

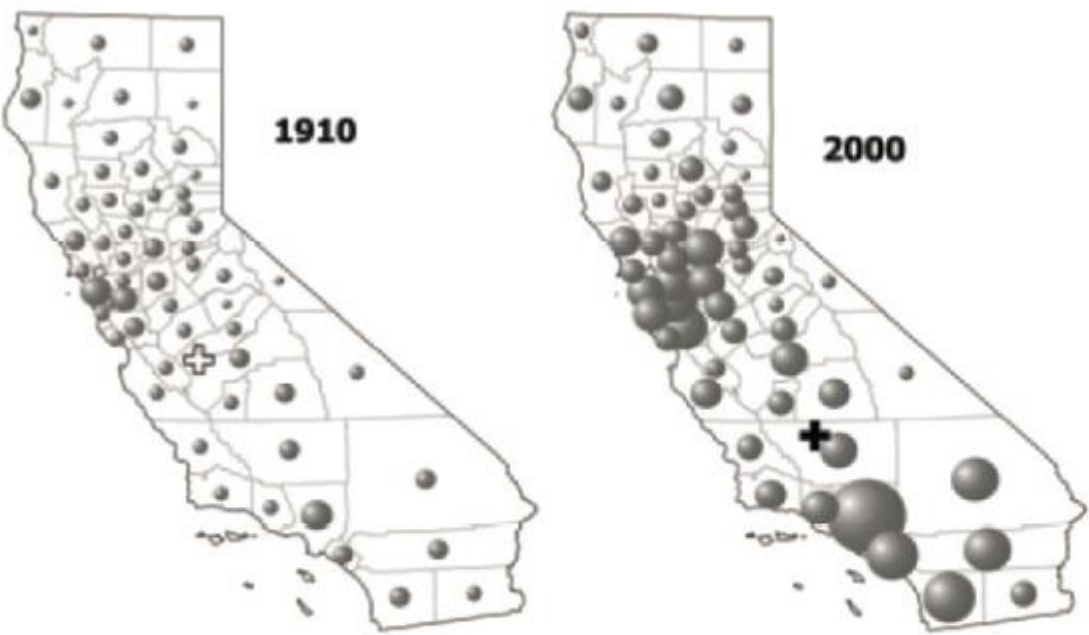


Measuring Geographic Distributions

The tools in the Measuring Geographic Distributions toolset are descriptive in nature

- Even the simplest tool in the Spatial Statistics toolbox can be a powerful communicator of spatial pattern when used with animation.
- They are useful for answering questions like:
 - Which site is most accessible?
 - Is there a directional trend to the spatial distribution of the disease outbreak?
 - What is the primary wind direction for this region in the winter?
 - Where is the population center?
 - Which species has the broadest territory?

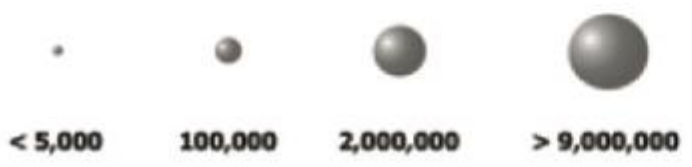
Tool	Description
Central feature	Identifies the most centrally located feature in a point, line, or polygon feature class
Directional distribution (standard deviational ellipse)	Measures how concentrated features are around the geographic mean, and whether or not they exhibit a directional trend
Linear directional mean	Identifies the general (mean) direction and mean length for a set of vectors
Mean center	Identifies the geographic center for a set of features
Median center	Identifies the location that minimizes overall Euclidean distance to the features in a dataset.
Standard distance	Measures the degree to which features are concentrated or dispersed around the geographic mean center



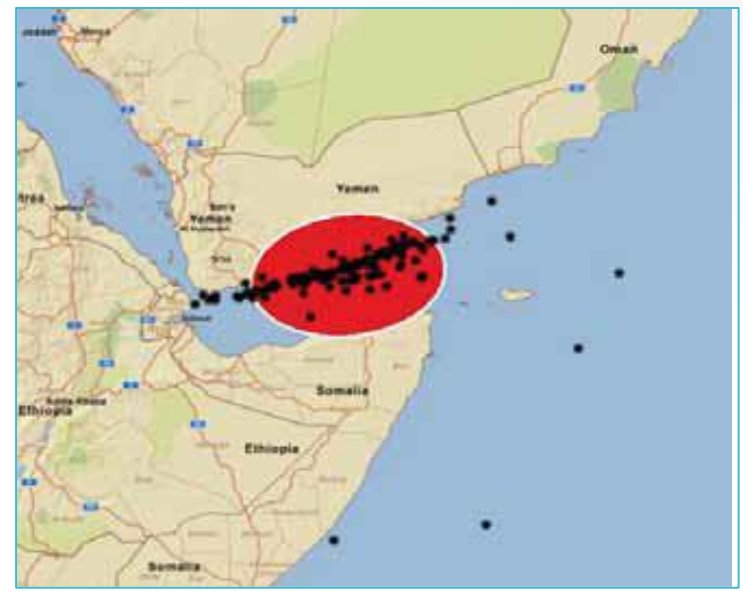
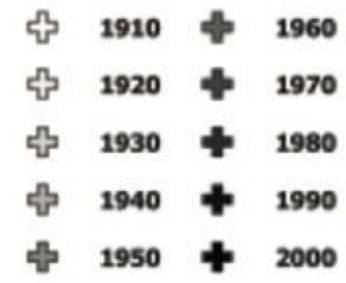
1910

2000

Population



Weighted Mean Centers



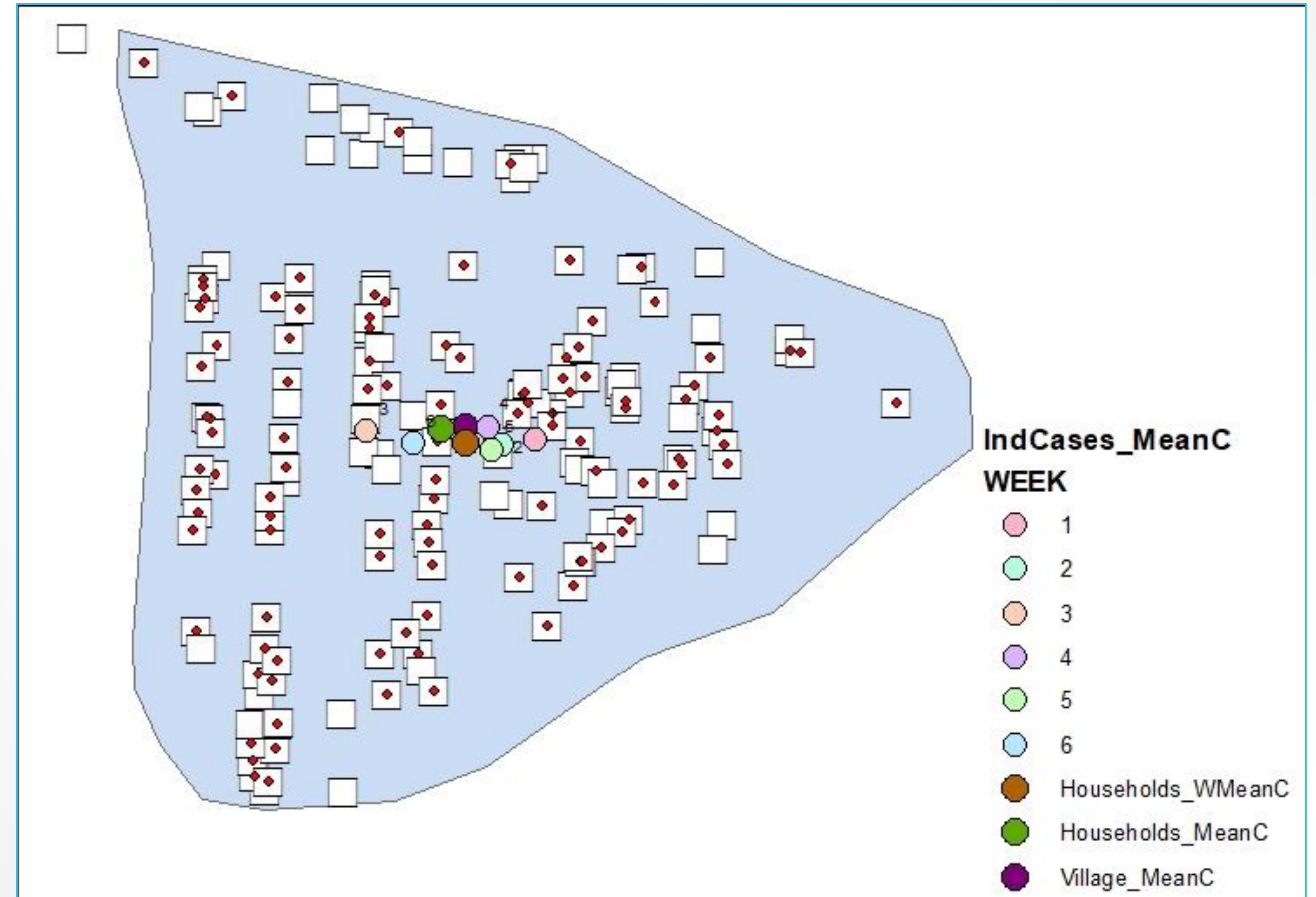
APPLICATION

IDENTIFY SPATIAL CHARACTERISTICS OF A DISTRIBUTION

- Where is the geographic center of all features?
- Which feature is the most centrally located?
- How are features dispersed around the center?

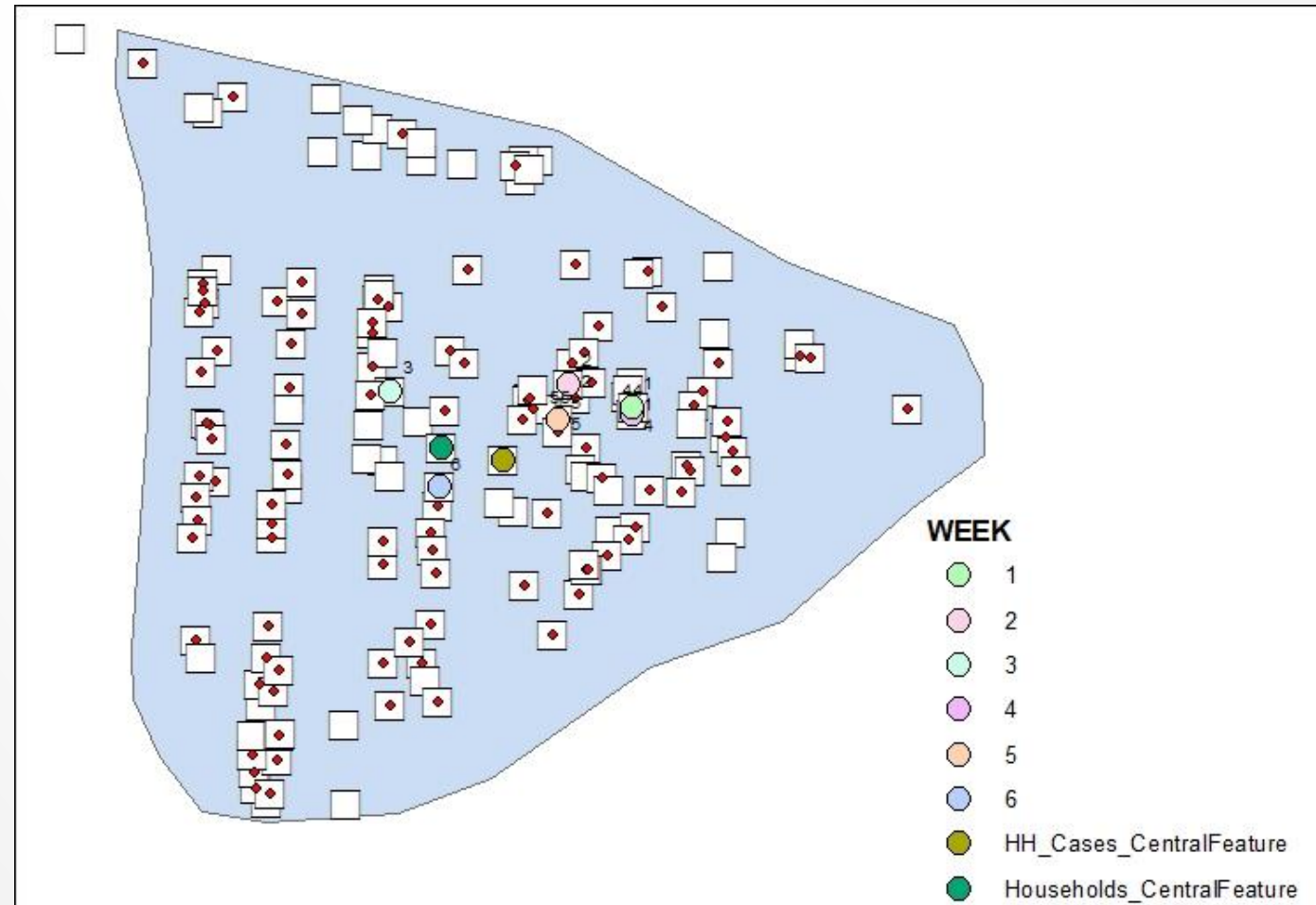
MEAN CENTER

- The geographic center for a set of features and it constructed from the average x and y values for the input feature centroids
- Simply the mean of the X and the mean of the Y coordinates for a set of points
- Sum of differences between the mean X and all other Xs is zero (same for Y)
- Minimizes sum of squared distances between itself and all points



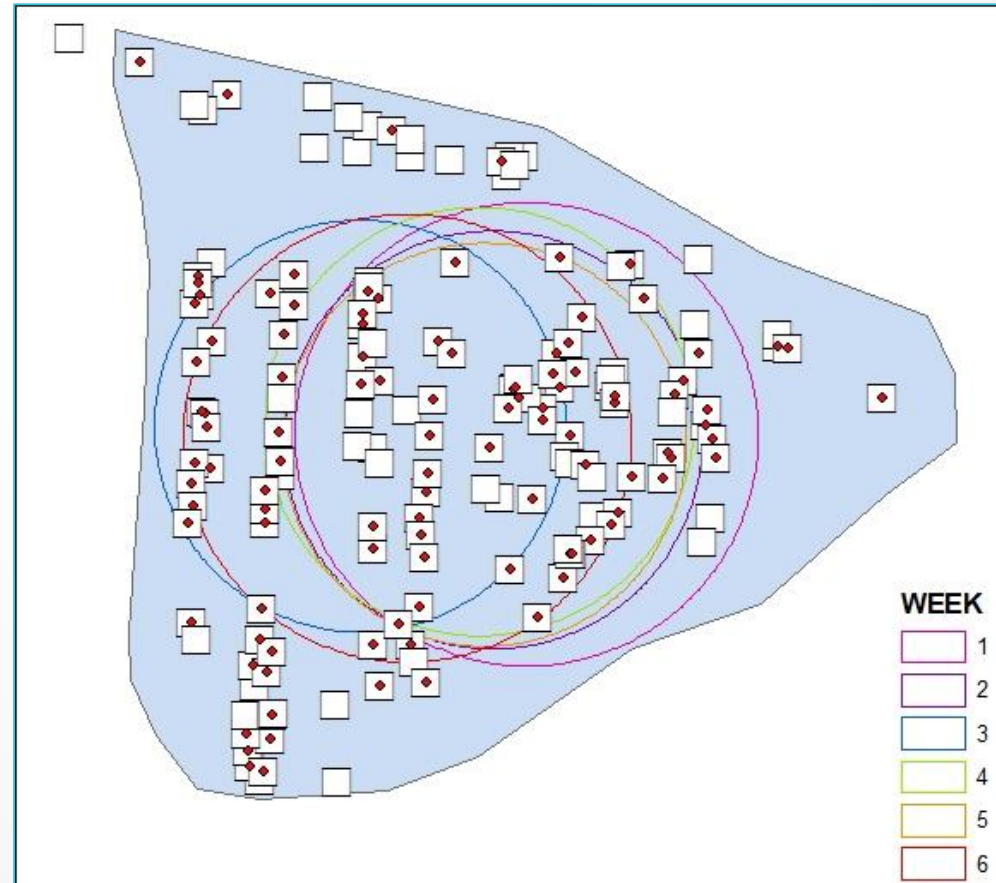
CENTRAL FEATURE

- Identify the most centrally located feature
- Feature having the lowest total distance to all other features



STANDARD DISTANCE – MEASURING FEATURE DISTRIBUTION

- Measures the degree to which features are concentrated or dispersed around the geometric mean center
- Mean Center and Central Feature tools tell us about the center of distribution, they don't tell us about the overall distribution
- Standard Distance tool tells up how dispersed the features are around the center

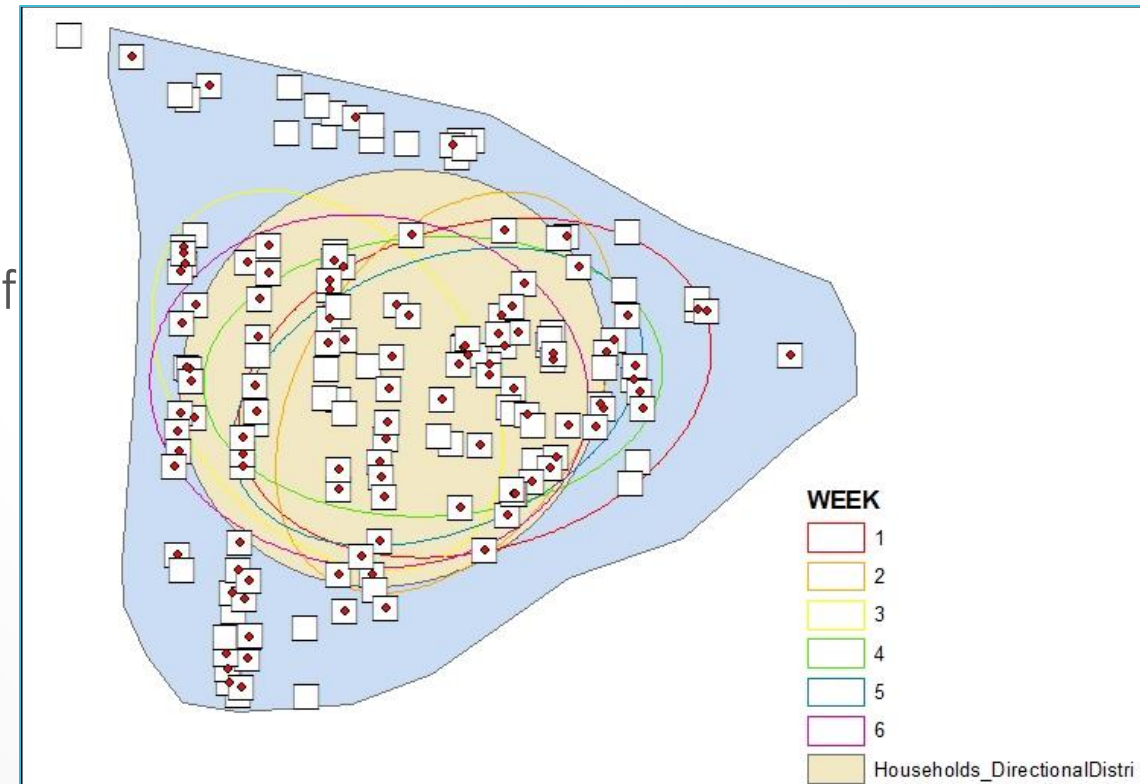


DIRECTIONAL DISTRIBUTION (STANDARD DEVIATIONAL ELLIPSE)

- Creates standard deviational ellipses to summarize the spatial characteristics of geographic features: central tendency, dispersion, and directional trends
- Identify spatial trends in the distribution of features
- Allows you to create standard ellipse indicating the orientation and direction of your distribution

Uses:

- Compare distributions
- Examine different time periods
- Show compactness and orientation



STANDARD DEVIATIONAL ELLIPSE: CONCEPT

- Standard distance deviation is a good single measure of the dispersion of the points around the mean center, but it does not capture any *directional bias*
 - doesn't capture the shape of the distribution.
- The *standard deviation ellipse* gives dispersion in two dimensions
- Defined by 3 parameters
 - Angle of rotation
 - Dispersion (spread) along major axis
 - Dispersion (spread) along minor axis

The *major axis* defines the direction of maximum spread of the distribution

The *minor axis* is perpendicular to it and defines the minimum spread

