2020 Public Use Microdata Areas Program (PUMA) Summary Guide

September 2021

Getting Started

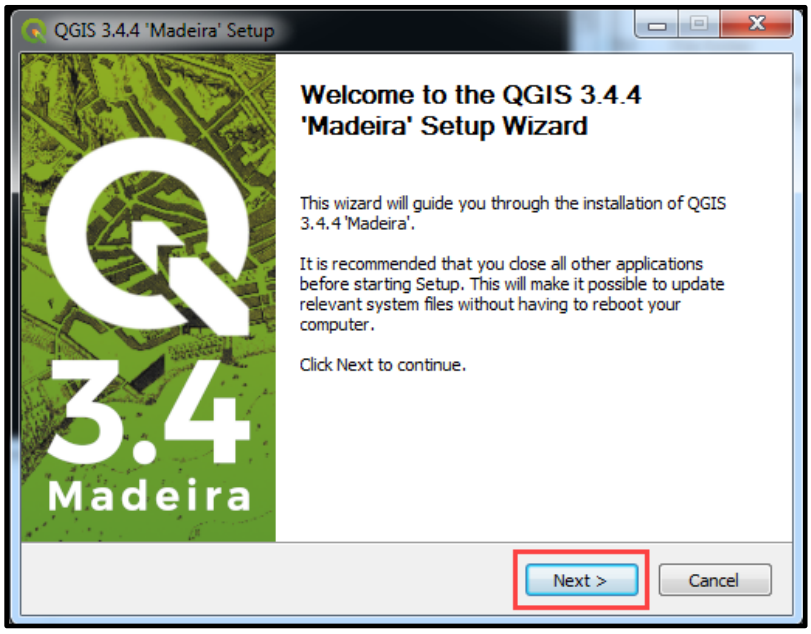
This Summary Guide provides a snapshot of the program and its most important parts. This guide contains only high-level details on the program and Geographic Update Partnership Software (GUPS) functionality. The participant guide and the final criteria documents provide the specifics and instructions that should be referenced in conjunction with this summary guide for the 2020 PUMA.

State Data Centers (SDCs) should develop a plan to delineate PUMAs. The plan should consider whether the SDC will complete the delineation on their own or will receive partial state delineations from other interested data users. The Census Bureau encourages SDCs to reach out to interested data users and stakeholders in their state to gather input on data requirements. Everyone involved with delineation (e.g., SDCs and interested data users) should download the gups.zip file and the program materials (e.g., the participant guide, final criteria, naming guidelines, coding guidelines, and 2010 PUMA names file) from the PUMA and 2020 PUMA websites, and save them to a designated folder on a local computer. Everyone involved should review the program materials prior to installing GUPS.

Download and Install GUPS

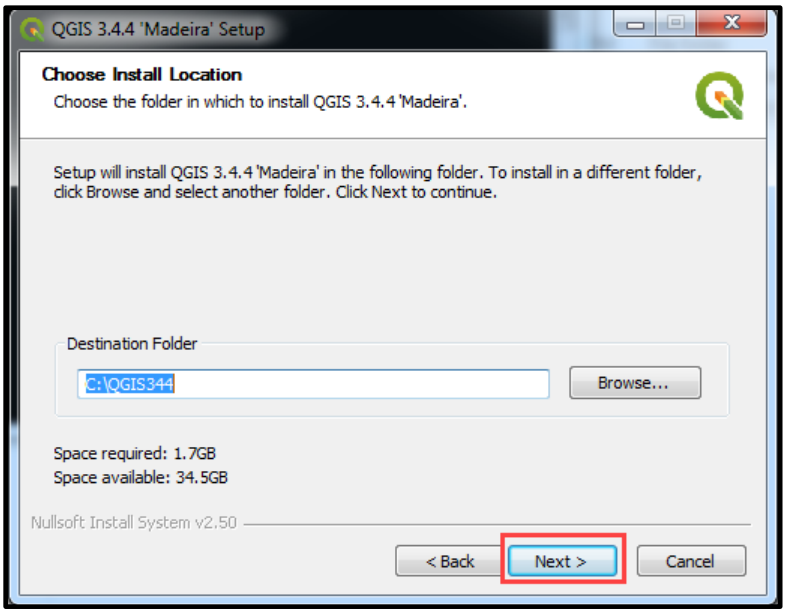
Follow the steps below to download and install GUPS. Detailed instructions are in chapter 2 of the participant guide. Please note that many agencies/organizations require certain security privileges to download and install external software. Work with your local Information Technology (IT) staff person to acquire those privileges or ask they assist with GUPS installation.

1) Download the **gups.zip** file from the 2020 PUMA website to the computer.
2) Unzip the file.
3) Use the left mouse button to double-click the **SETUP-<version>.bat** file and start the installation. The anticipated version is 14.0.0-6.
4) When the installer opens, the **Welcome to the QGIS 'Madeira' Setup** window opens. Read the information on the screen and select **Next**.

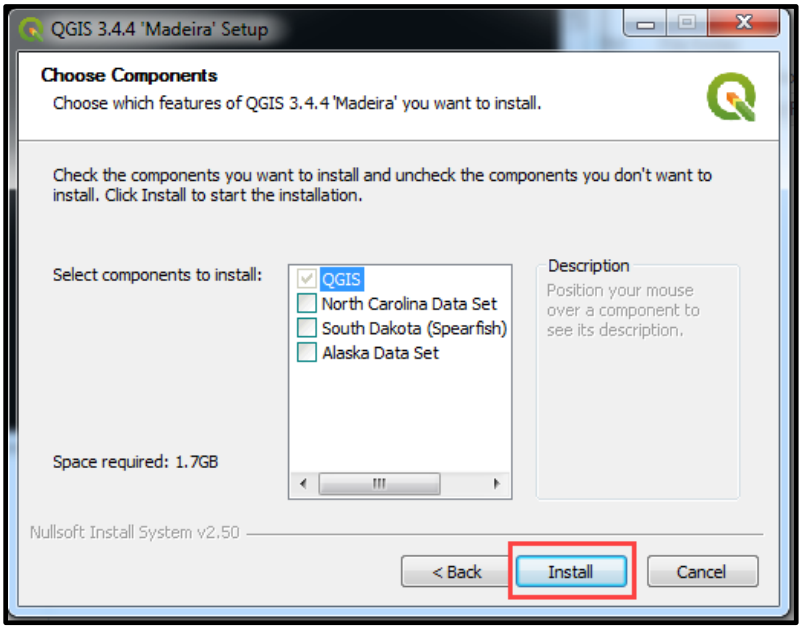


5) The **License Agreement** screen opens. Review the agreement and select **I Agree** to continue.

6) The **Choose Install Location** screen opens. The Census Bureau recommends installing GUPS at the default location (e.g., C:\QGIS344) or select **Browse** to choose the location to install GUPS. Once the location is set, select **Next** to continue installation.



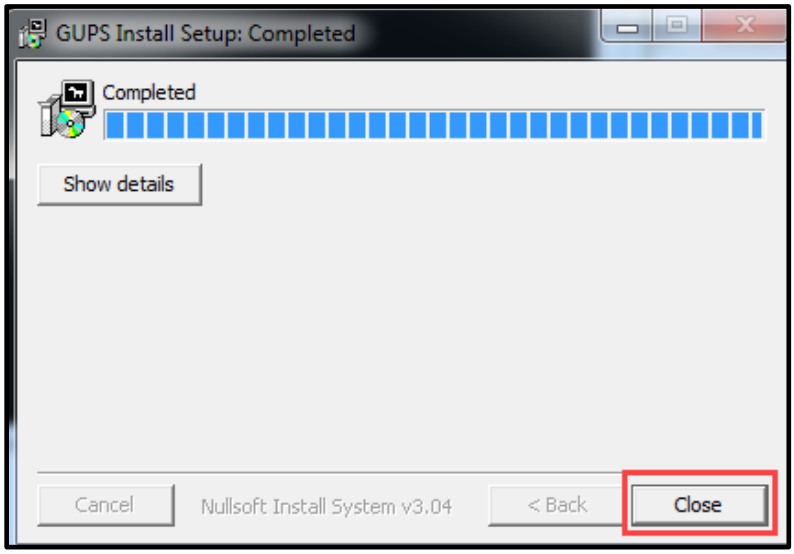
7) The **Choose Components** screen opens with '☑QGIS' selected and grayed out in the **Select components to install** section. Select **Install** to continue.



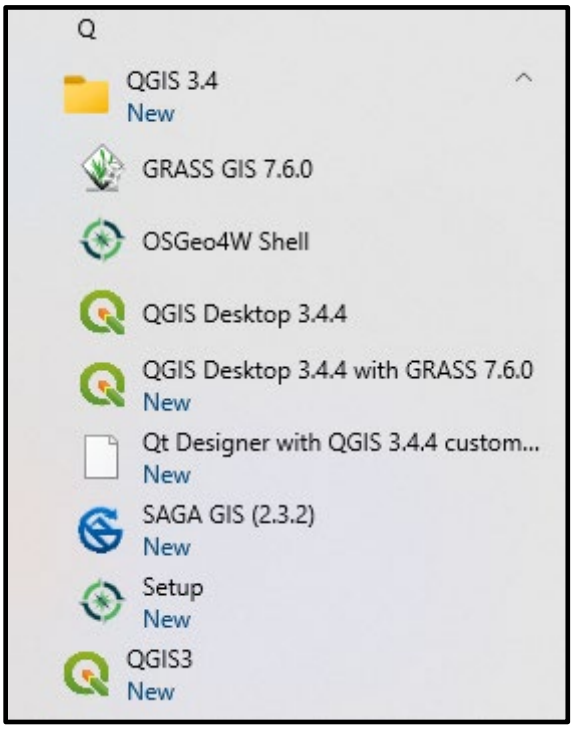
8) The **Completing the QGIS 3.4.4 'Madeira' Setup** screen reappears to confirm installation. To close the screen, finish the QGIS update, and launch GUPS, select **Finish**. The installation can take five to ten minutes to complete.



9) The **GUPS Install Setup: Completed** window opens and displays the status of the installation. Select **Close**.



10) Confirm installation by finding QGIS 3.4 in the Start Menu of the computer within the "All Programs" list. Use the **QGIS3** or the **QGIS Desktop 3.4.4** to launch GUPS.

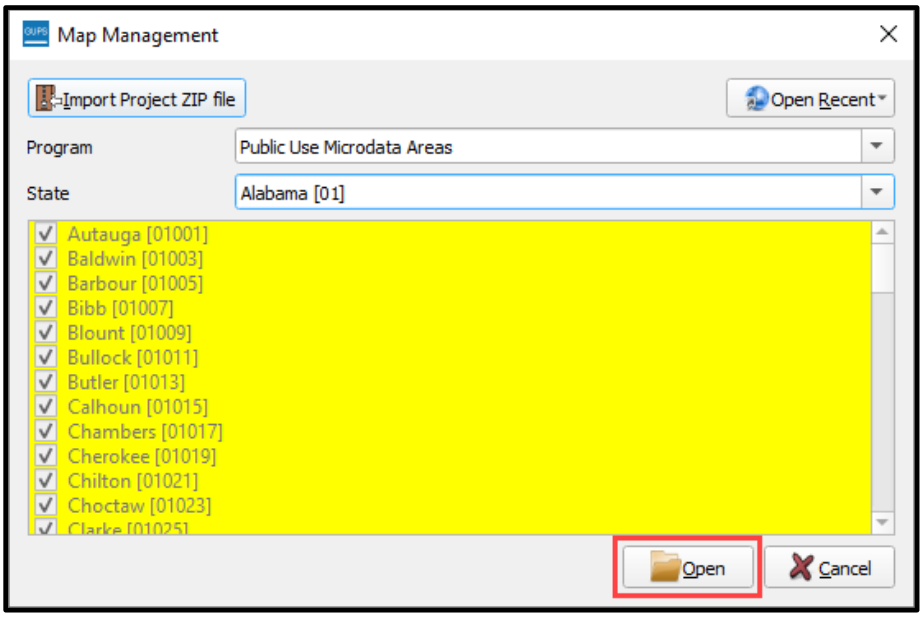


IMPORTANT:	GUPS users with different security privileges other than IT staff that installed the software may encounter problems accessing the directories and plugins needed to operate GUPS. This usually occurs when the software is not installed under the user's profile. To correct this, have the IT staff person reinstall GUPS under the user's profile using the user's credentials.

Start a PUMA Project

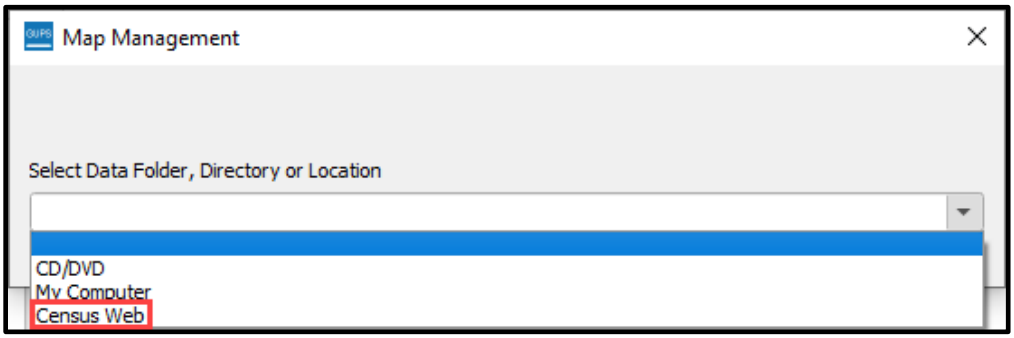
Follow the steps below to start a PUMA project using the most common options available to participants. Detailed instructions are in chapter 3 of the participant guide.

1) Select **QGIS3** from the Start Menu of the computer to launch GUPS. From the **Map Management** window, choose **Public Use Microdata Areas** for the **Program**, select your state for the **State** field, and then **Open**.



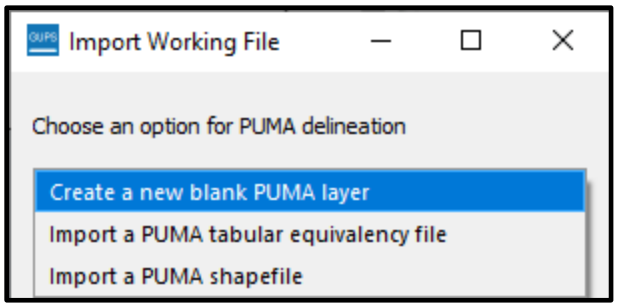
IMPORTANT: If the Map Management window does not appear, refer to appendix B of the participant guide for tips on troubleshooting the GUPS installation process.

2) A secondary **Map Management** window opens to choose the location of the data to use in the project. From the **Select Data Folder, Directory or Location** drop-down menu, select **Census Web**.



Note: **Census Web** loads the data needed for PUMA delineation directly from a server at the Census Bureau into the PUMA project. This is the most user-friendly option for participants because it symbolizes the layers and readies the project for delineation without added burden of downloading, extracting, and staging the necessary shapefiles. The process of downloading shapefiles and using the **My Computer** option are described in the appendix D of participant guide.

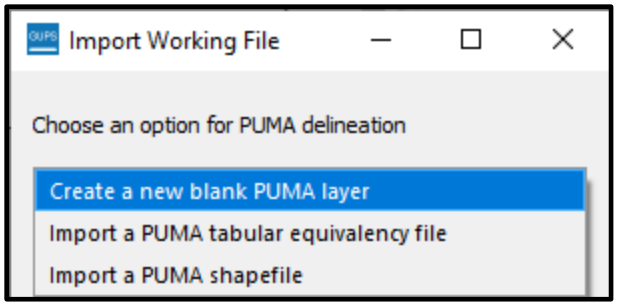
3) The **Import Working File** window awaits selection for how to begin PUMA delineation. Three options available for selection are: **Create a new blank PUMA layer**, **Import a PUMA tabular equivalency file**, and **Import a PUMA shapefile**.



Delineate PUMAs from a Blank Layer

When using the **Create a new blank PUMA layer** option, GUPS generates an empty (i.e., blank) PUMA layer named "pumacurrent_XX" (where XX is the two-digit FIPS code for the state) when using this option. This is the layer where the PUMA delineation work is stored. In the Table of Contents, ensure the tracts2020_XX, county_XX, and the puma2010_XX layers are turned on/enabled by checking the box next to the layer name. Use these layers as reference when delineating PUMA boundaries. Follow the steps in this section to interactively delineate PUMAs using the tools in GUPS. Detailed instructions are in chapter 4.1 of the participant guide.

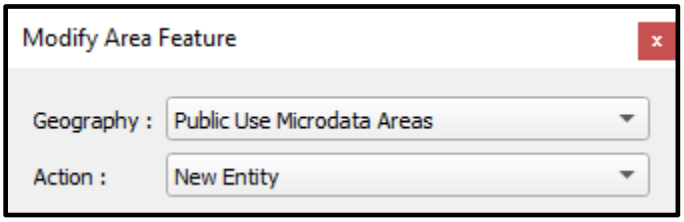
1) From the From the **Import Working File** window, select **Create a new blank PUMA layer** and then **OK**.



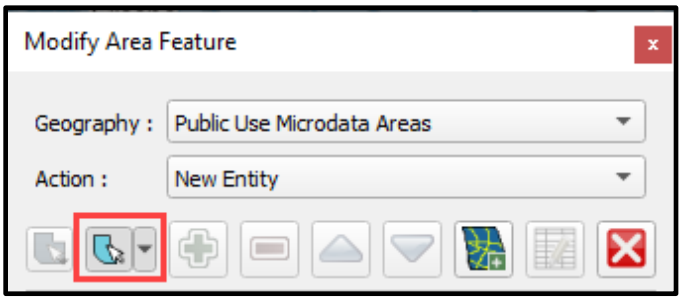
2) Select the **Modify Area Feature** button from the PUMA toolbar. The **Modify Area Feature window** opens. *Note: The Census Bureau staff recommend moving the window to the left or right of the Map View to dock it for later use*.



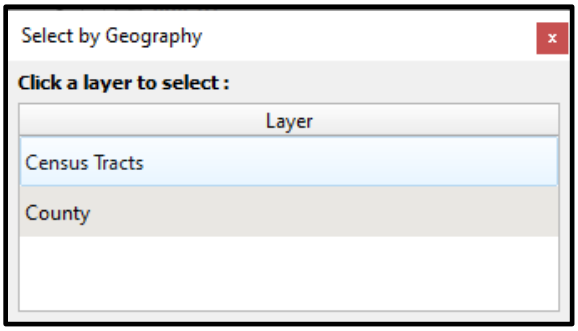
3) In the **Modify Area Feature** window, confirm the **Geography** menu displays **Public Use Microdata Areas**. Set the **Action** menu to **New Entity**.



4) From the **Modify Area Feature** window, change the **Select Feature(s)** button to **Select Features by Geography**. *Note: There are five options for selecting features; however, the summary guide only highlights this one option.*

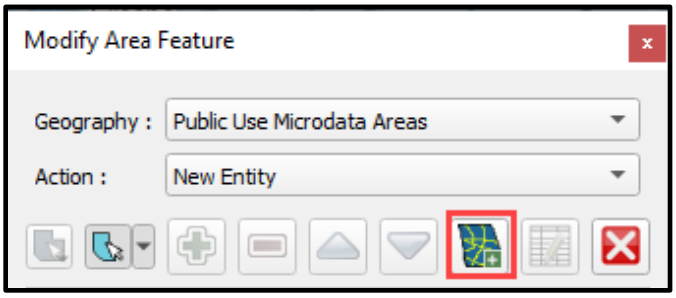


5) A secondary window, **Select by Geography**, opens to reveal the two layers (Census Tracts and County) available to select for the PUMA delineation. With the selection of a layer, the Table of Content updates to activate the selected layer.

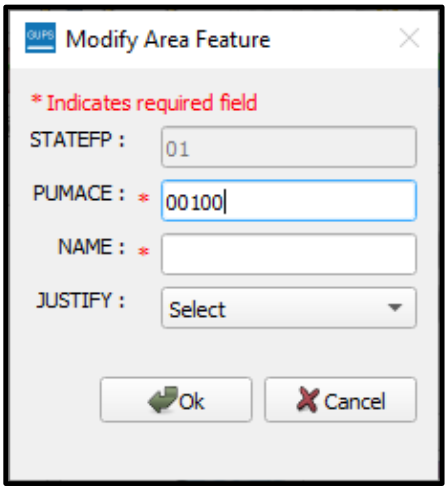


6) Use the mouse to select the census tracts or county(s) in the Map View. As census tracts and/or counties are selected, the Map View highlights the selected geographies and the Modify Area Feature window updates to show the Population of the selected geographies. This information assists with knowing whether the selected geographies meet the population threshold requirements for valid PUMAs.

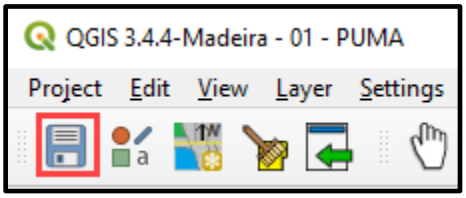
7) When all the census tracts and/or counties are selected for a new PUMA, select the **Add Entity** button in the **Modify Area Feature** window.



8) A secondary **Modify Area Feature** window opens. GUPS automatically populates the **PUMACE** field based on the next available five-digit numeric code. Confirm the new PUMA code or enter a different code and enter the **NAME**. Both fields are required. Provide a justification in the **JUSTIFY** field if necessary.



9) Select the **Save Project** button from the Standard toolbar to save edits and to save the project.



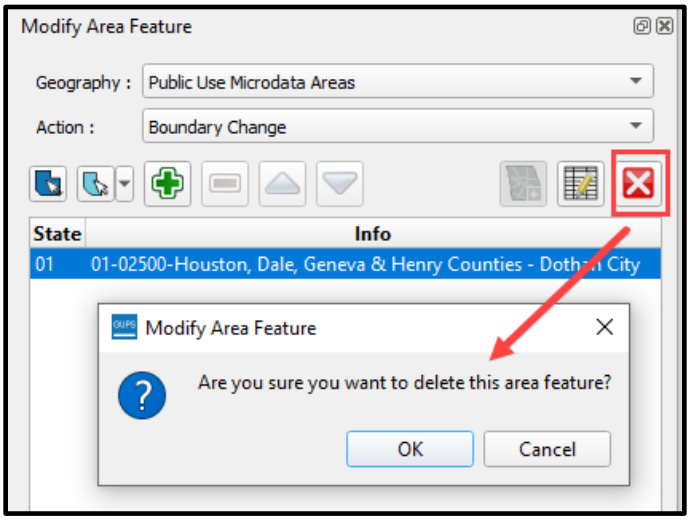
10) Repeat the steps above as many times as necessary to delineate new PUMAs.

Modify or Delete a PUMA

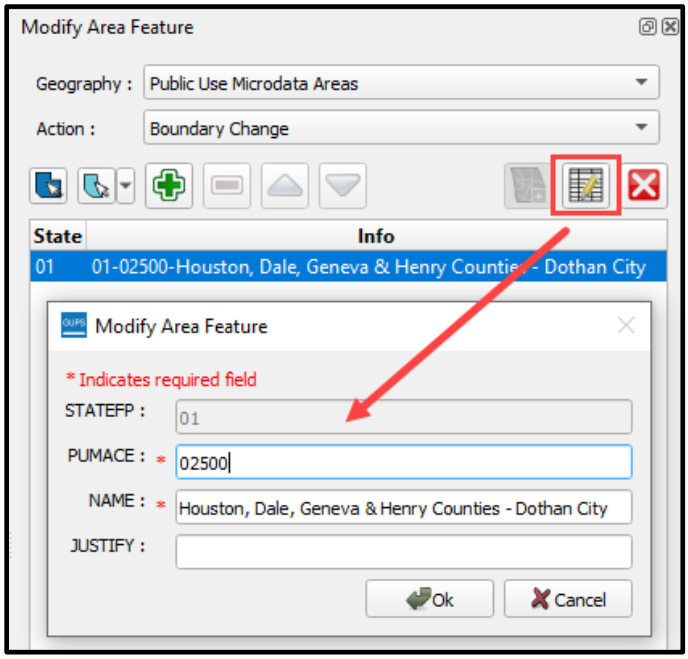
Delineated PUMAs may need boundary changes, attribute changes, or even deletion. Follow the steps in this section to learn more about these three tasks. Detailed instructions are included in chapter 4.2 of the participant guide.

1) In the **Modify Area Feature** window, confirm the **Geography** menu displays **Public Use Microdata Areas**. Set the **Action** menu to **Boundary Change**.

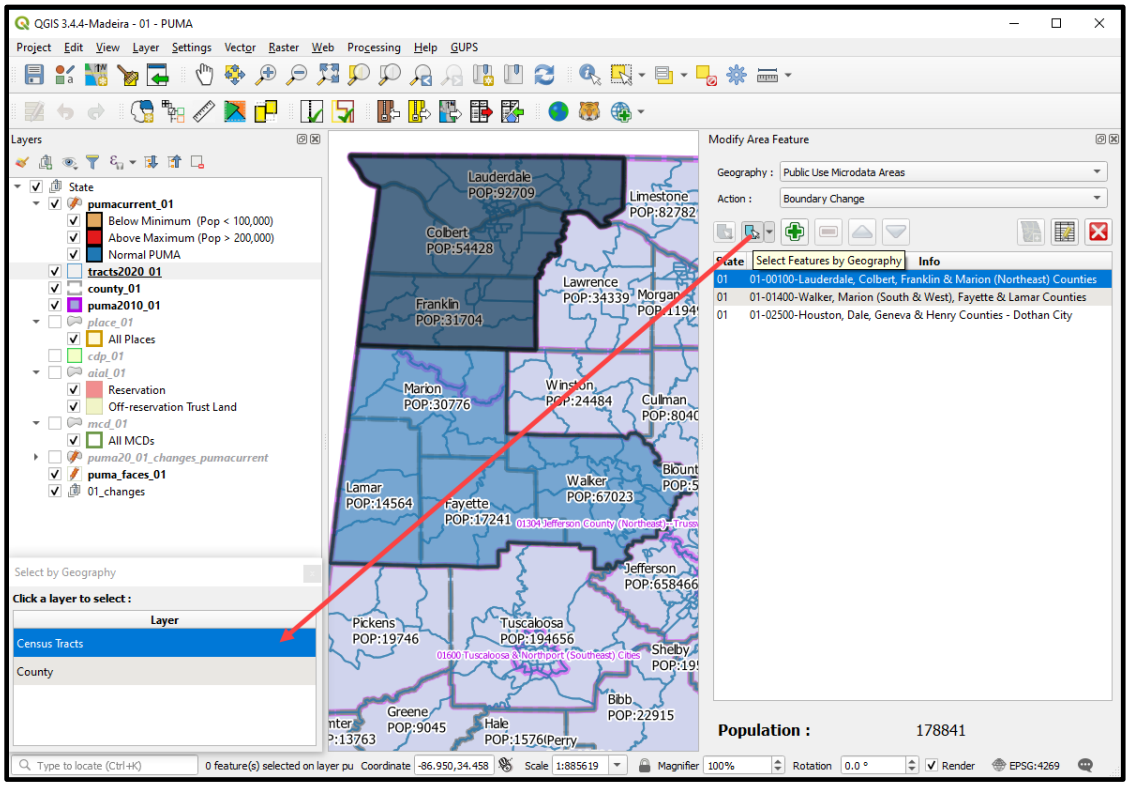
2) To delete a PUMA, select the PUMA from the **Modify Area Feature** window or in the Map View.
3) Select the **Delete Area Feature** button from the **Modify Area Feature** window. A secondary **Modify Area Feature** window appears to confirm or cancel the deletion. Choose **OK** to delete the PUMA or **Cancel** to cancel the deletion.



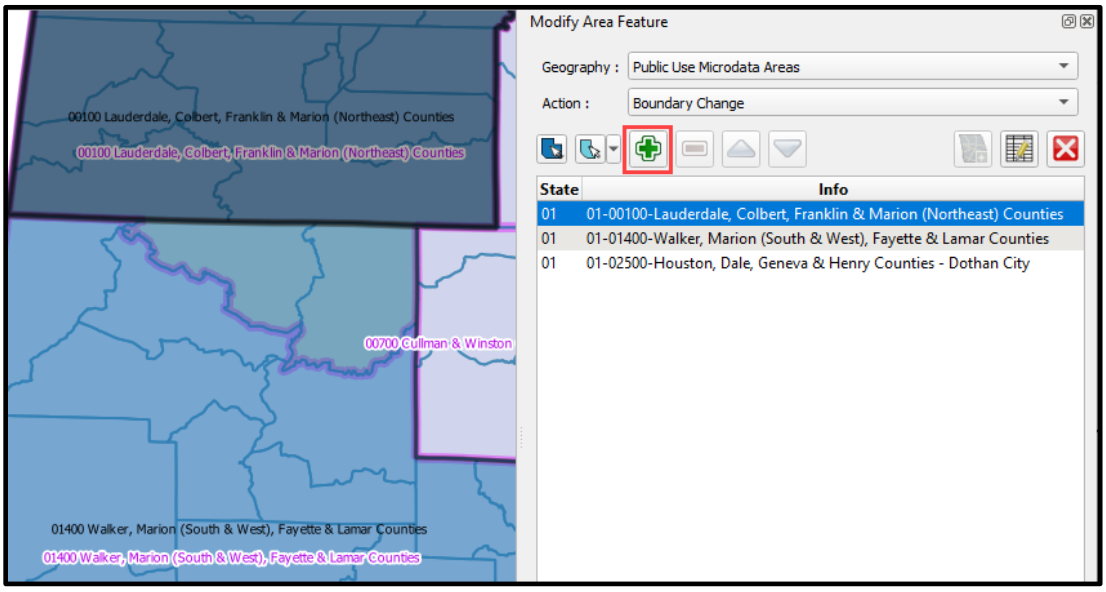
4) To modify a PUMA, select the PUMA from the **Modify Area Feature** window or in the Map View.
5) To modify a PUMA's attributes, select the **Change Attributes** button from the **Modify Area Feature** window. A secondary **Modify Area Feature** window appears to change attribution for the code or name of the selected PUMA. Choose **OK** to complete the modification of attributes or **Cancel** to cancel the modification.



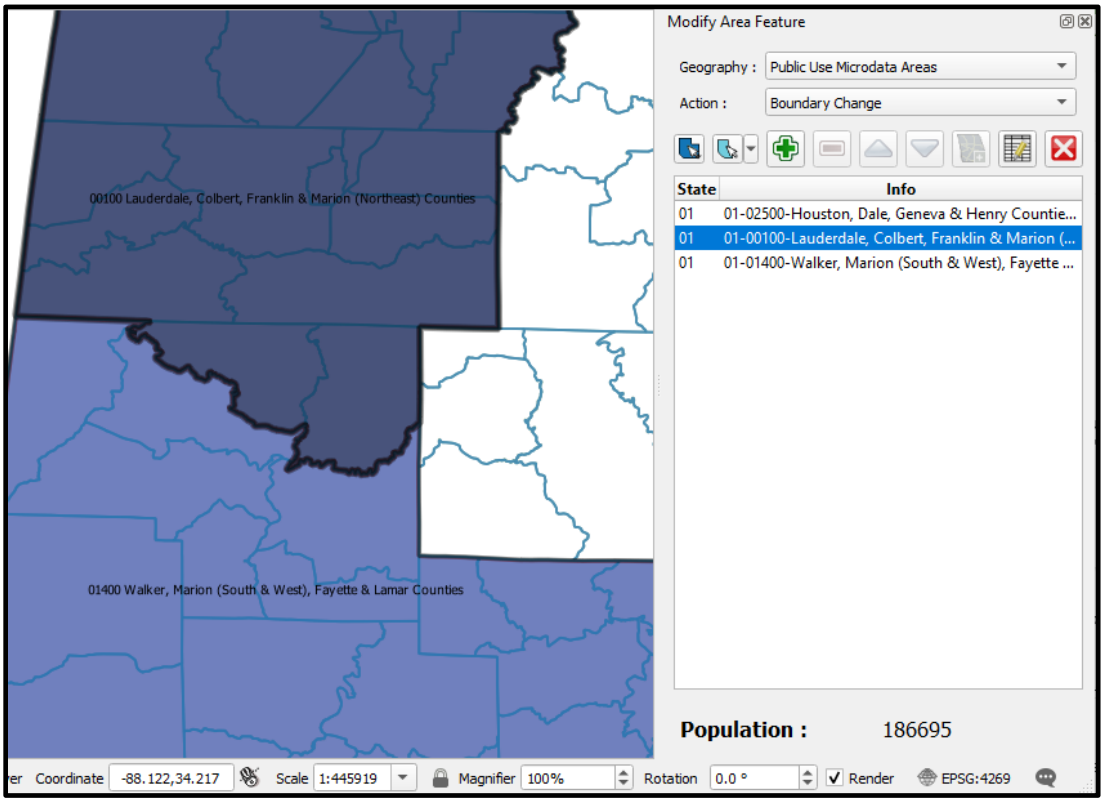
6) To modify a PUMA's boundary, activate the **Select Features by Geography** button in the **Modify Area Feature** window to open the **Select by Geography** secondary window. Select the appropriate geography (Census Tracts or County) to use to modify the PUMA boundary. *Note the population for the selected PUMA is 178,841.*



7) Use the mouse to select the geography, then select the **Add Area** button from the **Modify Area Feature** window to add the geography to the selected PUMA. *Note: Geography must be added to PUMAs, not removed from PUMAs, so for this example, census tracts were added to PUMA 00100 instead of being removed from PUMA 01400.*



8) Once GUPS completes the boundary modification, the new boundary appears in the Map View and the population for the modified PUMA updates in the **Modify Area Feature** window. *Note the population for the selected PUMA has changed from 178,841 to 186,695*.



9) Select the **Save Project** button from the Standard toolbar to save edits and to save the project.
10) Repeat the steps above as many times as necessary to modify or delete PUMAs.

Export PUMA Delineations

For interested data users providing delineation proposals to their SDC or for SDCs exporting whole state files when they complete their work, select the **Export Layer to Shapefile/TEF** button on the PUMA toolbar. Follow the prompts to complete the export. Interested data users must follow instructions given by the SDC for providing their exported file(s). The export process is detailed in chapter 4.3 of the participant guide.



Delineate PUMAs from a Shapefile

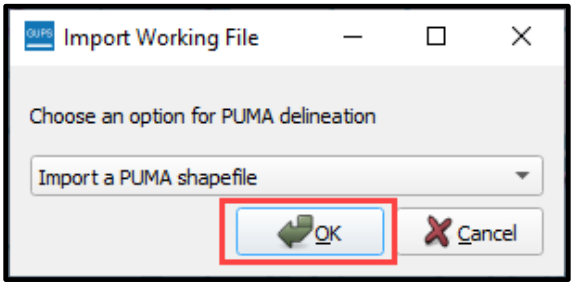
SDCs may import shapefiles from other data users into their state's PUMA project by using the **Import Working File** button from the PUMA toolbar. Details on this topic are included in chapter 4.4 of the participant guide.



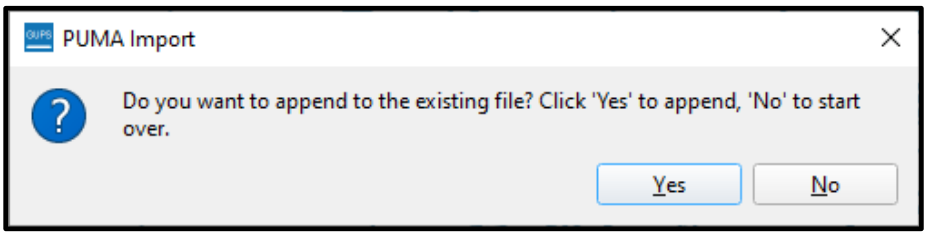
This button can be used to import an entire state of PUMA shapefiles, or it can import and append multiple shapefiles to create whole state coverage. The PUMA shapefile must contain fields for the State FIPS code, PUMA code, and PUMA name.

IMPORTANT:	The Census Bureau recommends a review of the shapefiles prior to importing into the state's PUMA project. Adding a PUMA shapefile as a reference layer is detailed in chapter 4.4.1 of the participant guide.

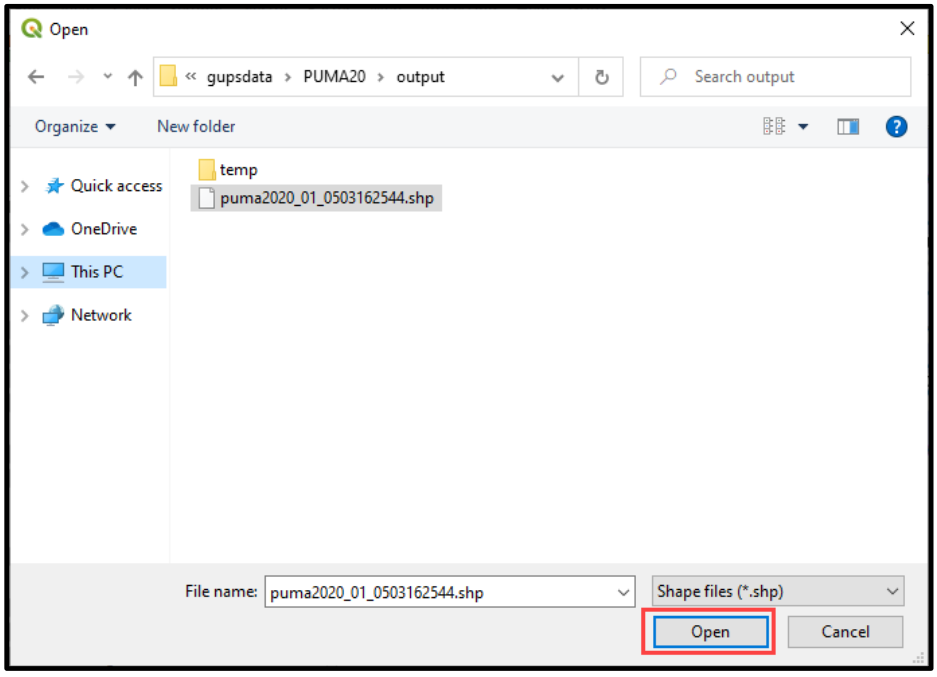
1) From the **Import Working File** window, select **Import a PUMA shapefile** and then **OK**.



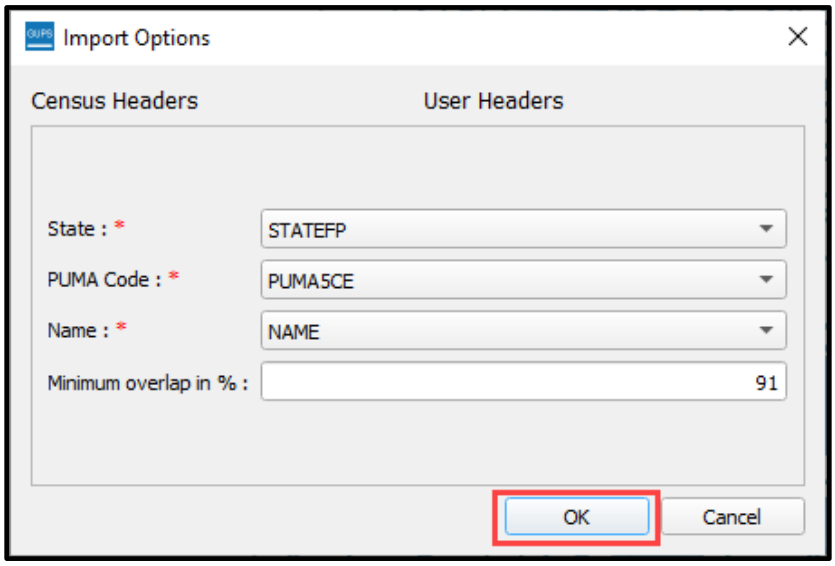
2) A **PUMA Import** confirmation window appears with the choice to append the shapefile to the existing project or to start over. Choosing to start over (i.e., choosing **No**) will delete all previously saved delineation work in the project.



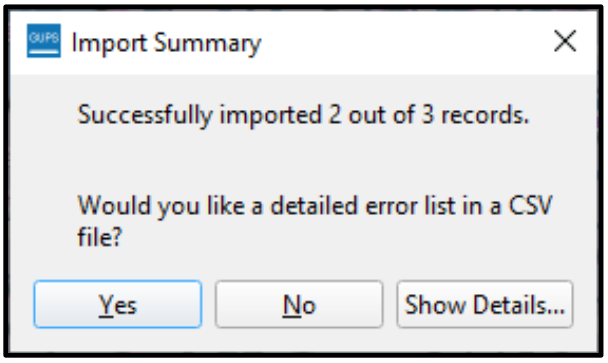
3) Navigate to the folder location of the exported shapefile. If the PUMAs were delineated using GUPS, the folder location is "/GUPSGIS/gupsdata/PUMA20/output". Select the shapefile to import and then **Open** to import the shapefile into the **pumacurrent_XX** layer.



4) The **Import Options** window opens. Select the appropriate values for each field from the drop-down list and select **OK**.



5) An **Import Summary** window opens after importing the file with information regarding the imported records. This window summarizes the number of successfully imported records as well as generates an error list. Choosing the **Show Details** button provides more information on the errant records. Choose **Yes** or **No** to continue.



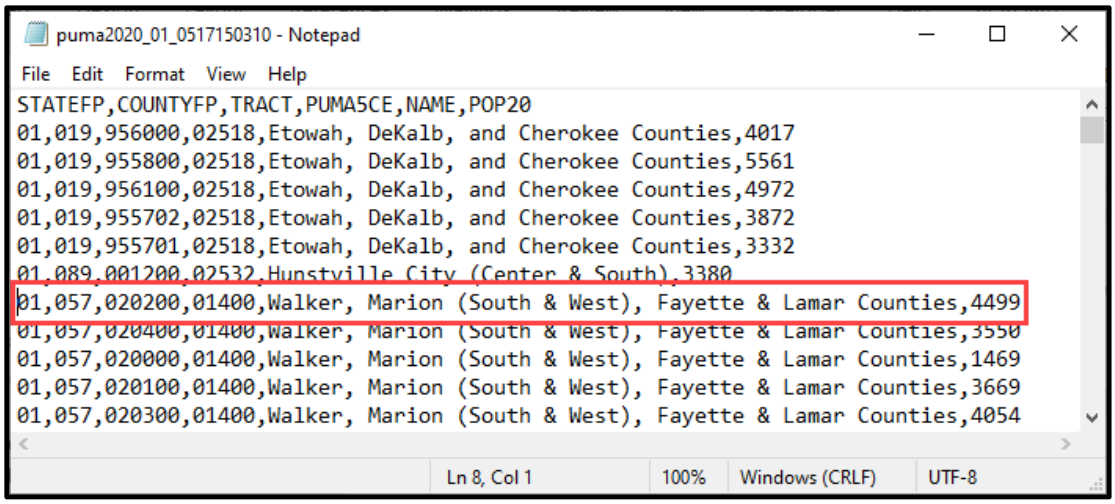
6) Continue to import shapefiles (and/or tabular equivalency files) or interactively create PUMAs as needed to complete work on the state's PUMA project.
7) Select the **Save Project** button from the Standard toolbar to save edits and to save the project.

Delineate PUMAs from a Tabular Equivalency File

SDCs may import comma-delimited, tabular equivalency files (TEFs) from other data users into their state's PUMA project by using the **Import Working File** button from the PUMA toolbar. Details on this topic are included in chapter 4.5 of the participant guide.

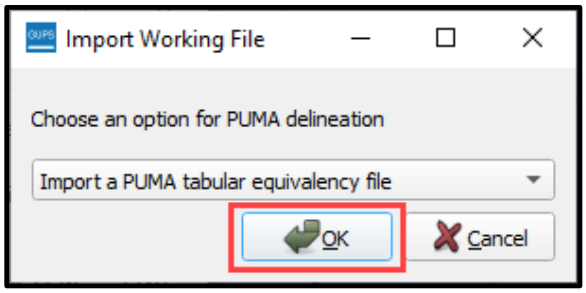


This button can be used to import a TEF that covers the entire state, or it can import and append multiple TEFs to create whole state coverage. The TEFs must contain fields for the State FIPS code, County FIPS code, Census Tract code, PUMA code, and PUMA name. Below is an example of a TEF opened in Notepad.

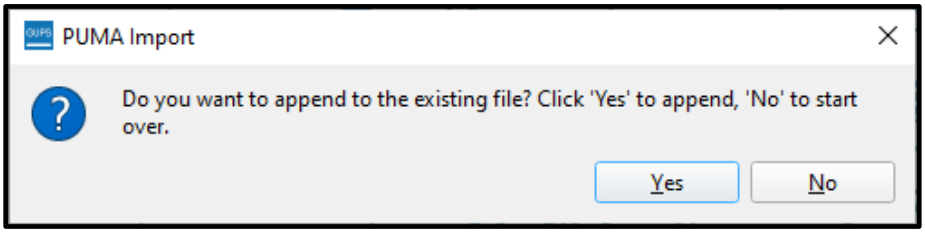


IMPORTANT: SDCs are encouraged to review the proposed PUMA TEFs they receive prior to importing them directly into their state's PUMA project. This review will minimize import failures and prevent unnecessary edits or corrections to the PUMA project.

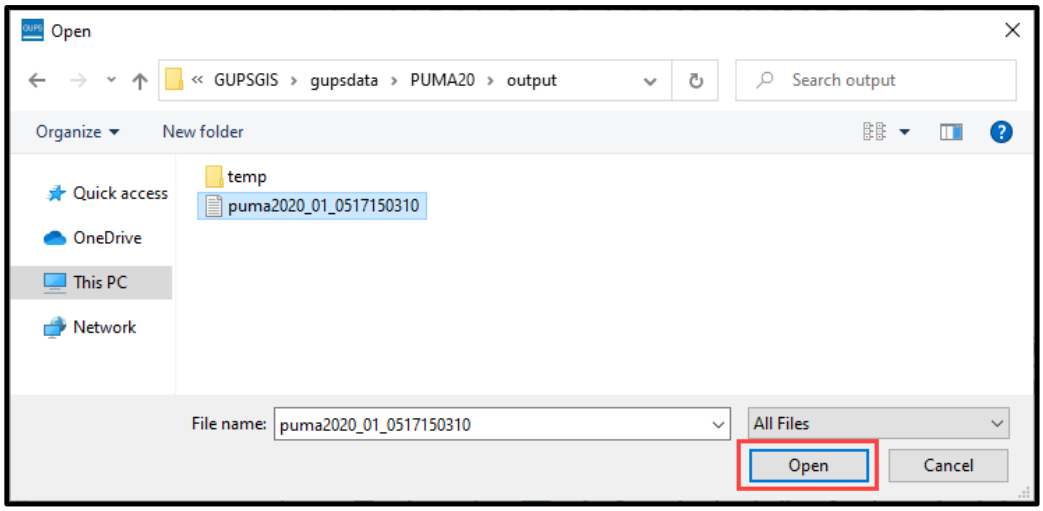
1) From the **Import Working File** window, select **Import a PUMA tabular equivalency file** and then **OK**.



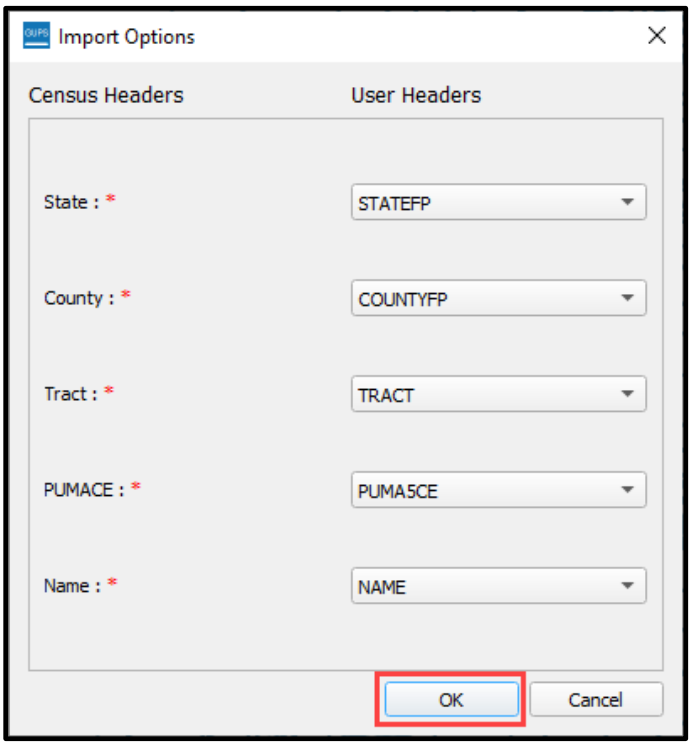
2) A **PUMA Import** confirmation window appears with the choice to append the TEF to the existing project or to start over. Choosing to start over (i.e., choosing **No**) will delete all previously saved delineation work in the project.



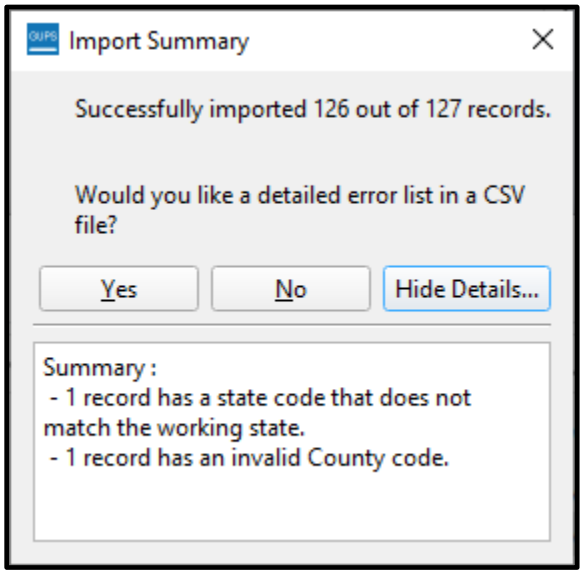
3) Navigate to the folder location of the exported TEF. If the PUMAs were delineated using GUPS, the folder location is "C:/GUPSGIS/gupsdata/PUMA20/output". Select the TEF to import and then **Open**.



4) The **Import Options** window opens. Select the appropriate values for each field from the drop-down list and select **OK**.



5) An **Import Summary** window opens after importing the file with information regarding the imported records. This window summarizes the number of successfully imported records as well as generates an error list. Choose **Yes** or **No** to continue. *Note: Choosing the **Show Details** button provides more information on the errant records and changes the button name to **Hide Details**.*



6) Select the **Save Project** button from the Standard toolbar to save edits and to save the project.
7) Continue to import TEFs (and/or shapefiles) or interactively create PUMAs as needed to complete work on the state's PUMA project.

Conduct Quality Checks and Criteria Review

Follow the guidance in this section to conduct quality checks and criteria review on the delineated PUMAs. Details on these topics are included in chapter 5 of the participant guide.

The Census Bureau recommends all participants conduct basic quality checks to review their project and its PUMAs for issues that integrated GUPS tools cannot identify. These checks are beneficial prior to executing the **PUMA Criteria Review** tool. Some basic quality checks include:

- Confirm the name accurately reflects the delineated area and follows the naming guidelines.
- Confirm the name is relative to the geography included within the PUMA.
- For PUMAs covering more than one county/city, confirm the order of name is correct.
- Confirm the name is spelled correctly.
- Confirm the code follows the coding guidelines.
  - Is the PUMA code maintained from previous vintage or new?
- Confirm the justifications provide adequate explanation for the requested exception.
  - PUMAs with justifications supplied during initial delineation will not appear as a criteria failure after executing the **PUMA Criteria Review** tool; therefore it is very important to conduct a thorough quality check of each PUMA justification prior to export.

With the basic quality checks complete, conduct criteria review by executing the **PUMA Criteria Review** tool. This tool is programmed with the 2020 PUMA final criteria and guidelines. It identifies three categories of criteria failures: Errors, Warnings, and Information only.

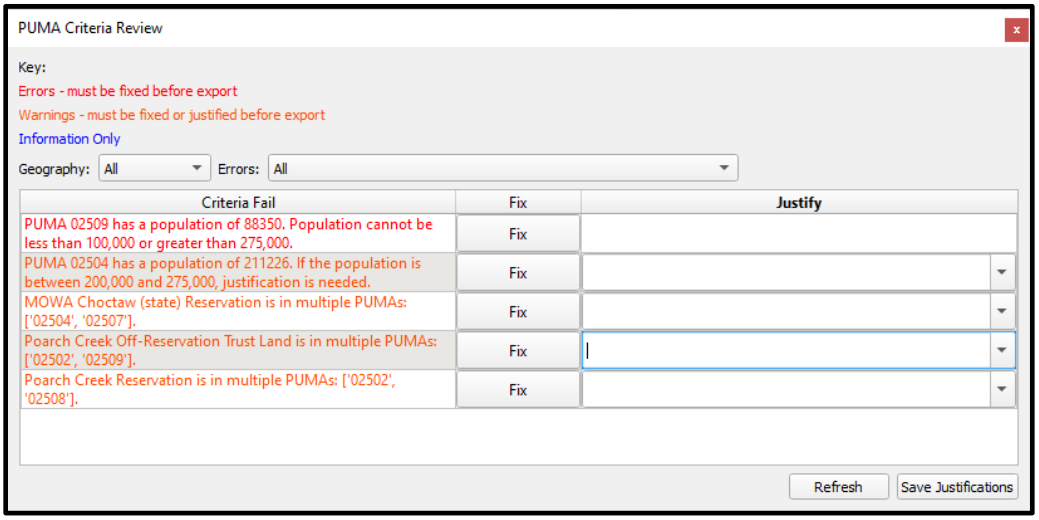
PUMA Criteria Review tool failures include the following:

- Unassigned geographies (i.e., no PUMA assigned). These are labeled as "faces" in the review tool.
- PUMAs that fall above/below population threshold requirement.
- PUMAs with overlapping geographies (most common when importing files, not possible with interactive delineation).
- PUMAs with noncontiguous boundaries.
- PUMAs that cross county boundaries with the census tracts having population of less than 10,000.

1) Select the **PUMA Criteria Review** button from the PUMA toolbar.



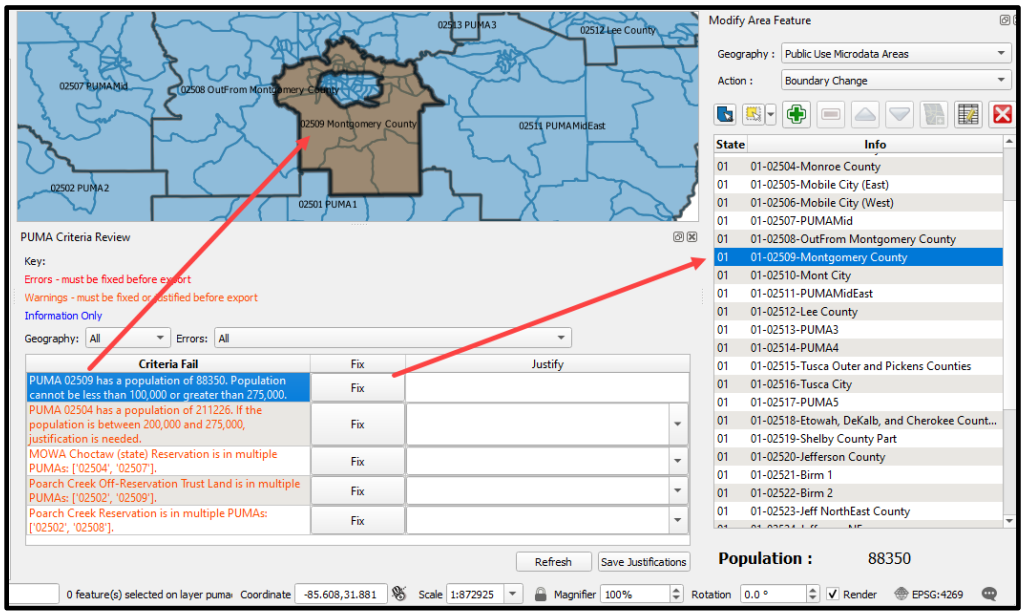
2) The tool runs and the **PUMA Criteria Review** window opens with the criteria failures listed. *Note: The Census Bureau staff recommend moving the window to the left or right of the Map View to dock it for later use*.



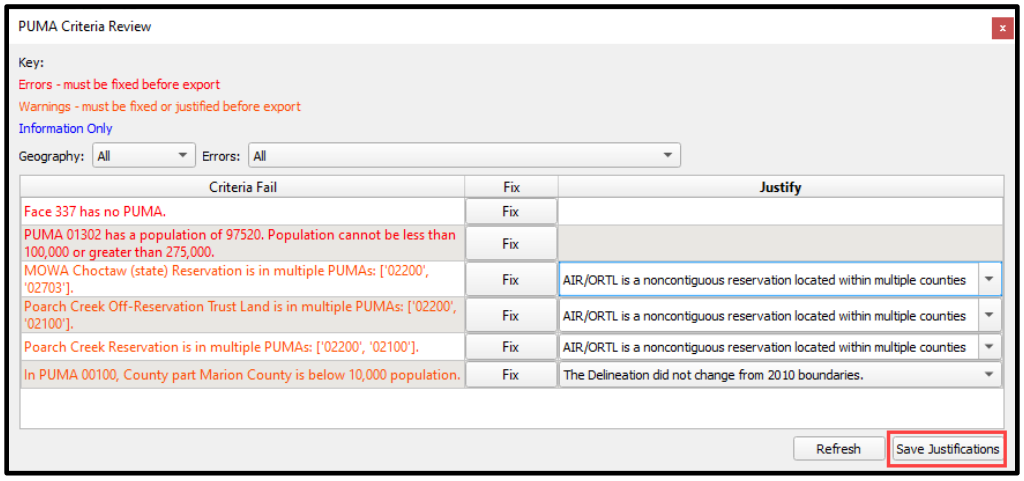
Note: **Errors** appear in red font and must be fixed prior to exporting the project for submission. Participants cannot provide a justification for an error. Review and correct these first. **Warnings** appear in orange font and must be fixed or justified before exporting the project. **Information only** items appear in blue font and should be reviewed to confirm they are as expected.

3) To locate a PUMA with a criteria failure, select the PUMA in the **PUMA Criteria Review** window. The Map View zooms to the selected PUMA. Conduct a review of the delineation to determine whether to fix or justify the error.

4) To modify the PUMA to resolve a failure, ensure the failure is selected in the **PUMA Criteria Review** window, then select the **Fix** button. The **Modify Area Feature** window opens. To make the modification, follow the guidance in the **Modify or Delete a PUMA** section from earlier in this guide or in chapter 4.2 of the participant guide. *Note: The failure will not disappear from the list once resolved. Participants must save the project and choose the **Refresh** button or re-run the **PUMA Criteria Review** tool.*

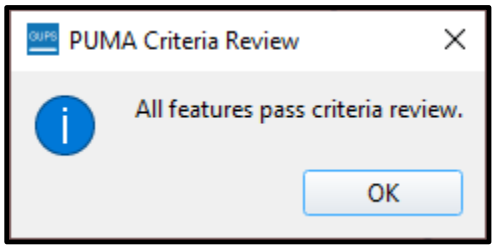


5) To retain the PUMA and provide a justification for a **Warning** or **Information Only** failure, enter a justification in the **Justify** field or use the drop-down menu to reveal and select a standardized justification options.



6) Select the **Save Justifications** button to save the work. The **PUMA Criteria Review** window closes and returns a confirmation window with information about the saved records.

7) Save the project and re-run the **PUMA Criteria Review** tool to confirm all failures are resolved. If the project is free from failures, a confirmation window opens for the participant to dismiss by choosing **OK**.



IMPORTANT: A project must be free of failures prior to submission to the Census Bureau; however, partial projects (like for interested data users that are working only part of a state) can include criteria failures when sharing with the SDC. The SDC will correct all failures prior to finalizing the state's project. More details on this topic are found in chapter 5.1.1 of the participant guide.

Export and Submit a PUMA Project

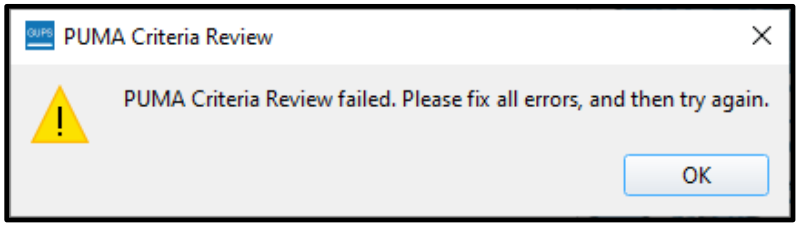
GUPS includes two project export options for 2020 PUMA: **Export for Census** and **Share with Another Participant**. This guide describes the **Export for Census** option used by SDCs to prepare their completed submission for the Census Bureau. Both options are described in detail in the participant guide, chapters 4.3.3 for sharing with others and chapter 6 for exporting for Census.

Note: The **Share with Another Participant** option exports the entire project and is beneficial for review of whole projects, not parts of the state's project. Supervisors or co-workers in the same office can use this option to review and approve whole project proposals prior to submission. Interested data users who may be working on part of a state, export and share their delineation work by using **Export Layer to Shapefile/TEF**.

1) Select the **Export to Zip** button on the PUMA toolbar.



2) Choose the **Export for Census** option and then **OK**. The export tool executes criteria checks and may take time to complete.
3) If criteria failures exist, a warning message with instructions to correct the errors, then export the project again. To correct the errors, re-run the **PUMA Criteria Review** tool and follow the guidance outlined in the previous section.



4) If no quality or criteria errors are found, the **GUPS User Contact Information** window appears to enter SDC contact person information. Once the form is complete, the export process continues for approximately 2-5 minutes before generating a .zip file of the completed project.
5) The exported .zip file is placed in the **/GUPSGIS/gupsdata/PUMA20/output** folder. This is the file to submit to the Census Bureau.

The Census Bureau provides one option for submission of the proposed PUMAs for 2020, the Secure Web Incoming Module (SWIM). Follow the instructions in chapter 7 of the participant guide for submitting the .zip file created from the **Export for Census** option.

Delete a PUMA Project and Restart Delineation

GUPS provides an option to delete a PUMA project and begin delineation work again. This action may be necessary to ensure a successful import of a shared PUMA project or to resolve GUPS issues that cannot be resolved otherwise.

Follow the steps in appendix E of the participant guide to remove the existing working project from your GUPSGIS folder. Please be aware that this action permanently removes all PUMA delineation work. If questions arise about whether this is the right option for your situation, please contact the Census Bureau to discuss the problems you may be encountering and seek input prior to executing the **GUPS Data Settings** tool.

Contact Information

Contact the Census Bureau staff involved with the 2020 PUMA by email at <geo.puma@census.gov>.