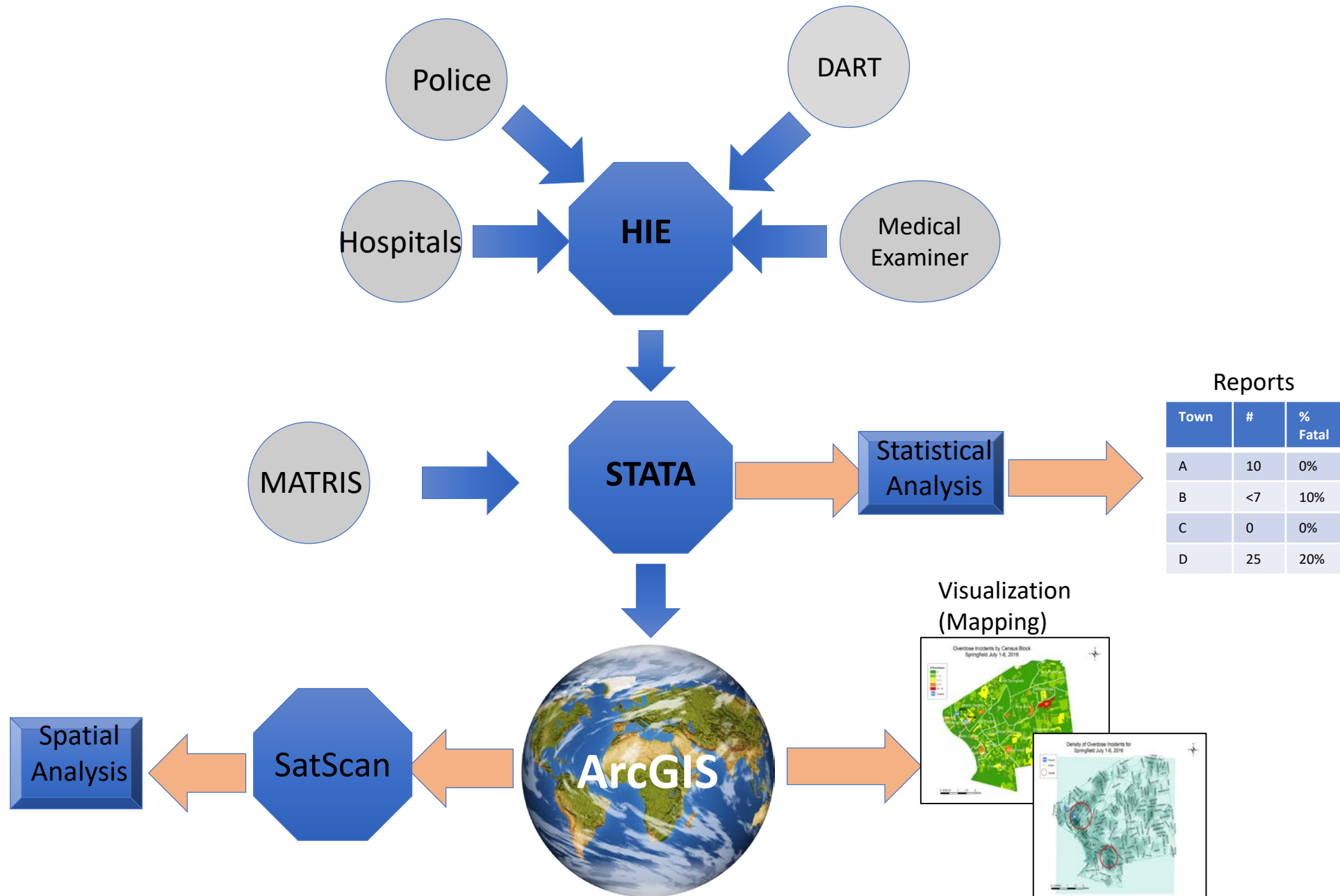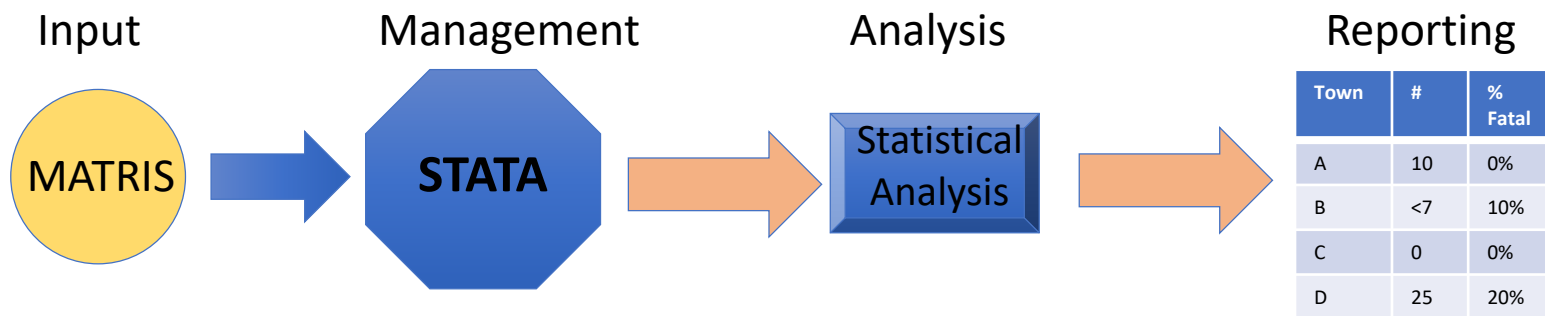# Using the Health Information Exchange for Surveillance and Mitigation of Opioid Overdoses in Western Massachusetts

Jane L. Garb, MS
Consultant for Hampshire Hope
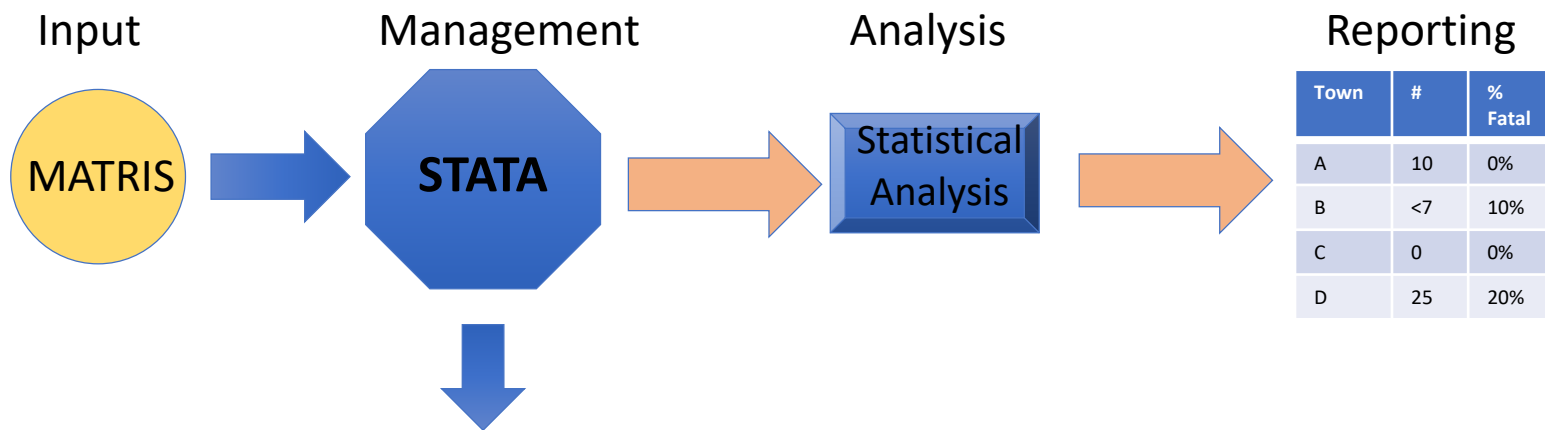
Flow of Information

	Input	Management	Analysis	Reporting

MATRIS → STATA → Statistical Analysis →

| Town	#	% Fatal
A	10	0%
B	<7	10%
C	0	0%
D	25	20%

Input: MATRIS

1) Download current Excel dataset from MATRIS file transfer site

2) Clean MATRIS file to standardize address field for easier geocoding

3) Import MATRIS excel file into STATA

Input	Management	Analysis	Reporting

Input: MATRIS

Management: STATA

Analysis: Statistical Analysis

Reporting:

| Town	#	% Fatal
A	10	0%
B	<7	10%
C	0	0%
D	25	20%

Management and Reporting: STATA

1. Generate Quarter, Year and Grandquarter fields for reporting overdoses over time

2. Generate County field for reporting by County

3. Select towns for geocode from all Western Mass Towns

4. Create tabular reports

5. export file to ArcGIS for geocoding

TOWN	COUNTY	2016 Quarter				2017 Quarter				2018 Quarter	
		1	2	3	4	1	2	3	4	1	2
AGAWAM	HAMPDEN	22	18	7	9	9	14	12	9	30	24
ATHOL	WORCESTER	22	10	12	15	9	13	11	6	21	37
CHICOPEE	HAMPDEN	144	70	52	55	44	65	68	77	81	115

| CHART DATA		2016 Quarter				2017 Quarter				2018 Quarter	
TOWN	COUNTY	1	2	3	4	1	2	3	4	1	2
GREENFIELD	FRANKLIN	22	15	24	11	9	17	24	9	15	8

GREENFIELD FRANKLIN
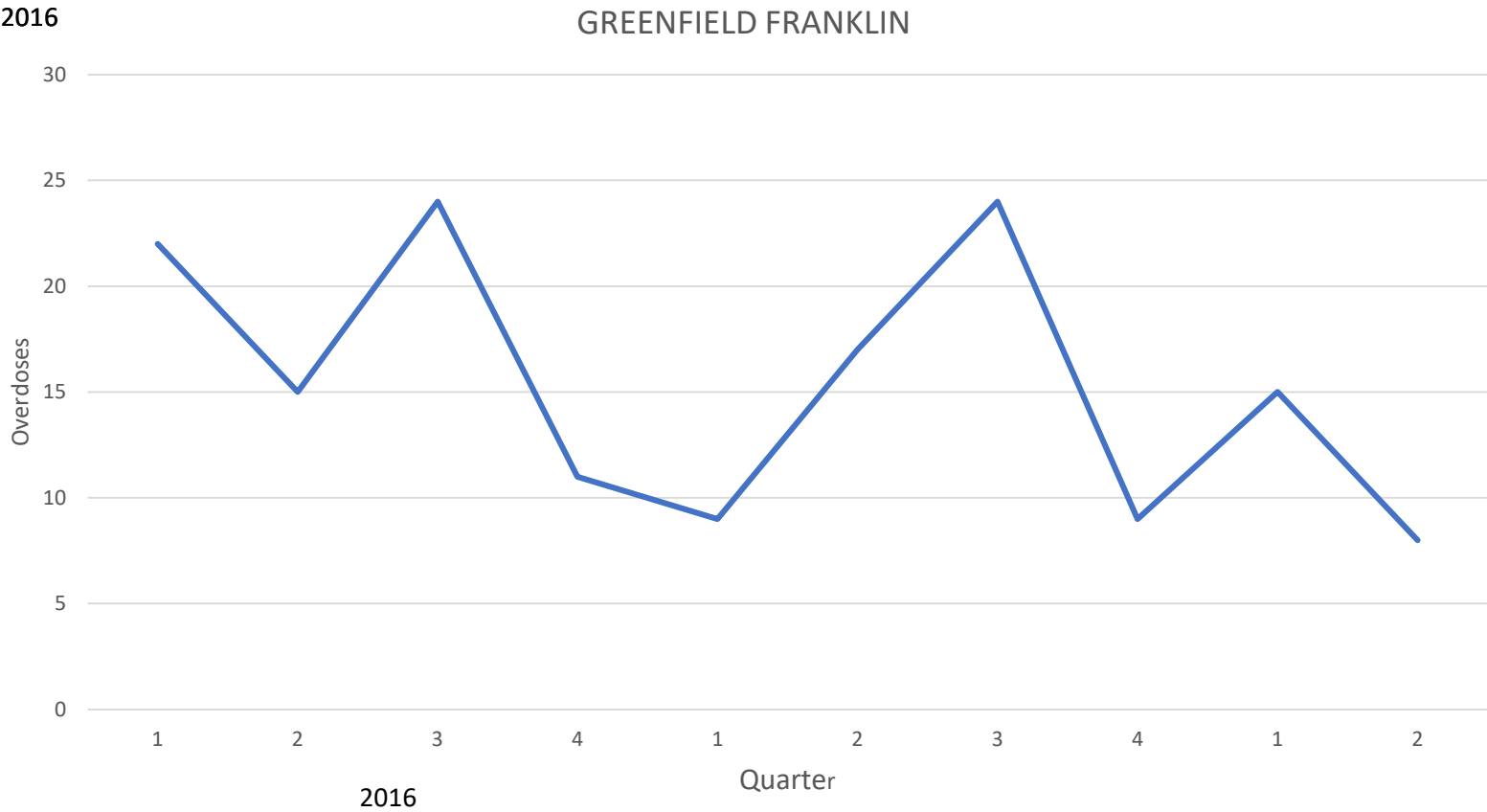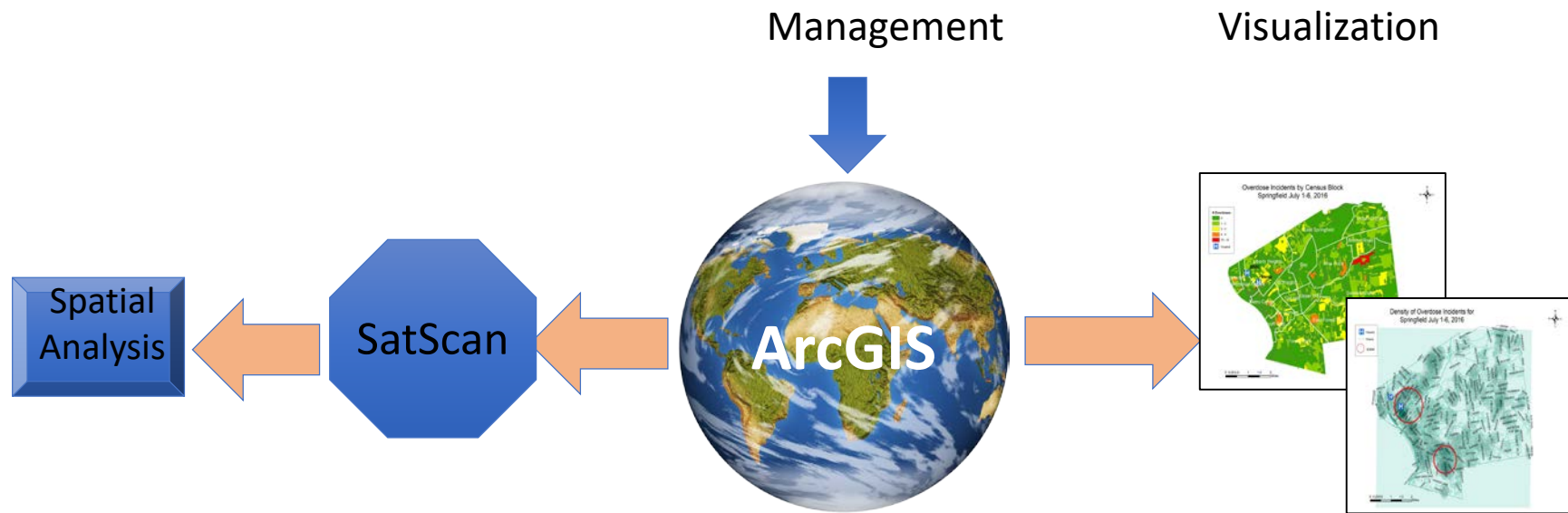
Visualization: ArcGIS

1. Geocode incidents

2. Merge with previous incidents to maintain a running file of all incidents

3. Generate Maps

4. Export file to SatScan for analyzing geographic clustering in space/time

Choropleth Map

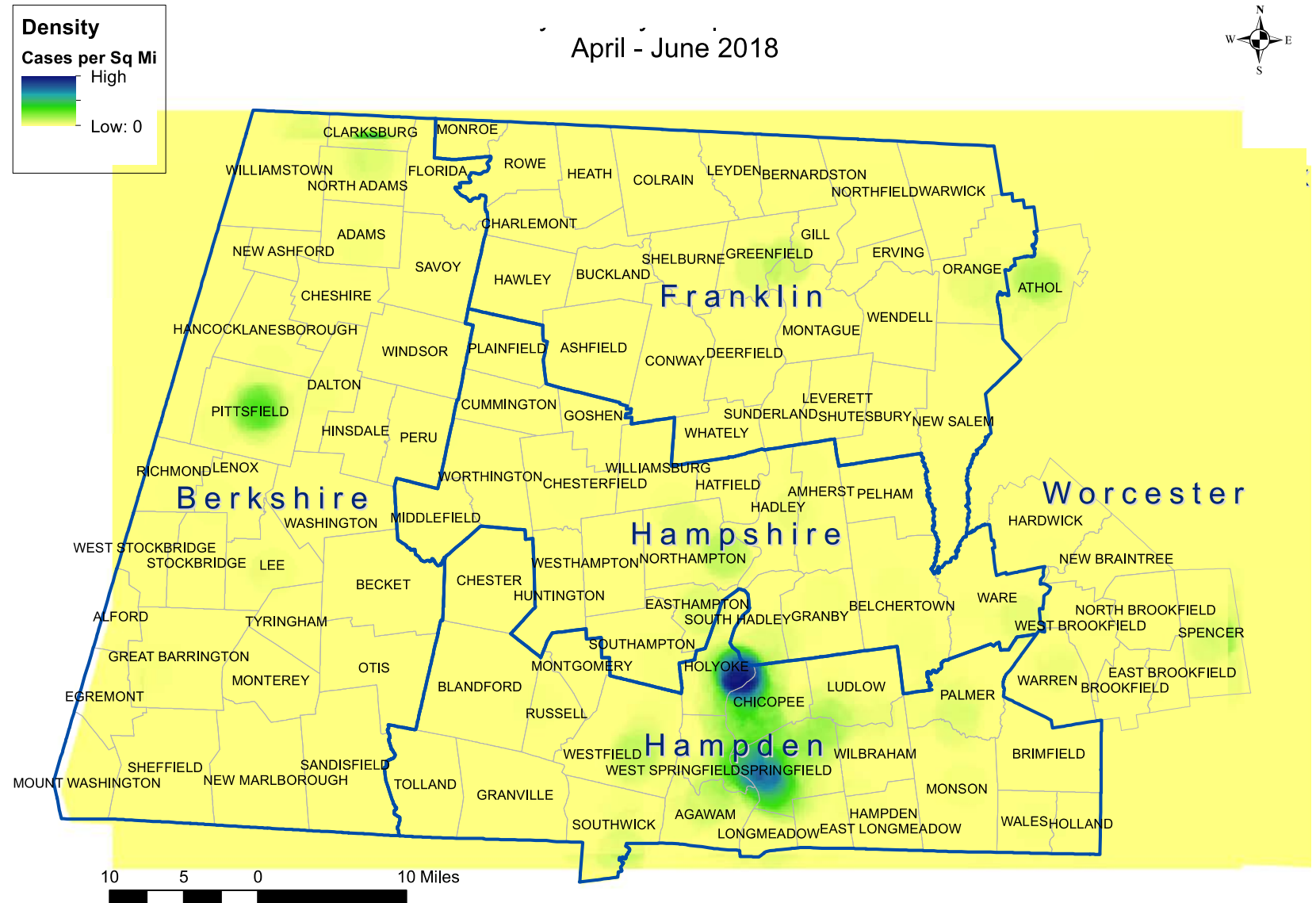Opioid Overdose Incidents by Town
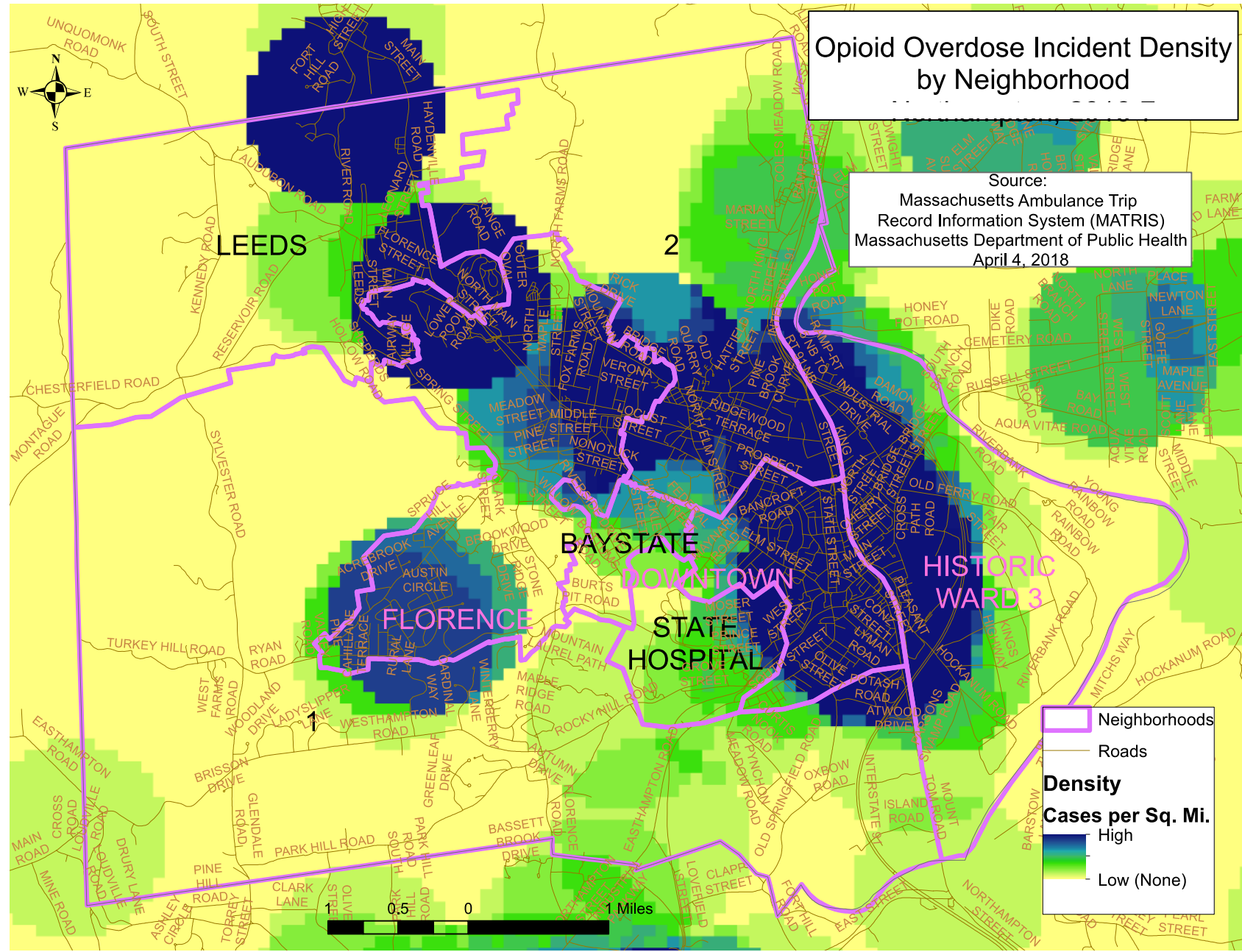July - Sept 2018
Hampden,Hampshire,Franklin Counties

Overdoses
None
<5
5-20
20-50
50-150
150-300
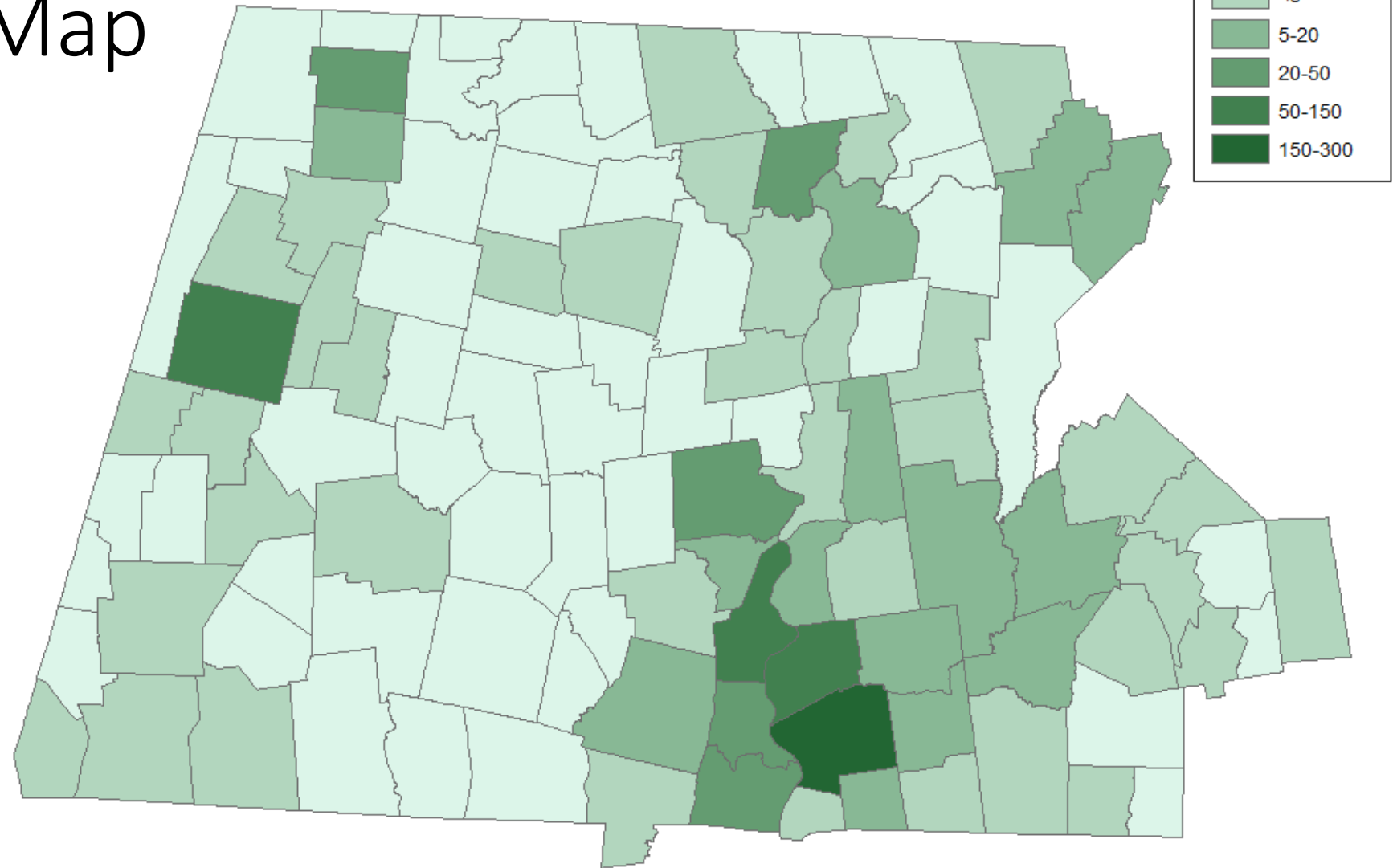
Source:
Massachusetts Ambulance Trip
Record Information System (MATRIS)
Massachusetts Department of Public Health
March 2019

Density Map

Density
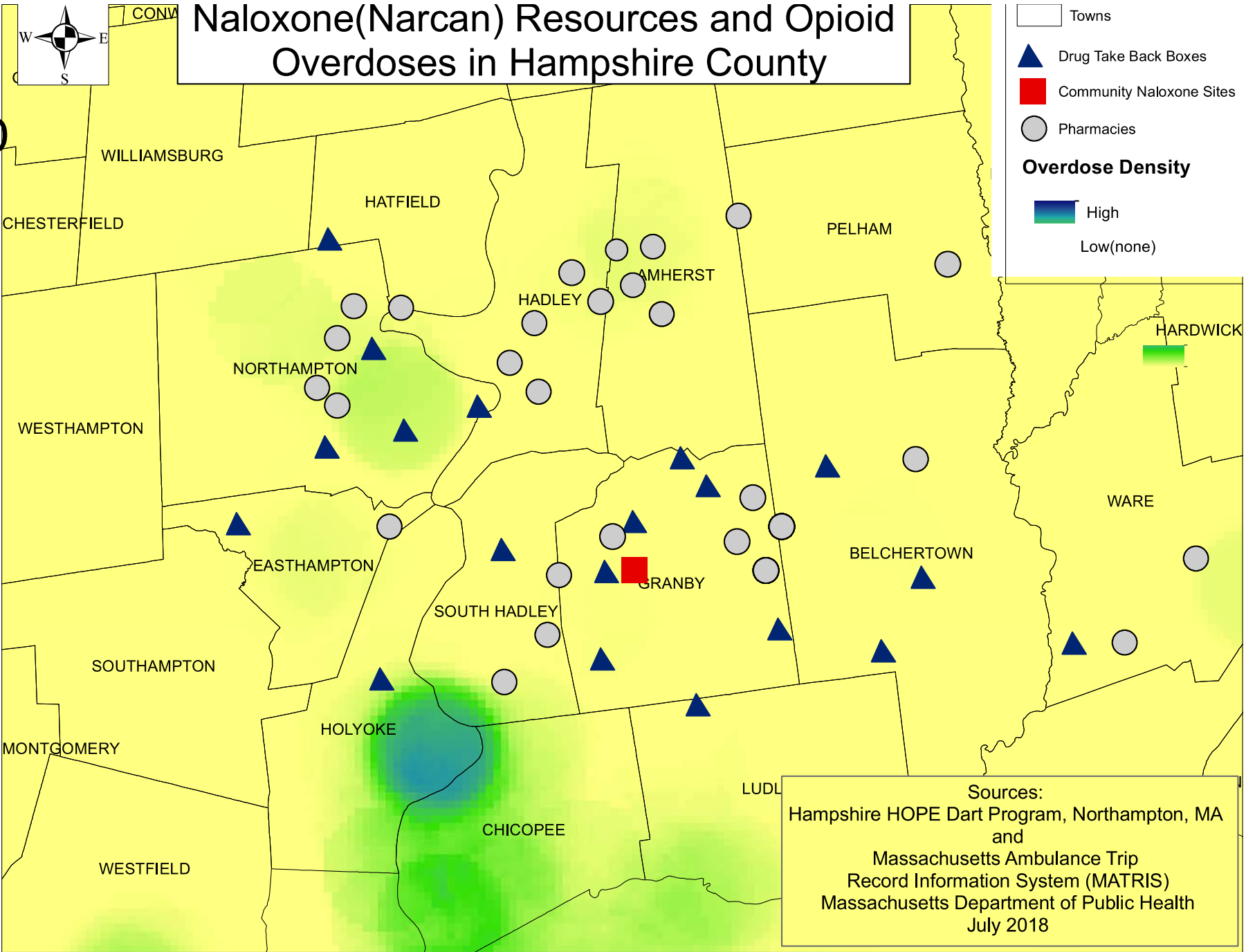**Cases per Sq Mi**
High
Low: 0

April - June 2018

Franklin

Berkshire

Hampshire

Worcester

Hampden

CLARKSBURG MONROE
WILLIAMSTOWN FLORIDA ROWE HEATH COLRAIN LEYDEN BERNARDSTON NORTHFIELD WARWICK
NORTH ADAMS
CHARLEMONT GILL
ADAMS SHELBURNE GREENFIELD ERVING ORANGE
NEW ASHFORD SAVOY HAWLEY BUCKLAND ATHOL
CHESHIRE MONTAGUE WENDELL
HANCOCK LANESBOROUGH PLAINFIELD ASHFIELD CONWAY DEERFIELD
WINDSOR LEVERETT
DALTON CUMMINGTON GOSHEN SUNDERLAND SHUTESBURY NEW SALEM
PITTSFIELD WHATELY
HINSDALE PERU
RICHMOND LENOX WORTHINGTON CHESTERFIELD WILLIAMSBURG HATFIELD AMHERST PELHAM HARDWICK
HADLEY
WASHINGTON NEW BRAINTREE
WEST STOCKBRIDGE MIDDLEFIELD WESTHAMPTON NORTHAMPTON WARE
STOCKBRIDGE LEE BECKET CHESTER HUNTINGTON NORTH BROOKFIELD
ALFORD EASTHAMPTON BELCHERTOWN WEST BROOKFIELD SPENCER
TYRINGHAM SOUTH HADLEY GRANBY
GREAT BARRINGTON OTIS SOUTHAMPTON EAST BROOKFIELD
MONTEREY MONTGOMERY HOLYOKE WARREN BROOKFIELD
EGREMONT BLANDFORD CHICOPEE LUDLOW PALMER
RUSSELL WESTFIELD WILBRAHAM BRIMFIELD
SHEFFIELD SANDISFIELD WEST SPRINGFIELD SPRINGFIELD
MOUNT WASHINGTON NEW MARLBOROUGH TOLLAND GRANVILLE AGAWAM HAMPDEN MONSON
SOUTHWICK LONGMEADOW EAST LONGMEADOW WALES HOLLAND

10   5   0   10 Miles

Neighborhoods and Roads Overlaid on Density Map

Point Overlay on Density Map (Fictitious)

Naloxone(Narcan) Resources and Opioid Overdoses in Hampshire County

Legend:
- Towns
- Drug Take Back Boxes
- Community Naloxone Sites
- Pharmacies

Overdose Density
- High
- Low(none)

Sources:
Hampshire HOPE Dart Program, Northampton, MA
and
Massachusetts Ambulance Trip
Record Information System (MATRIS)
Massachusetts Department of Public Health
July 2018

Analysis

Spatial Analysis ← SatScan ← ArcGIS → [maps]

Analysis: SatScan

We Can explore visual patterns found in maps further using spatial analysis

Export from ArcGIS to SatScan

1. Incident locations (lat/long)

2. Incident dates

3. # of Cases at each location

Hotspot Map in ArcGIS

Opioid Overdose Hot Spots & Cold Spots
April - June 2018
Hampden,Hampshire,Franklin Counties

Hotspots
- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence

Source: Massachusetts Ambulance Trip

10   5   0   10 Miles
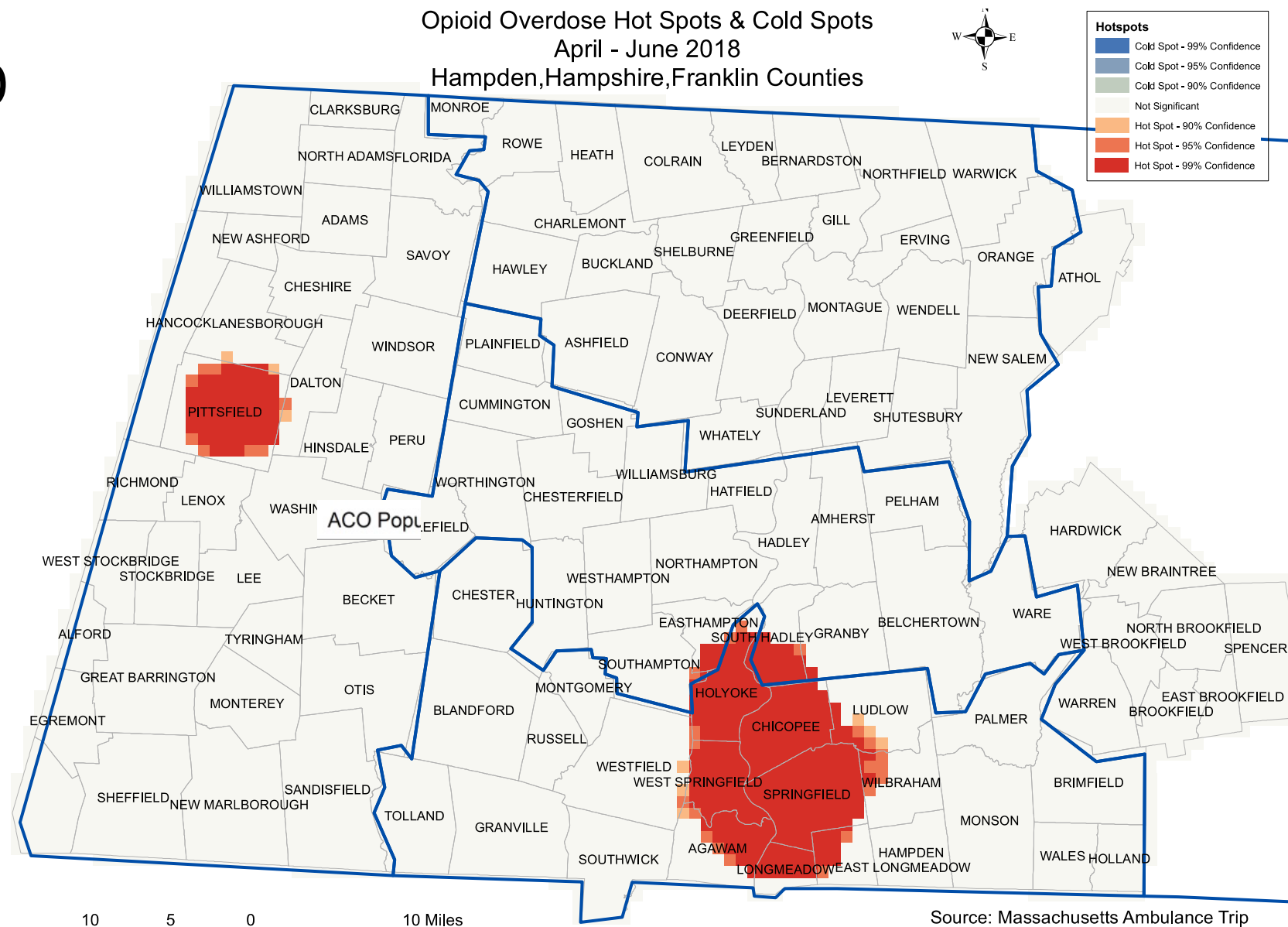
Decision Analysis

- Also called suitability or locational analysis

- Quantifies decision-making

- Criteria weighted and combined

- Weights chosen by decision-makers

- Result: Ranking of geographic areas for suitability

- Criteria/weights can be changed

Figure 2: Modeling Suitability
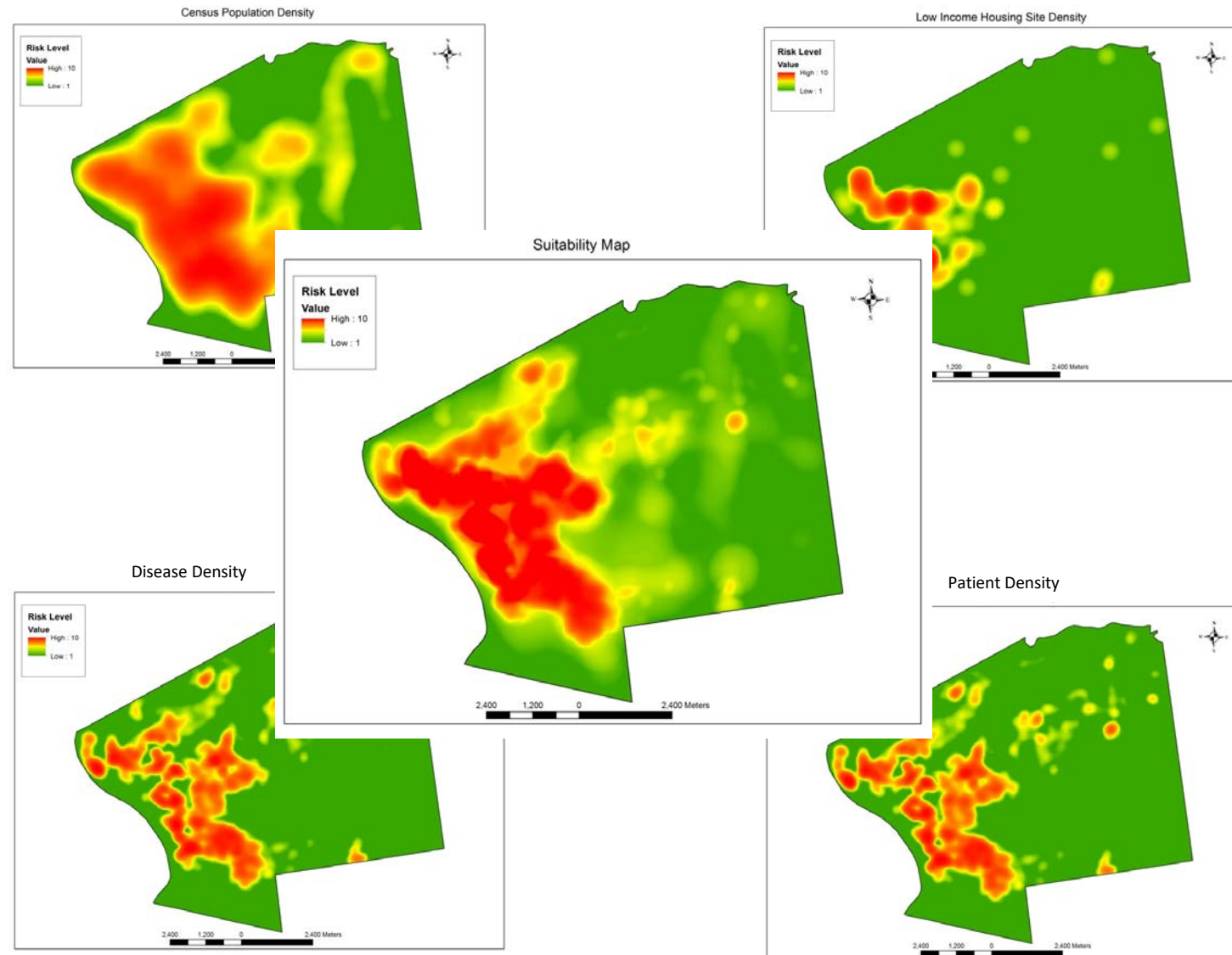
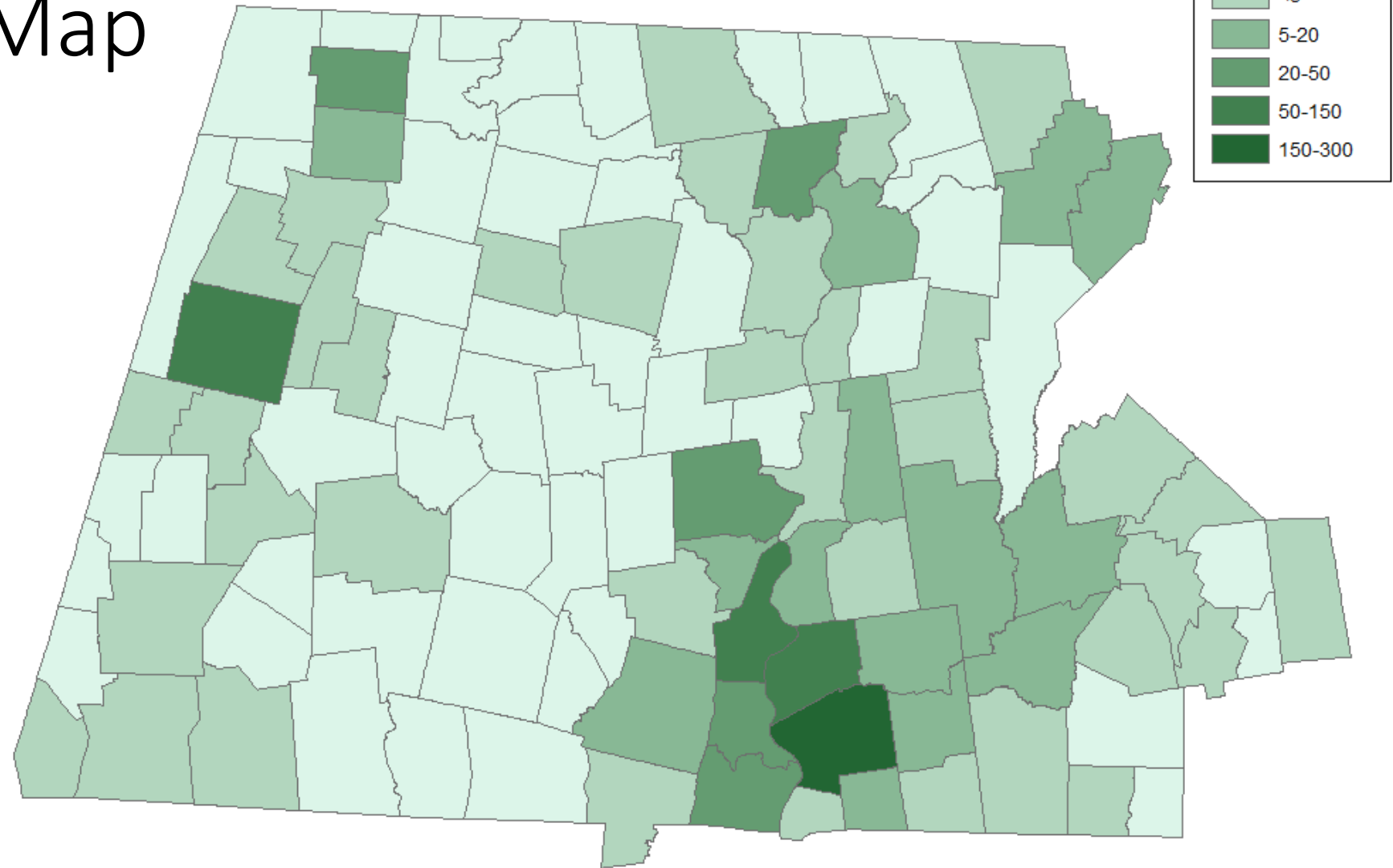# Suitability Ranking of the 30 Sites
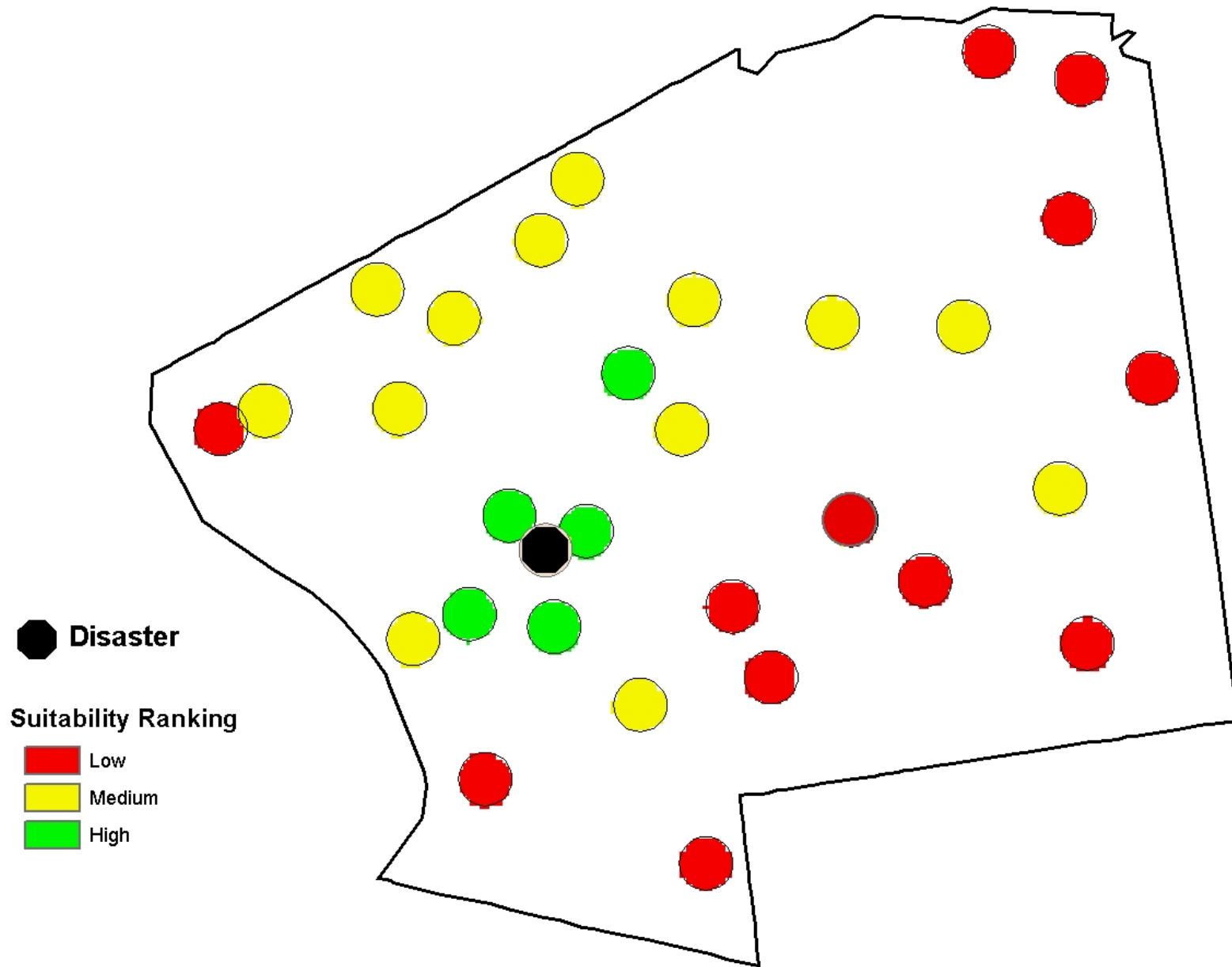
Using GIS with the HIE

- Visualization
  - Use choropleth maps to alert the public and civic leaders of the scope of the problem
  - Map the distribution of overdoses with density maps
  - Overlay resources to see the relationship of resources to overdose locations
- Spatial Analysis
  - Identify clustering of cases in space or time
  - ? Identify factors in overdose concentration in communities or sub-communities
- Decision Analysis
  - Generate suitability maps to guide the distribution of resources

Choropleth Map

Opioid Overdose Incidents by Town
July - Sept 2018
Hampden, Hampshire, Franklin Counties

Overdoses
None
<5
5-20
20-50
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Source:
Massachusetts Ambulance Trip
Record Information System (MATRIS)
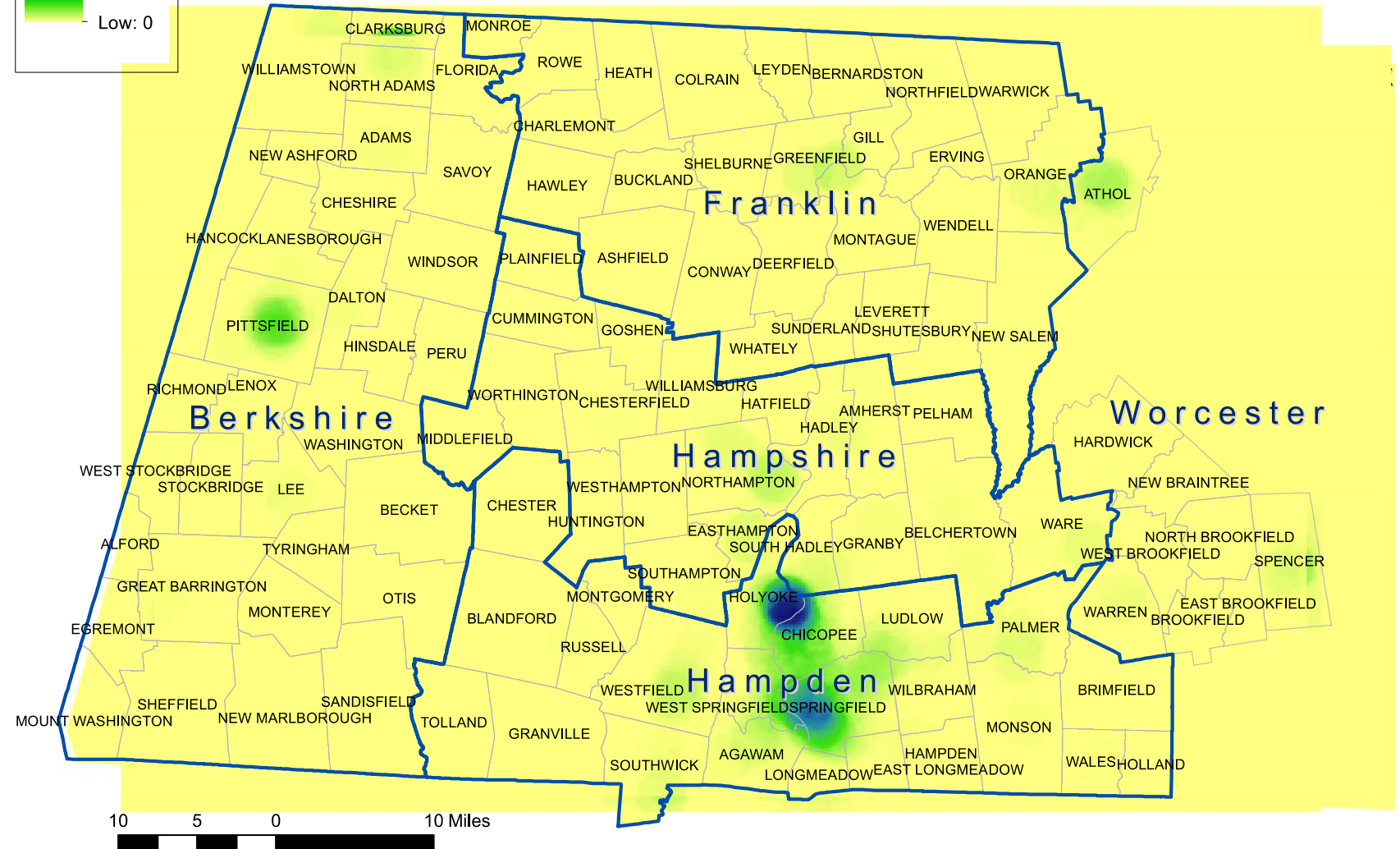Massachusetts Department of Public Health
March 2019

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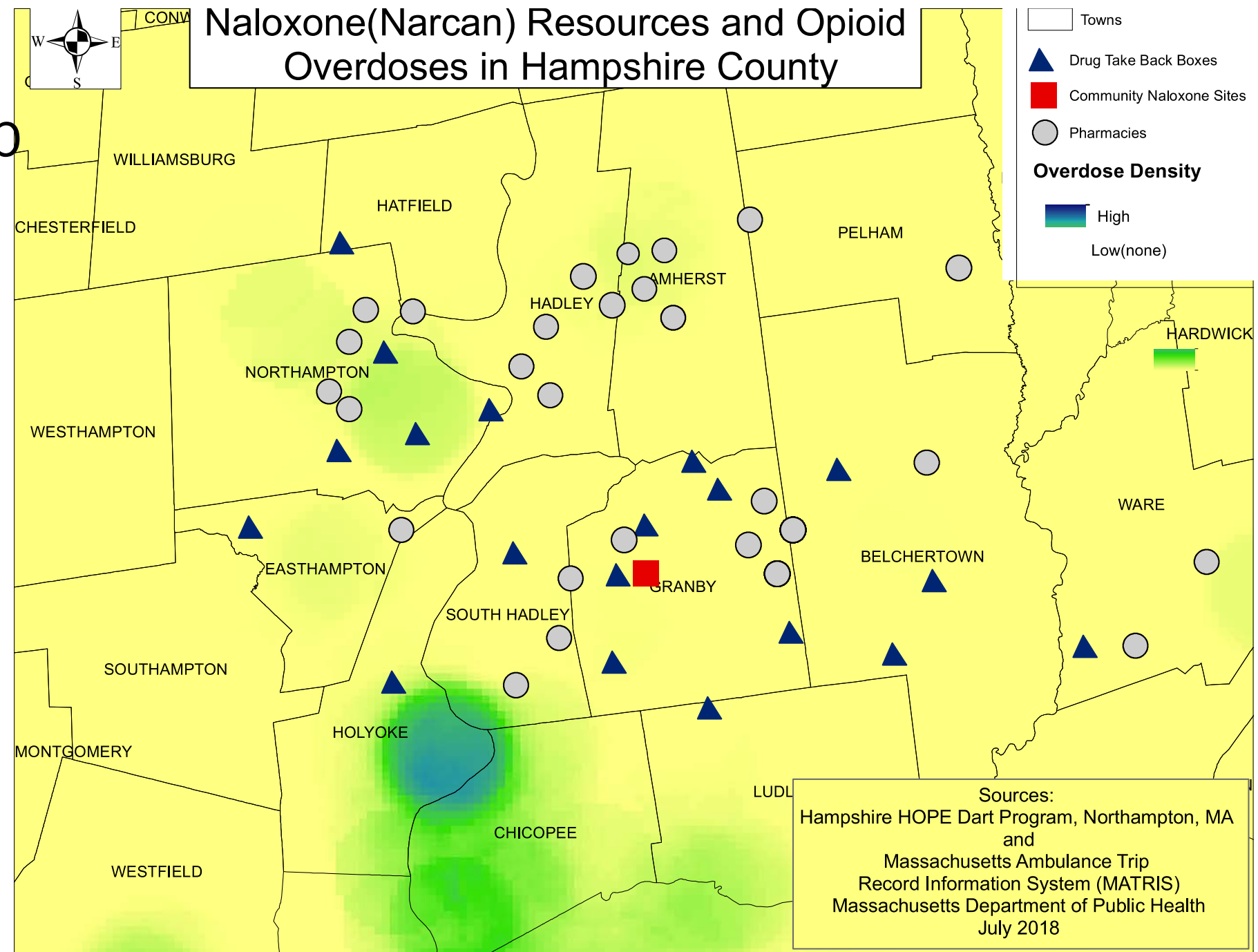
Density Map

April - June 2018

Density
Cases per Sq Mi

High

Low: 0
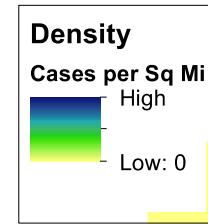
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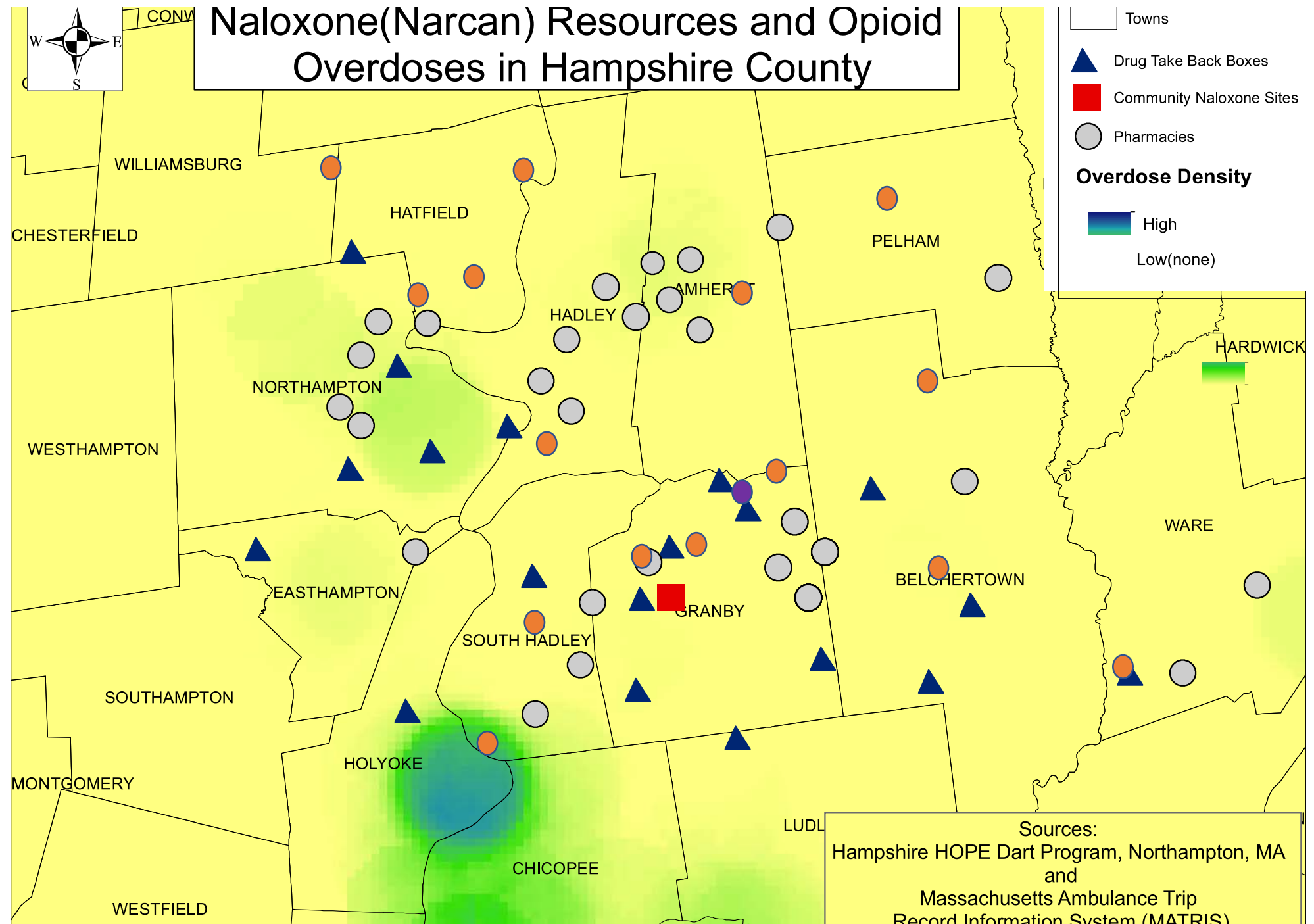
er 2018

10   5   0   10 Miles

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Point Overlay on Density Map

Naloxone(Narcan) Resources and Opioid Overdoses in Hampshire County

Legend:
- Towns
- ▲ Drug Take Back Boxes
- ■ Community Naloxone Sites
- ⚪ Pharmacies

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Sources:
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Massachusetts Ambulance Trip
Record Information System (MATRIS)
Massachusetts Department of Public Health
July 2018

Town labels: CONW, WILLIAMSBURG, CHESTERFIELD, HATFIELD, AMHERST, HADLEY, PELHAM, HARDWICK, NORTHAMPTON, WESTHAMPTON, WARE, BELCHERTOWN, EASTHAMPTON, GRANBY, SOUTH HADLEY, SOUTHAMPTON, HOLYOKE, MONTGOMERY, LUDL, CHICOPEE, WESTFIELD

Overlay bus routes and stops

Naloxone(Narcan) Resources and Opioid Overdoses in Hampshire County

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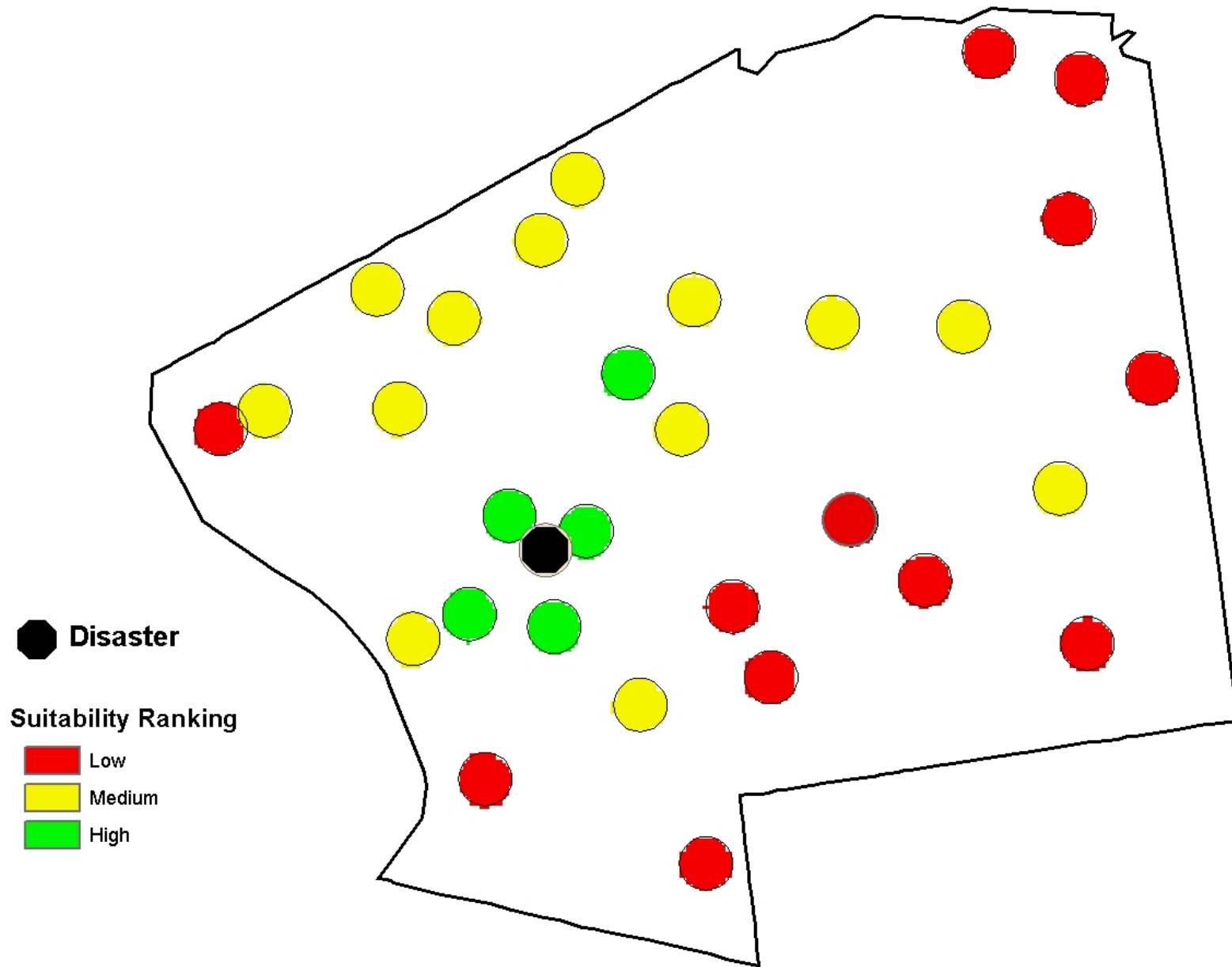- Spatial Analysis
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Suitability Ranking of the 30 Sites

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