Geo RED

GeoRED Platform
User Manual

Version 1.0
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Acknowledgements

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Introduction

Welcome to GeoRED, a geospatial data platform designed to assist the communities of the Coastal Bend, Texas in practicing smart growth practices by providing regional hazard, modeling, and economic development data. Begin by exploring data layers available in each category or using the interactive map tools.

A region's economic prosperity depends on its ability to prevent, withstand, and quickly recover from major disruptions. This has become clear in the Coastal Bend, a region still recovering from Hurricane Harvey, many years after the disaster. To strengthen our resilience to shocks, we must be able to anticipate and evaluate risks, including how various physical, social, economic, environmental, and other factors may impact key community assets.

The Regional Resilience Partnership (RRP) built this geographic information system (GIS) platform, Geospatial Resilient Economic Development (GeoRED), to provide our region with a tailored, powerful set of tools for building resilience to disaster and economic risks. The U.S. Department of Commerce Economic Development Administration funded the initial phase of this project, with a focus on the needs of Aransas, Bee, Refugio, and San Patricio Counties. With additional support from the Texas Commission on Environmental Quality and the Texas OneGulf Center of Excellence, the project was expanded to include Nueces, Kleberg, and Kenedy Counties.

The GeoRED online platform is available to the public and serves as a mechanism for local officials and experts to analyze and share data with other interested stakeholders and can even be used to print maps of areas of interest. The tools include parcel level data, hazard layers, social vulnerability data, economic development data, and other data unique to each county's residents and needs.

Some ways in which the data might be used include:
- Engaging communities in comprehensive planning
- Understanding the intersections of social vulnerability, risk, and economic diversification
- Integrating different data sets to better understand risk and resilience
- Conducting pre-disaster recovery planning
- Assessing redundancy in broadband networks
- Promoting smart growth practices across different neighborhoods
- Understanding potential restoration sites

The following sections describe the GeoRED platform and functionality. This document intends to familiarize the user with the functions of the platform and its four tools and to be a reference for using the tools and manipulating the maps.

GeoRED Links

https://geored.org/

Hazard Impact and Planning Tool

Social Vulnerability Tool

Economic Development Tool

Environmental Resilience Tool

Landing Page

The GeoRED website features four landing pages for each GeoRED tool (Figure 1). These landing pages provide introductory information. Each GeoRED landing page will open with a pop-up window welcoming the user. At the top of each landing page is also a "Launch Tool" button, which provides access to the corresponding tool.

Learn about the Hazard Impact and Planning Tool

GeoRED can be used by decision-makers and the public to build resilience to weather events, flooding and other disruptions.

Learn about the Social Vulnerability Tool

Community resilience and social vulnerability are intensely local. GeoRED builds specialized local data into resilience assessments.

Learn about the Economic Development Tool

Coastal Bend partners depend on a strong economy – learn how GeoRED can help strengthen economic resilience.

Learn about the Environmental Resilience Tool

GeoRED can be used to identify areas of priority concern to build environmental resilience, such as those listed in the Texas Coastal Resiliency Master Plan
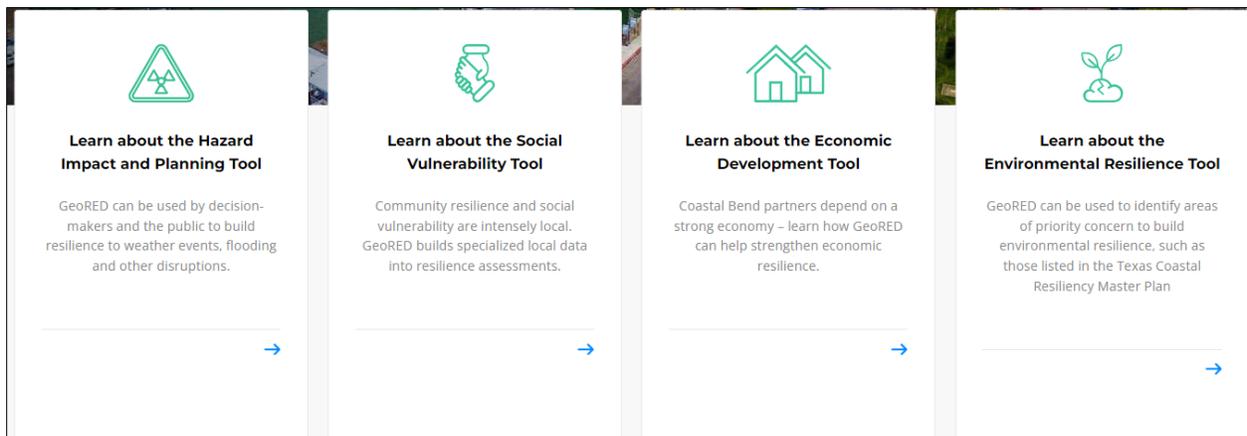
Figure 1. Landing pages for each GeoRED tool.

The landing pages feature an introduction to each tool, describing the potential uses, functionality, and layer information. The landing pages also offer a background to the themes of resilience and a narrative that supports the motivation and need for geospatial data. The landing pages prompt the user to explore various GeoRED functionalities.

Accessing GeoRED Tools

The GeoRED tools can be accessed through links found on GeoRED.org and linked through the landing pages described above. The tools feature the Map Layers (left panel), the map (center panel), and the Information/tool panel on the right. To close the left and right panels, click on the arrows alongside the panels (see Figure 2).

The GeoRED platform is designed such that the user can quickly move across tools. Once in a tool, the user will find that the top ribbon houses all 4 tools. The tool currently on display will be highlighted in red. Pan the cursor ➤ to the tool you would like to change to and click to access it.
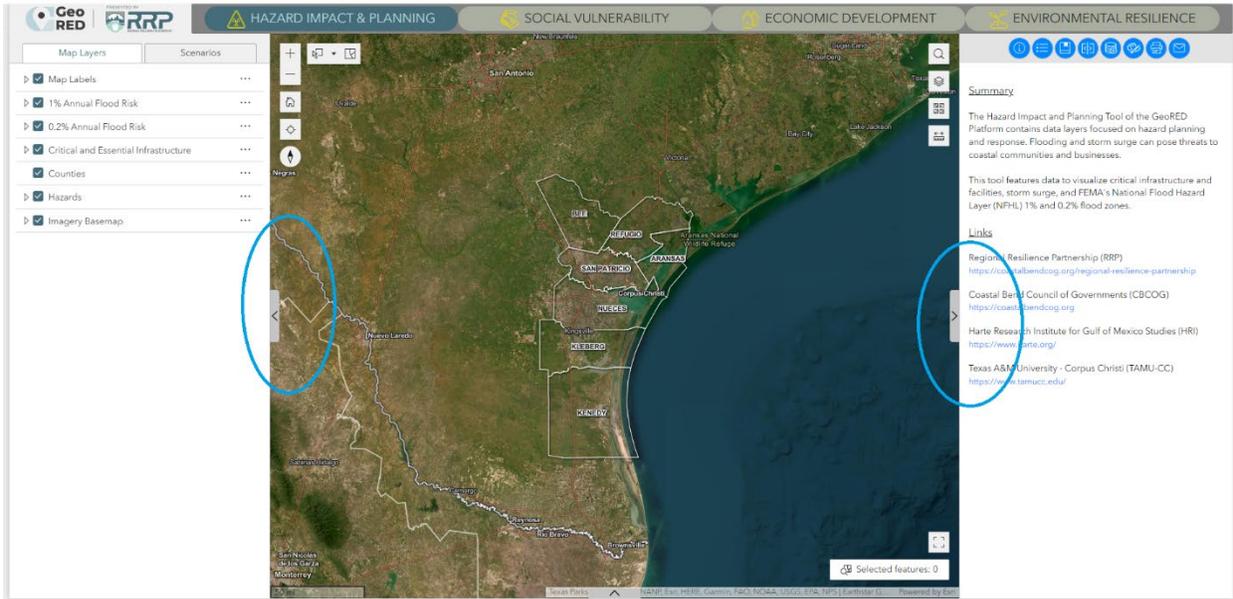

Figure 2. Example of the Hazard Impact & Planning Tool.

Hazard Impact and Planning Tool

The Hazard Impact and Planning Tool of the GeoRED platform contains data layers focused on hazard planning and response. Flooding and storm surge can pose threats to coastal communities and businesses. This tool features data to visualize critical infrastructure and facilities, storm surge, and FEMA's National Flood Hazard Layer (NFHL) 1% and 0.2% flood zones.

Data layers include:

- Critical infrastructure
- Essential facilities
- Storm surge
- Flood Hazard Zones

Types of infrastructure and facilities:

- Medical
- Nursing home
- Fire, Police, Emergency Management
- Shelters
- Schools
- Child care

- Places of worship
- Mobile homes
- Communication
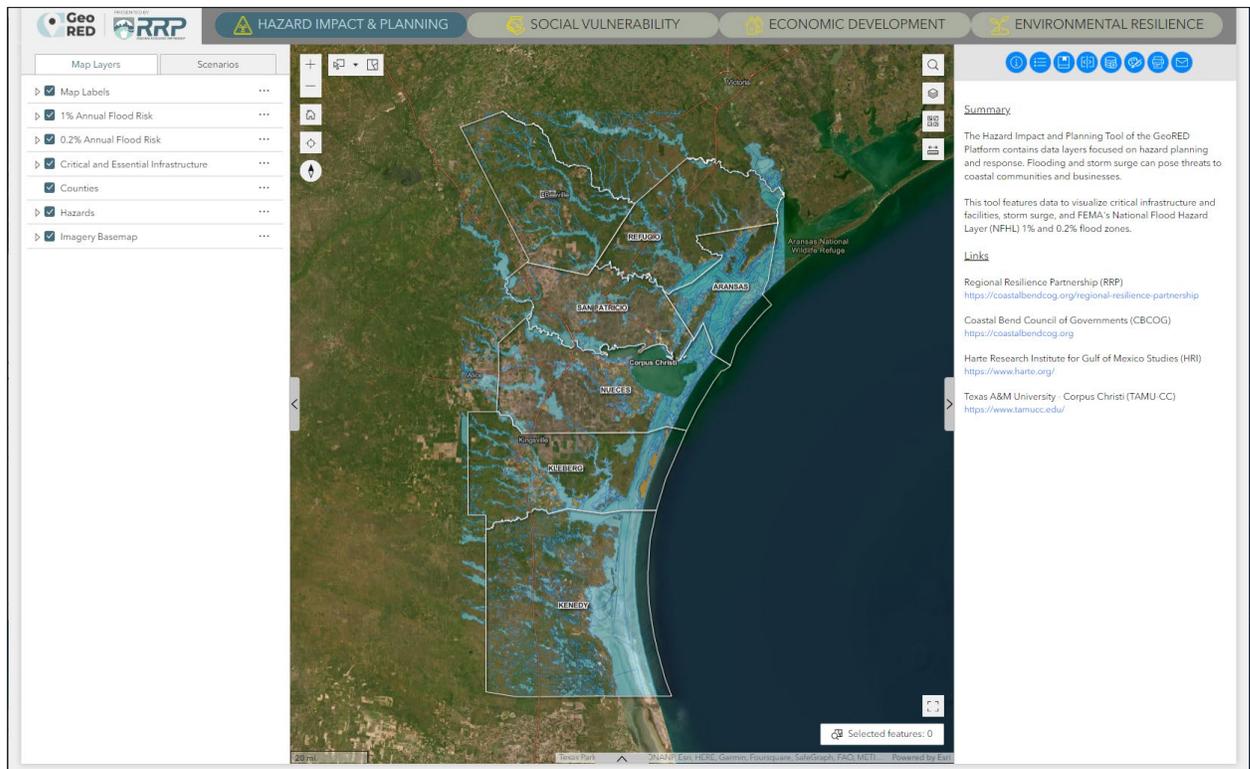- Transportation
- Energy
- Wastewater

Figure 3. The GeoRED Hazard Impact and Planning Tool

Social Vulnerability Tool

The Social Vulnerability Tool of the GeoRED platform features layers to describe the social, cultural, economic, and demographic factors that affect the resilience of human communities to hazards and disasters. The tool classifies data into population-focused measures, which help characterize people at the tract and county level, and community-focused measures, which describe community-level attributes and exposure. The tool features several indices and other standards used to determine vulnerability and resilience in coastal communities at the state or national level.

Data Categories:

- Population-focused measures
    - Demographics, veteran status, disability status, access to vehicle, income, employment, education, employment status
- Health characteristics
    - Life expectancy, obesity, heart disease, asthma, health insurance, SNAP benefits (Nutrition)
- Community-focused measures
    - Access to broadband, access to shelter, mobile home communities, colonias, HUD multifamily housing
- Indices
    - FEMA National Risk Index, Justice40 Tracts, CDC Social Vulnerability Index, Census Community Resilience Estimates
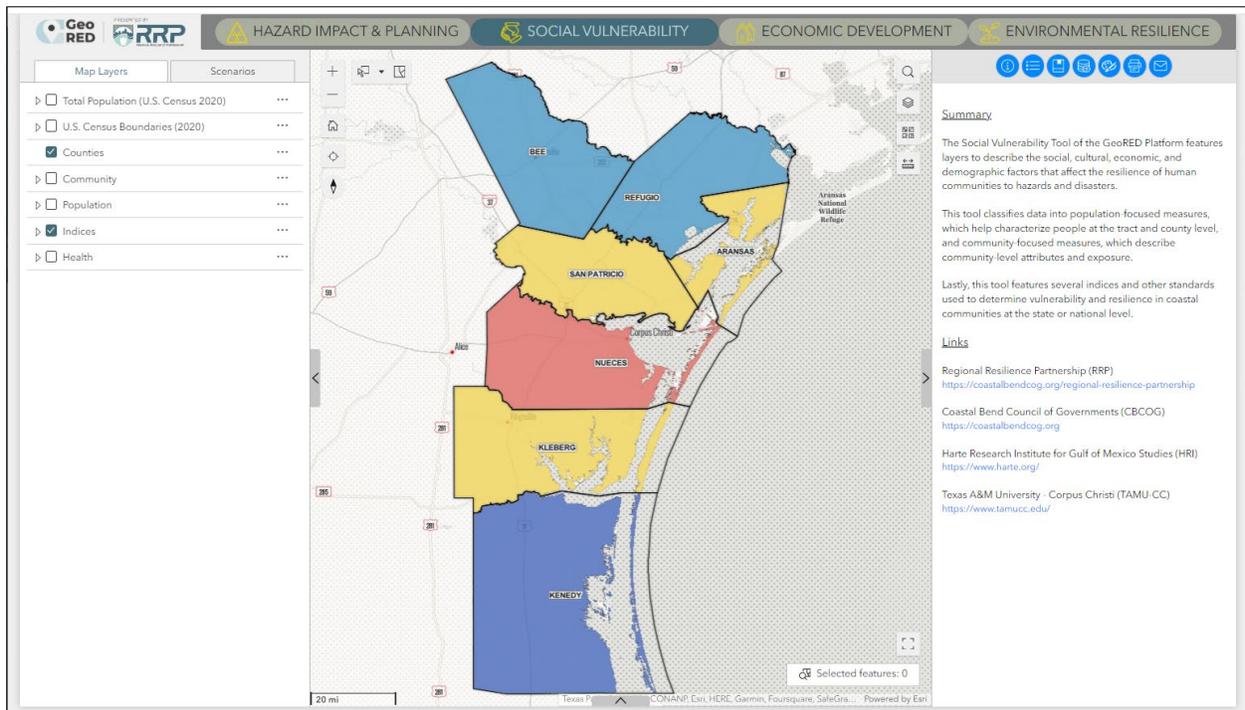

Figure 4. The GeoRED Social Vulnerability Tool

Economic Development Tool

The Economic Development Tool of the GeoRED platform features layers to maintain and plan for resilience under a growing economy. Maintaining economic activity depends on the health and functionality of various infrastructure, such as energy, transportation, and utilities. The tool features a variety of national, state, and local data identifying transportation, energy, communication, and business infrastructure, utilities, current and future land use, and their proximity to flood hazard zones.

Data layers include:

- Qualified sites
- Transportation facilities
- Emergency, communication, medical, and school facilities
- Heavy industrial facilities
- Energy infrastructure
- Communication infrastructure
- Wastewater infrastructure
- Pipelines
- Utilities
- Housing
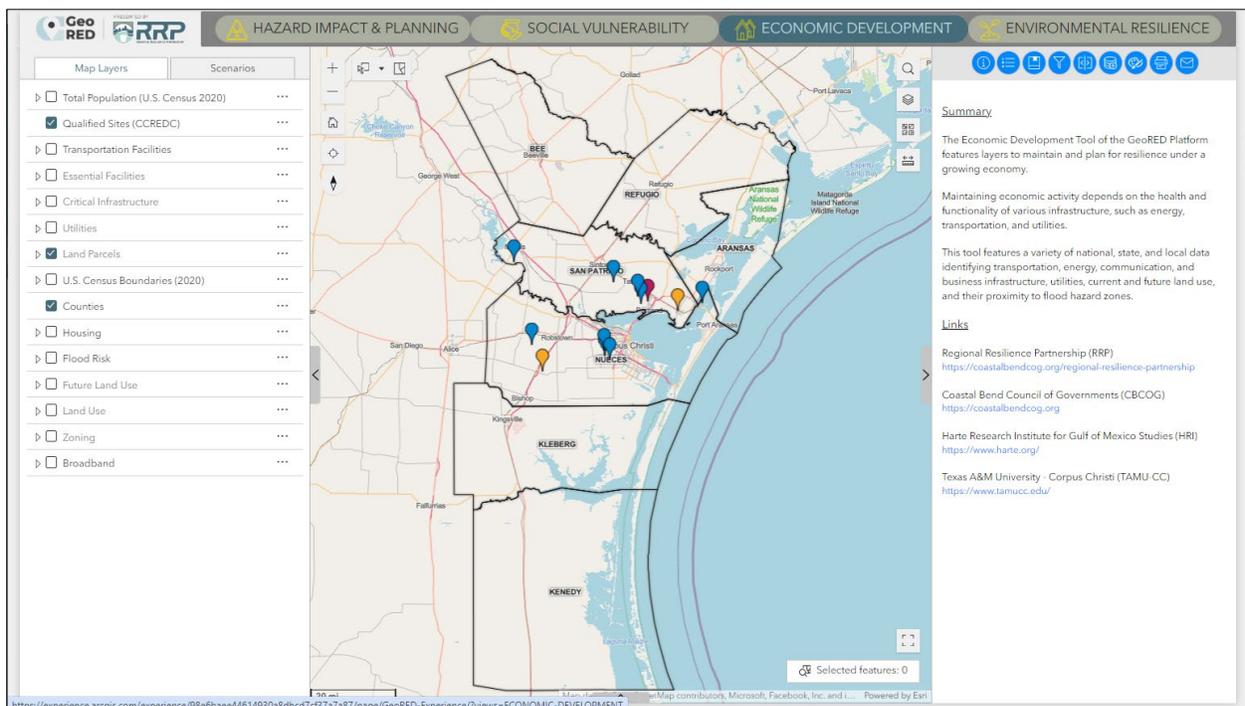- Current and future land use
- Zoning
- Flood hazard zones

Figure 5. The GeoRED Economic Development Tool

Environmental Resilience Tool

The Environmental Resilience Tool of the GeoRED platform features layers to visualize the health of the natural environment, which supports the coastal economy and community well-being. This tool features data to highlight protected lands, trails and bike routes, recreational facilities, water quality and hazard disposal sites, the location of wetlands, and urban heat.

Data layers include:

- Managed areas
- Environmental quality monitoring and permitting
- Recreational amenities
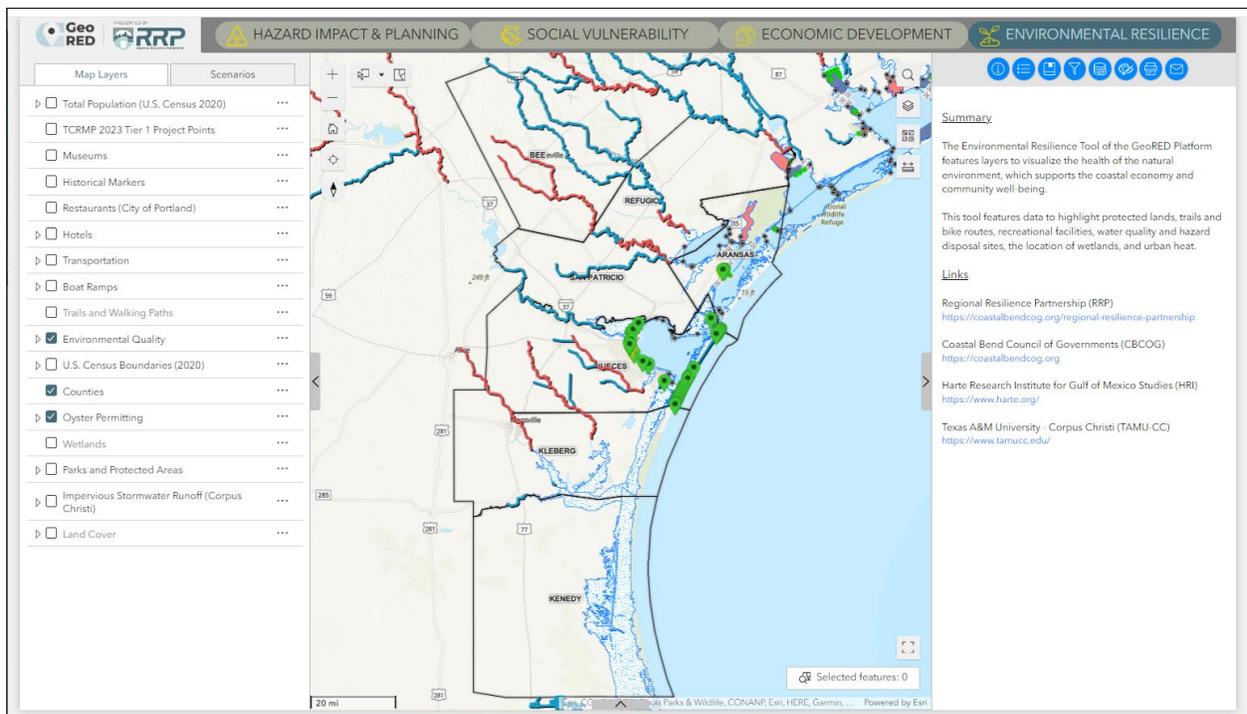- Restoration activity
- Landcover

Figure 6. The GeoRED Environmental Resilience Tool

Scenarios

GeoRED features are built-in scenarios to access theme-specific layers easily. Scenarios are stand-alone maps that feature select layers related to a theme. The scenarios can be accessed by clicking the scenarios tab to the right of the layer tab (left pane of the GeoRED tool (Figure 7)). The following scenarios are available through GeoRED tools:

- **Planning for Storm Impacts: Evacuation Routes**
  - This scenario features a regional overview of evacuation routes and FEMA flood hazard areas.
- **Planning for Sea Level Rise: Oil and Gas Facilities**
  - This scenario shows Corpus Christi Bay oil and gas facilities with FEMA flood risk zones and geohazards.
- **Planning for Nature-Based Solutions**
  - This scenario features a view around Capano Bay. It visualizes shoreline erosion, water quality, and Texas Coastal Resiliency Plan Priority restoration projects.
- **Enhancing Community Respiratory Health**
  - This scenario features a view of the City of Corpus Christi and Justice40 tracts, air quality, and prevalence of asthma.
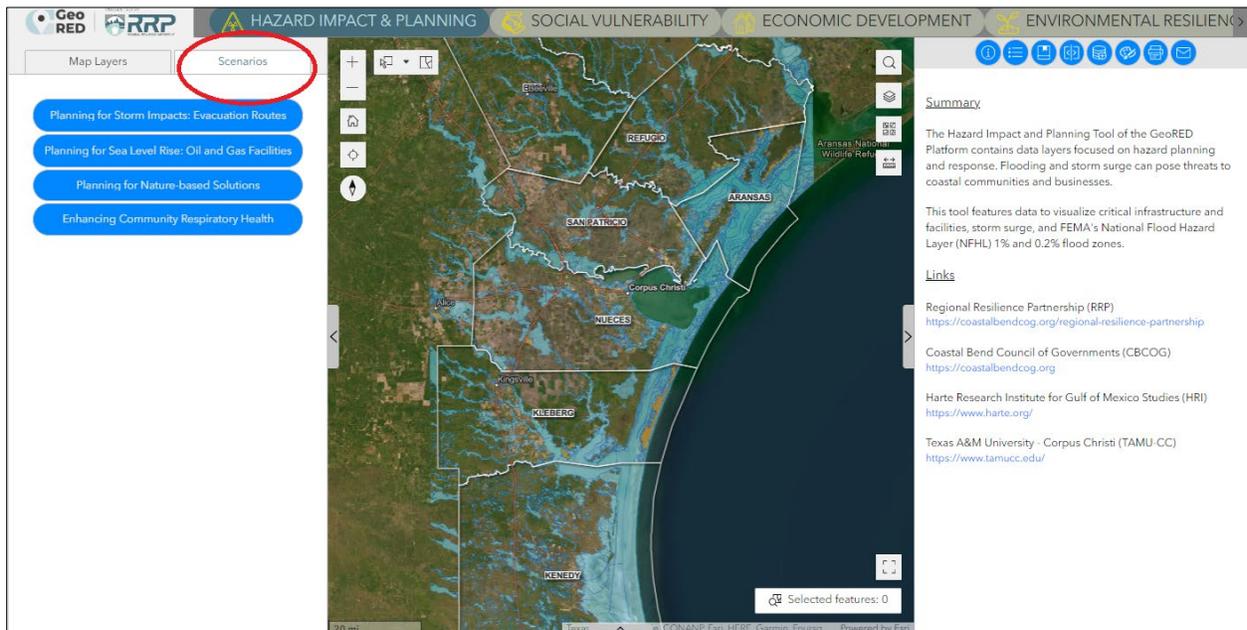

Figure 7. Accessing the GeoRED Scenarios

Navigation

The map will automatically display the seven Coastal Bend counties for which GeoRED currently has data: Aransas, Bee, Kenedy, Kleberg, Nueces, Refugio, and San Patricio. These counties are also accessible using the "Bookmarks" tab along the website banner's top right side. Clicking each county name in the dropdown menu will zoom to the selected county boundary.

You can navigate the map using your mouse in the following ways:

- Drag the map in any direction.
- Zoom in to or out from the map.
- Rotate the map.

Table 1. Navigating the GeoRED maps using the mouse

To:	Use the mouse in this way:	
Move or pan the map		Click the left mouse button and drag the map in the direction in which you want to move it.
Center the map at a specific position.		Double-click the left mouse button on the point you want at the center of the map.
Zoom in or out on the map at the location of the cursor		Roll the mouse wheel forward or away from you to zoom in on the map at the location of the mouse cursor. Each click will zoom in approximately 75% of the current map scale.
Rotate the map		Click the right mouse button and drag left or right depending on the direction in which you want to rotate the map.

For more details, visit: https://webhelp.esri.com/arcgisexplorer/2500/en/mouse_navigation.htm
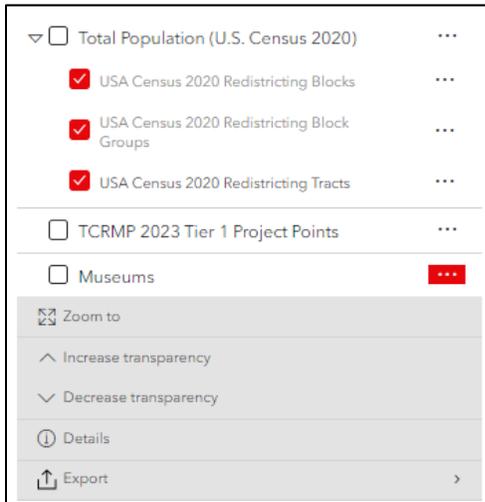
Working with Data Layers (Left Pane)

Figure 8. Data layer visualization options

All data layers corresponding to each of the four tools are available on the left pane. A white arrow ▷ to the left of the layer name signifies multiple layers associated with that layer group.

The three dots (…) to the right of each layer open the layer option. The options include "zoom to," which takes you to the spatial extent of that layer. Some layers may span all of the Coastal Bend, while some are specific to certain geographies. The user can also increase or decrease the layer transparency. This is particularly helpful when viewing multiple layers at a time. The details ⓘ icon will open a new tab that provides the layer background information. Lastly, the export tool allows you to share that particular layer. Export can be done in JSON, CSV, or GeoJSON format.
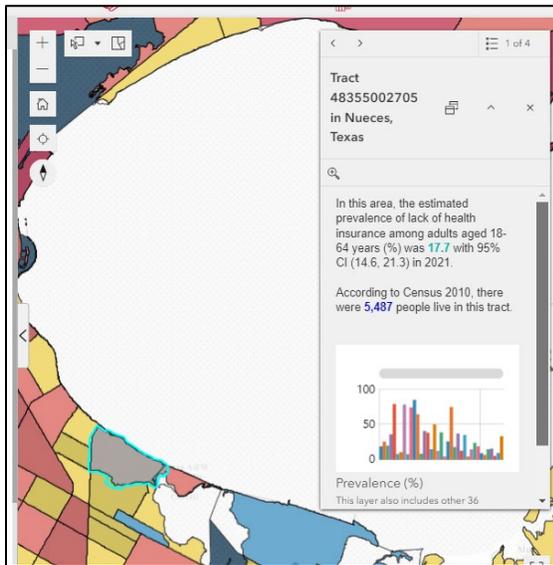

Figure 9. Viewing feature field data

Feature Information

To see additional layer information, select a feature by left-clicking on the map. The selected feature will appear highlighted in light blue, and an information window will pop up with more information on the selected feature. On the top right of the pop-up, you can select from multiple active layers that may have a feature in the selected site. Toggling through these will change the source of the information.
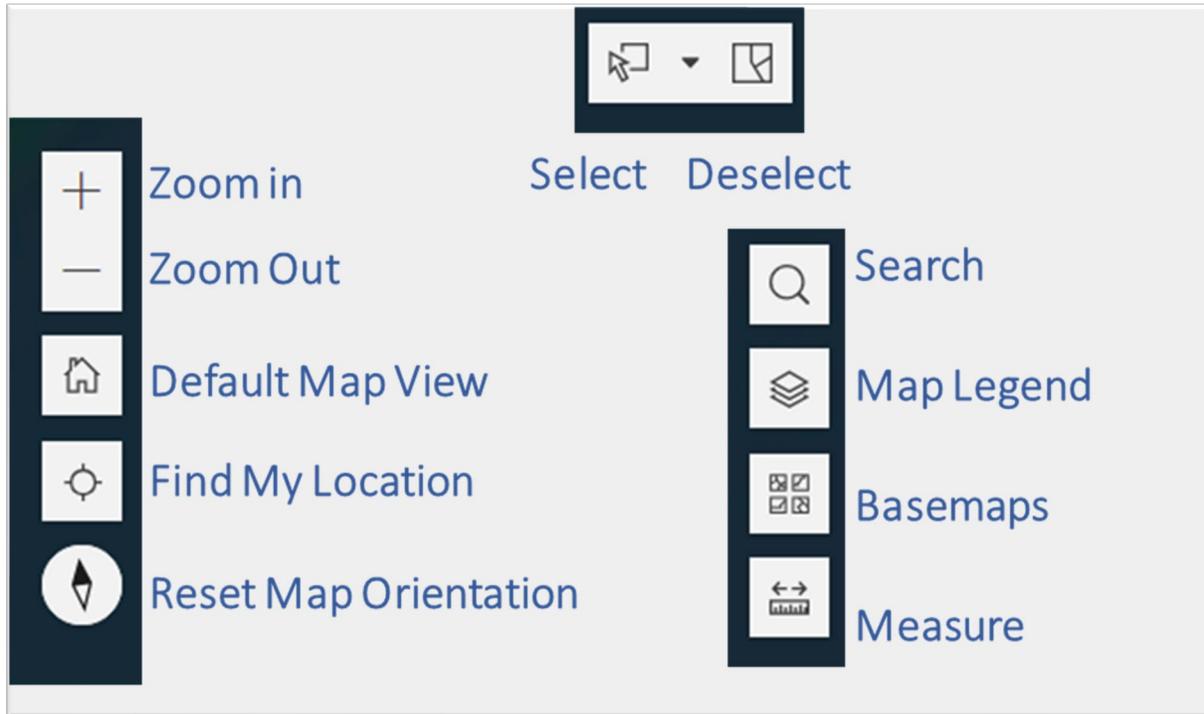
Map Widgets (Middle Pane)

Figure 10. Map widgets available in the map panel (middle panel) of the four GeoRED tools.

Zoom in and Zoom Out

In addition to the navigation option provided in the last section. The "+/-"buttons will let users zoom in and out to their desired extent and allow them to visualize various layers.

Default Map View

The "Home" button will take the user back to the default extent.

Find My Location

This feature will utilize your device location to zoom the map to your current location. A blue circle will appear on the map to show your current location.

Reset Map Orientation

This feature will reset the map orientation to north being the top of the page.

Select and Deselect

The select feature can be used to select map features from layers visible in the map (Figure 9). The down arrow of the selection widget reveals multiple options for selecting features:

- **Rectangle**- is used to select multiple features within the same area. A rectangle is drawn on the map by clicking and dragging the corners to the desired extent. All features from the active layer(s) within the rectangle or that intersect the rectangle will be selected.
- **Lasso**- is used to select multiple features within an irregular area. A closed shape is drawn on the map by dragging the cursor to create the desired shape. All features from the active layer(s) within the shape or that intersect the shape will be selected.
- **Circle**- is used to select multiple features in a radius. A circle is drawn on the map by clicking and dragging the cursor to the desired extent. All features from the active layer(s) within the circle or that intersect the circle will be selected.
- **Line**- selects multiple features along one or several line segments. Click at an initial location, and a line is drawn on the map by clicking the endpoints of the line. Double-click on the last endpoint to finish drawing the line. All features from the active layer(s) that intersect the line will be selected.
- **Point**- is used to select multiple features at one point location. Use the cursor for the +/- option to zoom to the desired scale. Click on the point of interest. All features from the active layer(s) that intersect the point will be selected.
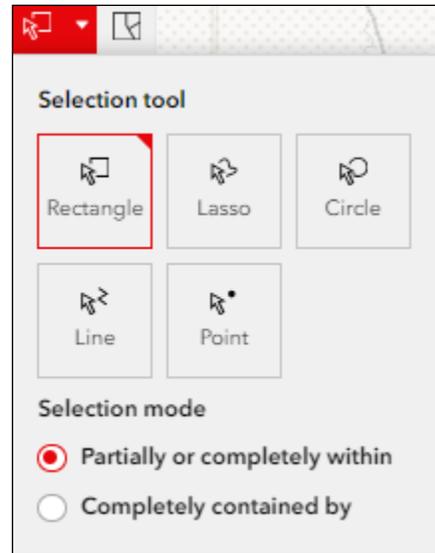- **Deselect**- is used to clear any selection previously made

Figure 11. Select and Deselect features

Search

The search feature can be used to search for addresses or places. Start typing the address of the name of a location, and the search feature will provide options that match the text. Click on the option that matches your search, or continue typing your place of interest. Press enter when done.
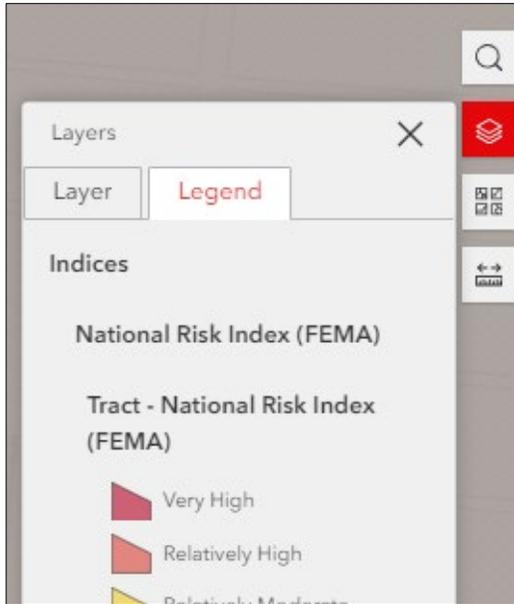
Map Legend

The layer icon shows several squares stacked over each other (highlighted in red in the image to the right). This feature opens a menu that features a "Legend" tab and a "Layer" tab (Figure 10). The legend provides a key or symbology of the layer features in the map.
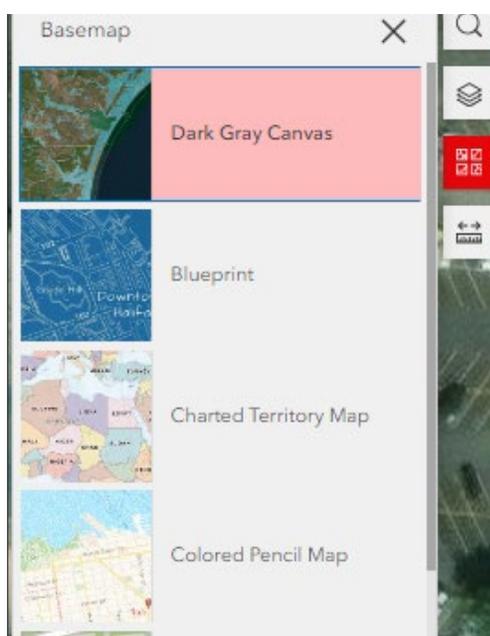
Figure 12. Legend feature

Basemaps

The basemap feature (Figure 11) is represented by an icon featuring four squares (highlighted in red in the image to the left). GeoRED allows changing the background basemap featured under the layers displayed. There are 31 different basemaps available, from simple *dark Gray Canvas* to imagery-based backgrounds and maps with geographic names such as *OpenStreetMap* and *USGS National Map.* To learn more about the ESRI basemap service, visit https://www.esri.com/en-us/arcgis/products/arcgis-platform/services/basemaps.
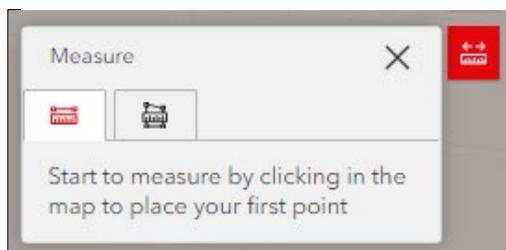
Figure 13. Basemap feature

Measure

The measure feature (Figure 12) is represented by a ruler icon. Users can estimate the length of a line on the map by clicking the left tab and drawing a line on the map. Double click to end feature. The area can be calculated by clicking the left tab and then drawing the shape onto the map.

Figure 14. Measure feature

Key Functionality (Right Pane)

The following functionality can be accessed through the right panel of the GeoRED tools.
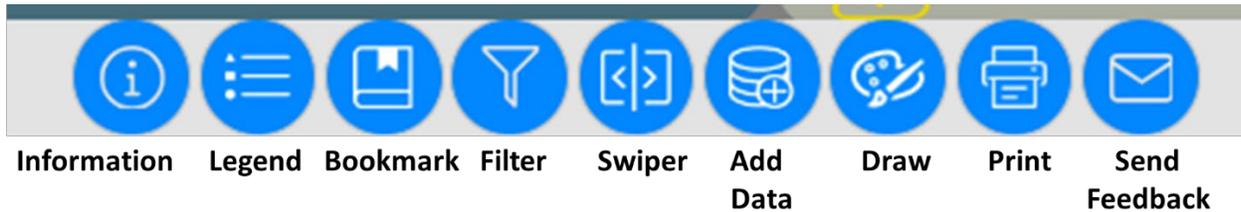
Information

The information widget provides a summary of the selected widget.

Using the Legend

The Legend widget describes the symbols used to represent layers in a map. Only active layers will appear in the legend. This widget is available in the Economic Development and Environmental Resilience https://doc.arcgis.com/en/web-appbuilder/latest/create-apps/widget-bookmark.htmTools.
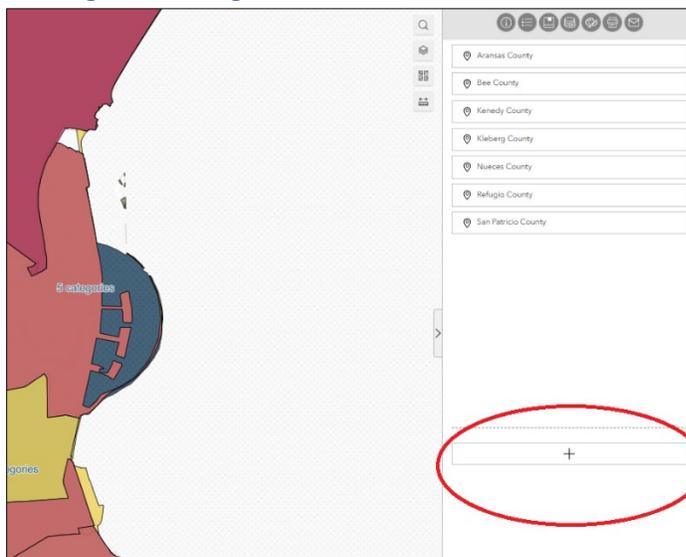
Making and Using Bookmarks

Figure 15. Using Bookmarks

The Bookmark widget (Figure 13) in GeoRED stores a collection of map view extents (spatial bookmarks). Currently, GeoRED has seven preset bookmarks corresponding to the current GeoRED counties of Aransas, Bee, Kenedy, Kleberg, Nueces, Refugio, and San Patricio.

To create new bookmarks, zoom to the geographic area where you want to set your bookmark. Next, click the + sign at the bottom of the bookmark pane. Label your bookmark accordingly. The newly added bookmarks are saved in your web browser's cache. They will be removed after you clear your browser cache.

Note that moving from one GeoRED tool to another will retain your current view. But the bookmark won't be saved.

Filter Widget

The Filter widget allows you to limit the visibility of features in a layer. Only the features that meet the expression criteria will be visible on the map.

Swiper Widget

The swiper widget allows users to see underlying layers, helps compare two layers, and is particularly useful for layers showing before and after images or maps with various scenarios or imagery taken at different times. The swiper widget is currently available in the Hazard Impact & Planning Tool and the Economic Development Tool.
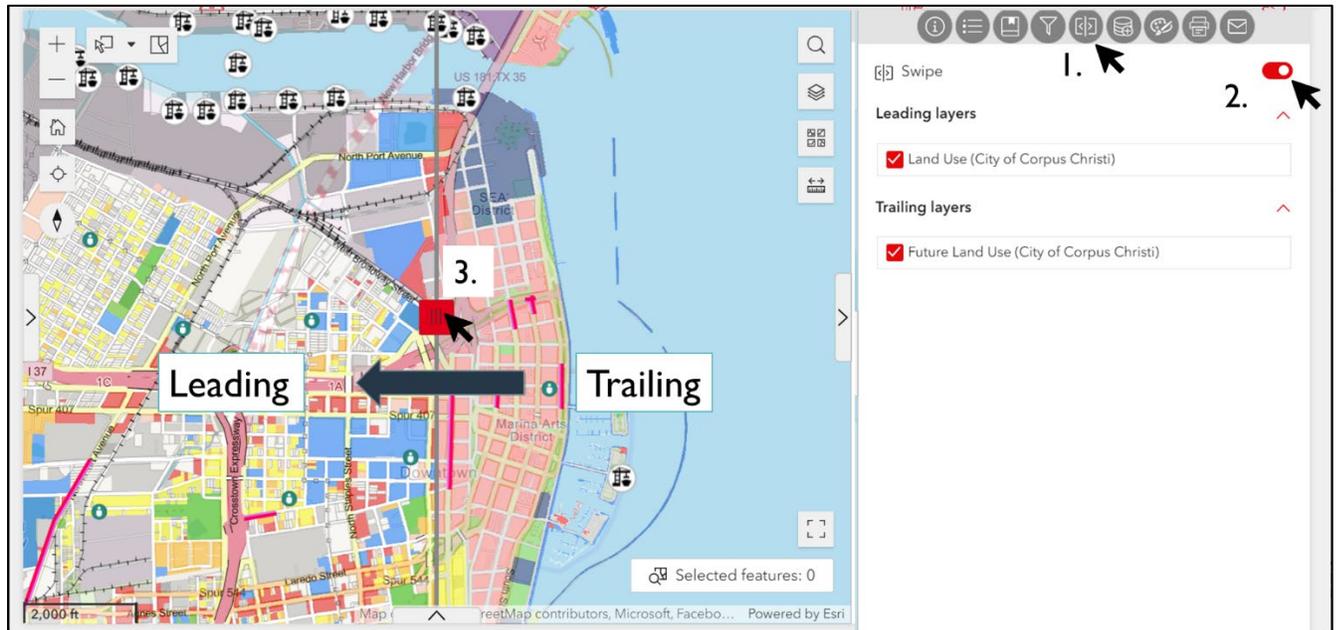

Figure 16. How to use the Swiper tool

To use the swiper widget (Figure 16), be sure that the appropriate layers are on Map Layers (left pane).

1. Click on the swiper logo on the right pane.
2. Next, turn on the swiper by clicking the swiper on the button on the top-right.
3. Click the red slider marker on the map and drape the trailing layer over the leading layer.
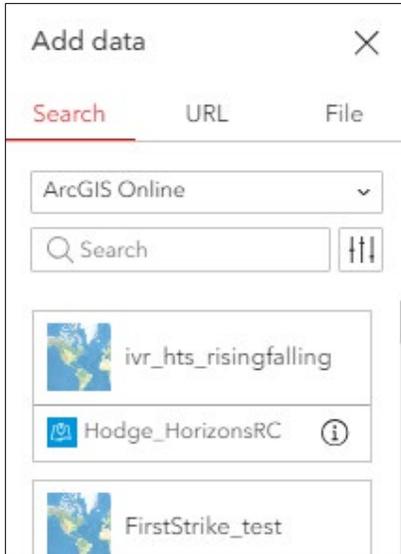
Figure 17. Adding Data

Adding GIS Data

GeoRED allows input of other geospatial data. Using this feature (Figure 15), you can temporarily add layers to and remove layers from the map. However, you can't save the layers to the map, nor will these be accessible to other users of GeoRED. Click the "add data" widget to import data to your map.

You can add data from:

- ArcGIS online, if you have an ArcGIS online account.
- URL of currently available web services. These include ArcGIS Server, WMS, WMTS, KML layer, and GeoJSON layer.
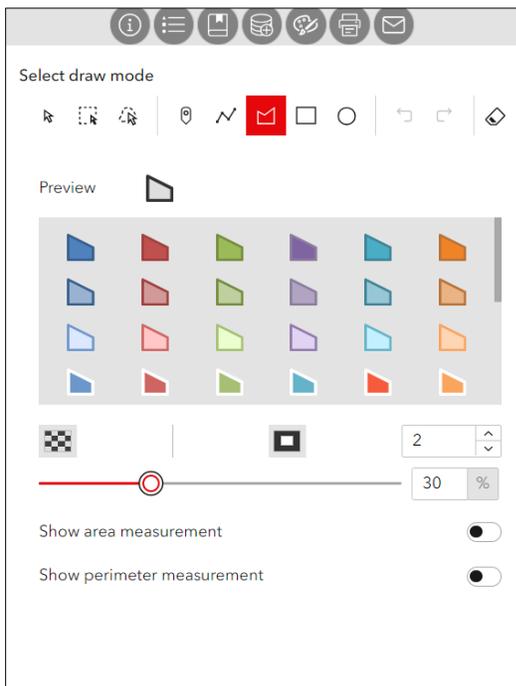- Upload local files. Supported formats: Shapefile, CSV, KML, GeoJSON

Figure 18. Map annotations

Draw and Annotate the Map

Drawing and annotating (Figure 16) can help you add text and shapes to your map. Annotation can describe features or add general information to the map.

To use the function, click the Draw widget to access the drawing option. First, select a draw mode: point, polyline, polygon, rectangle, or circle. Edit the color, look, line width, and transparency before you draw your feature. Also, specify if you want your shape to show spatial measurements such as coordinates (points), length (lines), or area and perimeter (for polygons).

You use the select widgets (with the dashed lines) to select and edit drawings. The drawing widget also features an undo and redo button and a "clear all" option.

Printing a Map using GeoRED

Use the Print widget in Map Viewer (Figure 17) to export a printer-friendly page of your map in various formats, including PDF, PNG, JPEG, GIF, EPS, and SVG. You can print the map layout or only the map.

The map layout includes the document title, a scale bar, and the date. To create a printer-friendly map layout, complete the following steps:

1. In Map Viewer, open the map you want to print.
2. On the Contents (dark) toolbar, click Print.
3. Click the Layout tab.
4. Enter a title for the map document.
5. From the Page Setup dropdown menu, choose a layout.
6. From the File format dropdown menu, choose the file type to export.
   a. File types include PDF, PNG8, PNG32, JPG, AIX, GIF, EPS, SVG, and SVGZ.
7. Optionally, click Advanced options and do any of the following:
   a. Set the map scale.
   b. Include author and copyright information.
   c. Change the dpi of the map.
   d. Include a map legend and North Arrow.

Figure 19. Printing Maps in GeoRED

Once you set your print specification, you can click the red "Print" bar, and your print results will be saved on the "Print Results" tab at the top of the menu. Click on the printed file you have saved, and a document will open in a new window.

Contacting the GeoRED Team and Help

The final widget is the "Send Feedback" tab on the far right side of the top banner. This tab offers a clickable link, allowing the user to contact the GeoRED team to provide helpful feedback regarding issues with the web viewer, outdated or incorrect data, broken links, etc.