Task 2: Long-Distance Travel Charging Needs

Update for EVICC

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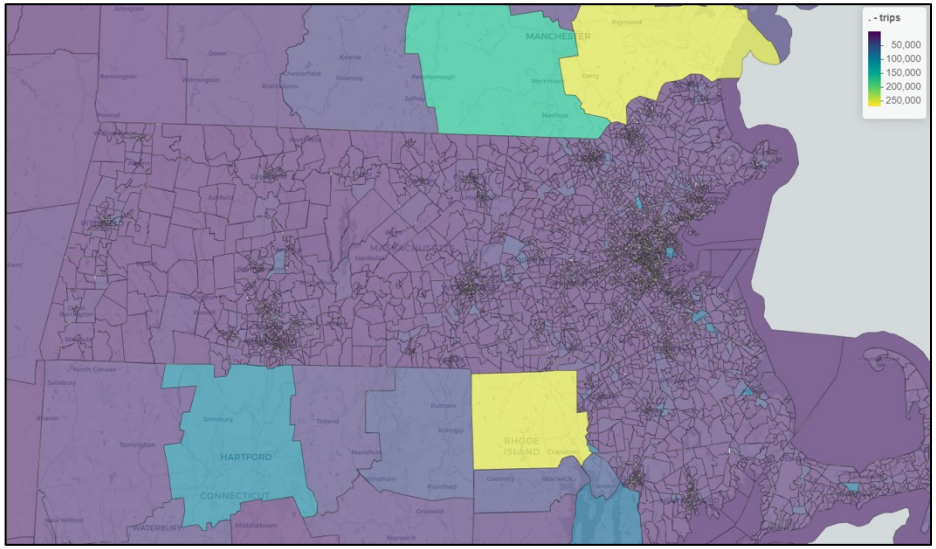
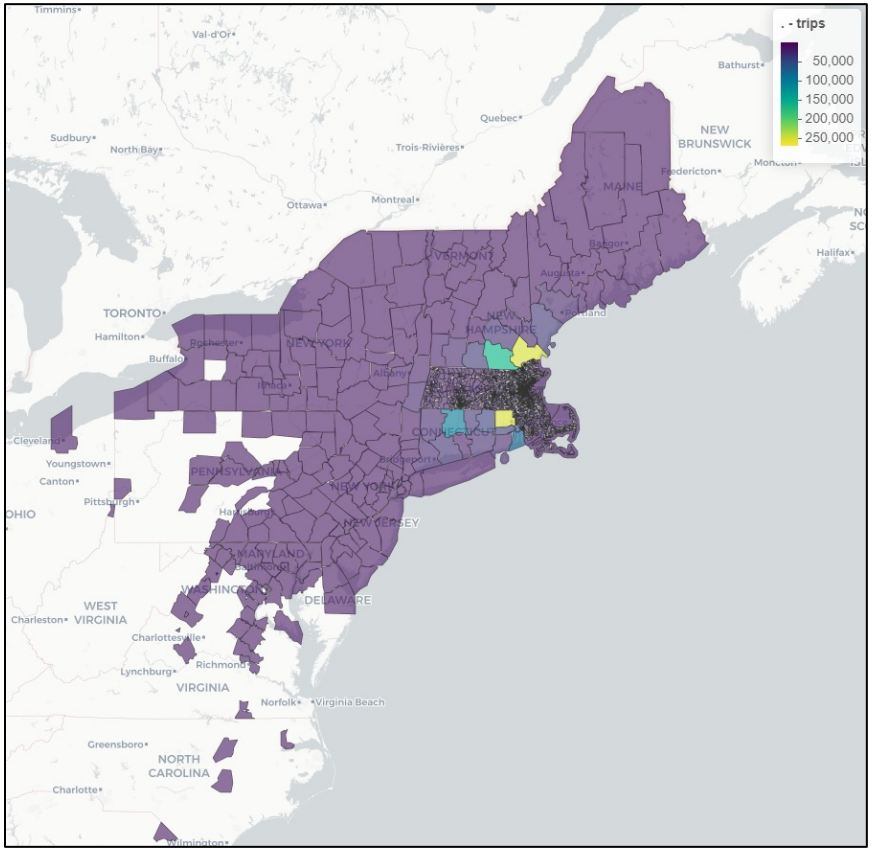
Long Distance Travel Analysis

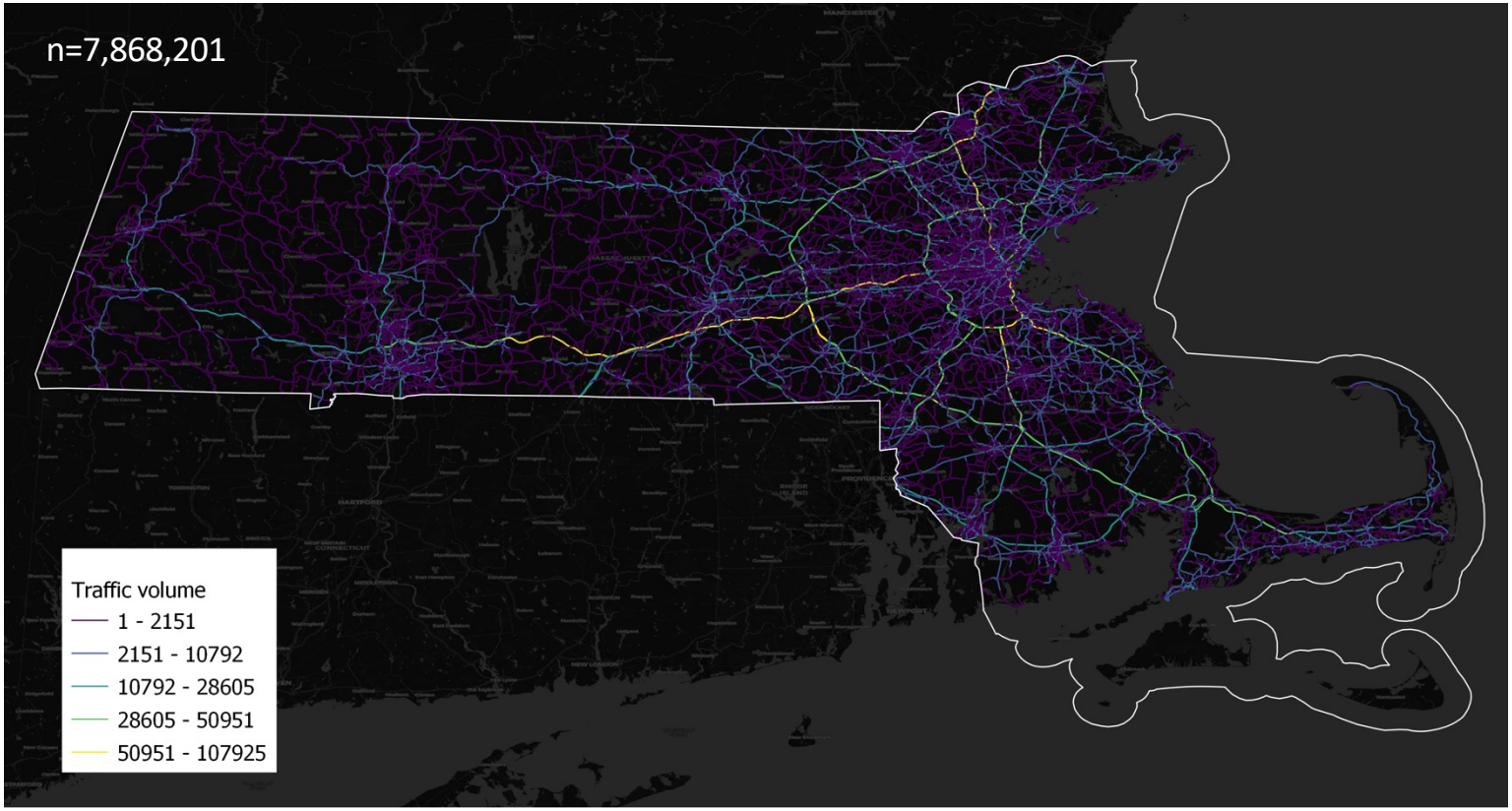
Streetlight Connected Vehicle Data

- Passive data purchase
  - Origin-destination data was provided in the form of census block groups within Massachusetts & counties outside the state (in cases where a trip had an origin or destination within Massachusetts)

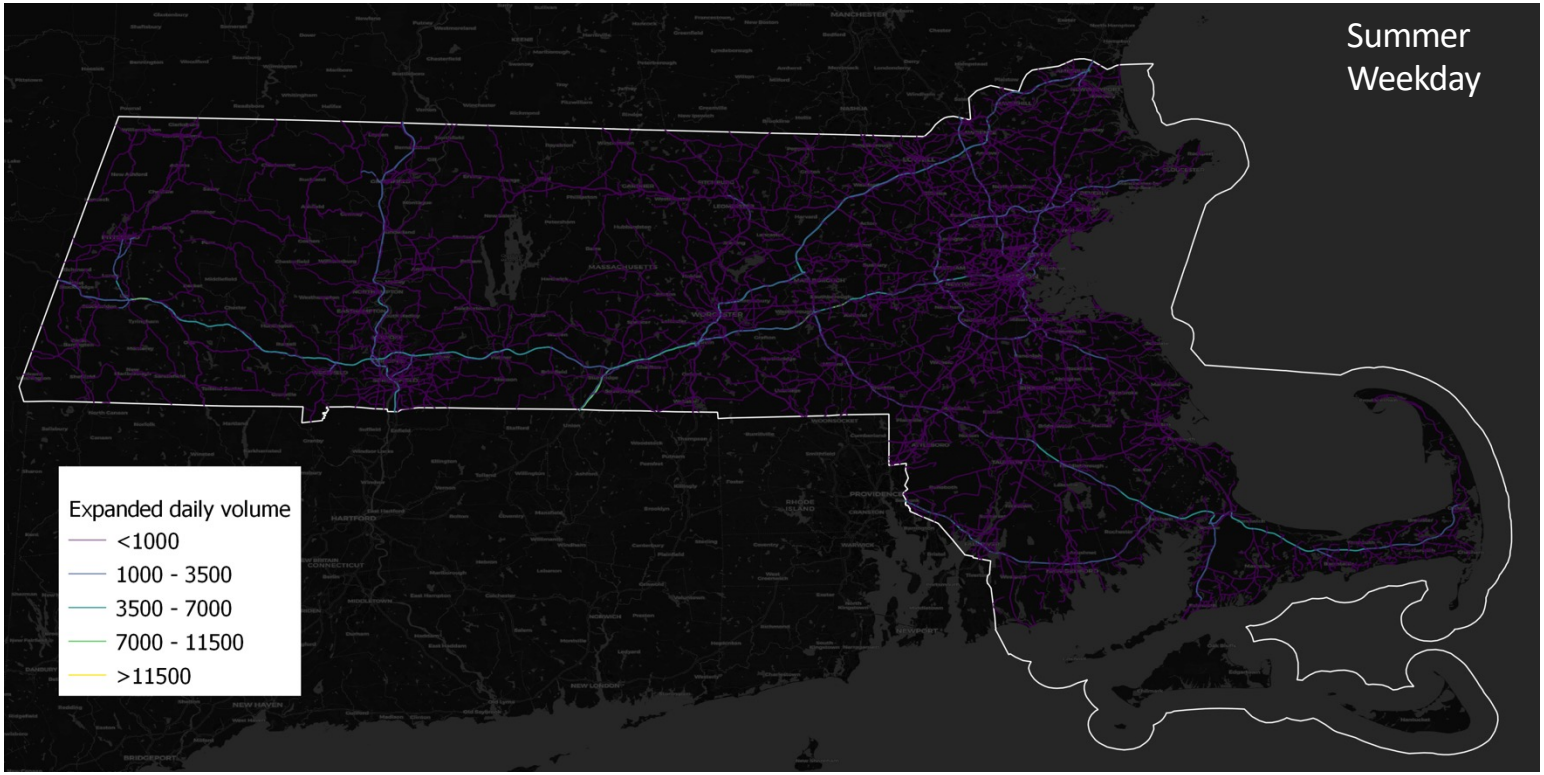




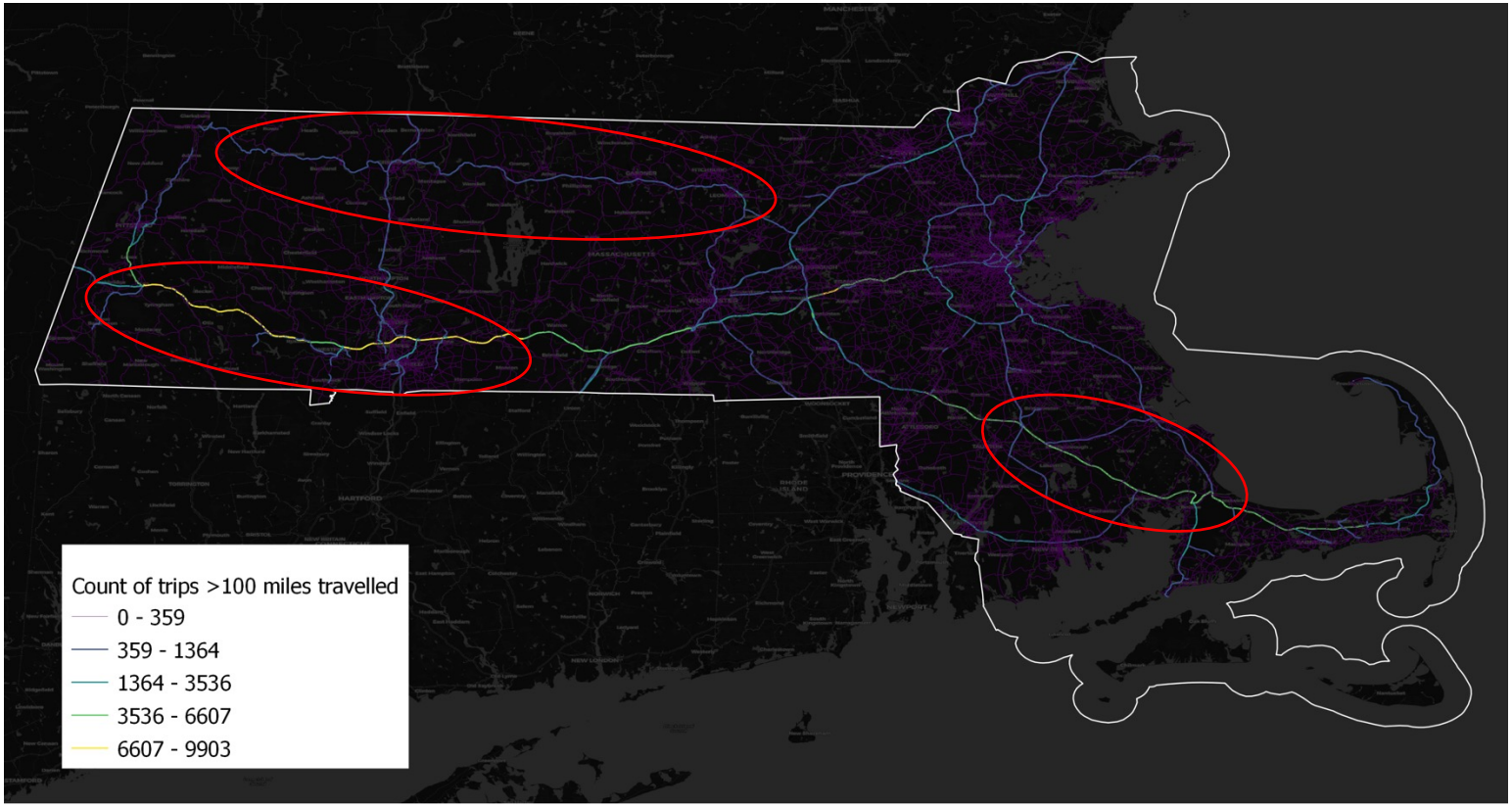
Passive data routed on the network (summer)



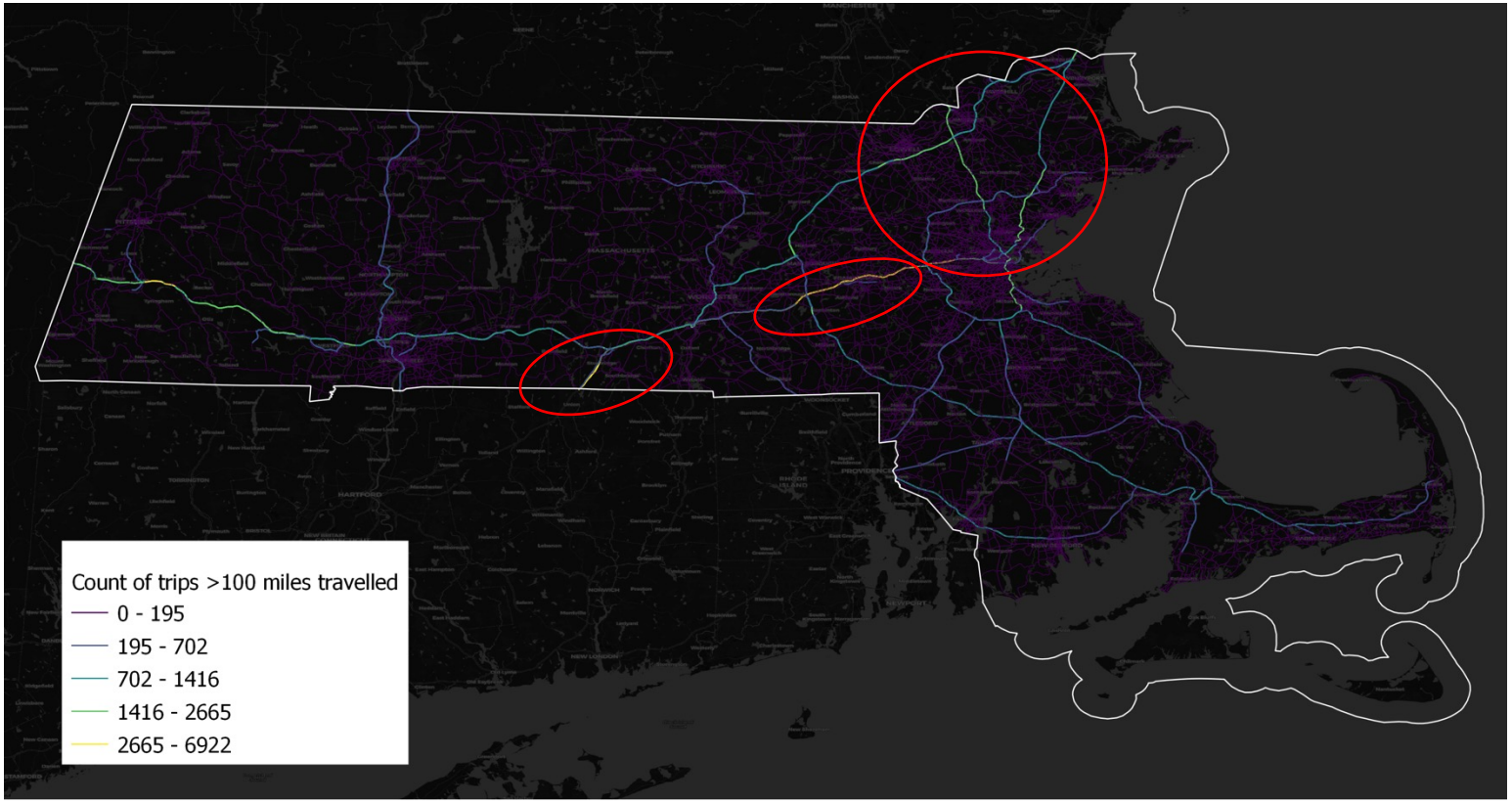
Expanded long-distance trip volumes (summer)



Summer long distance trips after 100 miles



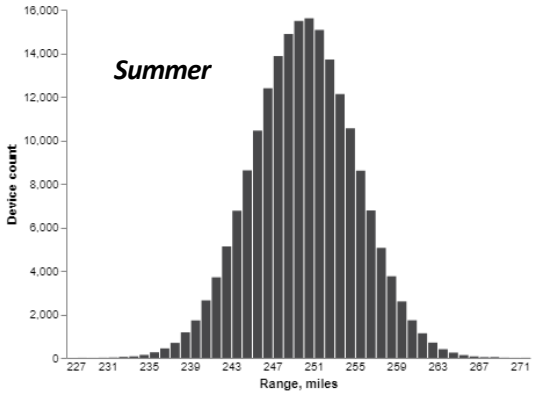
Winter long distance trips after 100 miles

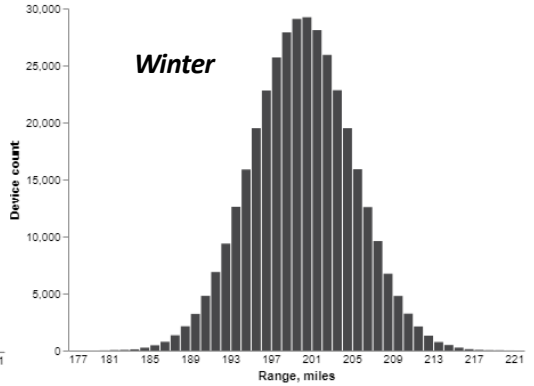


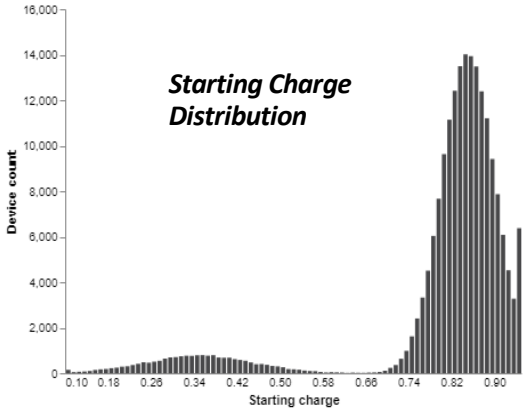
Recharge behavior assumptions

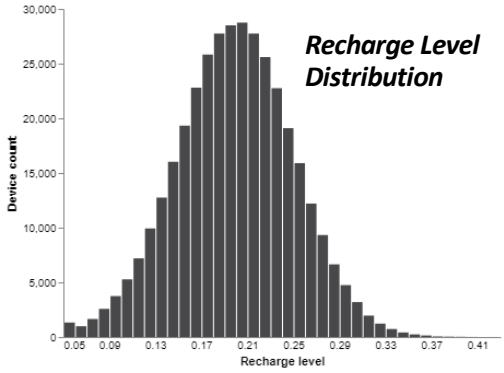
PARAMETER	MEAN	SPREAD
Percent of vehicles charging at home	90%	5%
Charge level when charged at home	85%	5%
Charge level when charged away from home	35%	5%
Range	250 miles	5 miles
Critical recharge level	20%	5%
Charge to level	70%	5%
Winter range handicap (reduced range)	20%	n/a

Parameter Distributions

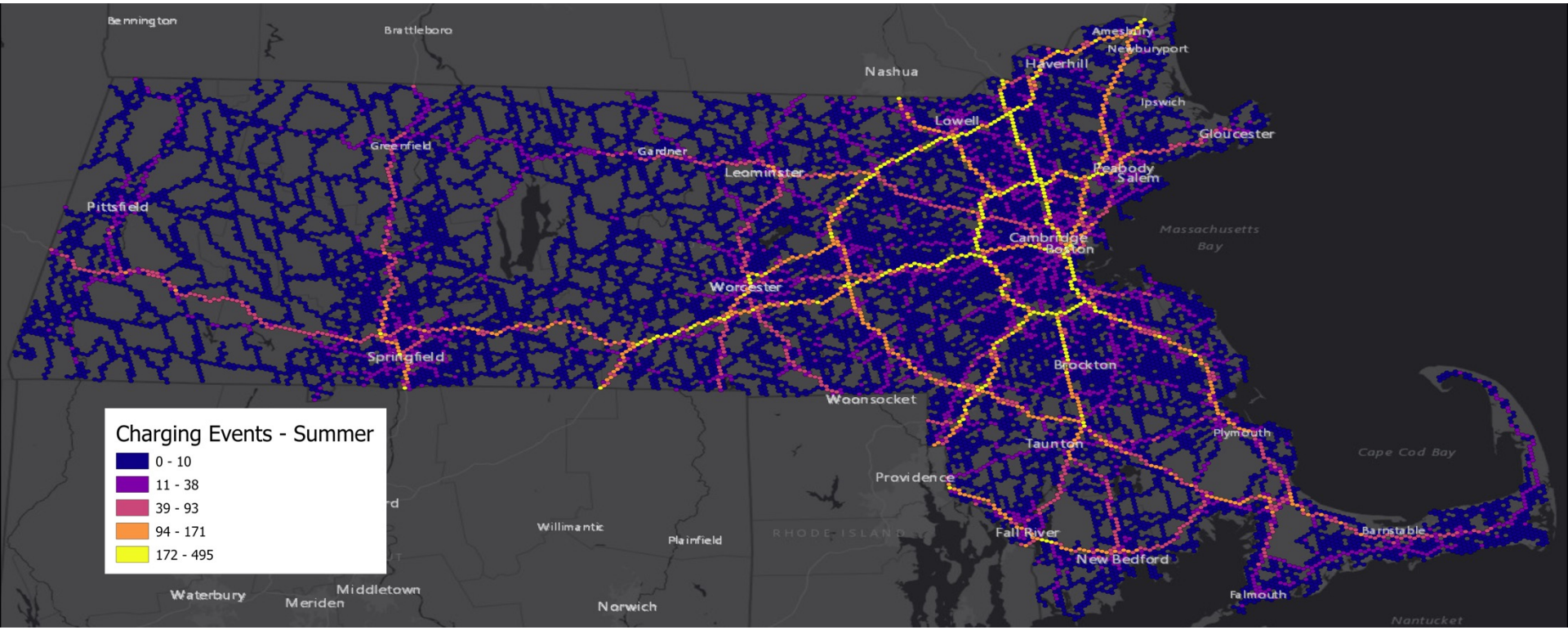




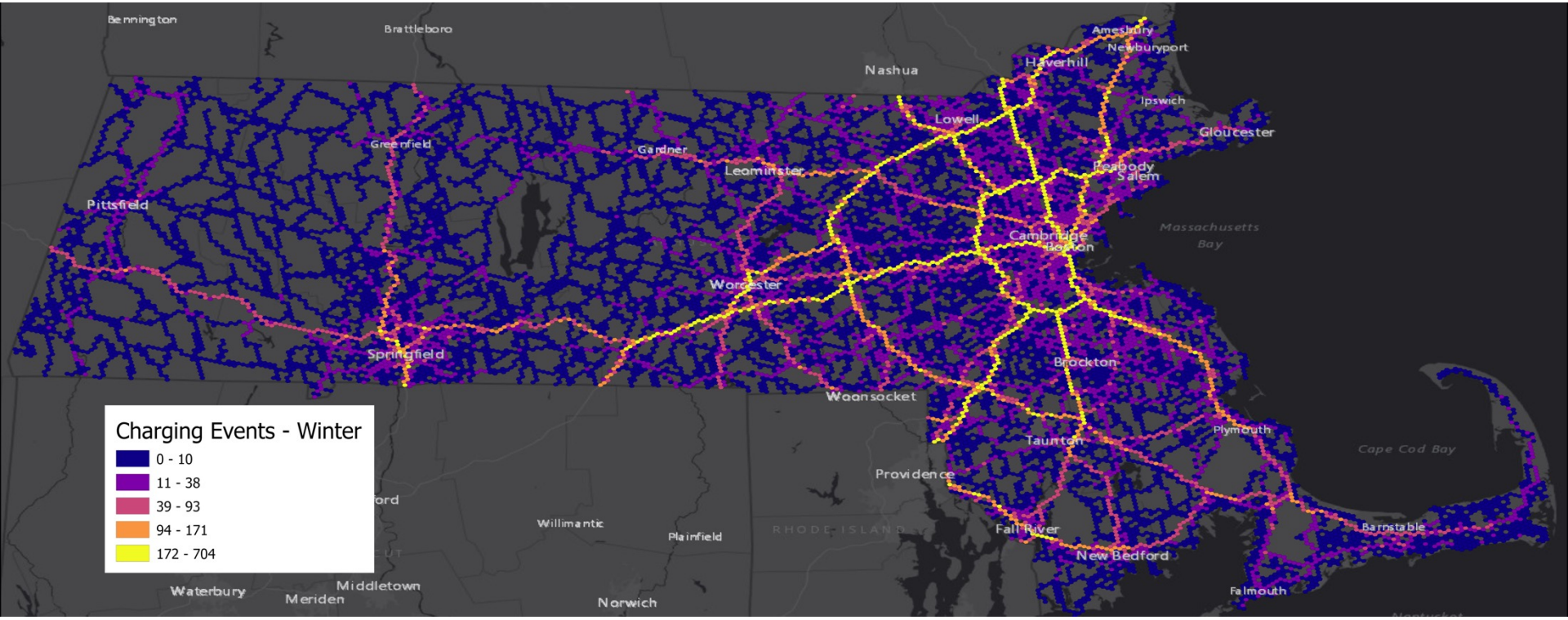




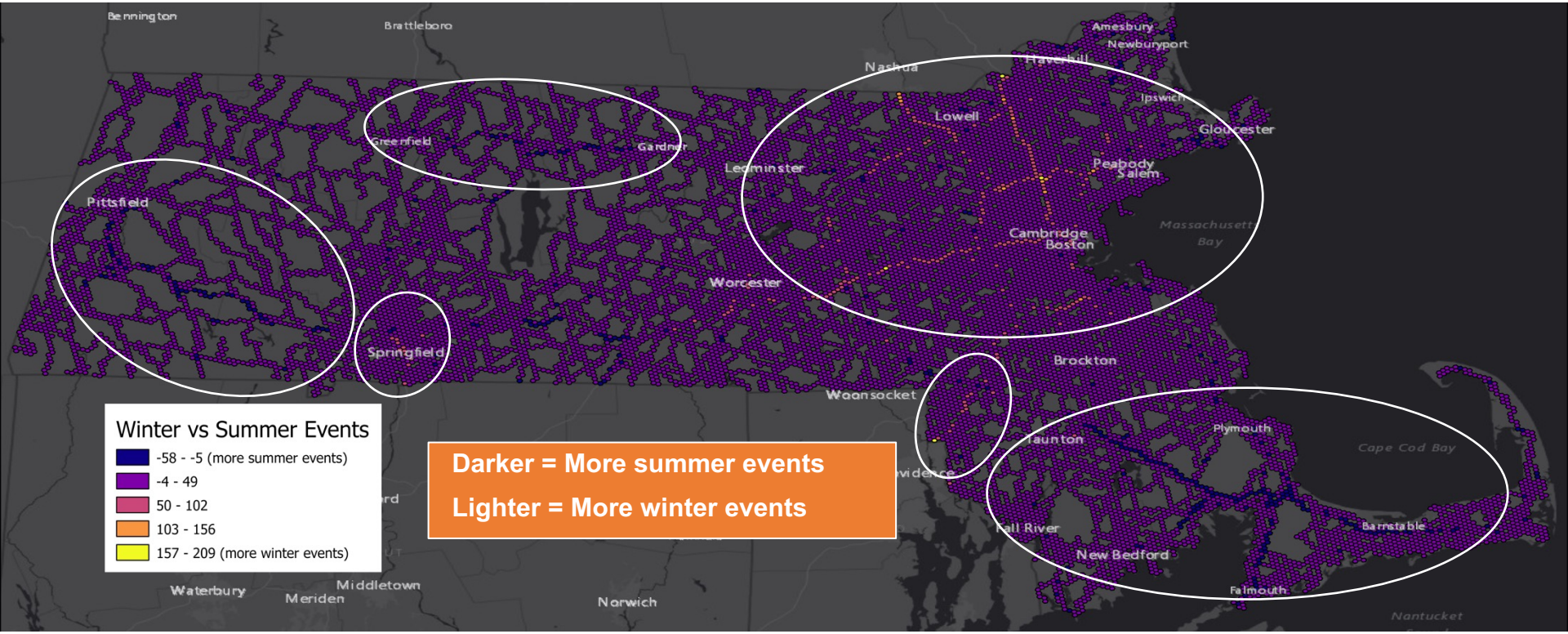
Peak summer charging events



Peak winter charging events



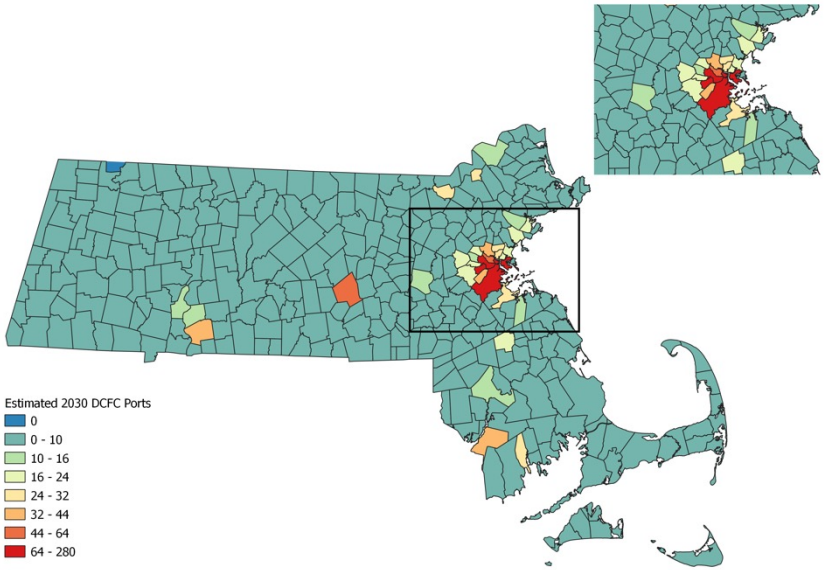
Winter vs. summer charging events



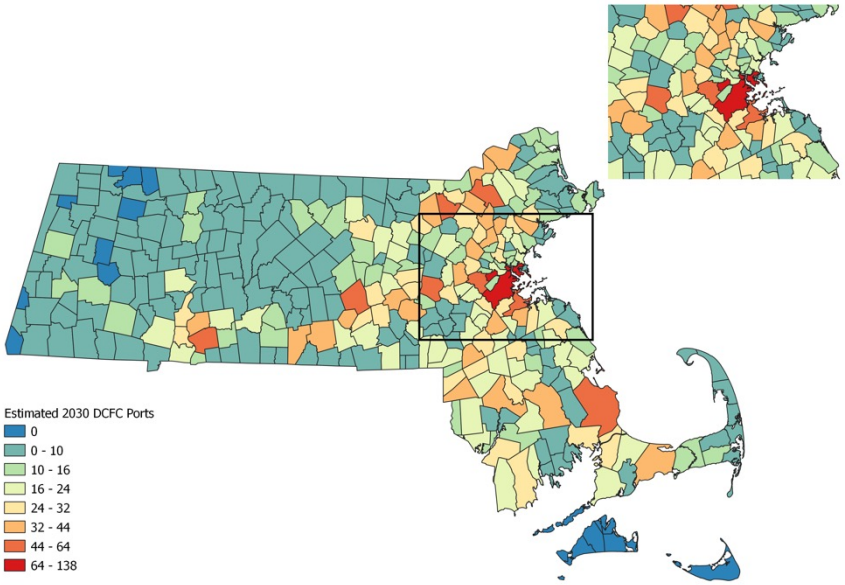
DCFC Charger Locations

Town-Level Allocation

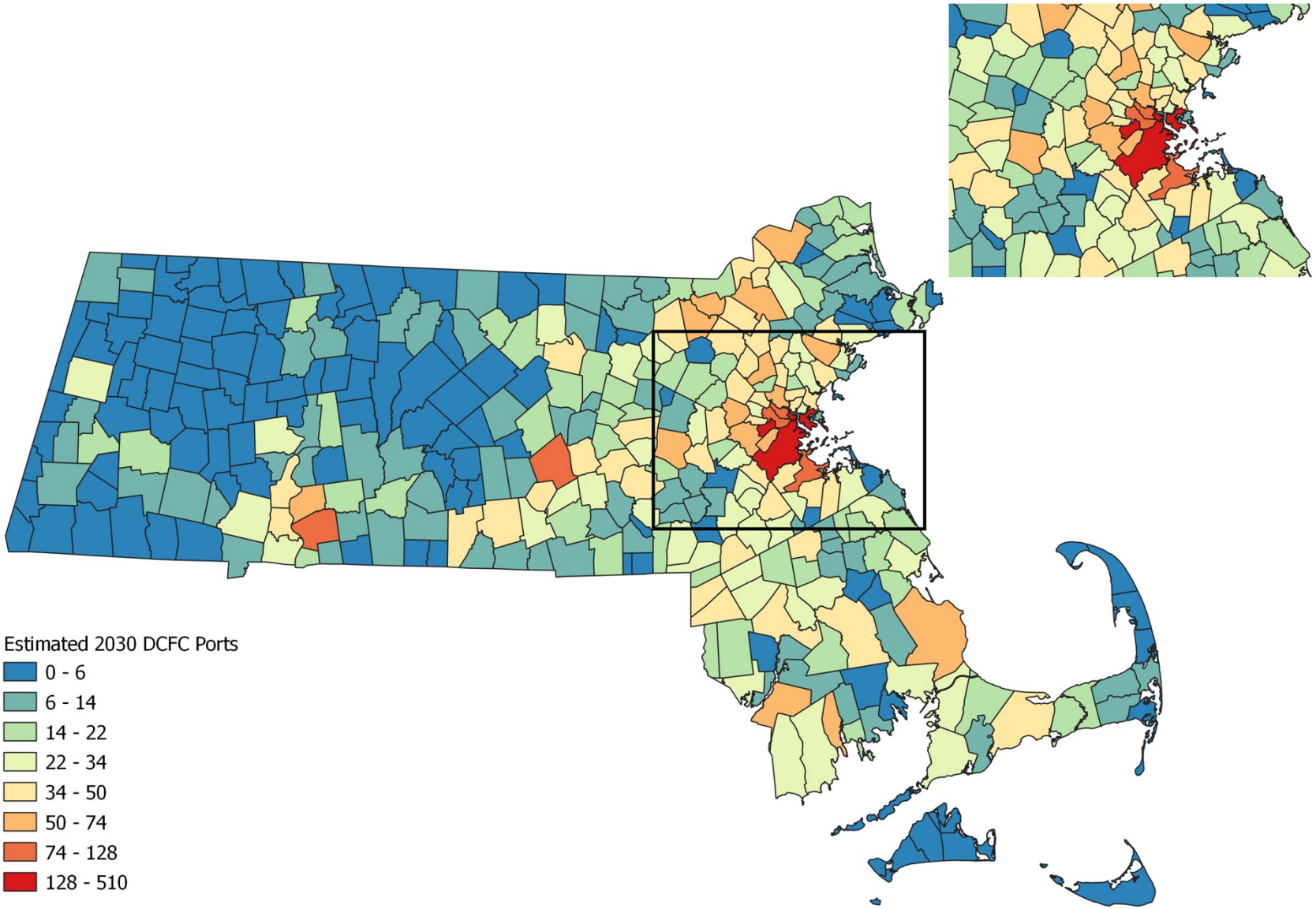
- 2,000 DCFC allocated based on apartment density



- 5,000 chargers based on the peak total charging demand from long-distance trips

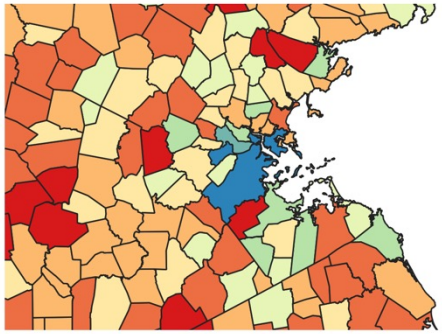


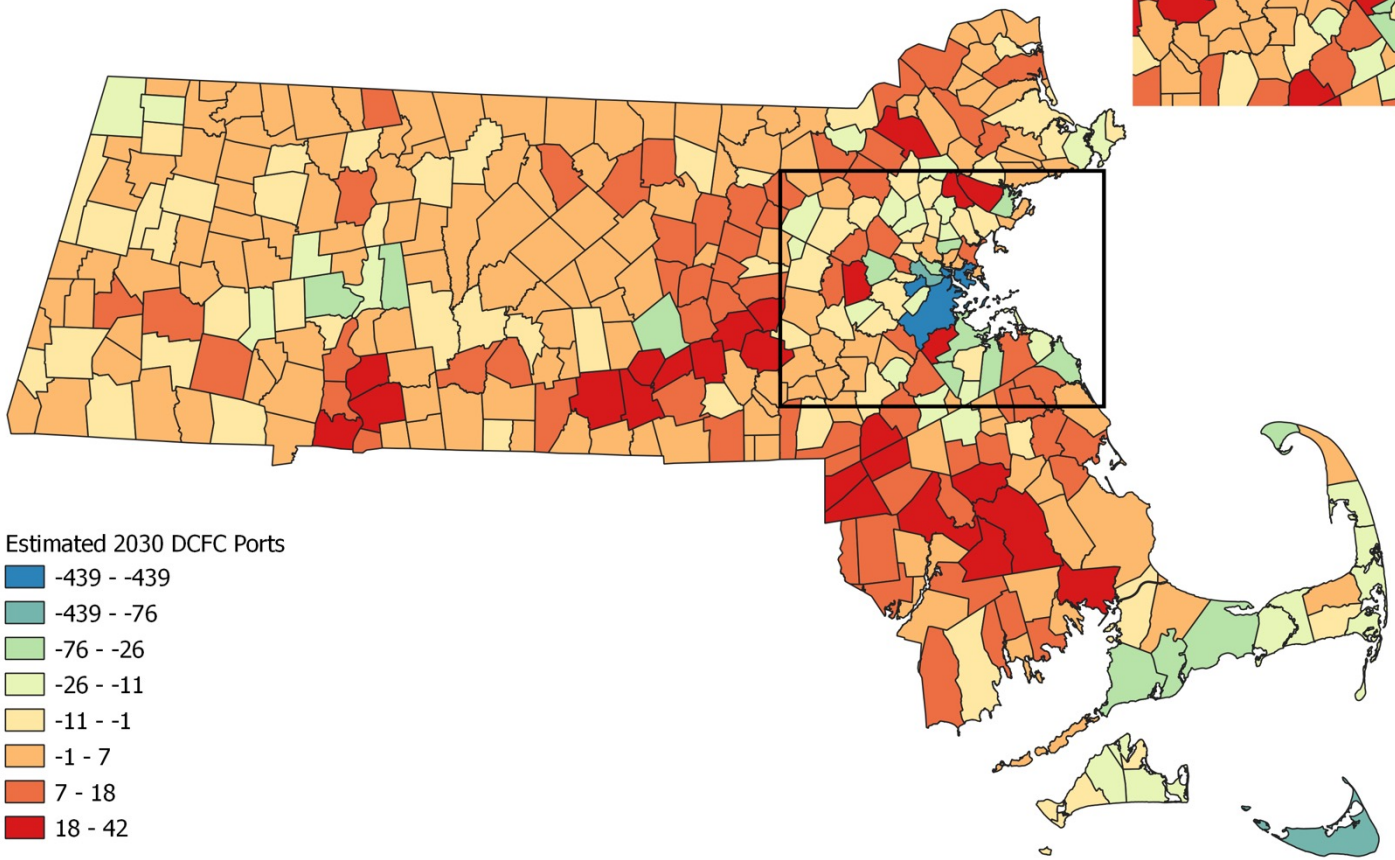
Final DCFC Allocation by Town



Difference Between Task 1 and 2 Results

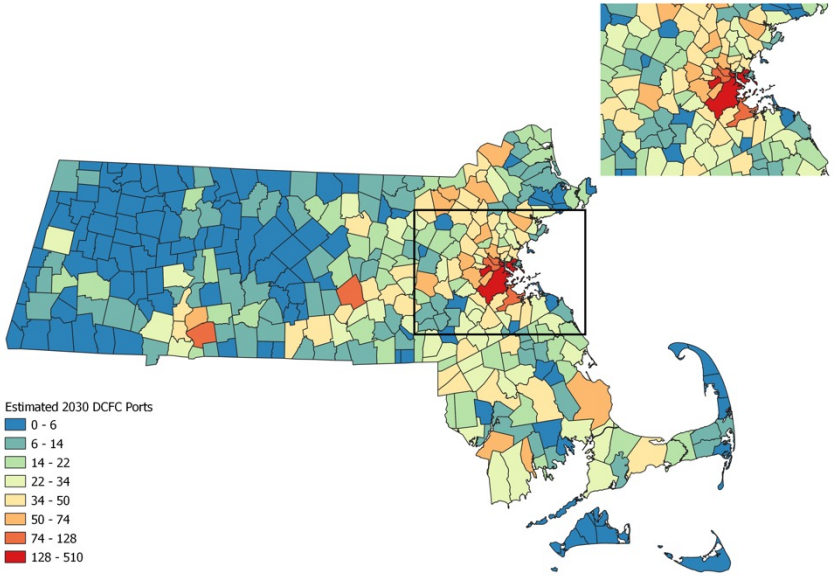
- Task 1 used “traffic”; Task 2 uses the “long distance charging demand”
- The difference in the approaches between Task 1 and Task 2 led to significant changes in the estimated number of DCFC



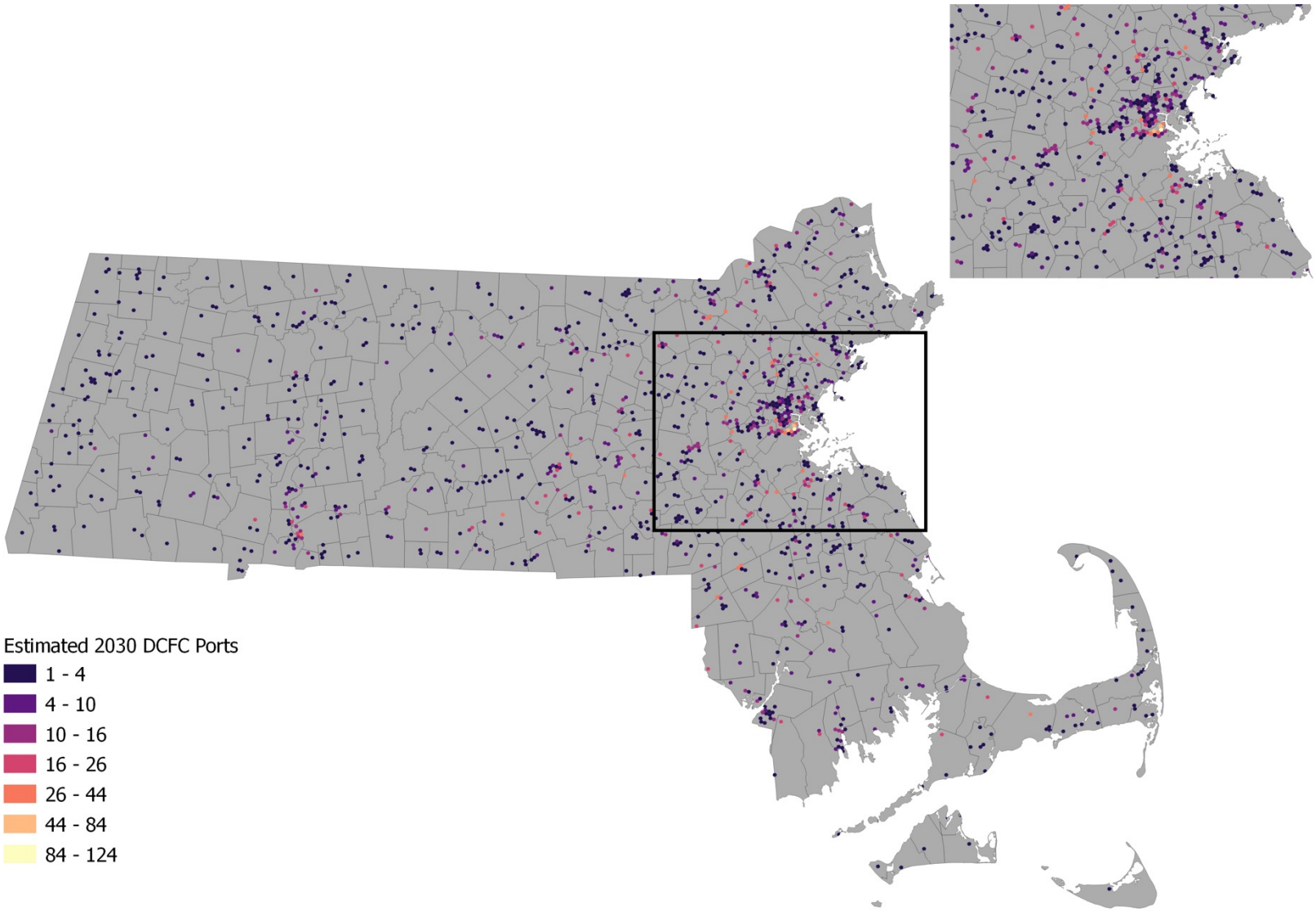


Allocating at the Hex Cell level

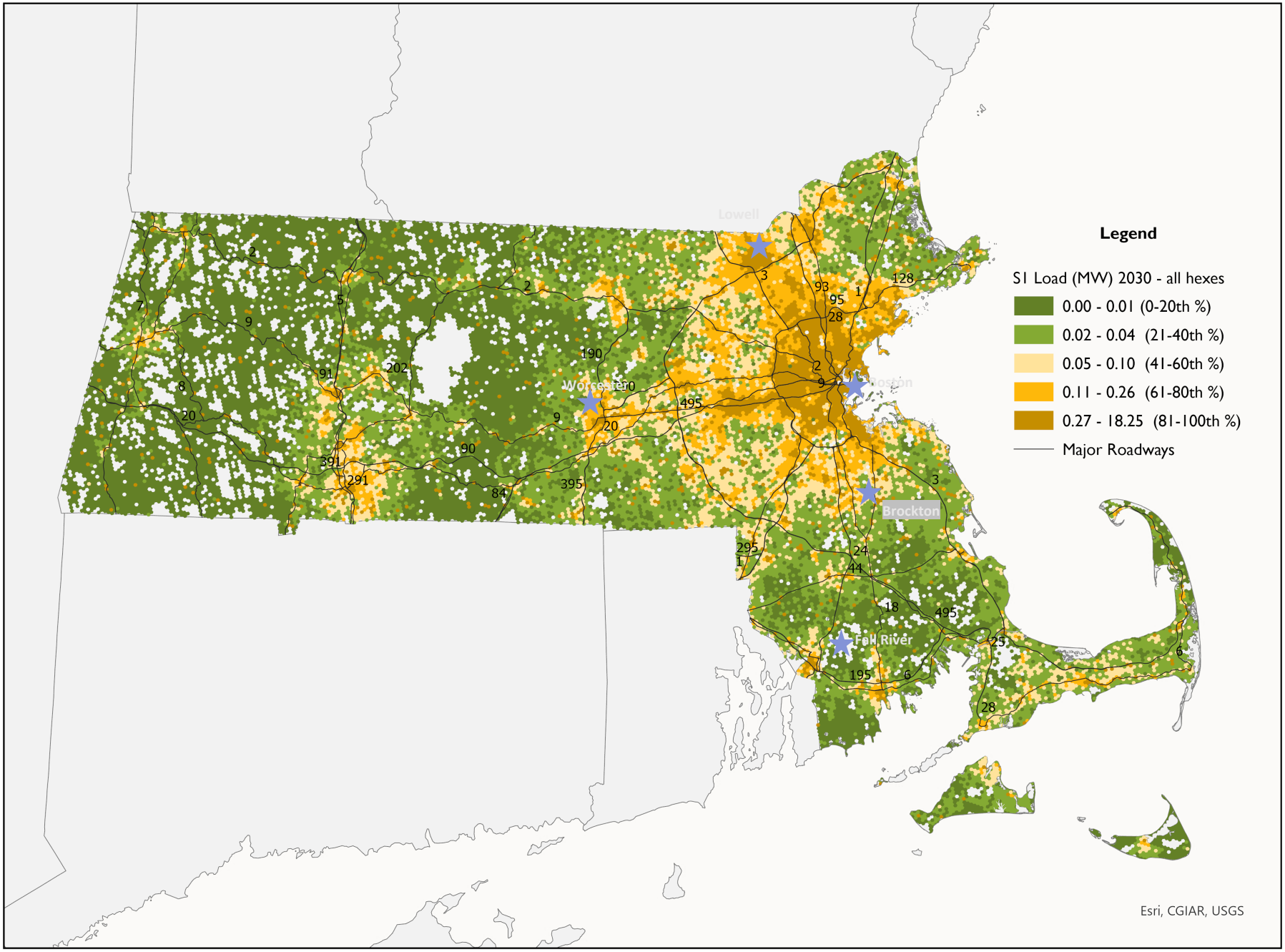
- Next we allocated chargers at the hex-grid-level using the same factors as in Task 1:
  - Proximity to existing DCFC
  - Charging demand from long-distance trips
  - Density of amenities
  - Proximity to highway exit ramp
  - Multi-family housing volume

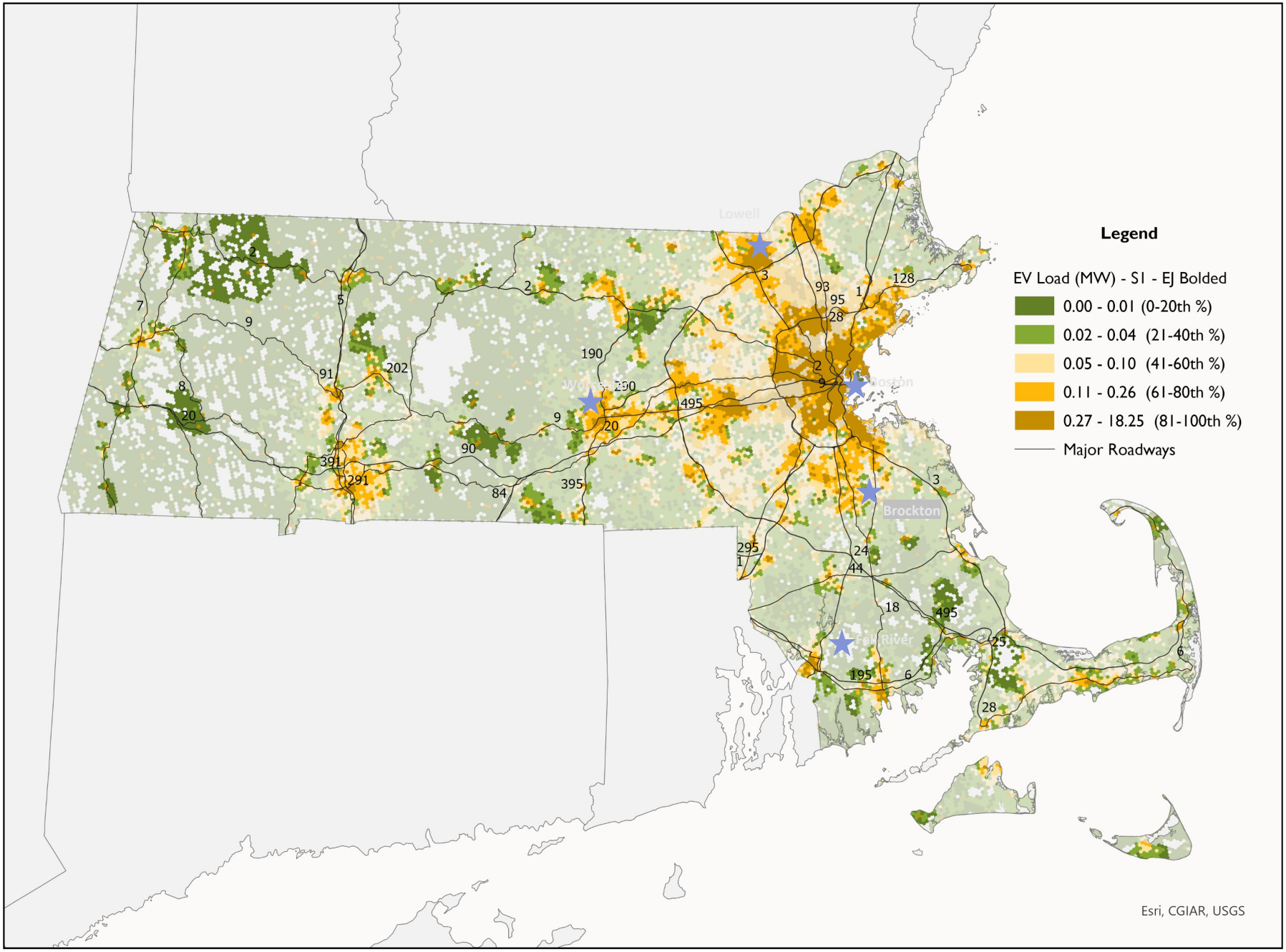


Final DCFC allocation by hex-grid cell

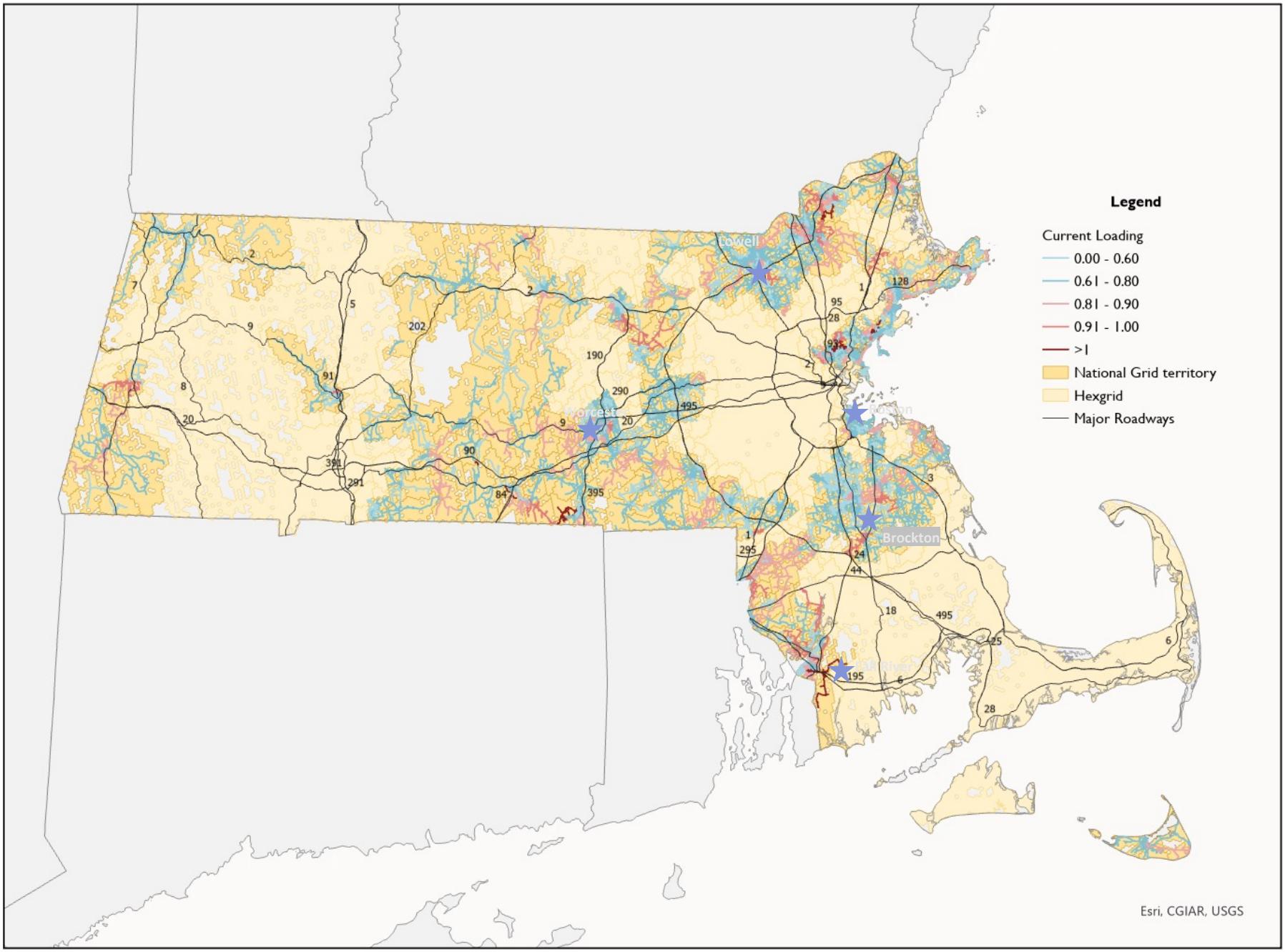


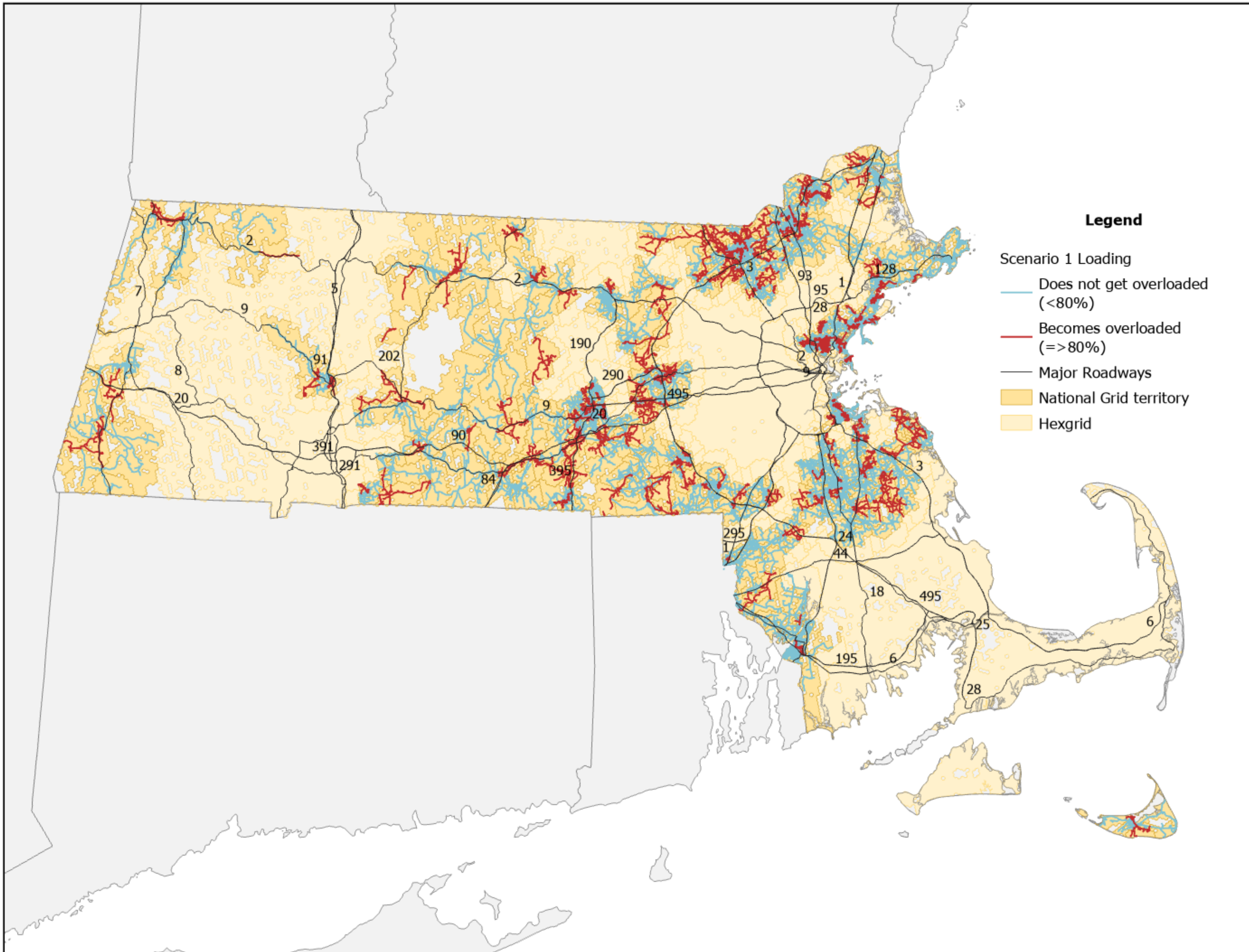
Combined Loads

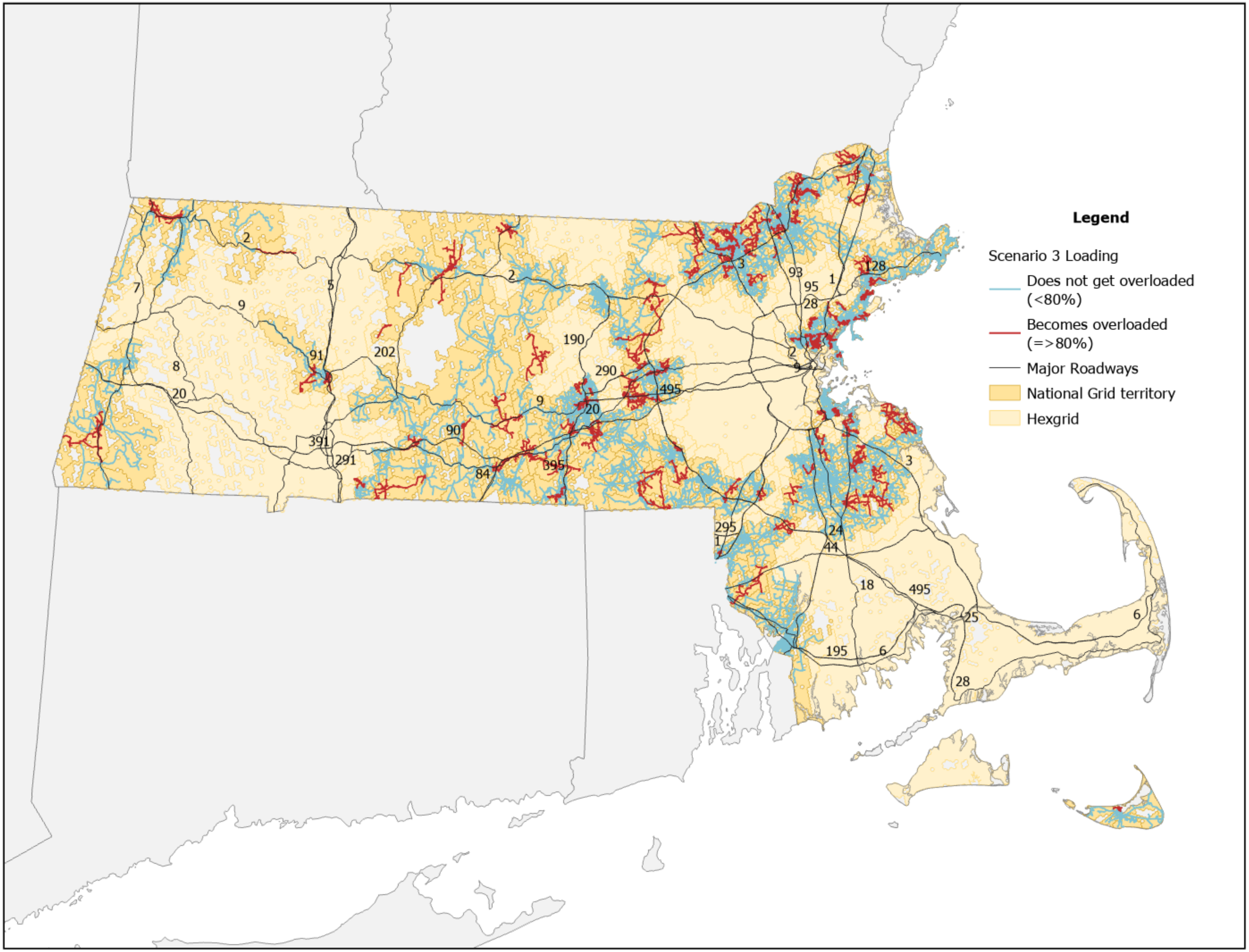

Legend
S1 Load (MW) 2030 - all hexes
0.00 - 0.01 (0-20th %)
0.02 - 0.04 (21-40th %)
0.05 - 0.10 (41-60th %)
0.11 - 0.26 (61-80th %)
0.27 - 18.25 (81-100th %)
Major Roadways
Lowell
Worcester
Boston
Brockton
Fall River
Esri, CGIAR, USGS


Legend
EV Load (MW) - S1 - EJ Bolded
0.00 - 0.01 (0-20th %)
0.02 - 0.04 (21-40th %)
0.05 - 0.10 (41-60th %)
0.11 - 0.26 (61-80th %)
0.27 - 18.25 (81-100th %)
Major Roadways
Lowell
Brockton
Fall River
Esri, CGIAR, USGS

Grid Impacts


Legend
Current Loading
0.00 - 0.60
0.61 - 0.80
0.81 - 0.90
0.91 - 1.00
>1
National Grid territory
Hexgrid
Major Roadways
Lowell
Worcester
Brockton
Esri, CGIAR, USGS


Legend
Scenario 1 Loading
Does not get overloaded (<80%)
Becomes overloaded (=>80%)
Major Roadways
National Grid territory
Hexgrid
2
7
9
5
91
202
8
20
391
291
90
84
395
9
20
290
190
495
2
3
93
95
28
1
128
2
9
3
295
1
24
44
18
495
25
6
195
6
28



Legend
Scenario 3 Loading
Does not get overloaded (<80%)
Becomes overloaded (=>80%)
Major Roadways
National Grid territory
Hexgrid
2
7
9
5
8
20
91
202
2
190
290
495
9
20
90
391
291
84
395
3
93
95
1
128
28
2
9
3
295
1
24
44
18
495
25
6
195
6
28

Questions?