How To Use the Hazus Loss Library

This resource lays out steps and instructions for navigating FEMA's Hazus Loss Library (HLL). The HLL is a centralized repository for accessing natural hazard risk information. It is curated by FEMA's Natural Hazards Risk Assessment Program (NHRAP).

What is Hazus? **What is the HLL?**	FEMA's Hazus program provides standardized tools and data for estimating the risk from four natural hazards: floods, tsunamis, earthquakes, and hurricanes. The HLL is an online collection of that data. Planners and emergency managers can use the library to search for, view, and download authoritative risk information generated using Hazus. For more information on Hazus and the library, see the HLL Fact Sheet.
Why is the HLL important?	The HLL makes hazard risk information accessible to a broad audience, including those who may not have the skills or resources to run the Hazus GIS software themselves. This helps users improve their mitigation strategies and response planning efforts and expedite their recovery.
How can I use the HLL?	The detailed steps in this guide can help a range of users, including those who are new or less experienced with the HLL. It explains how to search for a historic event, a planning scenario, or a location and find existing analyses. The HLL Use Cases offer examples of how professionals in various roles can use this information. If you are interested in the library but not sure how to apply the information to your work, please refer to the HLL's Use Case webpage.

Getting Started in the HLL

You can access the HLL and all of its analyses, use cases and information for users at https://hazards.fema.gov/hazus-loss-library/about. From the homepage of the HLL, select the ***Library*** tab on the top ribbon. The library is where all analyses in the HLL are stored and available for users to search through. Apply any of the ***Filters*** on the left to refine your search of the library. These options let you explore any available data that meets the parameters of your search. When you use a filter, the results will be populated live on the library page. The filtered results for all available library studies will be based on the information you entered.

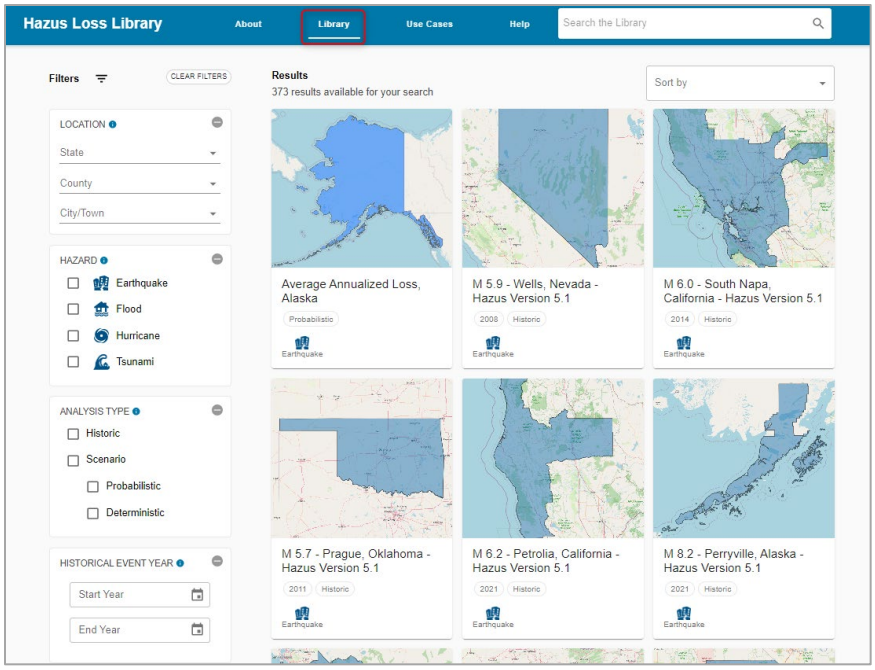

Figure 1. The Library tab of the HLL shows the available analyses to search.

Options for ***Filters*** include:

- ***Location.*** This filter lets you enter details for your area of interest. You can specify the state, county, or municipality, or a combination of the three.

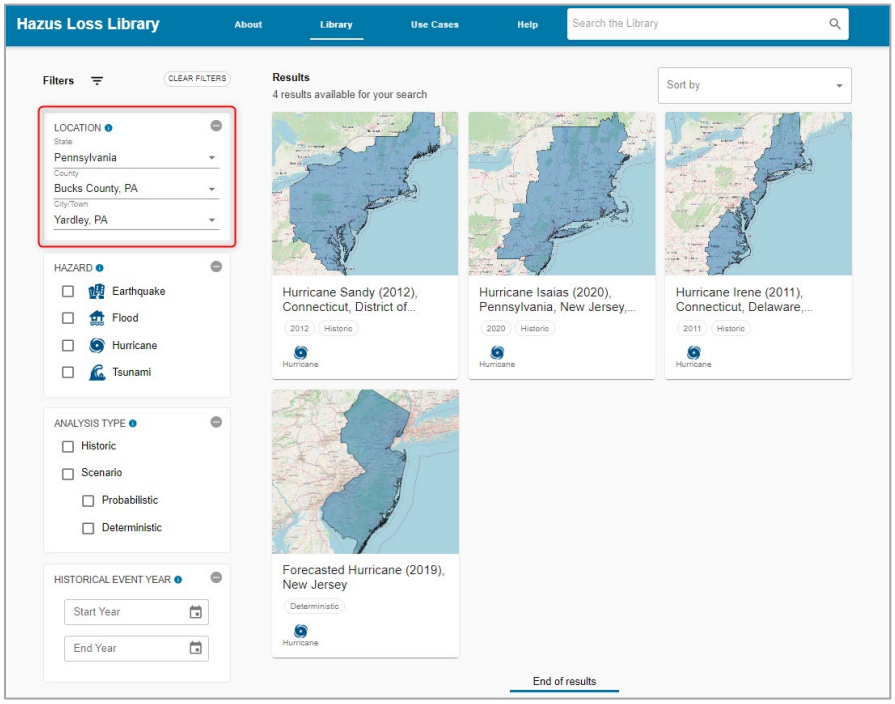

Figure 2. Options for using the Location filter in the library.

- ***Hazard.*** This filter lets you choose the types of hazard events. You can select one or more hazards. Four hazard types are available from Hazus:

EARTHQUAKE FLOOD

HURRICANE TSUNAMI

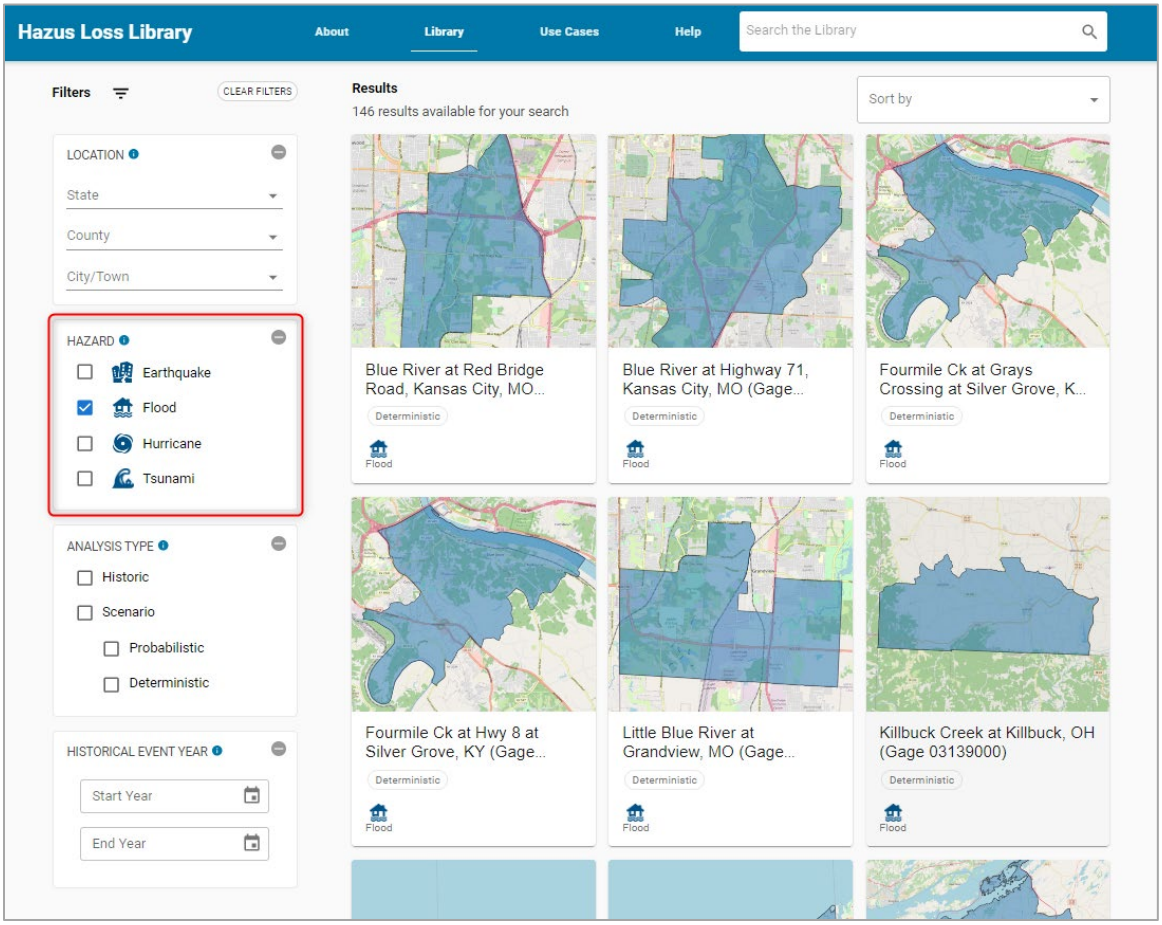

Figure 3. Options for using the Hazard filter in the Library tab.

- Use the ***Historical Event Year*** filter to create a timeframe for searching historic hazard events. You can set a time range with a start and end year. Currently you can go back as far as 1970, and extend up through the present year. This filter is useful if you are looking for a specific historical event. It is also good if you are reviewing the events from a certain period. This filter only applies to analyses of historic hazard events in the HLL. For more information on the types of analyses available, see the *Choosing an Analysis Type* section.

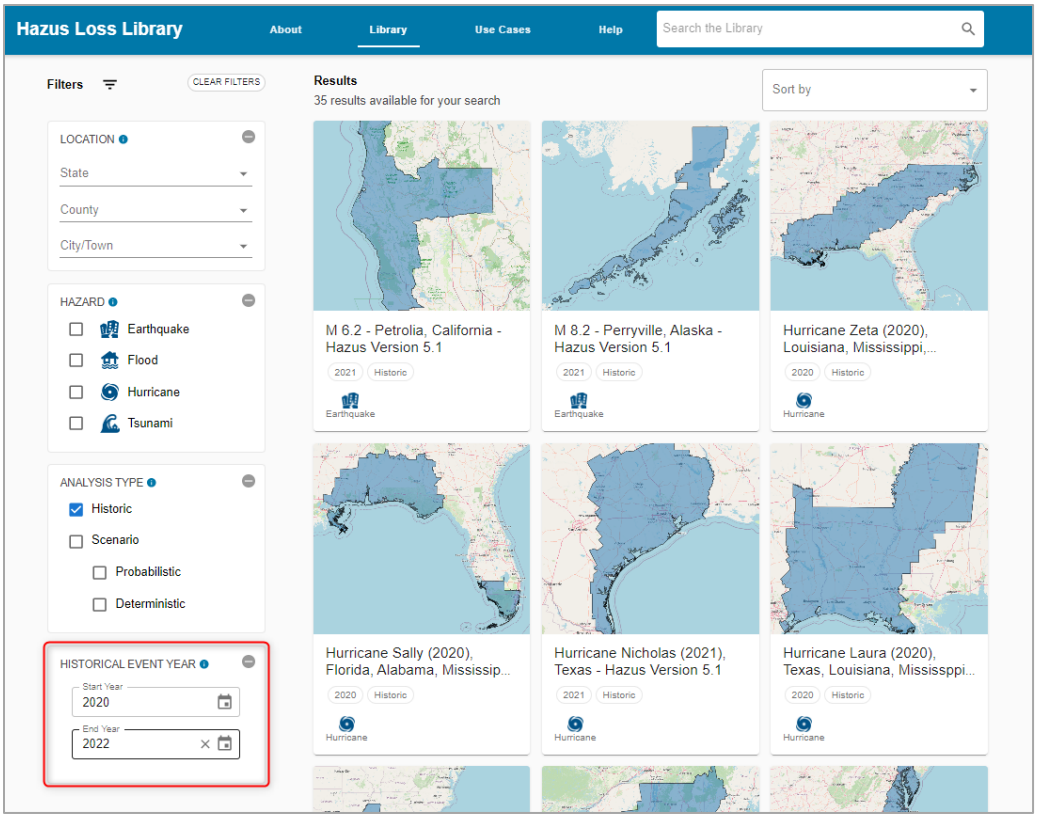

Figure 4. Options for using the Historical Event Year filter in the Library tab.

Combining Filters to Support Your HLL Search

You can combine the Location, Hazard, and Historical Event Year filters in the way that best supports the parameters of your search. For example, you can search for a hurricane that took place in a certain community in a specific year. Combining filters can help, if you want to know if an HLL analysis is available for a specific hazard event. For example, filter for the year 2012 and the hurricane hazard type to see if there is an analysis of Hurricane Sandy. More broadly, you could search for all available analyses of a hazard type within a certain time range. For example, you could search for all earthquake analyses from 1970 to 1990.

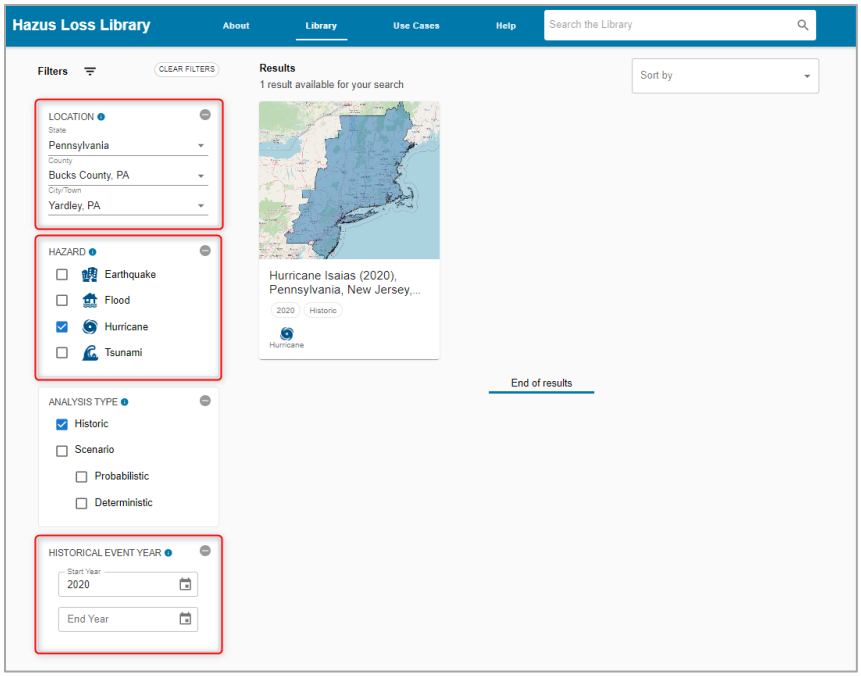

Figure 5. Combining filters for your library search.

Choosing an Analysis Type

A key filter for searching in the HLL is the ***Analysis Type*** filter. It provides the following options for the type of Hazus analysis:

Table 1. Analysis Type Filter Options in the HLL.

Analysis Type Filter Options		
Historic	A model of a past hazard event. The model is based on the actual extents of that hazard event. An example would be the extent of high wind speeds and resulting building damage from a hurricane event, like Hurricane Harvey, or the extent of ground shaking from an earthquake event.	
Scenario	A model for a natural hazard event that has not occurred. The scenario analysis has two different subtypes: Probabilistic and Deterministic.	
	Probabilistic	This is modeled using a return period, such as a 1%-annual-chance flood. That is a flood event with a 1 in 100 chance of occurring in any given year. Another example is a 500-year earthquake. There is a 1 in 500 chance that an event of this size will occur in a given year. Some hazards can also show the average annualized loss, which is the expected value of the loss per year, over a long time span.

Analysis Type Filter Options		
	Deterministic	This is modeled after a hypothetical event, such as an earthquake from the San Andreas fault. It is based on authoritative data from partner agencies, like the USGS ShakeMap for earthquake data. It lets you review the results for a hazard scenario that has not happened but could.

You can select one or more of the ***Analysis Type*** options mentioned above to help refine your search. The type of analysis will depend on your needs. Here are some potential applications:

- Filter for *Historic* analyses to reference data from a specific hazard event.
- Filter for *Probabilistic* scenario analyses to review an event based on its chance of occurring in a given time period.
- Filter for *Deterministic* scenario analyses to review a hypothetical scenario, such as a worst case.

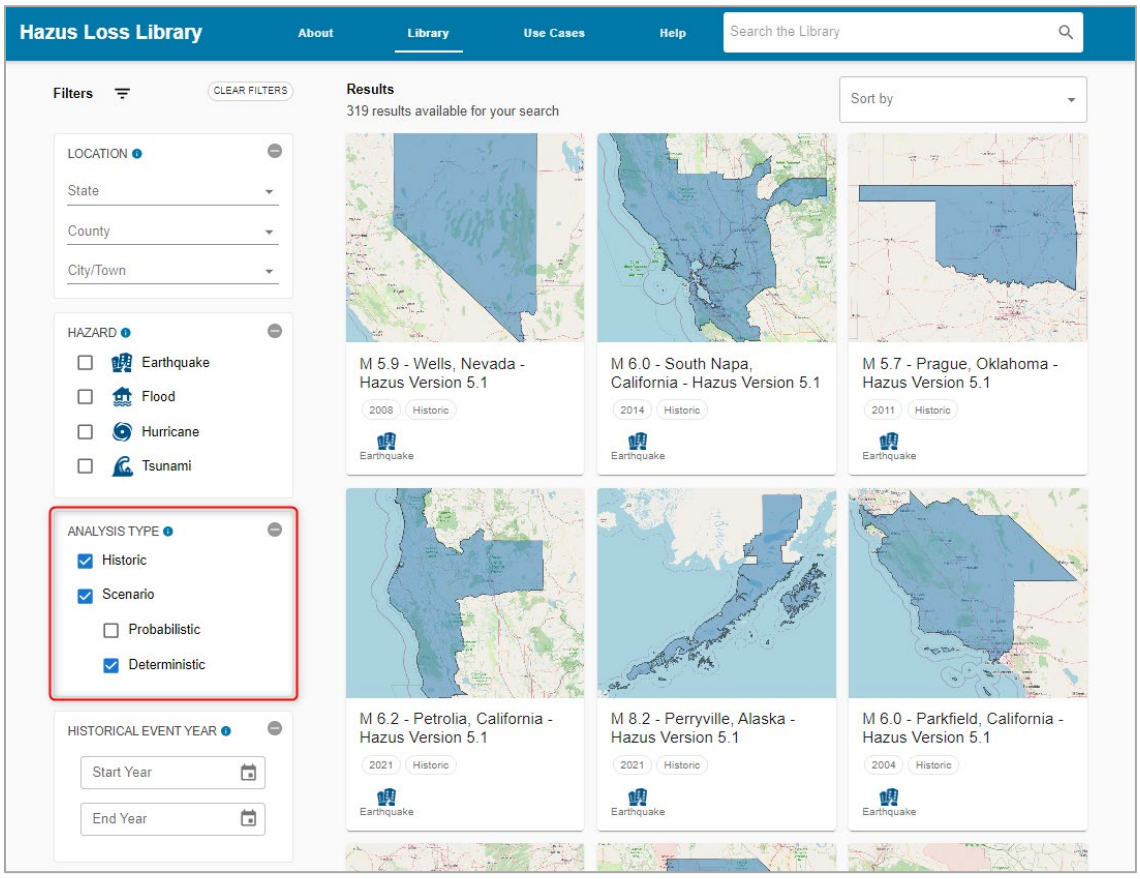

Figure 6. Options for using the Analyses Type filter in the library.

Reviewing an Analysis

Once you find an analysis in the HLL that you would like to use, there are a few ways to review the results and information the model provides. An HLL analysis will include information on the analysis source, date, and type. It will show which version of Hazus was used to compute the model. The results will also list key statistics. These may include the hazard type, the geographic area affected, total economic losses, and the inventory data used in the analysis. For more on the types of information in a Hazus analysis, review the Hazus User Guidance manuals.

Here are some directions to help you navigate the different download options and find the information you need from an HLL analysis:

- Click the ***Show Downloads*** dropdown on the analysis listing to see more details and options.

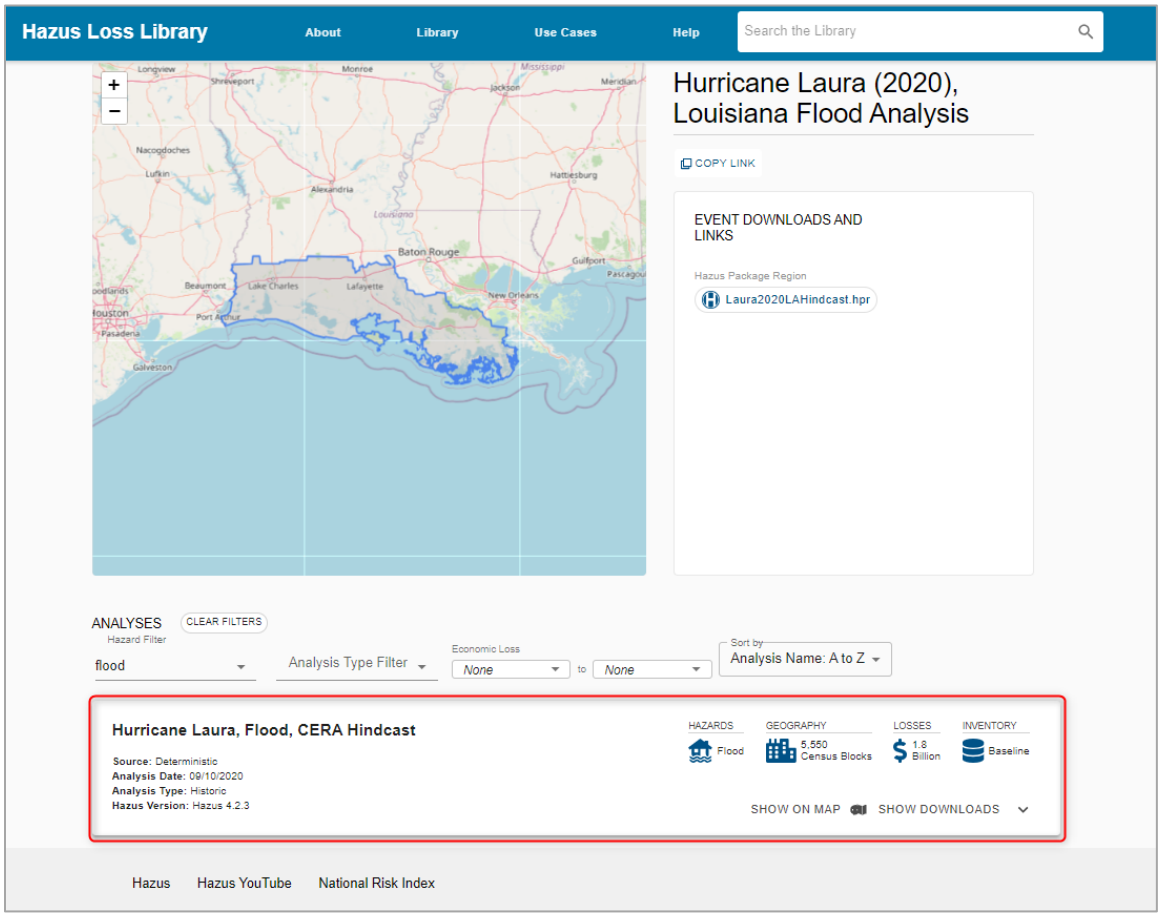

Figure 7. Summary on the analyses landing page, with available filters and download options.

- ***Report*** – This download provides a one-page PDF report with key statistics and visuals. The visuals include color-coded charts and maps.

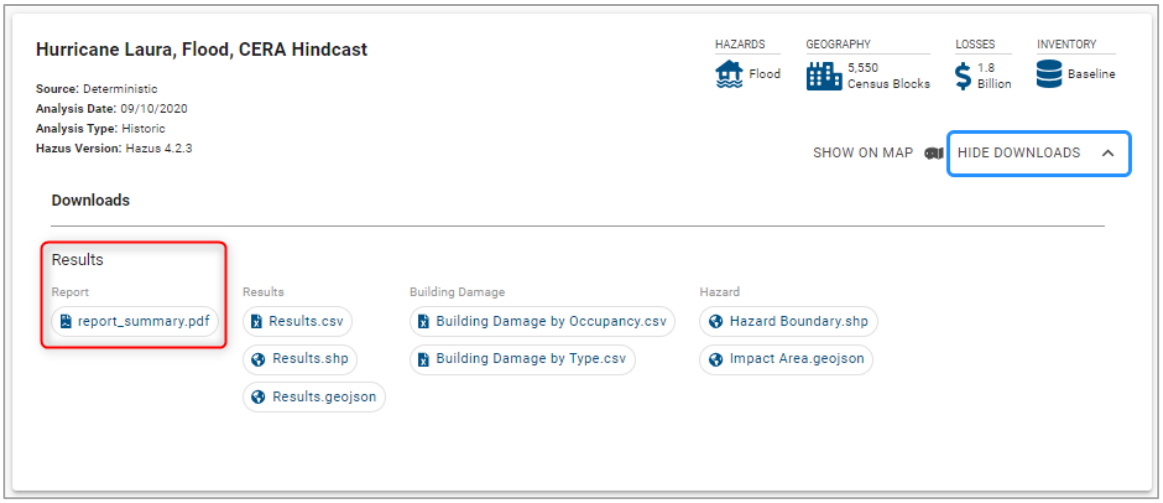

Figure 8. The summary report available to download.

The information that is included will depend on the hazard type and the model. A report may have information on economic losses by occupancy or type, the debris generated, shelter needs, hazard specifics, and more. For example, flood event or tsunami event report may show flood depth maps; hurricane events may include maps of peak wind gusts; tsunami events may include maps showing the amount of time needed for older adults to travel to safety; and earthquake events may include maps that show the expected ground shaking strength in a given area. Figure 9 shows a flood report from an analysis of Hurricane Laura, which impacted Louisiana in 2020.

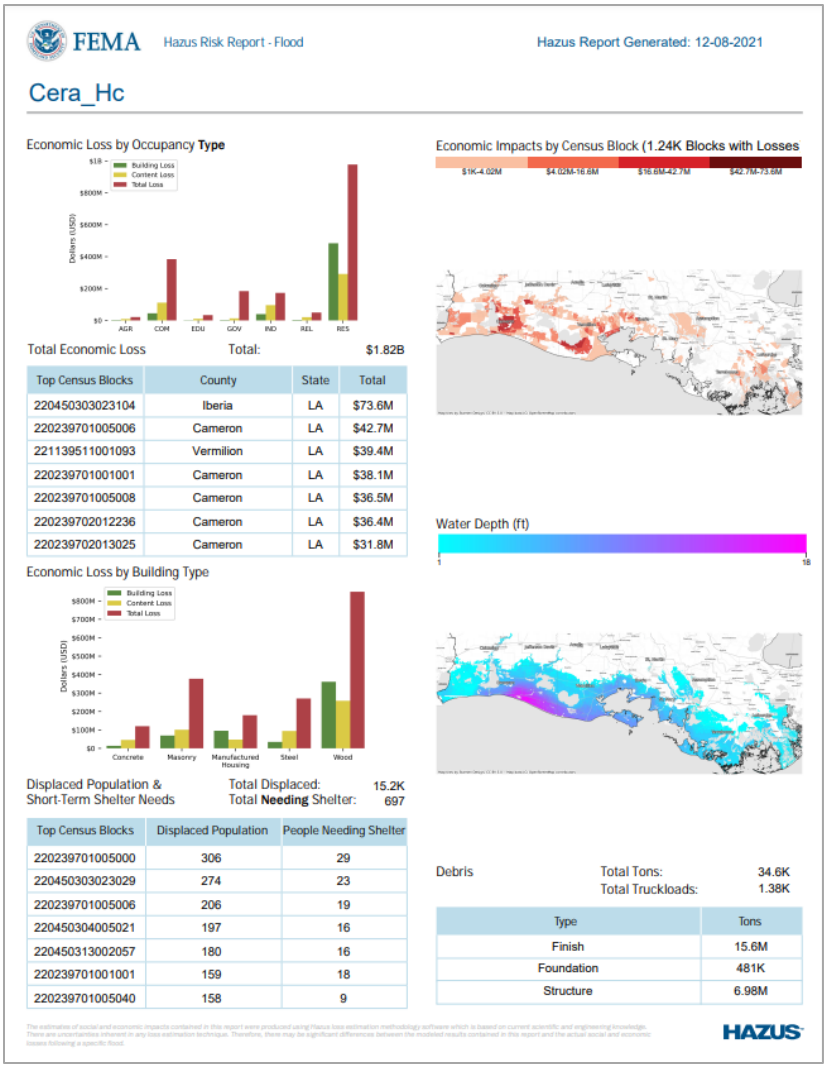

Figure 9. Flood report download for Hurricane Laura, a historic hazard event that impacted Louisiana in 2020.

- ***Results*** – The data and modeling results from the hazard model are provided in several file formats, including spreadsheets and spatial files. Click to download the formats you want to use. The specific information in the downloaded data file will depend on the hazard type and the model. The information will be aggregated by a geography type, such as census blocks. It may include:

Physical damage estimates to residential and commercial buildings, schools, critical facilities and infrastructure.

Affected populations including displaced households, shelter requirements, and exposure to the hazard.

Economic losses such as business interruptions and reconstruction costs.

Cost effectiveness of common mitigation strategies, such as elevating structures in a floodplain.

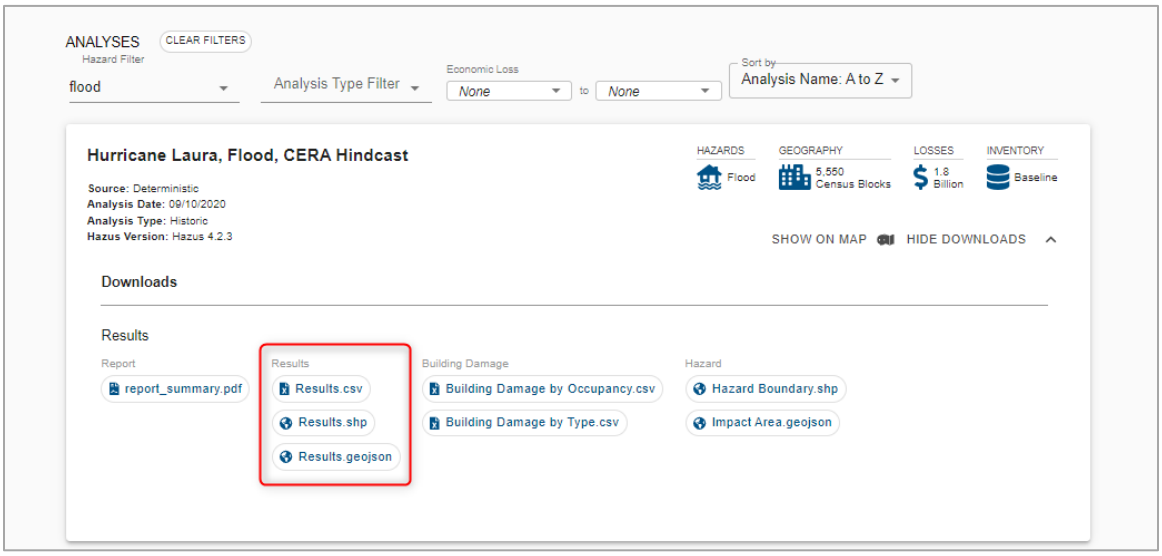

Figure 10. The different data files available to download in the results of a hurricane study.

- ***Building Damage*** – These downloads offer detailed estimates for building damage. Building damage estimates can be viewed by the building material type, such as concrete or wood. They can also be viewed by occupancy type, such as commercial or residential. These files are available in .csv formats.

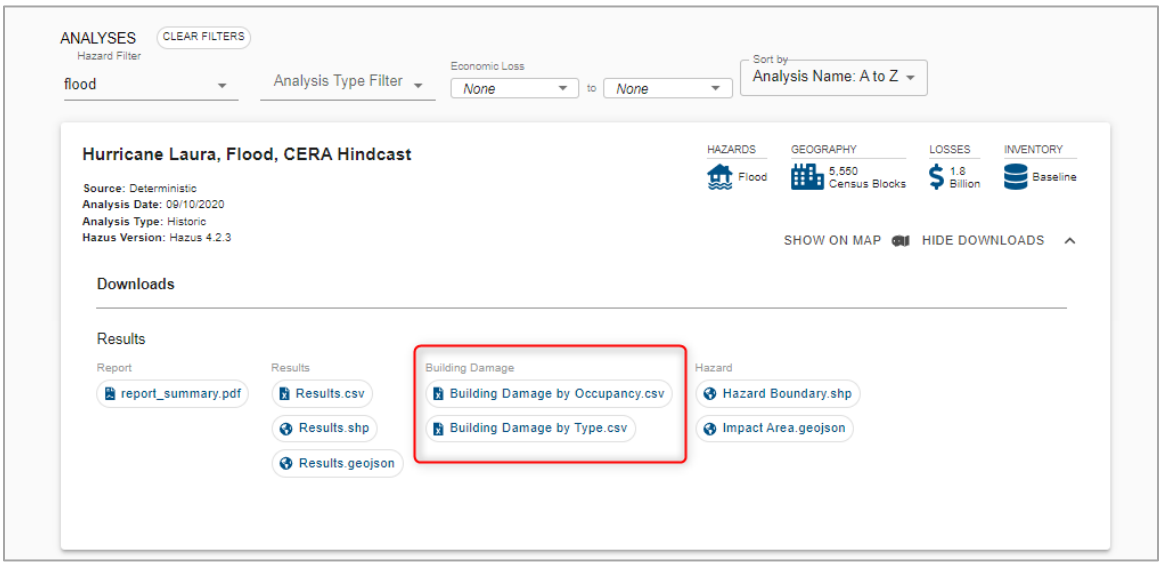

Figure 11. Types of building damage estimate data available for download.

- ***Hazard*** – These downloads are shapefiles. They can be imported into geographic information system (GIS) software. They show the extent of the hazard that is being profiled. You can use this to check the extent of the modeled event with other data that you may have.

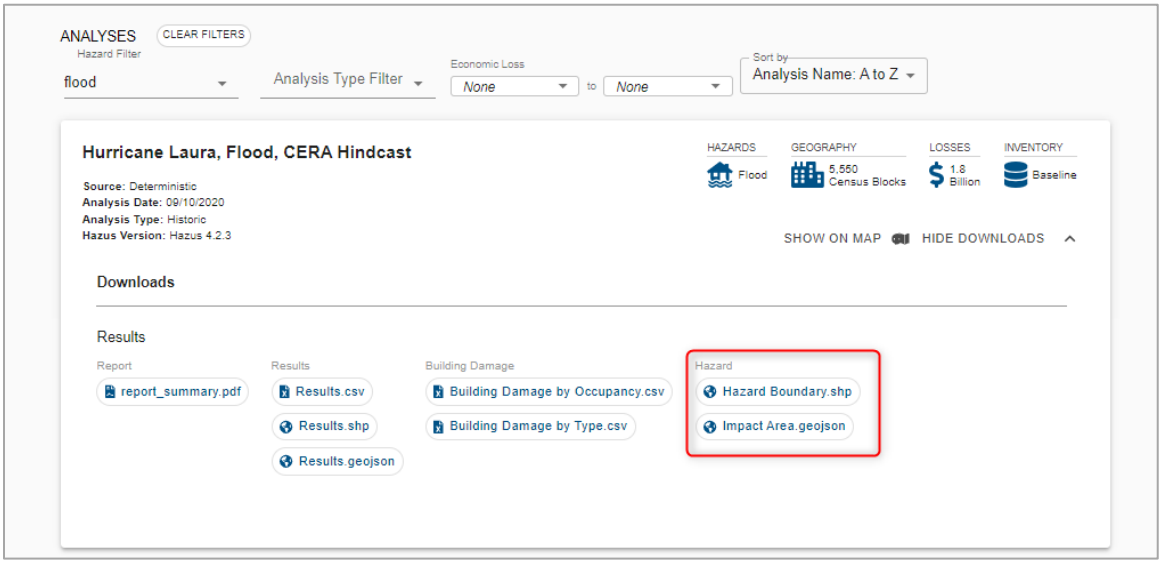

Figure 12. Types of GIS data available for a hazard analysis.

Downloading a Full Hazus Analysis

A ***Hazus Package Region*** (.hpr) is another download option available to help you analyze the results of a model. An .hpr provides the full Hazus model, select results for a specific area of interest, and other information that may not be available on the HLL. Using the .hpr as is requires you to have Hazus software installed, which may require some experience to navigate. Download the .hpr by clicking the link in the *Event Downloads and Links* section. If you do not have Hazus installed, you can modify and use the .hpr in other software. Instructions for this alternate method are in the next section.

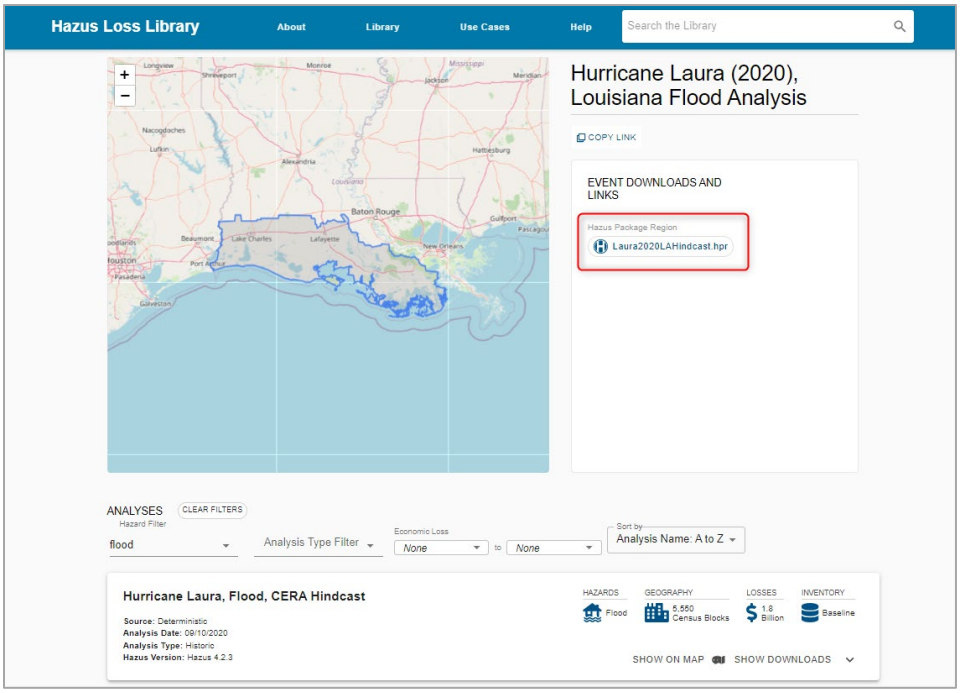

Figure 13. The event downloads and links option within an analysis, where you can download an. hpr.

1. ***Import the Hazus Package Region*** – After the Hazus Package Region is downloaded, you will need to import the downloaded .hpr file into your version of Hazus. Open your Hazus program and select ***Import a region*** on the startup menu. After the import is finished, select ***Open a region*** from the startup menu. Please note that if your version of Hazus is different than the version in which the .hpr was created, you may be prompted to update the region while importing the file. Find more information on the HLL's Help page: [https://hazards.fema.gov/hazus-loss-library/help.](https://hazards.fema.gov/hazus-loss-library/help)

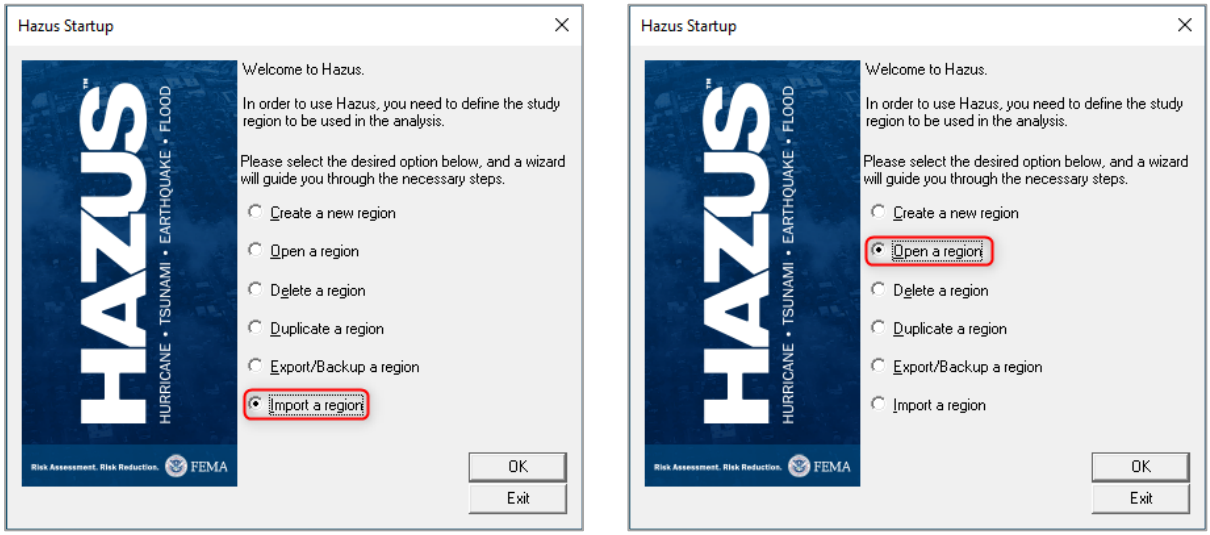

Figure 14. Options for users in the Hazus Startup menu, where you can import HLL data for further review.

2. ***Open the Results*** – With the region open in Hazus, you will see the shapefiles related to the hazard model, shown in the layers section of the Table of Contents (see Figure 15). To view the results of the analysis, go to the ***Results*** tab and select ***View Current Scenario Results By...*** From here, select the scenario under the ***Available Results*** tab, then click ***OK***.

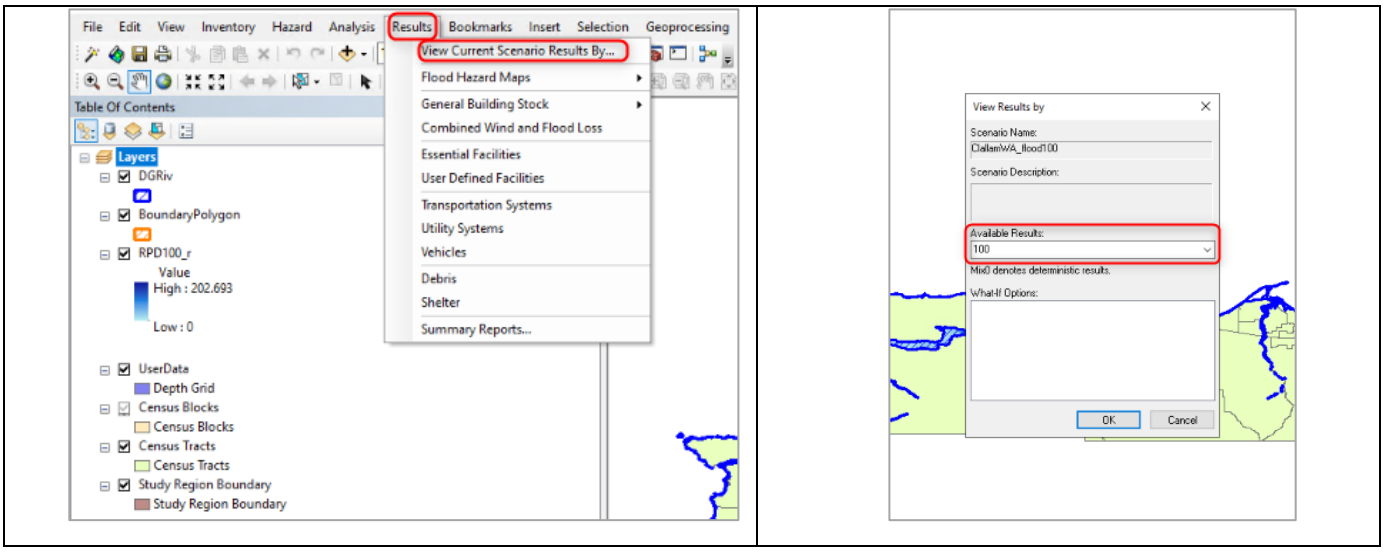

Figure 15. Hazus tab options for reviewing the results of the analysis.

3. ***Review the Results*** – From here, you will have several options to view the results. Under the ***Results*** tab, you can choose to view the hazard-related information that is useful to your work. Some examples include:

   a. ***General Building Stock.*** Review the number of damaged buildings or economic cost estimates.

   b. ***Essential Facilities.*** Review the damages to critical facilities.

   c. ***Debris*** or ***Shelter.*** See the generated debris or shelter needs after a hazard event.

4. ***Summary Reports.*** Explore the default report options Hazus offers.

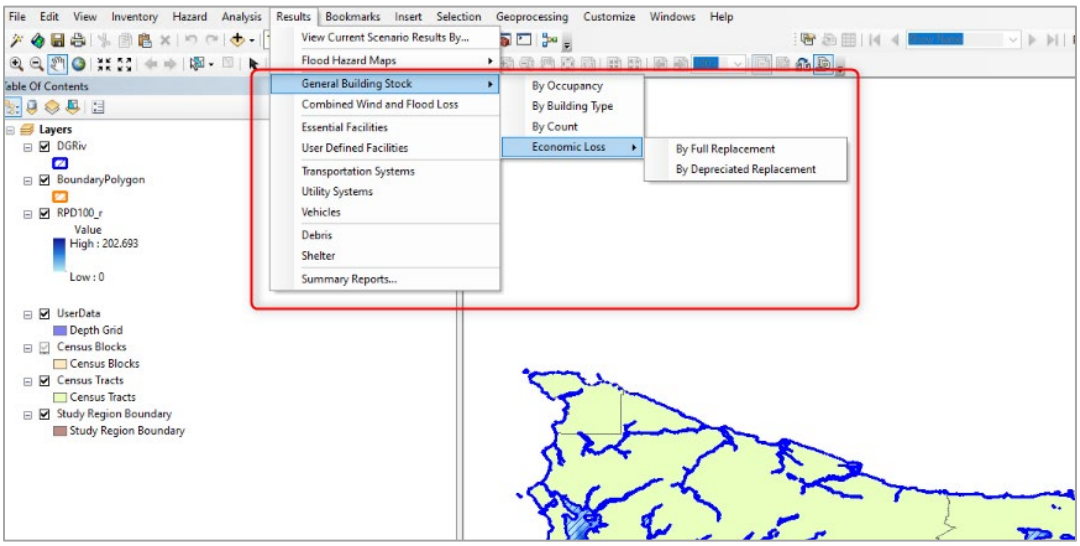

Figure 16. Options for viewing analysis results to see the impacts of a hazard event.

Modify an .hpr File for Use in Software Other Than Hazus

1. Download the .hpr file.
2. Manually rename the file. Instead of the file ending with ".hpr," manually edit the name to end with ".zip".
3. Unzip the newly named .zip file by right-clicking and selecting ***extract all***. This will let you access the files downloaded from the HLL.
4. Manually choose components from the .hpr that are useful to you. There are many file types such shapefiles, SQL databases, text logs and more.
5. You can now import the spatial layers you need into your GIS software and create an analysis that fits your project needs.

Benefits of Reviewing an HPR in Hazus

The information in the HLL often covers large regions with many communities. You may want to analyze a smaller area, like one community or even one street block. In that case, using Hazus to review the .hpr would be ideal. In Hazus, you can aggregate the data to your specific area of interest rather than reviewing damage and economic estimates for multiple counties or states. You can perform a typical GIS analysis to select the data results by a census tract or even blocks within your community. You can summarize the data from there. The data in the library is available and useful for a variety of analyses, but if your community can perform more specialized analyses, Hazus is also available to download and use.

More Information on Using the HLL

For more information on navigating the HLL, visit the Help webpage. There are use cases available on the HLL website that offer different ways to apply the library in your work. If you need additional assistance, please contact the Hazus team at FEMA-Hazus-Support@fema.dhs.gov.