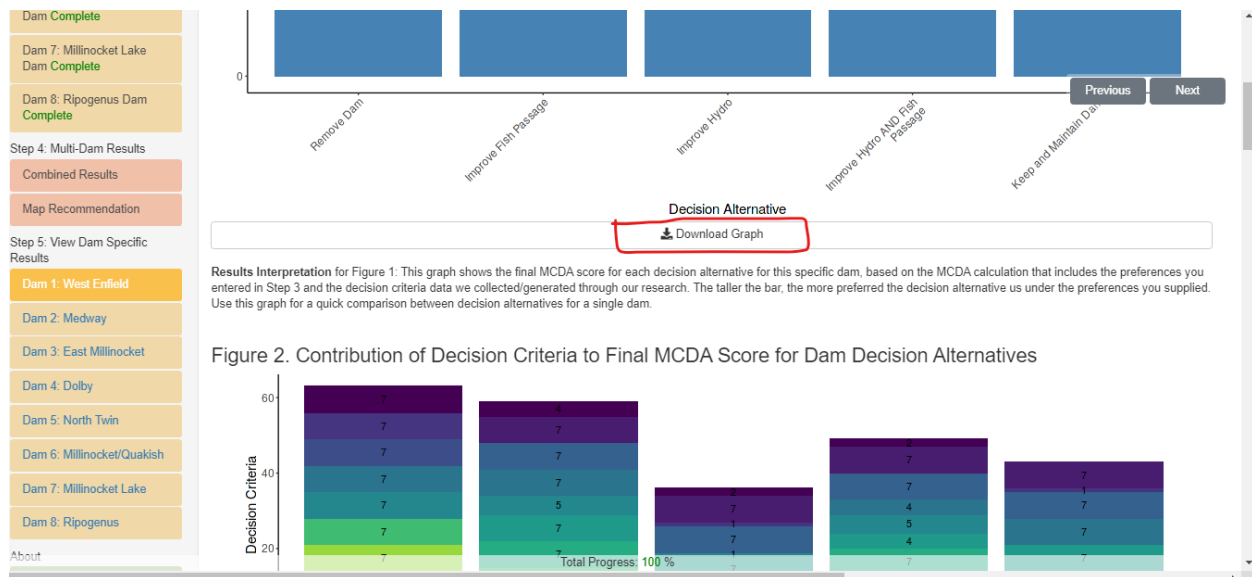
Generate

Total Progress: 100 %

Then, visit the Step 5 dam tab to view your results. For example, the results in the figure below were generated using equal preferences (all slider bar values in Step 3: set equal to 7.143



Keep in mind that the “save” function in the Dam Decision Support Tool only applies to your preference inputs from Step 3. Interested in keeping track of your results? There is a download button below every figure so you can save a .png file of your graphed output.



There is also a download button below each table, so you can download the tables of your results to explore the results of the calculations in greater detail.

Table 2. Data Values for West Enfield Dam

Show entries

Search:

	FishHabitat	RiverRec	Reservoir	ProjectCost	BreachDamage	NumProperties	ElectricityGeneration	AvoidEn	Previous	Next
Remove Dam	86750	19	0	179	0	5	0	0		
Improve Fish Passage	55480	12	0	1067	2	0	73	10		
Improve Hydro	24200	12	0	949	2	0	73	10		
Improve Hydro AND Fish Passage	55480	12	0	1067	2	0	73	10		
Keep and Maintain Dam	24200	12	0	949	2	0	73	10		

Showing 1 to 5 of 5 entries

[Download Table](#)

Results Interpretation for Table 2: This table displays the raw data values we collected and/or calculated/generated through our research for each decision criterion and alternative. You may remember seeing these data when you clicked on the link for the data matrix for this dam during the preference elicitation in Step 3. We include the raw data values again here to help make the MCDA calculations more transparent, so you can clearly see what goes into the final calculation that produces Figures 1 and 2 above. In addition, you can use this table to sort decision alternatives in ascending or descending order in each column by clicking on the arrow next to the column header. Note: fish survival values shown here are discrete, but in reality, the values are

The tables have a few functions to help you explore the results. You can select how many values to show at one time:

Table 2. Data Values for West Enfield Dam

Show 10 entries

Search:

	FishHabitat	RiverRec	Reservoir	ProjectCost	BreachDamage	NumProperties	ElectricityGeneration	AvoidEm	Previous	Next
Remove Dam	86750	19	0	179	0	5	0	0		
Improve Fish Passage	55480	12	0	1067	2	0	73	10		
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Showing 1 to 5 of 5 entries

Previous 1 Next

[Download Table](#)

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You can use the search bar to filter the results to row at a time:

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Show 10 entries

Search:

	FishHabitat	RiverRec	Reservoir	ProjectCost	BreachDamage	NumProperties	ElectricityGeneration	AvoidEm	Previous	Next
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Showing 1 to 5 of 5 entries

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Or, you can use the “Next” button at the bottom of the table to show more decision criteria.

Table 2. Data Values for West Enfield Dam

Show 10 entries

Search:

	FishHabitat	RiverRec	Reservoir	ProjectCost	BreachDamage	NumProperties	ElectricityGeneration	AvoidEm	
Remove Dam	86750	19	0	179	0	5	0	0	
Improve Fish Passage	55480	12	0	1067	2	0	73	10	
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Keep and Maintain Dam	24200	12	0	949	2	0	73	10	

Showing 1 to 5 of 5 entries

Download Table

Previous 1 Next

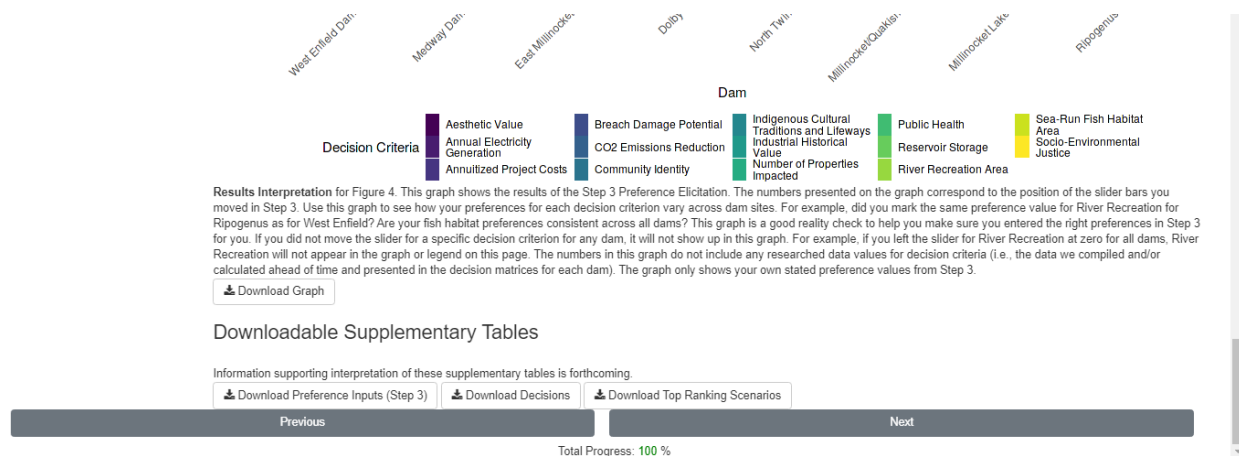
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Note: There is interpretive text below each table and graph to walk you through the results and help explain what you are seeing, if it is not immediately clear.

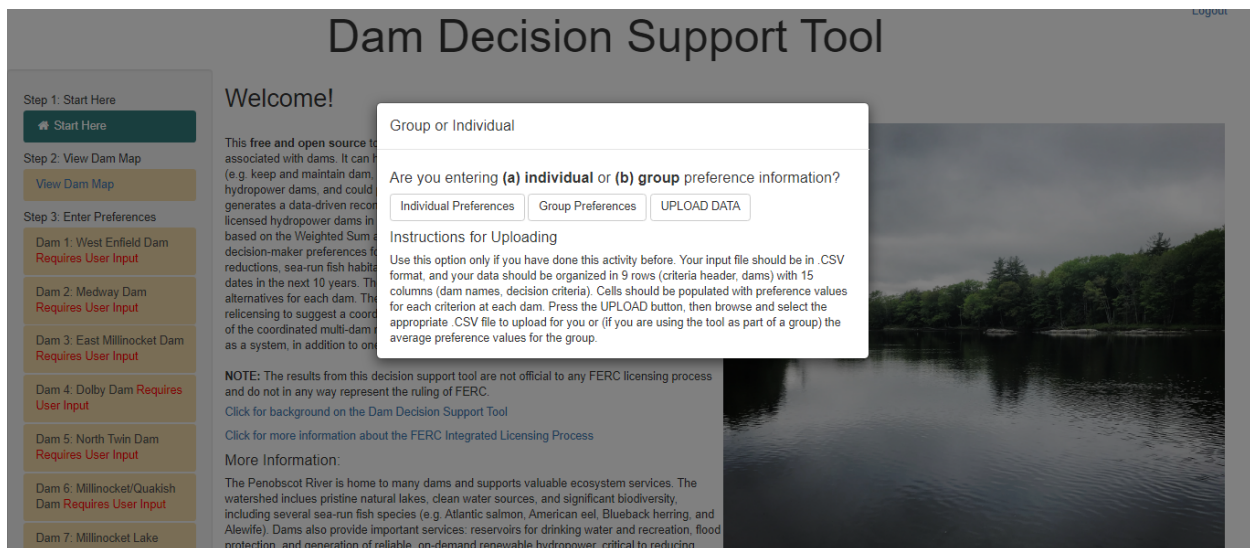
4. Troubleshooting

If the results are really unexpected, or your preference values does not look familiar, go back to Step 3 and check your slider bar values for the appropriate dam. Remember, if you go back to change the slider bar values at any time, you will need to click UPDATE at the bottom of the dam page in Step 3. Then, navigate back to Step 4: View Multi-Dam results, Combined Results and click GENERATE to re-run the model.

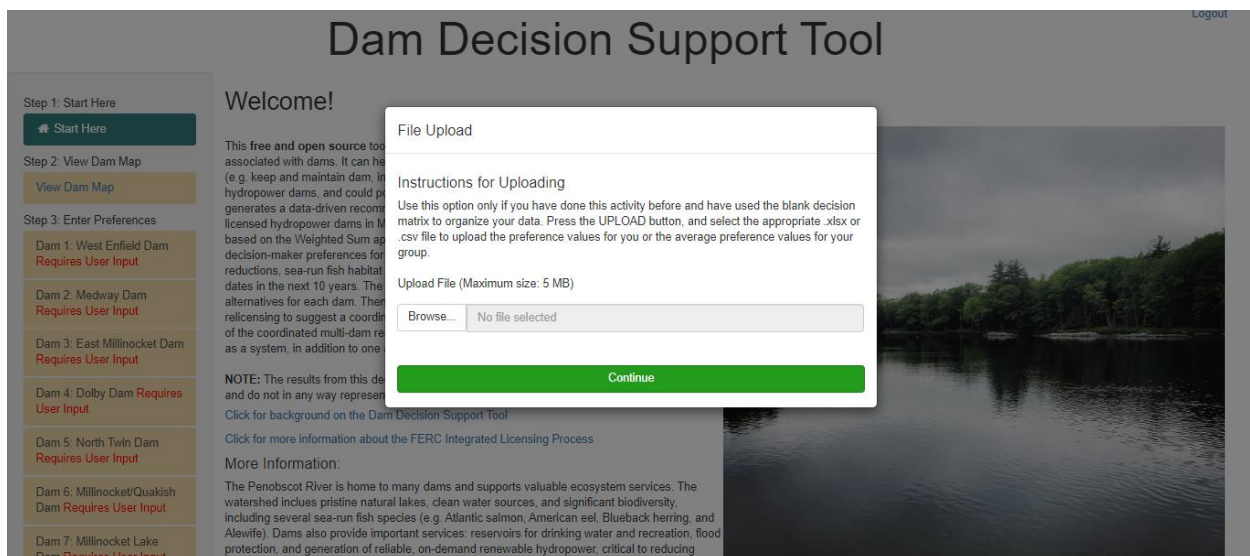
Pro tip: If saving does not work, you may wish to refresh the page. Be aware that refreshing will erase all of your preference values you entered in Step 3 if the values are not saved. To make the preference-entry process faster, scroll to the bottom of the Step 4: Multi-Dam Combined Results and click “Download Preference Inputs (Step 3)”.



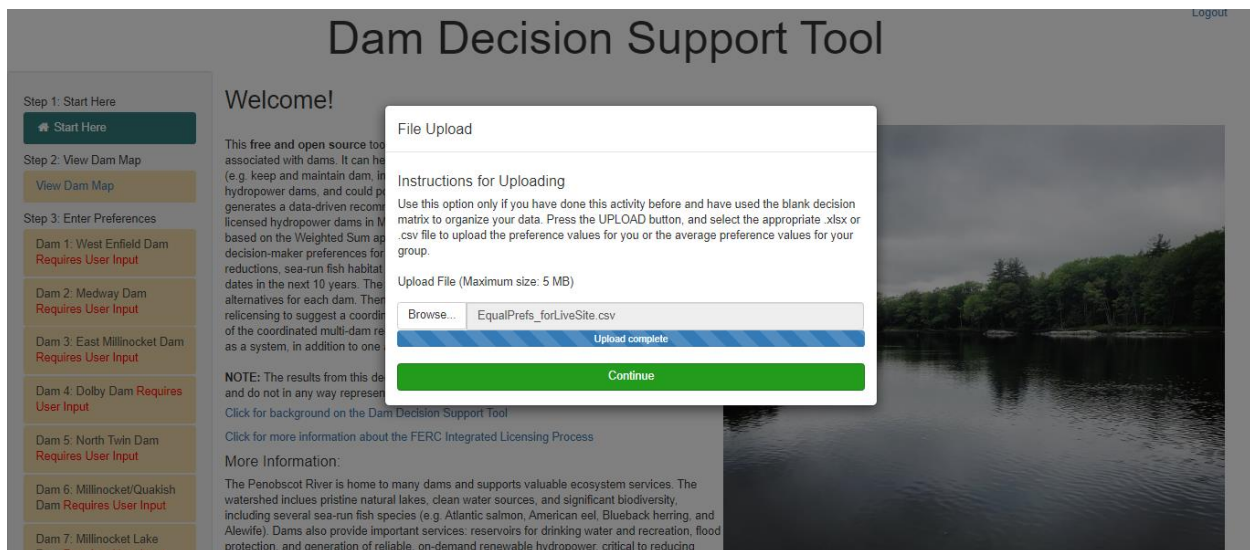
Then, refresh the page. Refreshing will return you to this screen, where you will select “UPLOAD DATA” (image below).



In the new dialogue box, select “Browse” and select the file.



If you saved the preference inputs file you downloaded, locate the file on your computer and upload it now. Then, click “Continue”.



When you upload your file with preference information, all of the tab labels will change from “Requires User Input” to “Complete” automatically.



Pro tip: If you are interested in exploring the impacts of different model inputs on the results, save your preference input file on your computer (e.g. UserPrefs1) and then modify your preference input values directly in the file, saving again with a new file name (e.g. UserPresfs2).

Resources

¹ Hollister J, Milstead WB (2010) Using GIS to estimate lake volume from limited data. *Lake Reserv Manag* 26(3):194–199.