The Location Advantage MOOC

Exercise

Understanding Risk Using Location-Based Information

Section 6 Exercise 1

10/2017

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Understanding Risk Using Location-Based Information

Instructions

Use this guide and ArcGIS Online to reproduce the results of the exercise on your own.

Note: ArcGIS Online is a dynamic mapping platform. The version of ArcGIS Online that you will be using for this course may be slightly different from the screenshots you see in the course materials.

Time to complete

Approximately 45-55 minutes.

Technical note

To take advantage of the web-based technologies available in ArcGIS Online, you need to use a fairly new version of a standard web browser, such as Google Chrome, Firefox, Safari, or Internet Explorer. Older web browsers may not display your maps correctly.

Note: For information on supported browsers for ArcGIS Online, visit http://doc.arcgis.com/en/arcgis-online/reference/browsers.htm.

Introduction

Managing risk is an important part of managing any business, large or small. Whether natural or man-made, risks can potentially impact your business, no matter what the probabilities are that they will be realized. Decreased profits, revenues, customer confidence, market share, or increased costs are all possible outcomes if risks (and subsequently, risk management) are underestimated or not handled properly. The four alternatives for handling risk are: avoiding it, mitigating or lessening its impacts, transferring it (by buying insurance, for example), or accepting it if the damages would be less than the cost of the other alternatives. This exercise focuses on risk mitigation and risk transference by putting you in the position of performing analysis at an insurance company.

Exercise scenario

In this scenario, you are a risk assessment manager at a branch of a major national insurance company. The company facilitates risk transference: it is compensated to take on risk through insurance policies for auto, life, fire, property, and other insurance types. Your branch is located in the southern state of Florida, which makes up your service area. Florida is known for receiving more hurricane activity than any other state, and it has a large amount of insurance claims from hurricane damage to properties. An insurance claim is a request for

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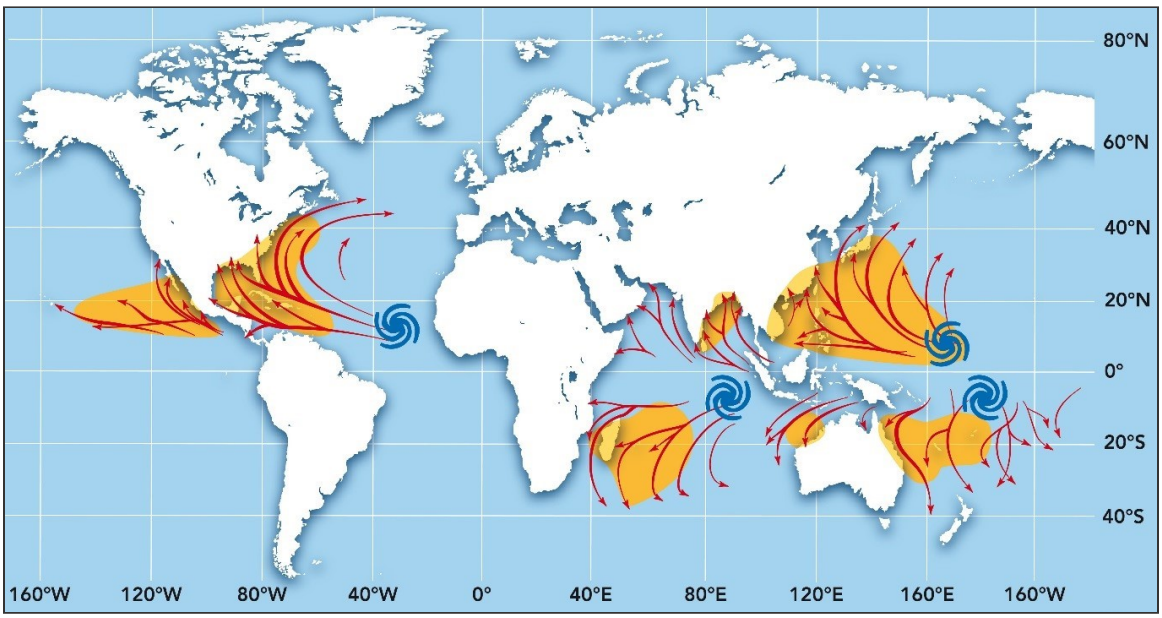
reimbursement from a property owner after a property suffers damage, such as from hurricane winds or flooding.

Hurricanes are very large storms that spin in a circle as they move around the eye, or center, of the circle. They are comparable to typhoons, cyclones, or tropical storms, differing only according to which region of the world they occur in and their size. For example, in the West Pacific Ocean, they are commonly referred to as typhoons. Tropical storms must have winds over 74 miles per hour (119 kilometers per hour) to reach the classification of hurricane.



Hurricanes gather heat, energy, and size as they move over water, and they slowly lose strength as they travel over land. Hurricanes which threaten the United States generally travel across the Atlantic from east to west, frequently reaching the Caribbean Sea or the Gulf of Mexico. When they reach land, they often strike places such as Cuba, Haiti, the Bahamas, and Florida.

When a hurricane makes landfall, it often damages buildings, trees, and anything in its path for many kilometers to either side. The damage is relative to the size of the storm, with a rating system used to describe the size of and potential damage from storms. The system lists categories from 1 to 5, with 5 being the worst and causing the most damage. A Category 5 storm rating, given to the largest hurricanes, has winds in excess of 155 mph (249 kph). In the Florida region, hurricanes generally move from the south or southeast to the north or northwest. When they move from water to over land, they could inflict damage anywhere along the length of Florida before losing energy.

As an insurer in the Florida region, you are familiar with historical storms and hurricanes, as well as the areas that frequently experience damage from them. Hurricanes cause so much

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damage because spatially, they are not simply lines, as symbolized on the map. Instead, they are huge, wide storms that do not necessarily move in a straight line.

Your decision makers want to better understand the liability risk the company may experience from claims due to damage from wind and flooding from hurricanes in Florida. In this exercise, you will analyze policies and the policyholders' locations, and you will examine the total insured value (TIV) of policies in the region.

In this exercise, you will use the ArcGIS Online mapping platform to perform these tasks:

- Analyze a web map
- Create a density map to assess clusters or concentrations
- Create a buffer
- Identify areas where features overlap or intersect
- Aggregate locations to summarize

Note: The analysis tools in ArcGIS Online require a subscription. While you are enrolled in this course, you have access to an ArcGIS Online subscription at no cost.

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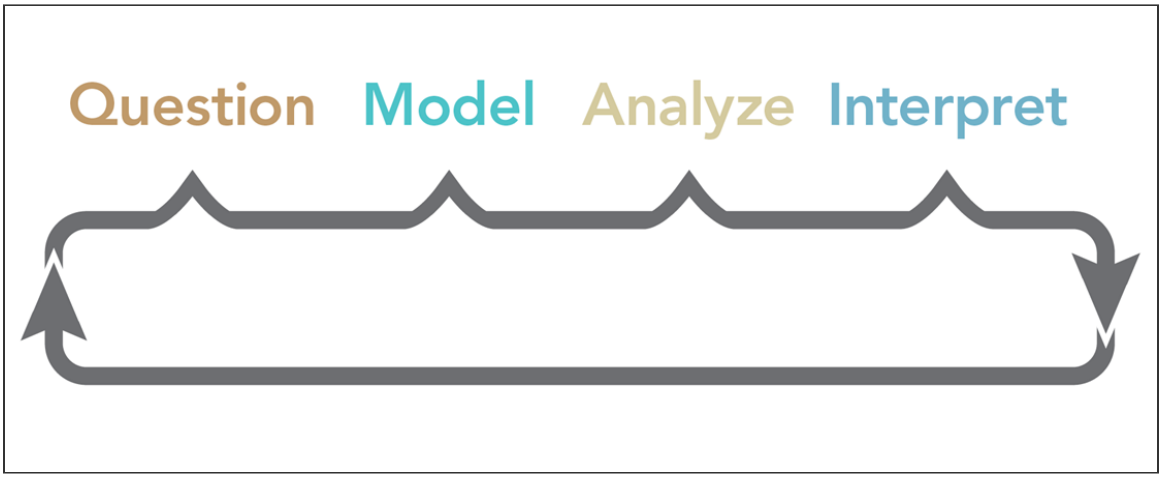
If you would like to continue using ArcGIS Online after the course ends, you will need to purchase a subscription. For more information, visit www.arcgis.com.

Approach

You will apply the four-step decision-making workflow as you analyze and make discoveries about your policyholders and risks in Florida. You will also explore how locations of properties, natural features, and risk zones are related, and how you can use this information to identify liability risk and exposure for your company.



Note: The Resources section in Udemy for this lecture includes a downloadable version of the four-step decision-making workflow explanation.

Formulate the Question

Location impacts many facets of the insurance business. These questions are some that may arise:

- Where are customers located?
- How does the company best reach them?
- What are the risks based on location?
- Will those risks impact costs?
- At what level should premiums be set?
- How can the company maximize profit?
- How much loss can be expected should a catastrophic event occur?

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Geography influences all of these questions in some way. Adding location to your analyses is useful for running your business and can help you gain an advantage over your competitors. The following business question will drive the analysis for this exercise:

How can you include location to better analyze risks from hurricanes?

Model the Solution

The next step is to model the analysis that can help answer the business question. Design a model by identifying geospatial techniques as well as the business and location data that you need.

What is the locational component?

Your company is interested in both minimizing losses from insurance claims payouts and developing a response plan for hurricanes in Florida. These are the locational components in this scenario:

- Locations of policyholders by address and by TIV (total insured value in U.S. dollars).
- Identification of areas at high risk for claims from hurricanes, such as coastlines or low-lying areas in Florida.

What data do I need for my map?

To analyze the policyholders' properties, risks, and potential property claims from hurricanes in your region, you will need several types of data:

- Information about policyholders, including their locations, property or asset values, and insured amounts, to show densities or areas with higher concentrations of policyholders, along with TIV.
- Historical hurricane tracks to assess areas where hurricanes may be more likely to strike, areas more prone to wind damage, areas where claims may be higher, and areas where insurance premiums that your company charges may need to be higher.
- Coastal areas and distances to coast or other areas of lower elevation to understand implications of storm surge (higher ocean waves or flooding levels caused by hurricanes) to learn more about where claims may be higher after an event.

Where can I get the data I need?

Datasets like those needed here are available in your insurance organization from sources like spreadsheets, file systems, document management systems, or possibly CRM or ERP systems, as mentioned in the lecture. Your company uses ArcGIS Online for analysis and keeps

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updated map layers for policyholder locations, TIV by location, TIV summarized by area, historical hurricane tracks, high storm surge (low elevation and coastal) areas, and more. ArcGIS Online already features the basemaps needed for locating these items on a map and studying spatial relationships.

Which techniques will I use?

As you have learned, geospatial analysis is valuable in business decision making. In this exercise, you will visualize, buffer, summarize, aggregate, and intersect spatial data to help answer the business question.

You will use buffers to analyze historical hurricane tracks and storm surge predictions compared to locations of policyholders' properties. This analysis will determine the likelihood that a hurricane will affect different areas in Florida. You will also analyze the locations and clusters of properties that your company insures in relation to hurricane risk. This analysis will help identify the premium that these policyholders should be assessed for a hurricane clause in their homeowners insurance. Identifying the policyholders with the highest risk of loss is also valuable for contacting them before a hurricane, mobilizing assessors to visit the most-affected areas, and staging supplies ahead of storms to enable people to rebuild as quickly as possible.

Perform the Analysis

After collecting the data and identifying the techniques to apply, you have a foundation and a blueprint to begin analysis and get some answers in order to make decisions. As you perform the analyses in this exercise, think about why each step is performed, as well as whether other data or techniques could be useful.

Interpret the Findings

Taking the results or findings and turning them all into information and knowledge is the last step in the workflow. You might have an answer to your question and be able to take action, or you may need to perform more analysis. Interpretation means translating something and applying it to your specific scenario, learning from it, and incorporating it into your knowledge base. Risk management requires frequent reviews to monitor for new risks. You must prioritize and classify these along with existing known risks, and you must maintain a plan for avoiding, mitigating, transferring, or accepting them all. If you actively manage risk, it means continually interpreting what you learn, retaining that knowledge, and adding to it.

Note: For this exercise, these examples provide a starting point—in all likelihood, these analyses in the real world would encompass additional factors and criteria.

Analysis Workflow Using ArcGIS Online

Using ArcGIS Online, you can create a map with the information needed for your analysis.

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Step 1: Log in to an ArcGIS Online organization

In this step, you will again log in to the ArcGIS Online organization for the *Location Advantage* MOOC.

a. Open a new Internet browser tab or window.

b. Go to www.arcgis.com and sign in to ArcGIS Online using the credentials explained at the start of this course.

Note: The Section 1 Exercise 1 PDF explains how to determine your ArcGIS Online credentials (username and password) for this course. If you have trouble signing in, email GIStraining@esri.com for assistance.

Step 2: Analyze features using a web map

To begin learning about where the areas of greatest exposure to risk of damage from hurricanes in Florida lie for your company, you will look at the numbers of policyholders by TIV, or total insured value.

a. At the top of the page, click Groups, and then choose the group named Section 6.

b. Hover your mouse pointer over the thumbnail for the Section6_Step2 web map.

c. Click Open In Map Viewer.

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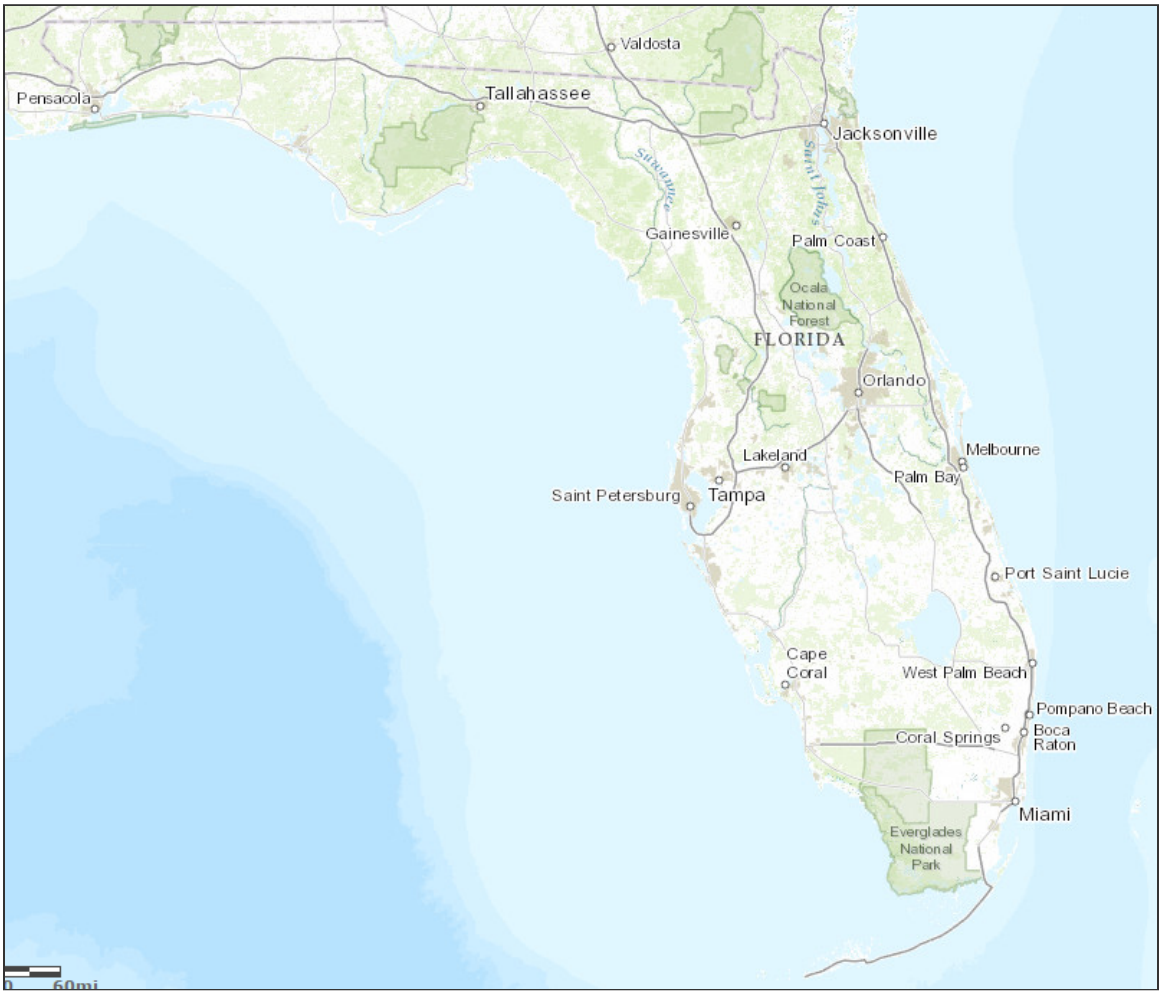
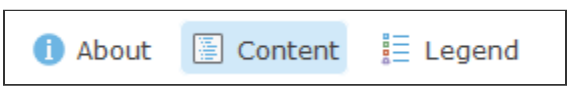
The initial map display shows the extent of the state of Florida and uses the Topographic basemap.



Understanding where your company's policyholders are located is crucial for knowing the level of risk they may face from storms, as well as how to properly charge them for taking on some of that transferred risk based on the total insured value of their property. The map includes a feature layer with this information.

d. If necessary, in the left pane, click the Content button to show the map layers.



e. Check the check box to turn on the Total Insured Value By Property layer.

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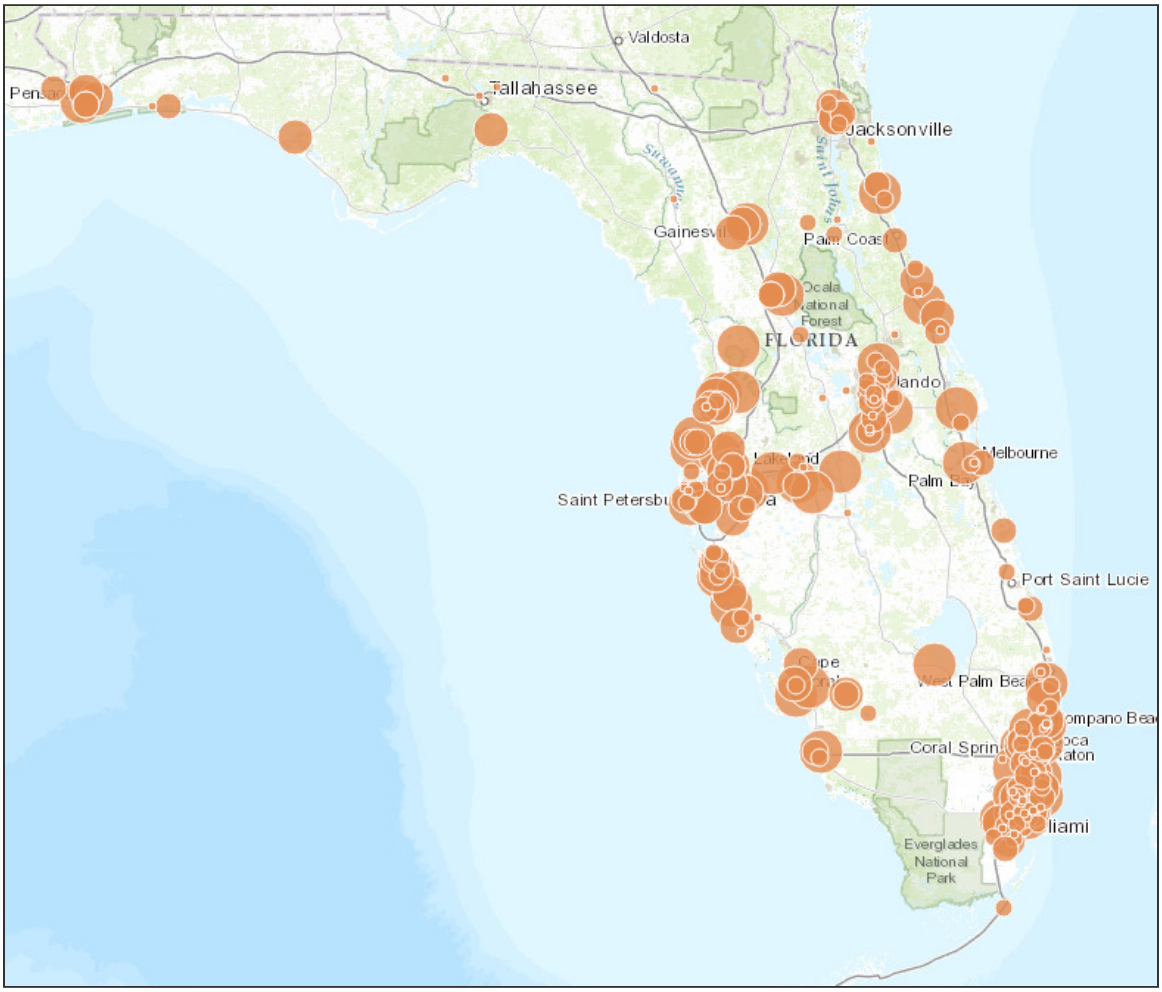
Your company is focused on minimizing losses from insurance claims payouts, so you want to view the locations of properties in terms of total insured values. The Total Insured Value By Property layer shows the locations of the properties which are covered by insurance policies issued by your company, using graduated circle symbology to show the relative amounts of TIV. The larger the circle symbol, the higher the TIV amount. This symbology can help reveal locational patterns about the actual amounts of property values that are at risk, in addition to the properties themselves.



Note: This data is fictitious and was created by Esri for educational purposes only.

What do you see in this visualization? What can you determine from the patterns of points showing the locations of policyholders and the sizes of the symbols? Notice that there are more policyholders located in the larger metropolitan areas, such as around Miami to the southeast (to the bottom right on the map) and the Tampa area on the west coast. The TIV amounts also seem to be higher in those areas, as well as near the coastlines.

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Step 3: Save the map

You will save a copy of the map for yourself so that you can edit the map and perform analysis.

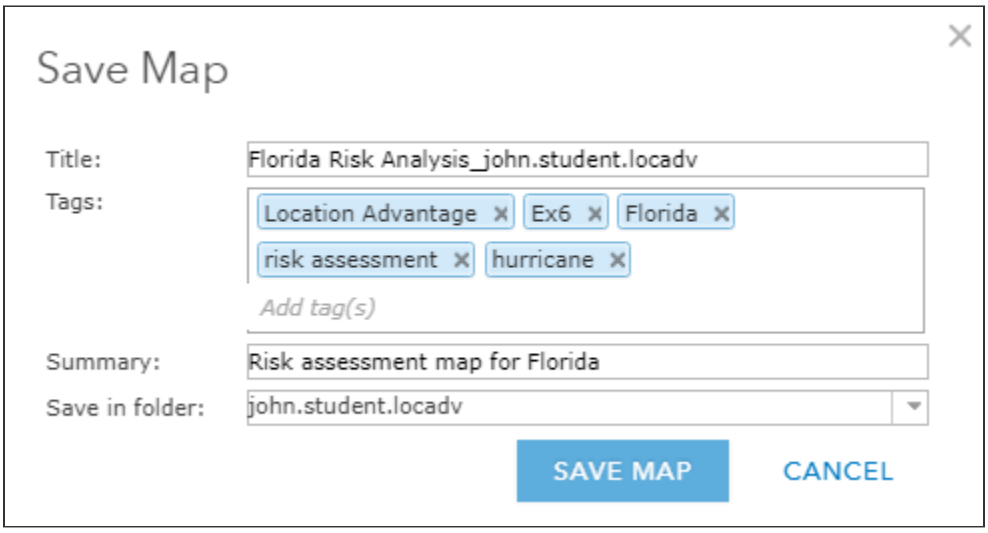
a. From the ribbon at the top of the page, click Save and choose Save As.

b. In the Save Map dialog box, for Title, type **Florida Risk Analysis_YourArcGISOnlineUsername** so the map has a unique name.

Note: Because there are many other students starting with the same map, it is important to click Save As so you do not save over the original copy. Adding your ArcGIS Online user name to the title will save it as your own.

c. In the Tags field, type **Florida, risk assessment, hurricane**, and any additional tags you would like. Tags are very useful for locating or grouping your content.

Note: Press Enter after each tag to save it in the Tags field.



d. Click Save Map, and remember to periodically save your map as you are working.

The map will be saved to your My Content collection, which you can access at any time.

Step 4: Create a density map to assess clustering

Before 1950, hurricanes in Florida impacted the population living there, but the total property damage was less compared to recent years. From 1950 onward, Florida experienced rapid population growth along the Atlantic and Gulf coasts, as well as in its interior, particularly the area near Orlando. These densely populated areas coincide with the areas that currently have

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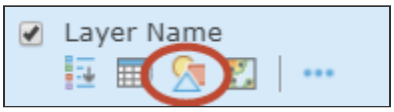
more properties which are insured for higher amounts as compared to other, more sparsely populated areas. Knowing where population and associated housing infrastructure tend to be located is important when you are considering and managing risk assessment.

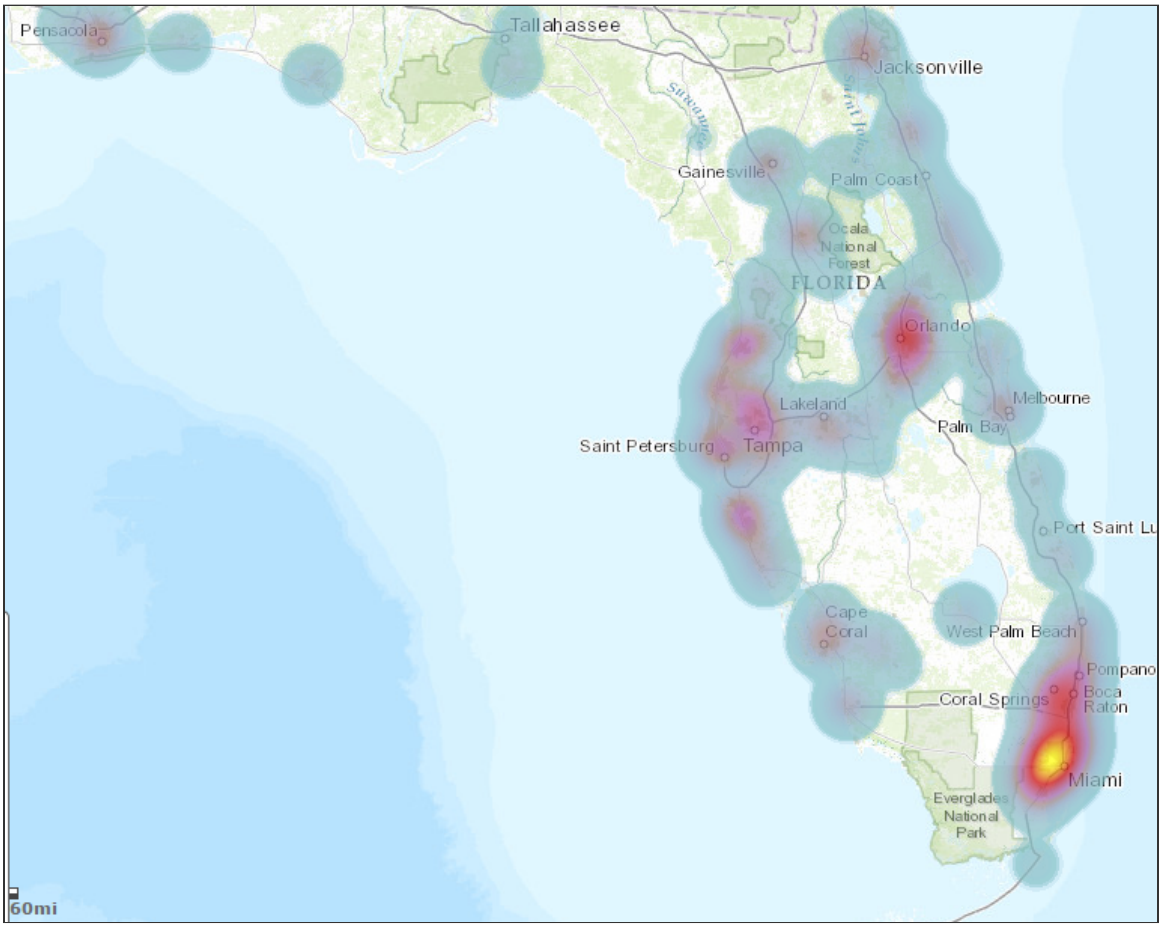
To visualize the property points and view TIV in a different way, you will create a density (heat) map.

a. In the Contents pane, hover your mouse pointer over the Total Insured Value By Property layer name and click the Change Style button.



b. In the Change Style pane, below Heat Map, click Select.

c. Click Done.



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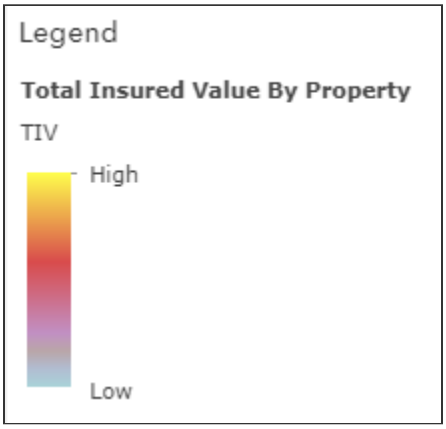
A heat map shows clustering by symbolizing each area with its density value. It is helpful for visualization, but it is not a quantitative measure. It is called a heat map because areas with higher activity or values appear to glow hotter. The areas with higher TIV values are indicated in yellow; areas with lower TIV values are depicted in blue.

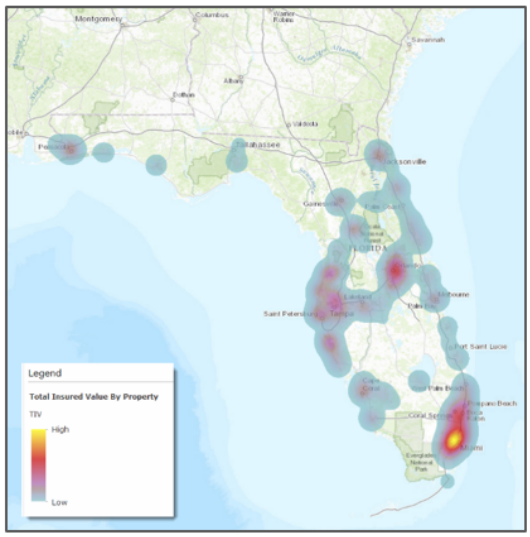
d View the legend to see how TIV is symbolized in a heat map.



Note: For more information, you can read this article about spatial analysis and heat maps.

What do you notice about the spatial patterns on the map? Where do you see the concentrations of TIV, and how does this visualization differ from the previous one that had the graduated point symbols? Think about the differences between what the two visualizations show and how you could use the different visualizations to support your work.

Circles representing TIV.



Heat map representing TIV.

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In the map where TIV is symbolized as point data, you can see that high amounts of TIV exist in many areas. Conversely, the heat map mostly highlights the Miami area because of the denser concentration of insured properties there compared to everywhere else. The first map does not display this density as clearly. You should be aware of what different types of maps show and do not show, and how the symbology you choose affects the message.

e In the Contents pane, turn off the Total Insured Value By Properties layer.

Florida is affected by the annual Atlantic hurricane season. This occurs from June through November, a time when multiple hurricanes form in the Atlantic Ocean. You can use historical hurricane information to anticipate future hurricanes, so you will next view and learn from some historical hurricane tracks.

Step 5: Add more layers for analysis

The United States first started keeping records on hurricanes in 1851, which you can view in these information pages compiled from the National Oceanic and Atmospheric Administration (NOAA). NOAA also provides a dynamic web map that shows all historical hurricane tracks since 1851. However, so many hurricanes have occurred around the globe that the patterns are difficult to detect.

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As you know, it is good to have data in business, but it can be possible to have too much data. Simplifying data layers can be as much of a task as gathering enough data. You can simplify data to glean information by filtering the data, changing the map symbology, or setting visibility ranges to analyze only recent hurricanes or only major hurricanes. Or, you could use algorithms or other analysis to generalize the data, like finding the average, and find the most likely path or paths that hurricanes typically take through a region.

For the purposes of this scenario, a colleague has obtained and processed the raw data for those historical tracks and narrowed them down to three paths that represent the most statistically probable tracks that hurricanes would take across Florida. You have created an ArcGIS Online feature layer from that data, representing these paths as three lines. Next, you will compare the likely hurricane tracks to the locations of your policyholders and areas of high TIV. There is also a layer containing arrows that show the direction of these likely hurricanes.

a. Turn on the Three Most Likely Florida Hurricane Tracks and Hurricane Tracks Directional Arrows layers.

b. If necessary, zoom in and pan to the state of Florida and the three likely hurricane tracks.

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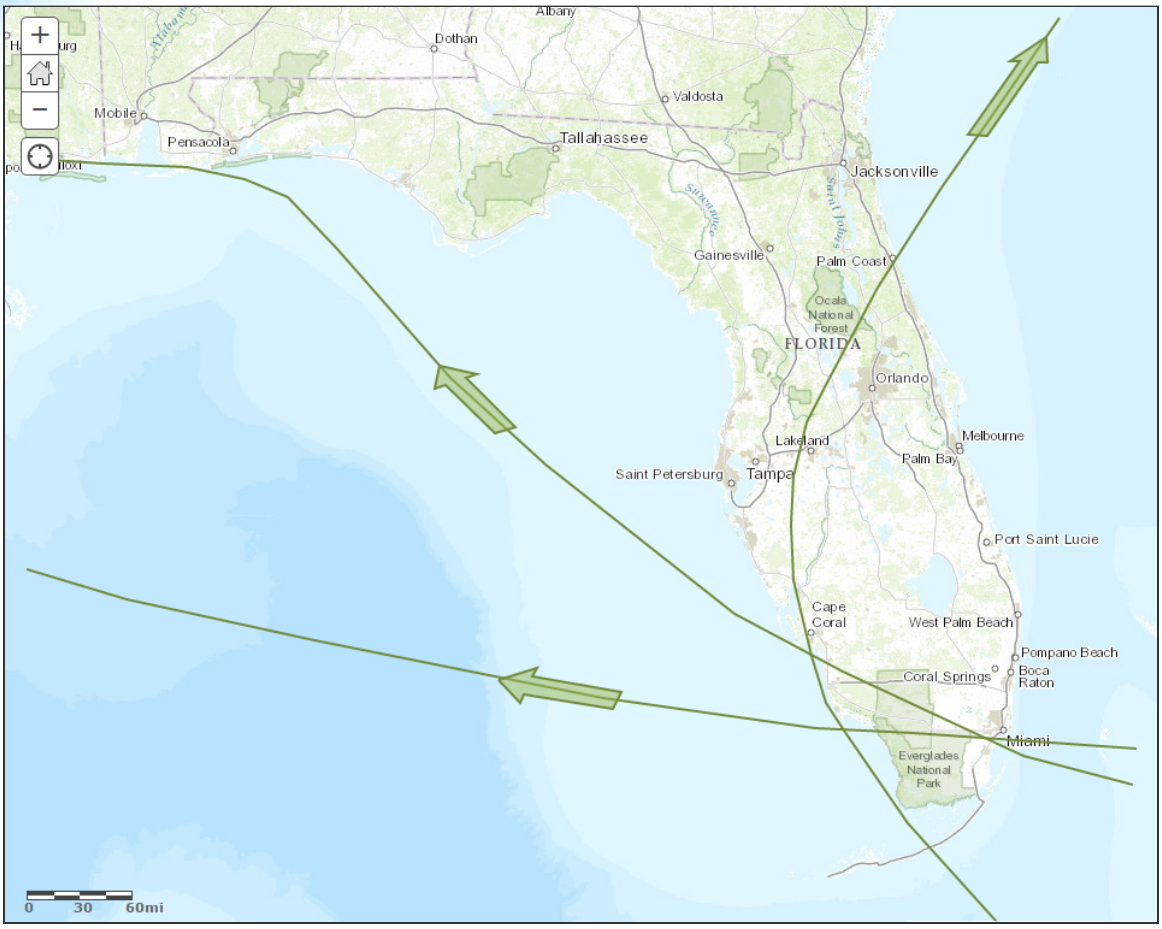

Being a force of nature, hurricanes are governed by many factors, including ocean and wind currents, high and low pressure, ocean temperatures, convection, and more. While hurricanes can strike anywhere, for the purposes of this exercise, it is statistically probable that future hurricanes will follow or be close to these tracks compared to any other potential track in Florida. You will base your analysis on these three paths representing likely hurricane tracks.

Examine these paths. Which large cities are more or less likely to experience a hurricane in Florida? Notice how these cities compare to the ones with the most TIV, such as Miami, Tampa, and Orlando.

This information can be useful to your company for understanding risk in different locations. Now that you have viewed these predicted hurricane tracks, you can perform analysis to determine how to set insurance rates for policyholders in the region.

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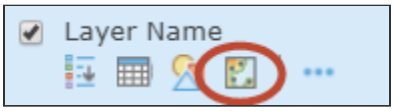
Step 6: Create a buffer to show area

To determine zones of the heaviest likely impact, you will buffer the hurricane tracks to better simulate the width of the areas of heaviest damage that hurricanes can cause. Wind speeds and potential property damage are usually highest between the outer wall of a hurricane and the eye wall, which surrounds the eye (or center) of the hurricane. For the purposes of this exercise, you will use 90 kilometers for this width of maximum potential damage.

a. In the Contents pane, hover your mouse pointer over the Three Most Likely Florida Hurricane Tracks layer name and click the Perform Analysis button.



b. Expand Use Proximity, and then click Create Buffers.

You will create a distance buffer showing areas within 90 kilometers of the tracks to depict the approximate width of the highest wind areas of the largest hurricanes.

c. In the Create Buffers pane, verify that the Three Most Likely Florida Hurricane Tracks layer is selected in the layer drop-down.

d. Accept the default method for creating the buffer size of Distance.

e. In the buffer size field, type **90**.

f. Change the units drop-down from Miles to Kilometers.

g. Name the result layer **Buffer of Tracks_YourArcGISOnlineUsername**.

h. Choose to save the result in your student folder.

i. Leave the box for Use Current Map Extent checked.

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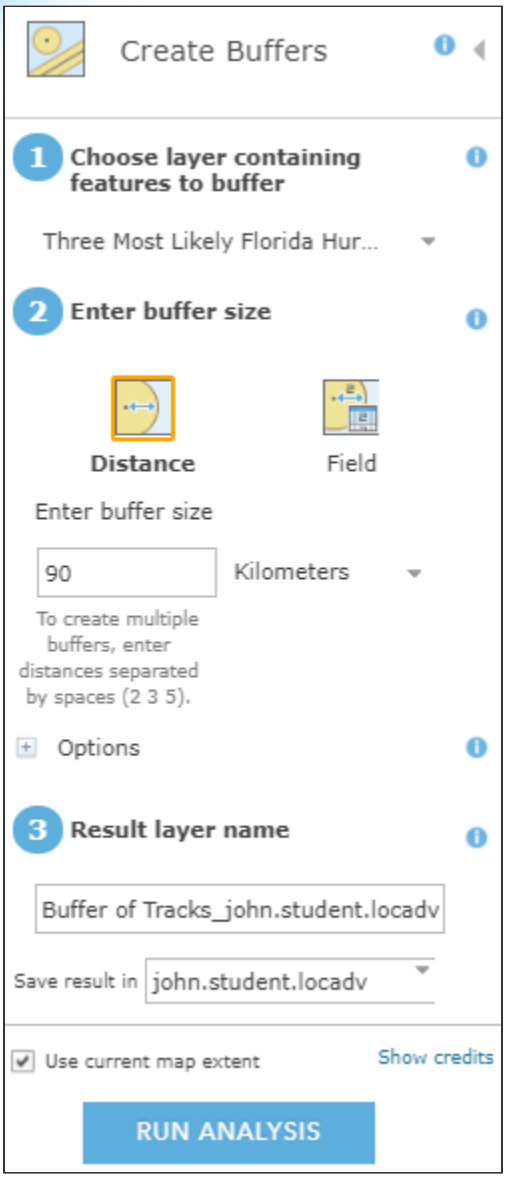

j Click Run Analysis.

The buffered zones display on the map, and the layer appears in the Contents pane.

k If necessary, zoom out once to view all of the buffers.

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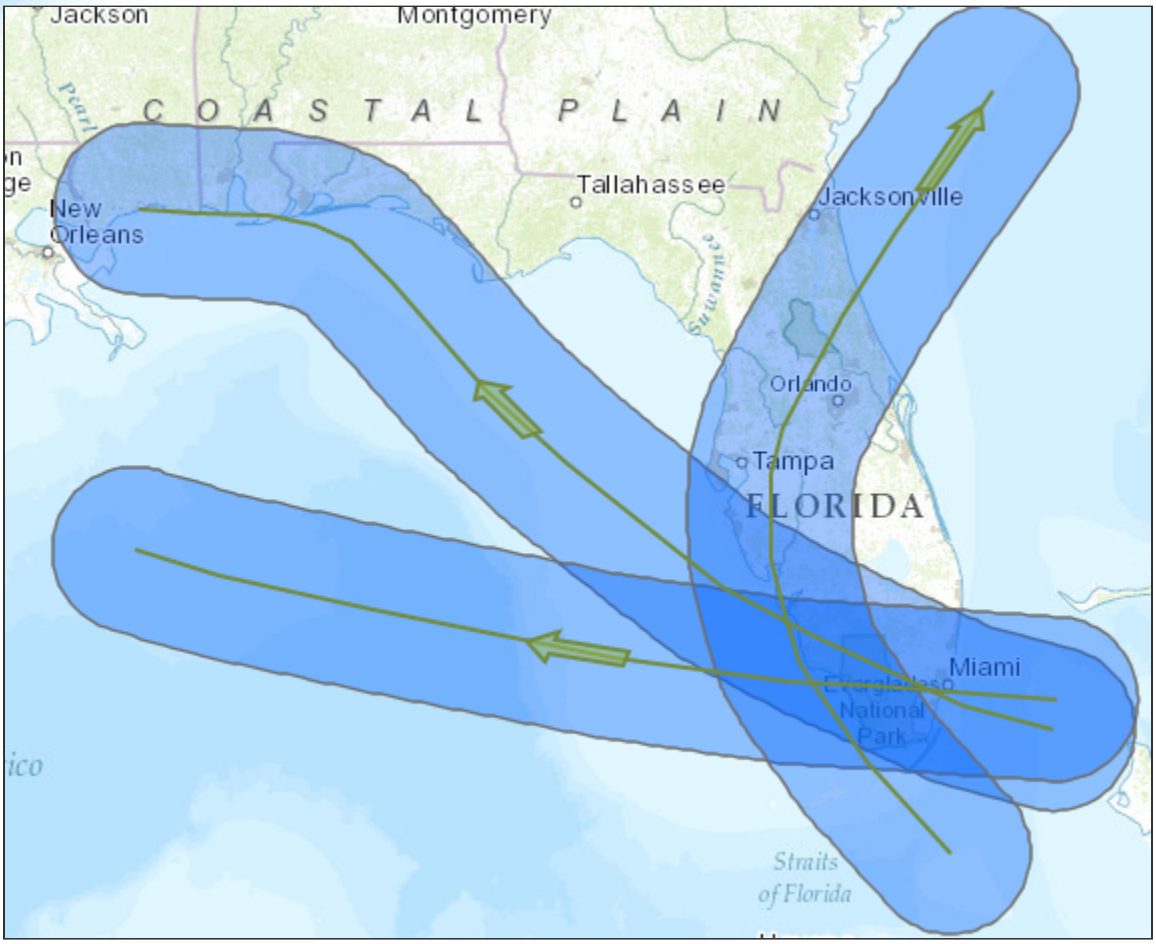

The results show the potential high-damage areas from the hurricane paths. These zones will help your company decision makers be aware of the possible extent of damage from hurricanes that follow the likely paths. Managers can then set property insurance rates accordingly. The buffer can help measure risk and predict destruction in a swath around the hurricane.

Does this information suggest that rates might be higher for a large number of policyholders in much of the state because your insurance company would be taking on a greater risk?

The buffers are a good start, but you need additional information to assess the correct insurance premium amounts for policyholders living in these zones. Damage from hurricanes inland comes primarily from wind, which is just one aspect of the liability risk. You will also add potential damage due to flooding from storm surge to your analysis.

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Step 7: Analyze storm surge

Wind is not the only force that causes hurricane damage to property. Flooding is another huge factor. Coastal areas are typically the lowest in elevation, and so, they would receive the highest levels of flooding from storm surge.

Storm surge refers to higher water levels and flooding caused by a storm or hurricane. A hurricane can push water along ahead of itself. As the water gets shallower, such as when the hurricane moves over the continental shelf just off the coast and on toward land, water goes flooding up onto land. Storm surge can be as much as 20 feet (6 meters) higher than the normal tide.

This graphic shows a storm surge forecast from the September, 2017 hurricane Irma that struck Florida.

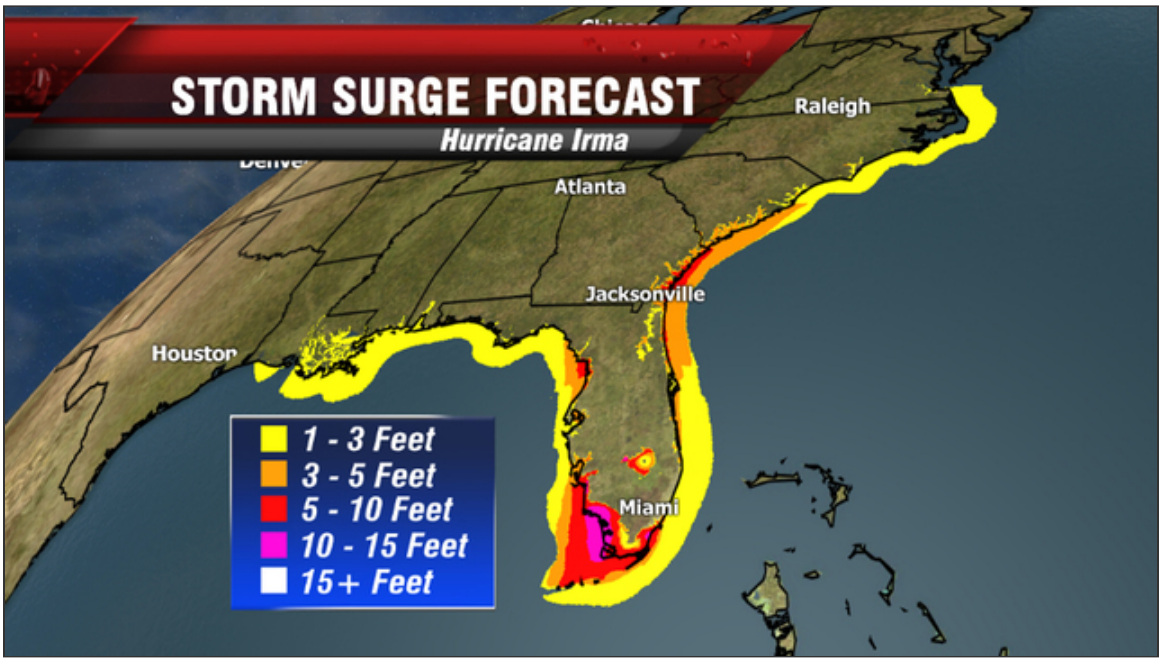

Image credit: http://www.fox5dc.com/news/local-news/virginia-declares-state-of-emergency-to-provide-aid-to-states-impacted-by-hurricane-irma

Much of the population and insured properties in Florida lie along the coast. There are good reasons for a coastal location, but with elevation at or barely above sea level, coastal areas have increased danger from storm surges. Also, large parts of the rest of the state are not much higher in elevation than the coast.

You have another layer in your map that shows danger from storm surge. The CFEM (Coastal Flood Exposure Mapper) Storm Surge layer shows the areas that would be affected by the worst possible flooding from the storm surge from hurricanes.

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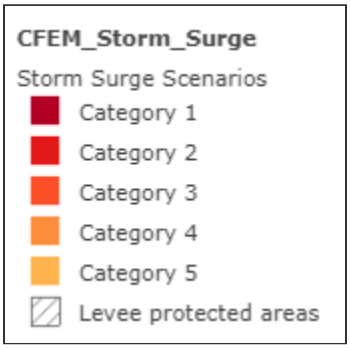
a. In the Contents pane, use the check box to turn off the buffer layer you created, and turn on the CFEM Storm Surge layer.

b. Zoom in and pan the map to examine how large parts of many states are at risk for significant flooding from storm surge.

c. Pan back to the state of Florida, and switch to the Legend view to learn more.



Notice that more of southern and western Florida would be affected and experience a greater extent of damage than the Atlantic coast. This is because those areas are lower in elevation.

You can find more information about the web service behind this layer on its service page.

d. Return to the Contents pane, and turn off the CFEM Storm Surge layer.

Next, you will create and examine a more comprehensive prediction of flooding damage by creating a layer that shows a combination of storm surge and high winds from hurricanes.

Step 8: Overlay layers to find the intersection

To see a more accurate picture of the possible extent of hurricane damage to properties, you will overlay and intersect a storm surge layer with the buffers of the likely tracks. This overlay will allow you to visualize the highest risk areas, where there is both risk of storm surge from low elevation or coastal locations and high winds from being near the actual path of a hurricane.

For this exercise, your colleague has created a generalized, simplified layer from the CFEM Storm Surge layer (titled Storm Surge-Generalized), which focuses on Florida. This layer will help your analysis of the storm surge information.

a. In the Contents pane, turn on the Storm Surge-Generalized layer.

b. In the Contents pane, hover your mouse pointer over the Storm Surge-Generalized layer and click the Perform Analysis button.

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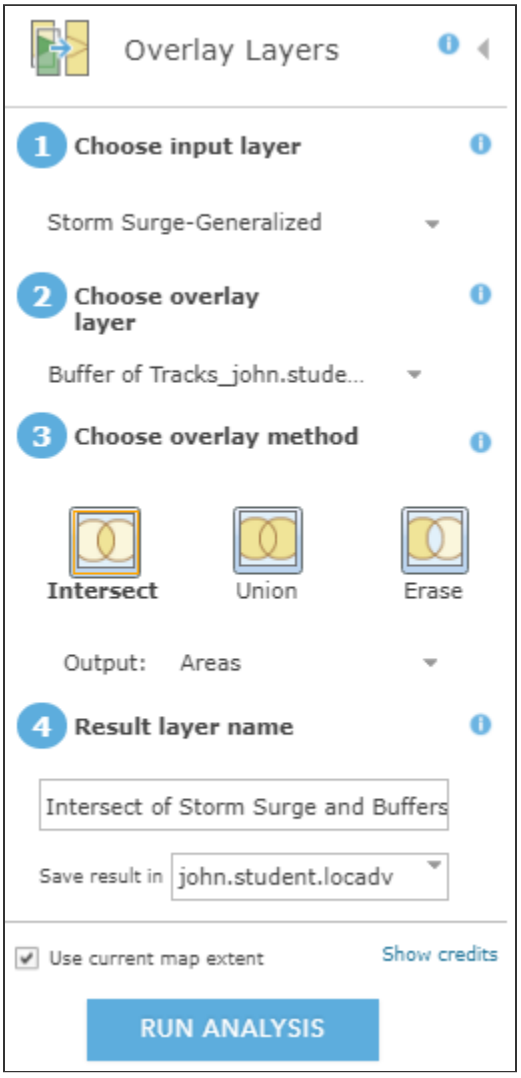
c. Expand Manage Data, and then click Overlay Layers.

d. Verify that the input layer is set to Storm Surge-Generalized.

e. For Choose Overlay Layer, choose the Buffer Of Tracks layer that you created earlier from the drop-down list.

f. Leave the default settings of an overlay method of Intersect, an output type of Areas, and the Use Current Map Extent check box checked.

g. Rename the result layer as **Intersect of Storm Surge and Buffers_YourArcGISOnlineUsername**.



h. Click Run Analysis.

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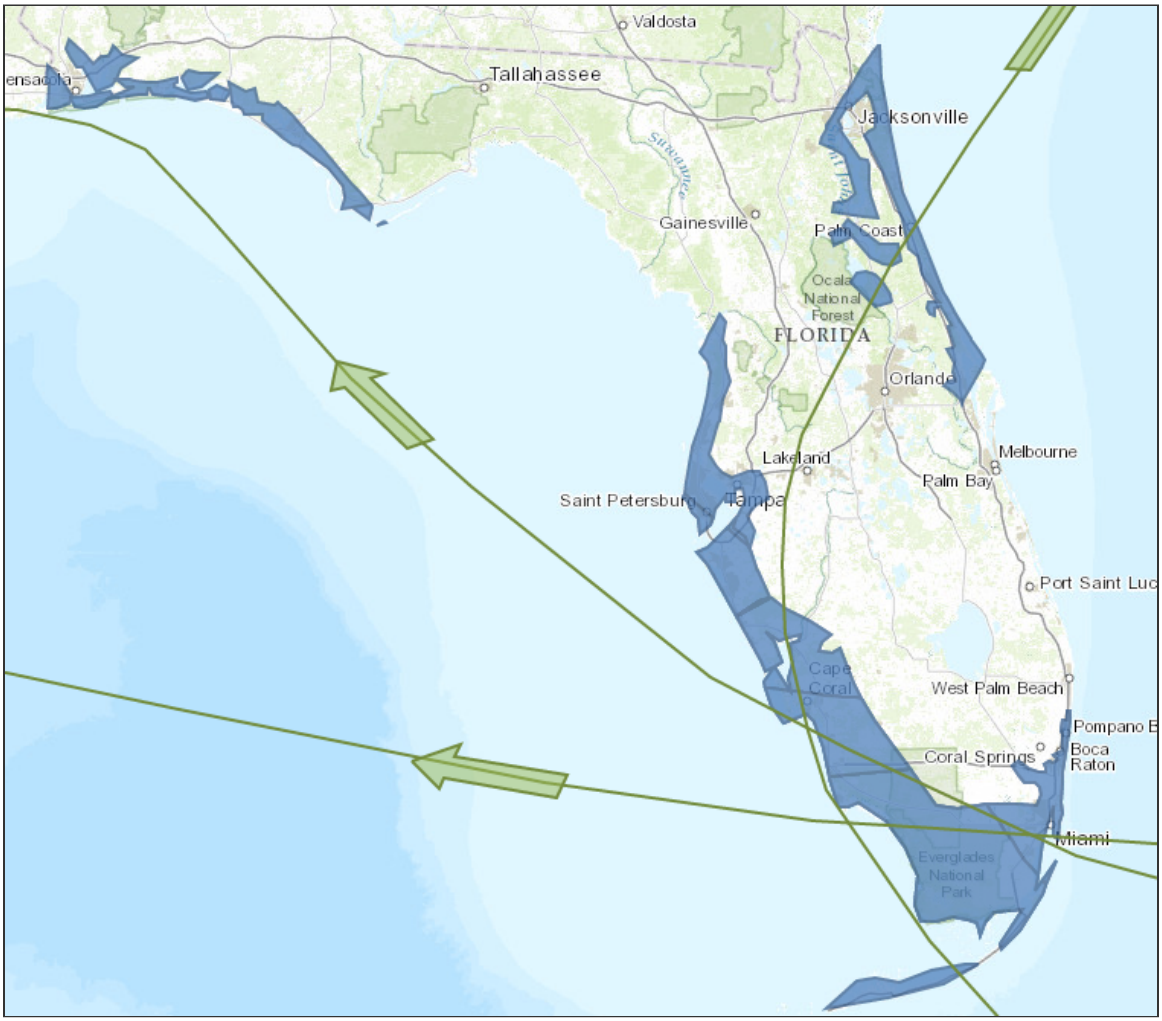
The resulting intersection layer appears similar to the Storm Surge layer.

Turn off the Storm Surge-Generalized layer to see the new overlay, which is only the storm surge areas that intersect with the high wind damage risk zones.



The intersect layer defines an even higher level of risk than the tracks buffers. It shows properties that are located both inside the 90-kilometer buffer and inside the storm surge areas. You can take this new information and apply it to your business by tracking these areas and flagging potential customers as high-risk. You can also identify properties of your existing policyholders in these areas that have this highest level of risk.

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Step 9: Overlay again to add information

Now you will combine the information from two different data layers for additional analysis purposes and to assess whether premiums are being correctly assigned to policyholders in the locations with the highest risk levels.

You will determine which policyholders' properties have the highest risk level from both high winds and flooding and are therefore most likely make a claim from property damage. You have created an intersect of the three likely tracks buffers and the storm surge areas, but it does not contain information on individual policyholders. In other words, you must use overlay again to create a new layer by taking the points layer that shows the property locations and combining it with the layer that shows the areas where the storm surge zones intersect the tracks buffers.

You can use these findings to send information to the policyholders about risk, hurricane preparedness, and evacuation routes. Identifying these policyholders is also valuable for contacting them in the event of a hurricane to alert them and establish communication early in the claims process. The information will also help you mobilize your claims assessors, who will move in after the storm to estimate the damage and compensate the policyholders as soon as the areas are safe to enter. You could also use this information to know the areas in which you would have to plan on staging supplies for emergency repairs and eventual rebuilding.

a. Turn off the Intersect Of Storm Surge And Buffers layer that you created in the previous step.

b. In the Contents pane, hover your mouse pointer over the Total Insured Value By Property layer and click the Perform Analysis button.

c. Expand Manage Data, and then click Overlay Layers.

d. Verify that Total Insured Value By Property is selected for the input layer.

e. For Choose Overlay Layer, choose the Intersect Of Storm Surge and Buffers layer, and leave the overlay method set to Intersect.

f. For Result Layer Name, type **Intersect of TIV with Intersect of Storm Surge and Buffers_YourArcGISOnlineUsername**.

g. Uncheck the Use Current Map Extent check box.

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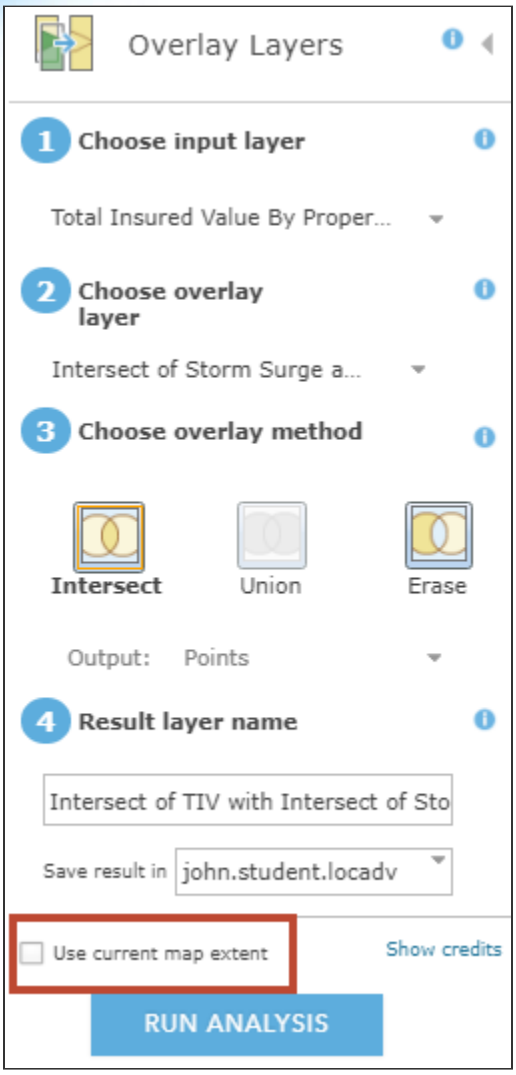

h Click Run Analysis.

The resulting points layer will display on the map and appear in the Contents pane.

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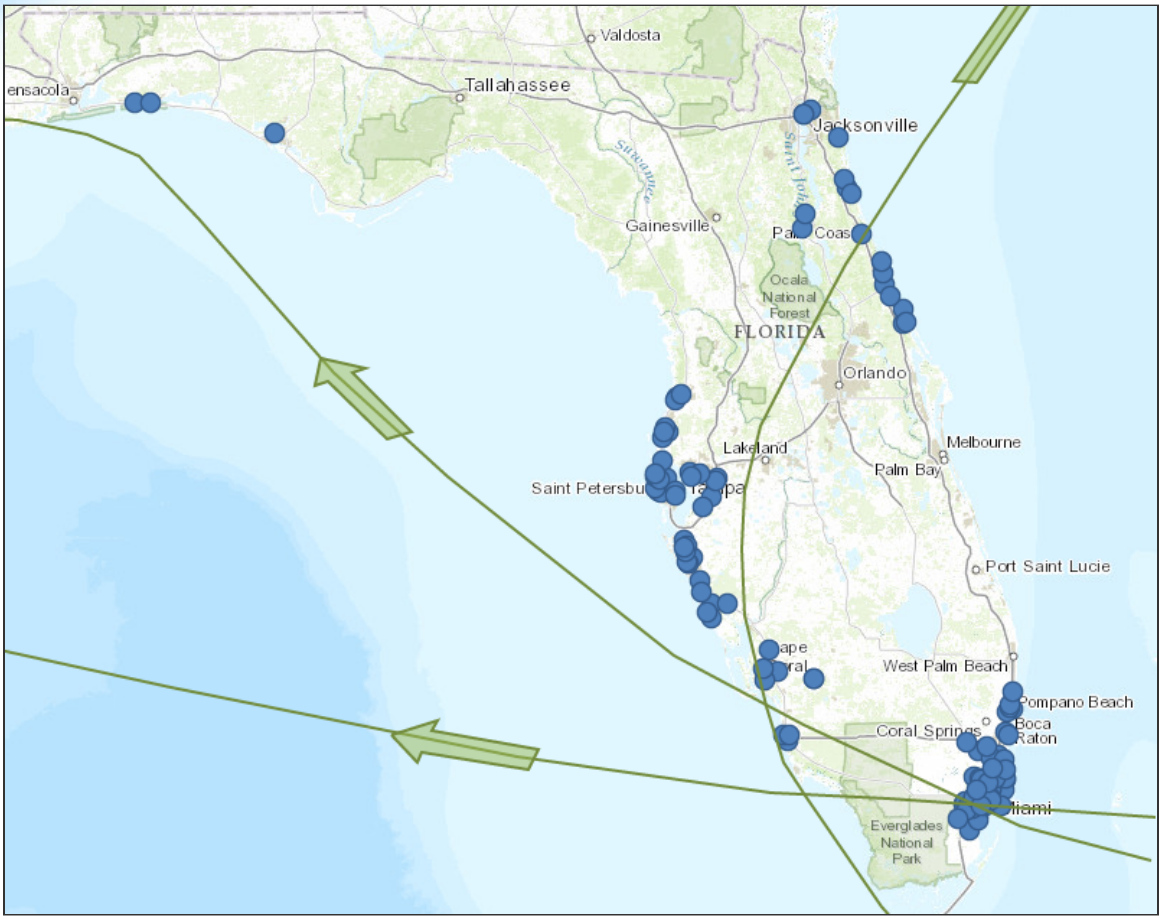
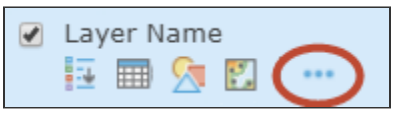


The points shown are only the properties which are in the highest risk zone.

i Turn on and off the Buffer Of Tracks and Storm Surge-Generalized layers, and also the Intersect Of Storm Surge And Buffers layer (which is the overlay of those two layers), to see that only the policyholder points that fall within have been added to the new TIV Intersect layer.

Premium amounts are affected by many factors, including property value, credit scores, and access to labor and resources for rebuilding. But the level of claims risk from location is one of the biggest factors. Analyses like this will help the accuracy of the actuarial formulas, ensuring that your company can assign a premium that is fair.

j Hover your mouse pointer over the Intersect of TIV With Intersect Of Storm Surge And Buffers layer name, click the More Options button.



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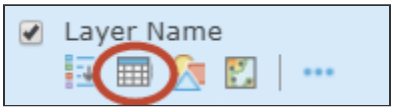
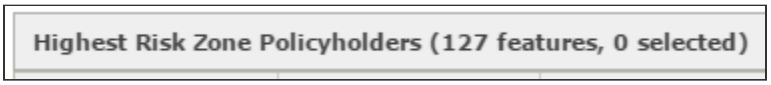
k. From the drop-down list, choose Rename.

l. In the Rename dialog, for Layer Name, type **Highest Risk Zone Policyholders**, and then click OK.

m. View the table for the Highest Risk Zone Policyholders layer by clicking the Show Table button.

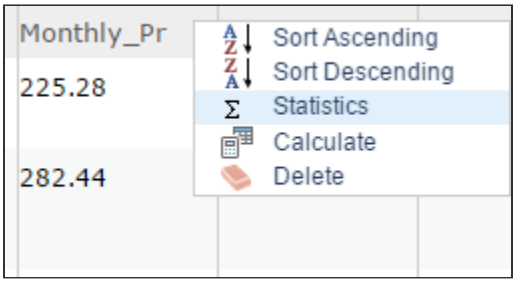


You can see that 127 of your current policyholders have insured properties located in this highest risk zone.



n. Scroll to the right in the table to view the Monthly_Pr column (the monthly insurance policy premium amount paid by the policyholder).

o. Click the column header.



p. Choose Statistics.

The statistics pop-up includes the average monthly premium of $262.09.

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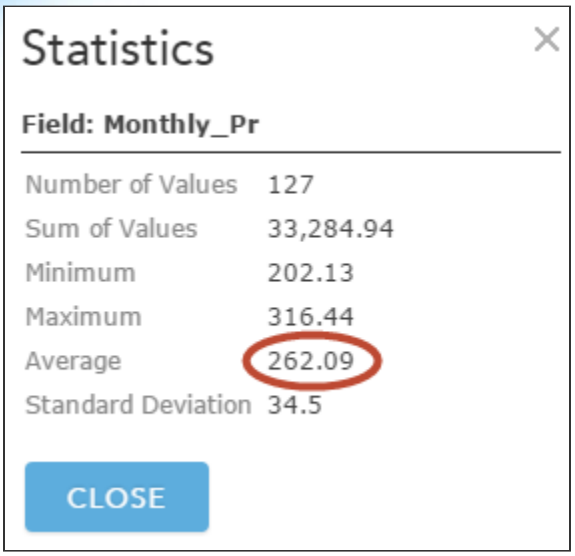

This amount is what property owners in this highest risk zone are currently paying on average. You and your managers determine that this amount is not enough to cover the costs relative to the premiums of property owners in lower-risk areas. As part of a risk management program at an insurance company, besides continuing to assess and prioritize risks, you also continually balance policyholders' premiums to match their costs with risk levels. You will add a multiplier to the premiums of properties in the highest risk locations to reflect the greater likelihood of damage from a hurricane.

Raising premiums is a decision that would be subject to the laws regulating insurance companies and the rules, policies, and formulas of your specific company. However, for the purposes of this exercise, you will use a simplified method of adding an 8 percent increase to all policyholders in this high-risk zone. You can calculate this new amount in the same attribute table.

q Close the Statistics pop-up.

Step 10: Add an attribute to a feature layer

To ensure fair and complete coverage, you want to add premium multipliers to these high-risk policies. You will add a new column to the table to record the new premiums assigned and calculate the revised monthly premium amounts.

a At the top right of the Highest Risk Zone Policyholders table, click the Options icon.

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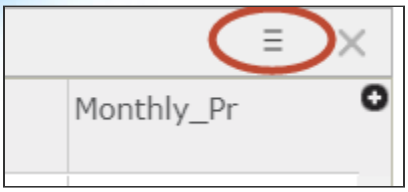


b. Choose Add Field.

c. In the Add Field dialog box, specify these parameters:

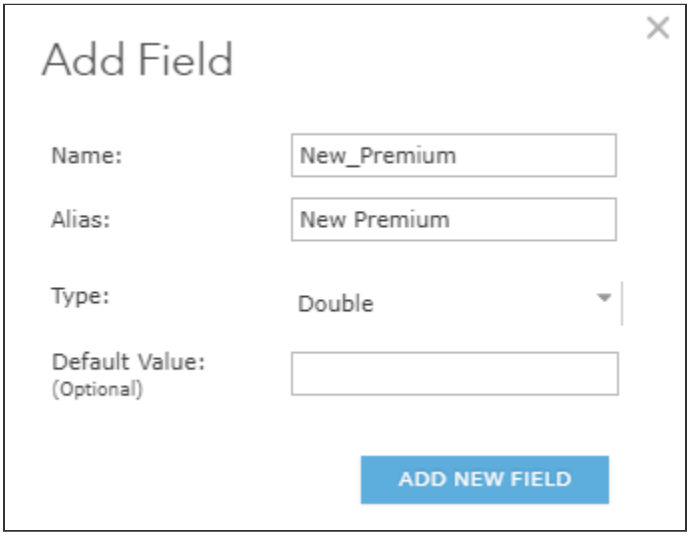
- Name: **New_Premium**

Note: Do not use spaces in database table fields.

- Alias: **New Premium**

Note: The alias is what will appear as the field name in the table.

- Type: **Double**



A field type of double means a double-precision floating-point, a decimal number appropriate for showing currency values.

d. Click Add New Field.

The new empty field is added to the table at the far right. The column title displays the alias name you just assigned. Next, you will calculate the new premiums in this field.

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Step 11: Calculate field contents

To populate the New Premium field with the premium values for the high-risk properties, you will create an expression based on the value you determined earlier: the premium increase of 8 percent. To show the new premium, you would add the current premium to the increase, which would be Premium + (Premium * 0.08). Another way of calculating this figure is to multiply the current premium by 1.08.

a. Click the New_Premium column header and choose Calculate.

b. In the Calculate Field dialog, use the Fields list and operators in the Expression Builder dialog box to create the following expression: Monthly_Pr * 1.08.

- From the Fields list, click Monthly_Pr to add it to the expression.
- From the row of operators, click the * button for multiplication.
- At the top, type **1.08** to complete the expression.

In plain language, this expression reads "Calculate the rate of the new monthly premium by multiplying the existing monthly premium by 1.08."

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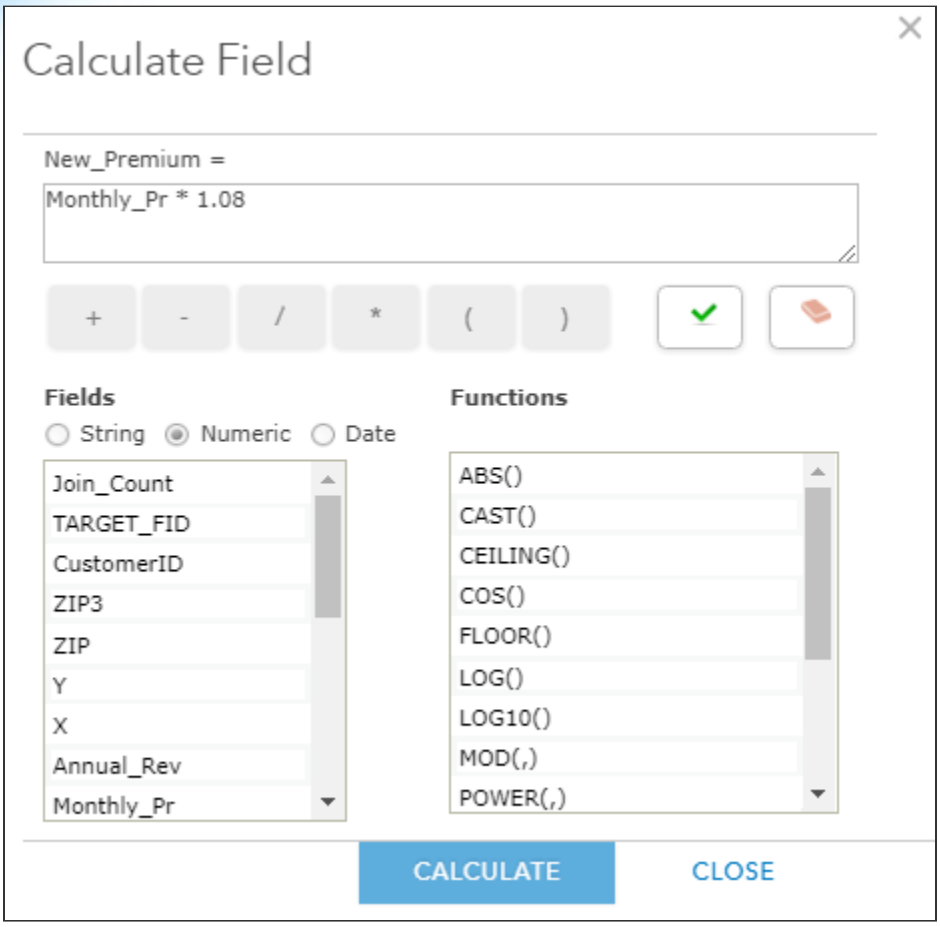

c. Click Calculate.

d. After the cells are calculated, click the New_Premium column header and choose Statistics.

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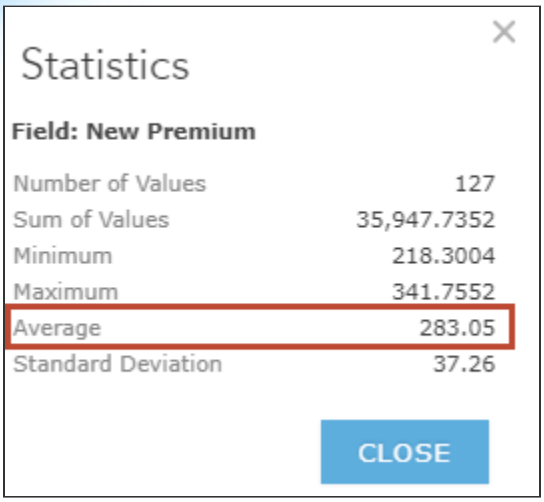

You have been able to increase the monthly premiums of each policyholder in the highest risk areas by 8 percent. This revision increases the average monthly premium from $262.09/month to $283.05/month, which will cover the higher potential for claims. This adjustment will help offset some of the measurable claims risk that your company is subjected to, keeping your risk management as effective as possible.

e. Close the Statistics pop-up, and then close the Highest Risk Zone Policyholders table.

Step 12: Sign out of ArcGIS Online

When you have finished the exercise, you can sign out.

a. At the top of the ArcGIS Online window, click your name.

b. From the drop-down list, choose Sign Out.

Conclusion

In this exercise, you looked at insurance policyholders and the total insured value of properties in a region that is prone to hurricanes. You also learned about how to categorize areas and policyholders for the purpose of adjusting premium amounts based on locational risk.

In all of the exercises in this course, you have modeled and performed analyses, produced results, and interpreted your findings. Are these results meaningful? Do they answer the original business questions? In a real-life scenario, you must continually verify the data that you use for analysis as the most accurate and current. You should also explore new or different analysis techniques to obtain the best results possible.

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Do other questions arise? That should be expected, and it is important to keep an open mind and use a flexible approach.

How else can you ensure the best possible results? Repeat analysis as needed. Verify your methods by corroborating results with other analysis. Finally, keep working until you have enough actionable intelligence to make decisions.

The exercises have given you the opportunity to apply a standard approach to using location information to address business questions. You have gained experience using a GIS to turn data into information that can be analyzed and visualized, and you have turned that information into knowledge that you can use to guide your decision-making. Hopefully, this lesson, and this course, have been useful to you, and you will continue to apply the decision-making approach and geospatial techniques to gain the location advantage.

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