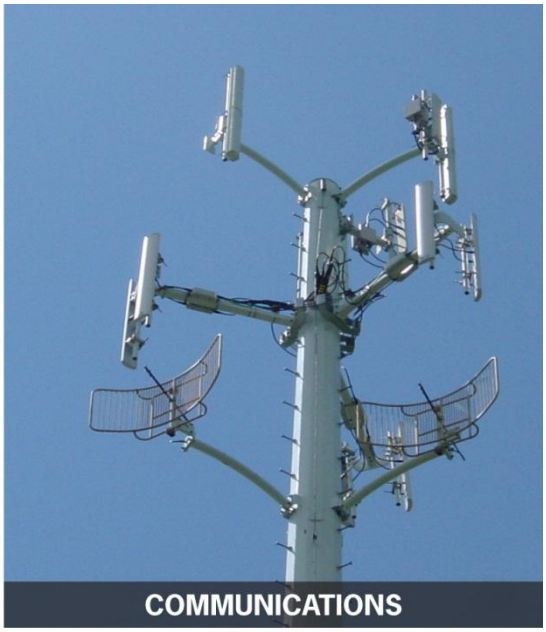
Ulteig

Greatest Needs Analysis – Ambulance Station

North Dakota Association Oil and Gas Producing Counties

Engineering, Surveying, and Consulting Services



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Engineering, Surveying, and Consulting Services

September 6, 2013
Vicky Steiner – Executive Director
NDAOGPC
400 East Broadway Ave.
Suite 304
Bismarck, ND 58501

Subject: Greatest Need Analysis– Ambulance 12.02149

Dear Ms. Steiner

Thank you for the opportunity to once again work for the ND Association of Oil and Gas Producing Counties. Please find our enclosed report analyzing the location of greatest need in the NDAOGPC 19 counties for additional ambulance service. The analysis includes the western McKenzie County area using ambulance run data from Montana for the Sidney and Fairview facilities.

Please do not hesitate to contact us if you have any questions or need additional information.

Sincerely,

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Background

Ulteig previously completed a study for NDAOGPC analyzing the existing ambulance coverage areas for 58 ambulance station—as well as fire stations—located in the 19 oil and gas producing counties (Figure 2). The goal this study was to map which areas of the 19 counties were currently being served within acceptable response times. It was previously established that a 20-minute response time was acceptable for rural areas; however during the study it was determined this response time was overestimating the actual coverage area due mobilization time of volunteer crews. Ulteig found the average mobilization time for the ambulance services was 5.3 minutes and adjusted the acceptable response time to 14.7 minutes. Using this response time, Ulteig mapped all 58 ambulance stations and calculated 14.7 minute drive-time analysis.

This Greatest Need Analysis project builds upon the previous work by investigating which areas currently not served within the 14.7 drive-time have the greatest need for an ambulance service. Several factors influencing the need for an additional ambulance station were identified: existing coverage area, population, DOT crash locations, ambulance runs, and proximity to existing cities. These factors of influence were imported into geographic information system (GIS) and analyzed to compare their relationship and find areas with the highest suitability (greatest need).

Analysis

GIS was used to analyze the factors of influence to calculate which areas had the highest suitability for an ambulance service using Weighted Overlay Analysis. Weighted Overlay Analysis allows multiple layers of data to be compared to identify commonalities between different factors to show the highest and lowest suitability (Figure 1).

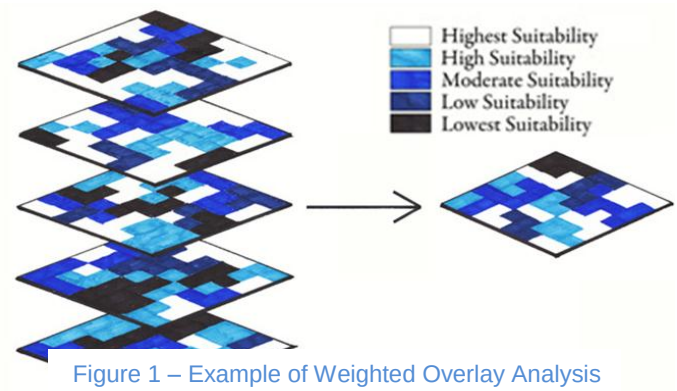


Figure 1 – Example of Weighted Overlay Analysis

The following factors of influence were imported into the GIS model:

1. Study Area: The study was limited to the 19 oil and gas producing counties and excluded areas within the existing 14.7 minute ambulance coverage area and bodies of water (Figure 2).
2. Population (Weighted Average 30%): 2012 census block group estimates for the study area were classified into three classes for the analysis based on total population using natural breaks clustering: top third total population group (high suitability), middle third total population group (neutral), and bottom third total population group (low suitability) (Figure 3). The greatest need would be those areas having the highest population since this potential equates to higher demand for ambulance services.
3. Proximity to Cities (Weighted Average 10%): Priority was also given areas closer to any city currently without an ambulance station. This data was used to supplement the block group census data which often times has a large geographic area and proximity to cities allows the model to target where populations are more concentrated. Locations within three miles of a city (high suitability), location within seven miles

(neutral), greater than seven miles (low suitability) were modeled (Figure 4). The greatest need is the areas in close proximity to cities, since these areas have higher density of populations. From an operations standpoint, proximity to cities is beneficial in that the needed infrastructure is in place to support a new facility and staff should find a city a more desirable working environment compared to an unpopulated rural location.

4. DOT Crash Locations (Weighted Average 30%): 2012 crash locations were analyzed using a "hot spot" analysis tool to locate areas having high occurrences of crashes: clusters of high frequency crash points (high suitability), statistically insignificant clusters (neutral), and clusters of low frequency crash points (low suitability) (Figure 5). The greatest need being those areas where vehicle crashes are the highest and likely creating high demand for ambulance services.
5. Ambulance Runs (Weighted Average 30%): 2012 Department of Health Emergency Preparedness Division counts of total ambulance runs per station were classified into three classes for the analysis based on total runs using natural breaks clustering: top third total ambulance runs (high suitability), middle third ambulance runs (neutral), and bottom third ambulance runs (low suitability) (Figure 6). The southeast corner of Adams County are served by stations located in South Dakota, and as such ambulance run data were not available.

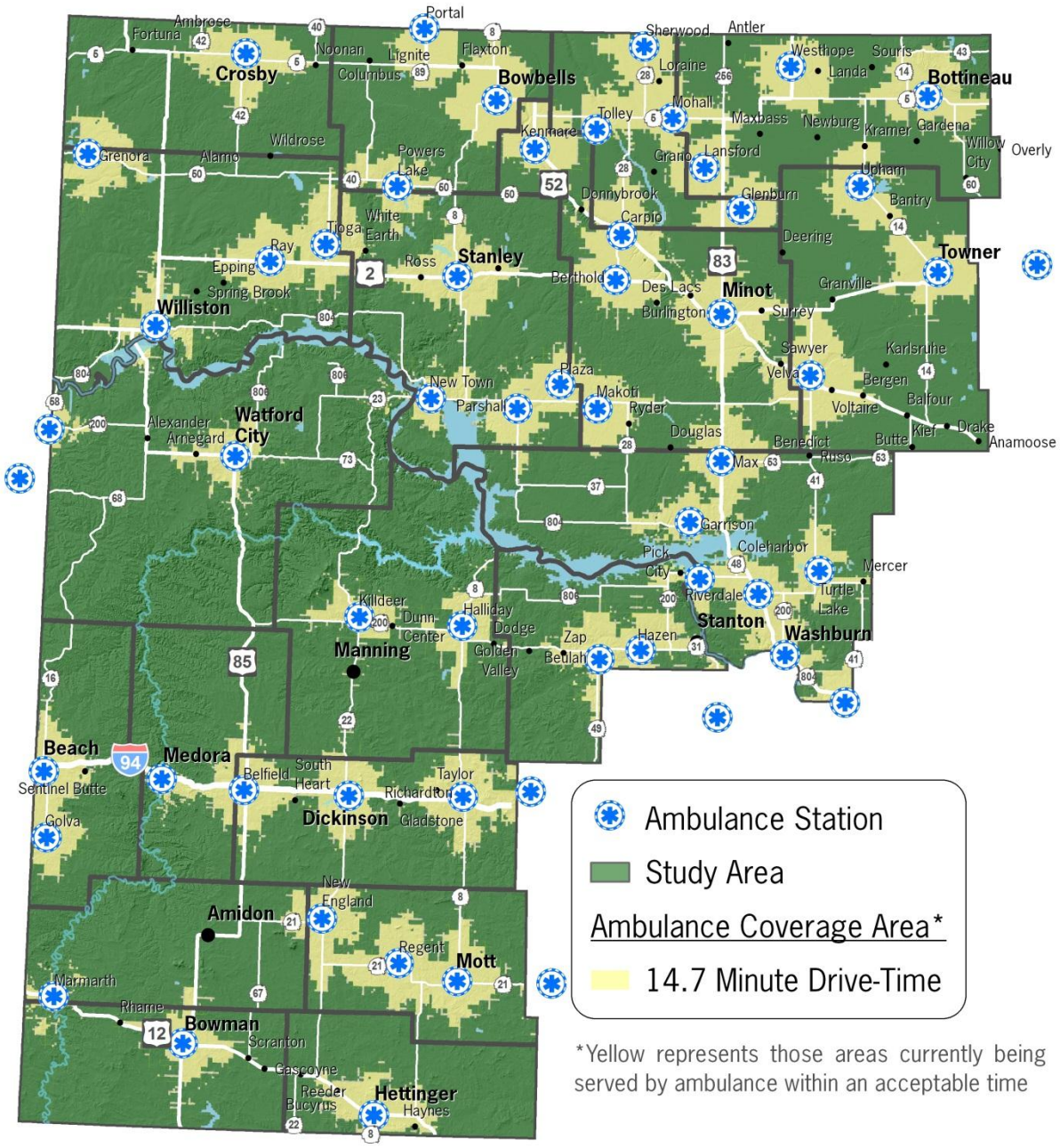


Figure 2 – Study Area

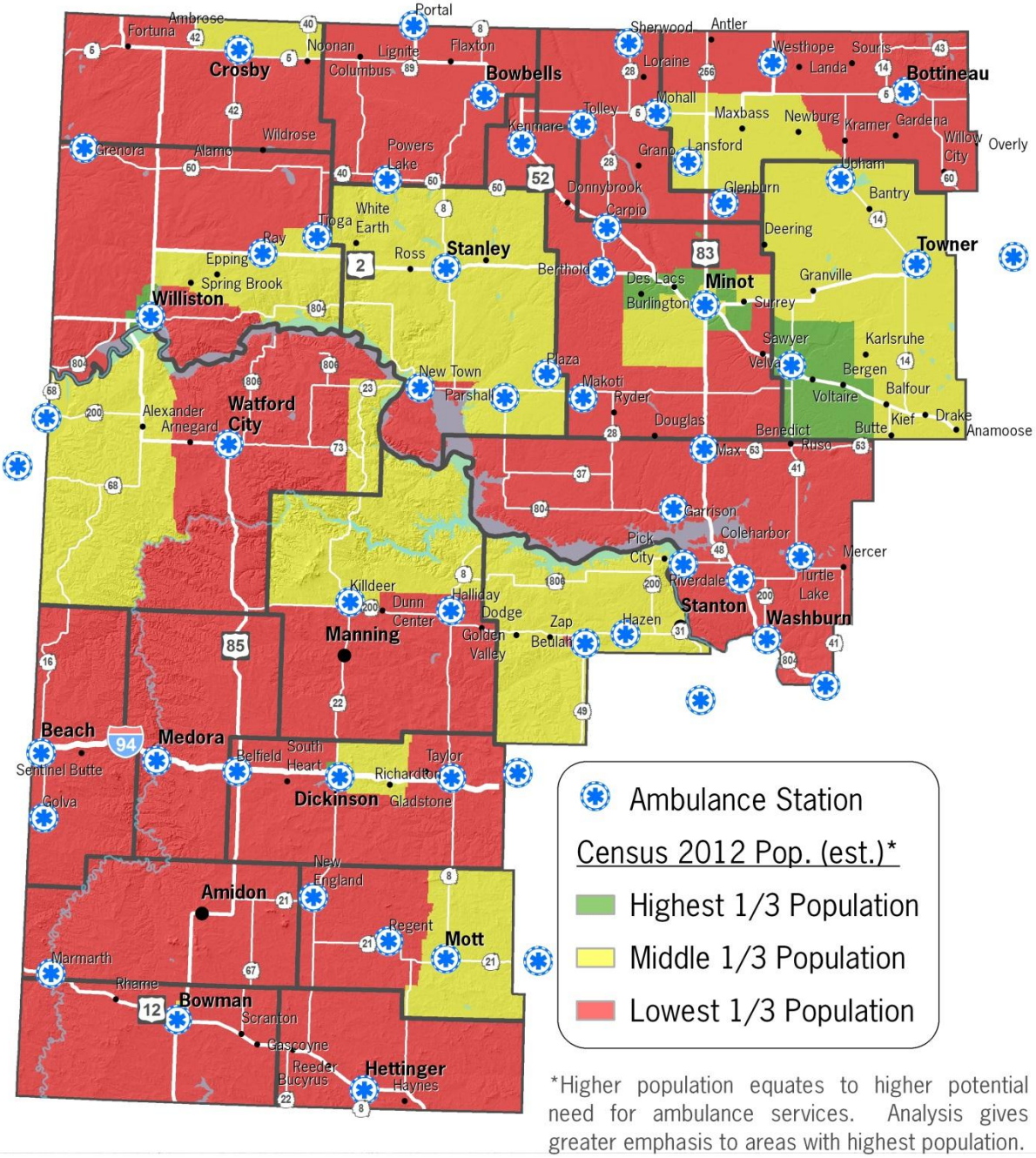
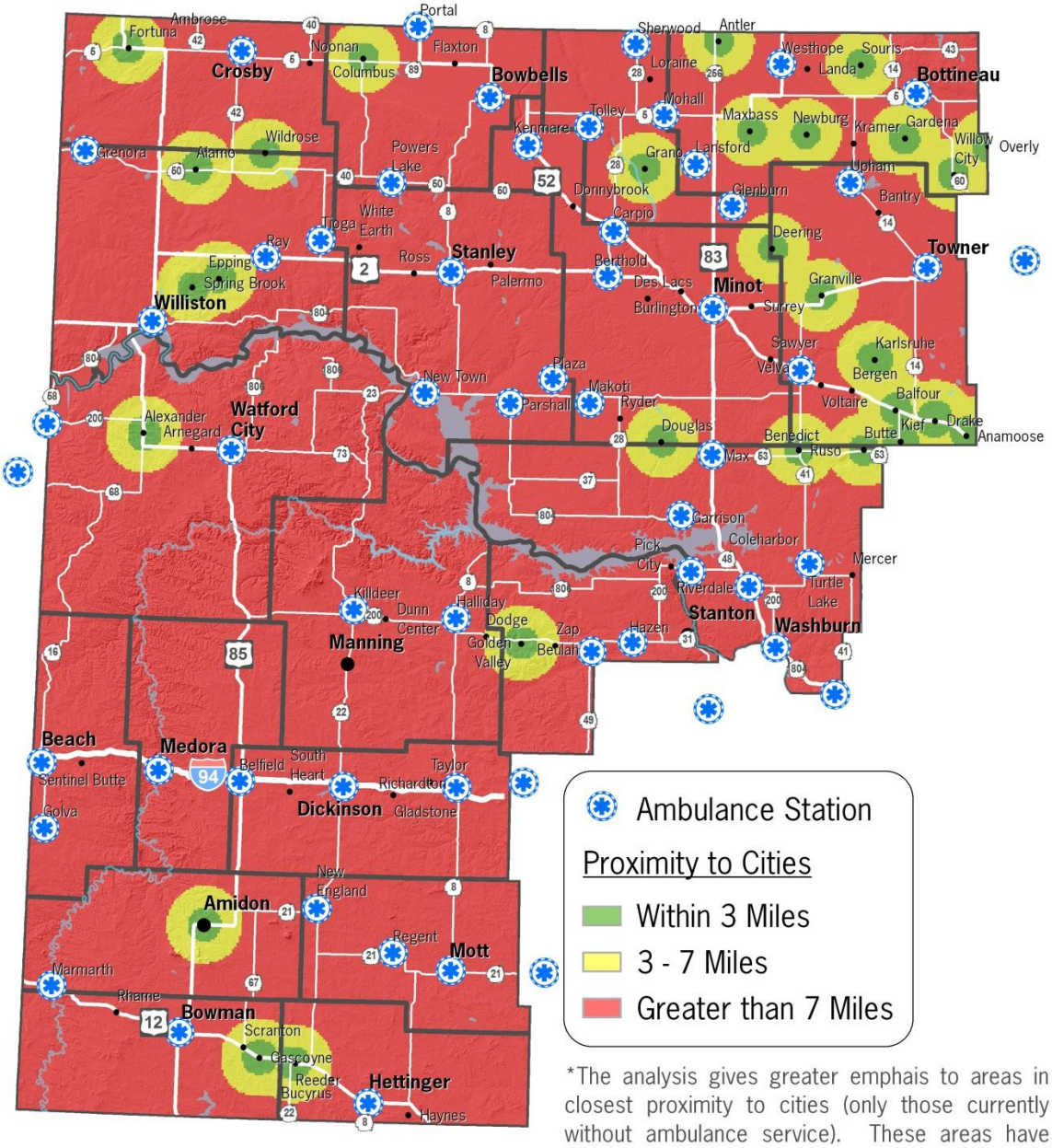


Figure 3 – 2012 Census Population Estimates



*The analysis gives greater emphais to areas in closest proximity to cities (only those currently without ambulance service). These areas have greater density of population, but also have the needed infrastructure to support a new ambulance station.

Figure 4 – Proximity to Cities

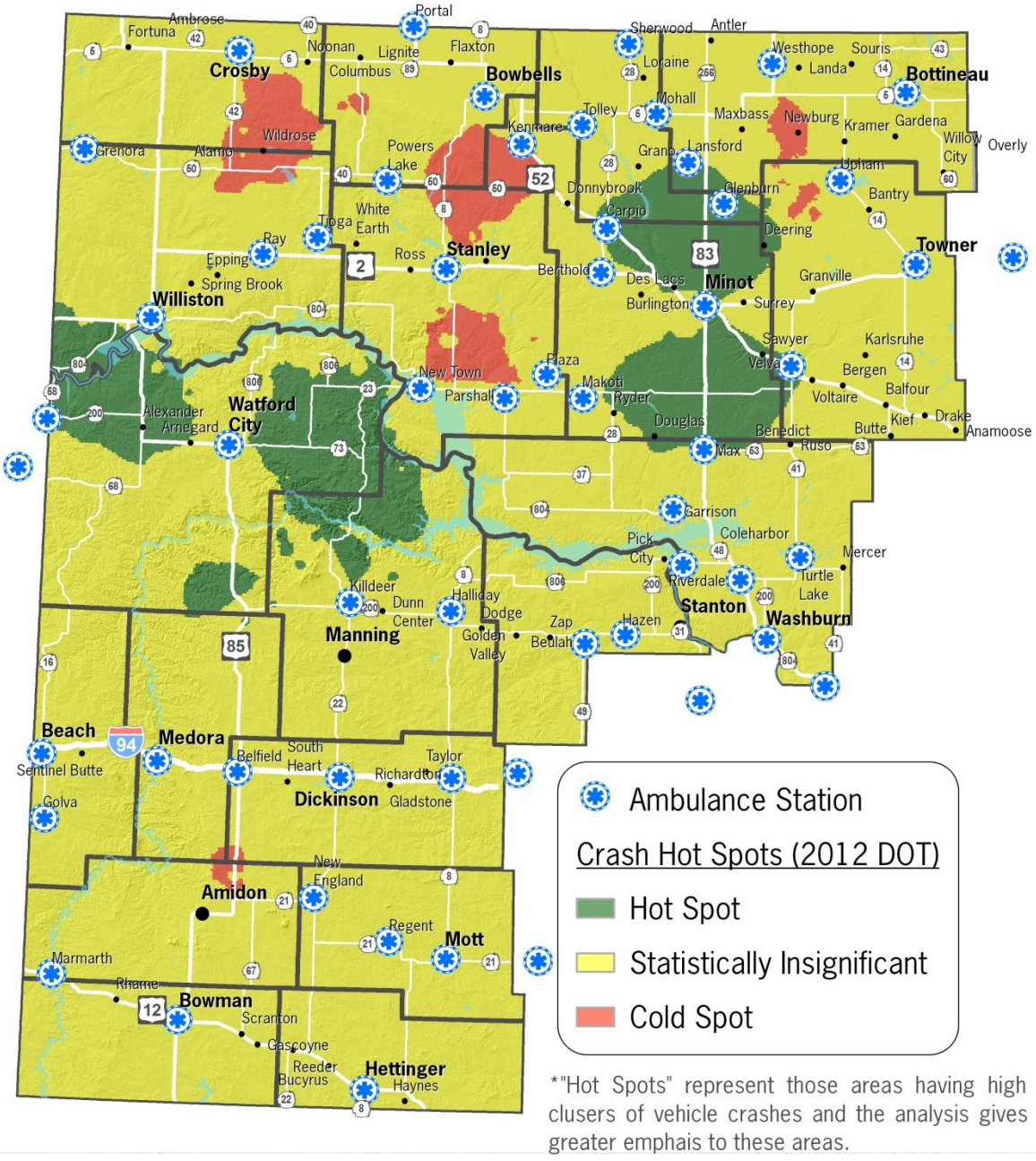


Figure 5 – DOT Crash Data Hot Spot Analysis

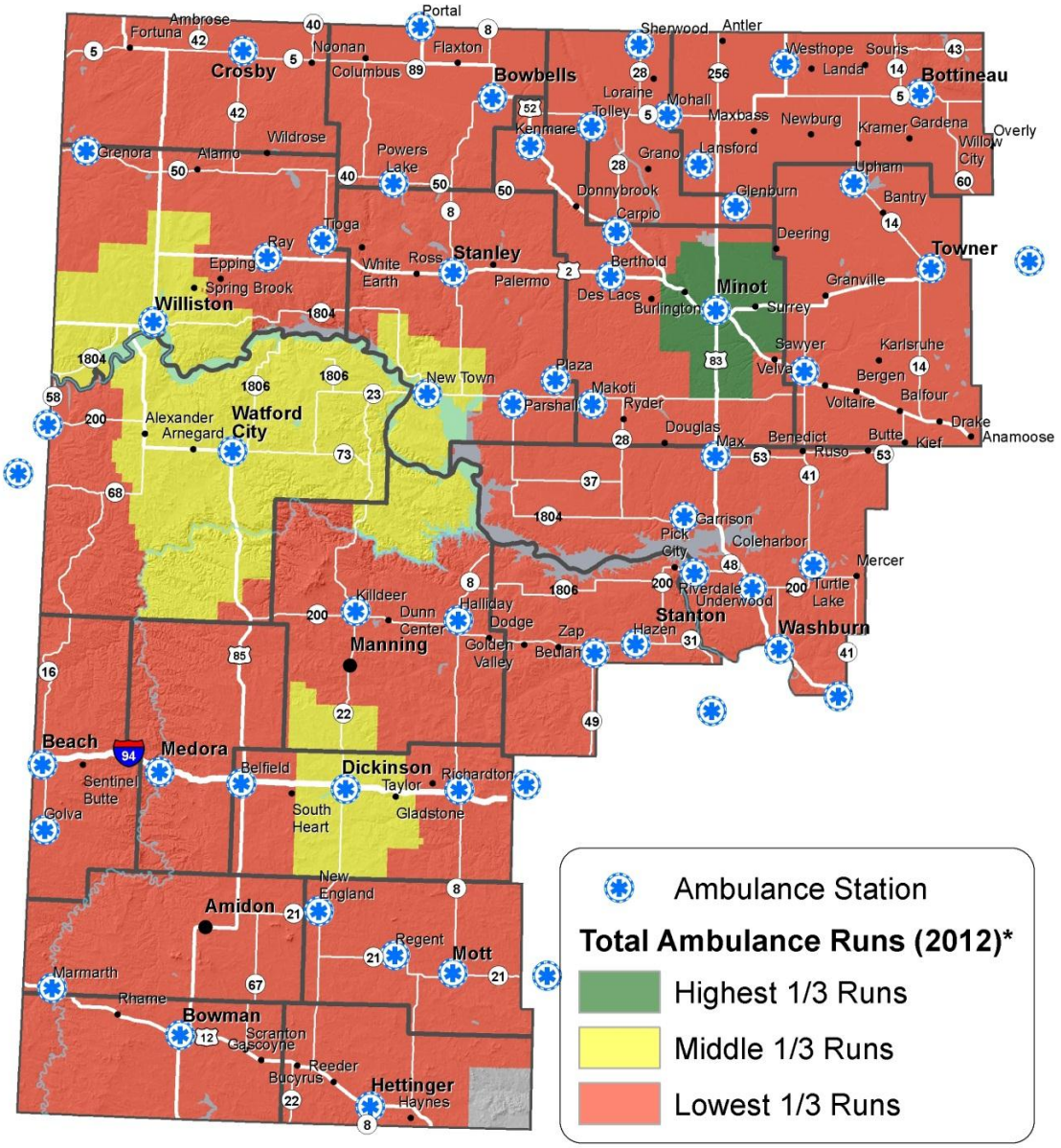
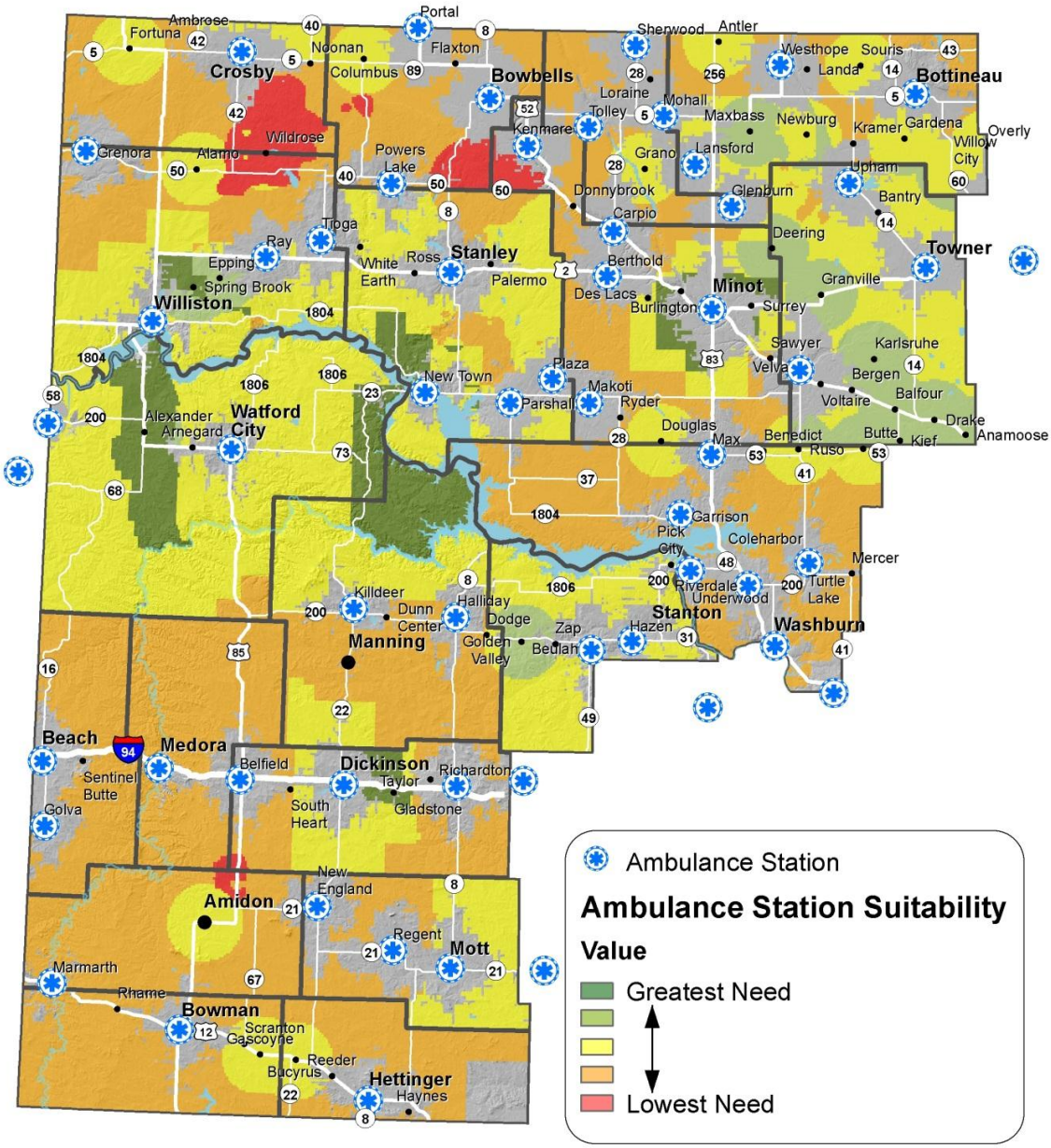


Figure 6 – Total Ambulance Runs

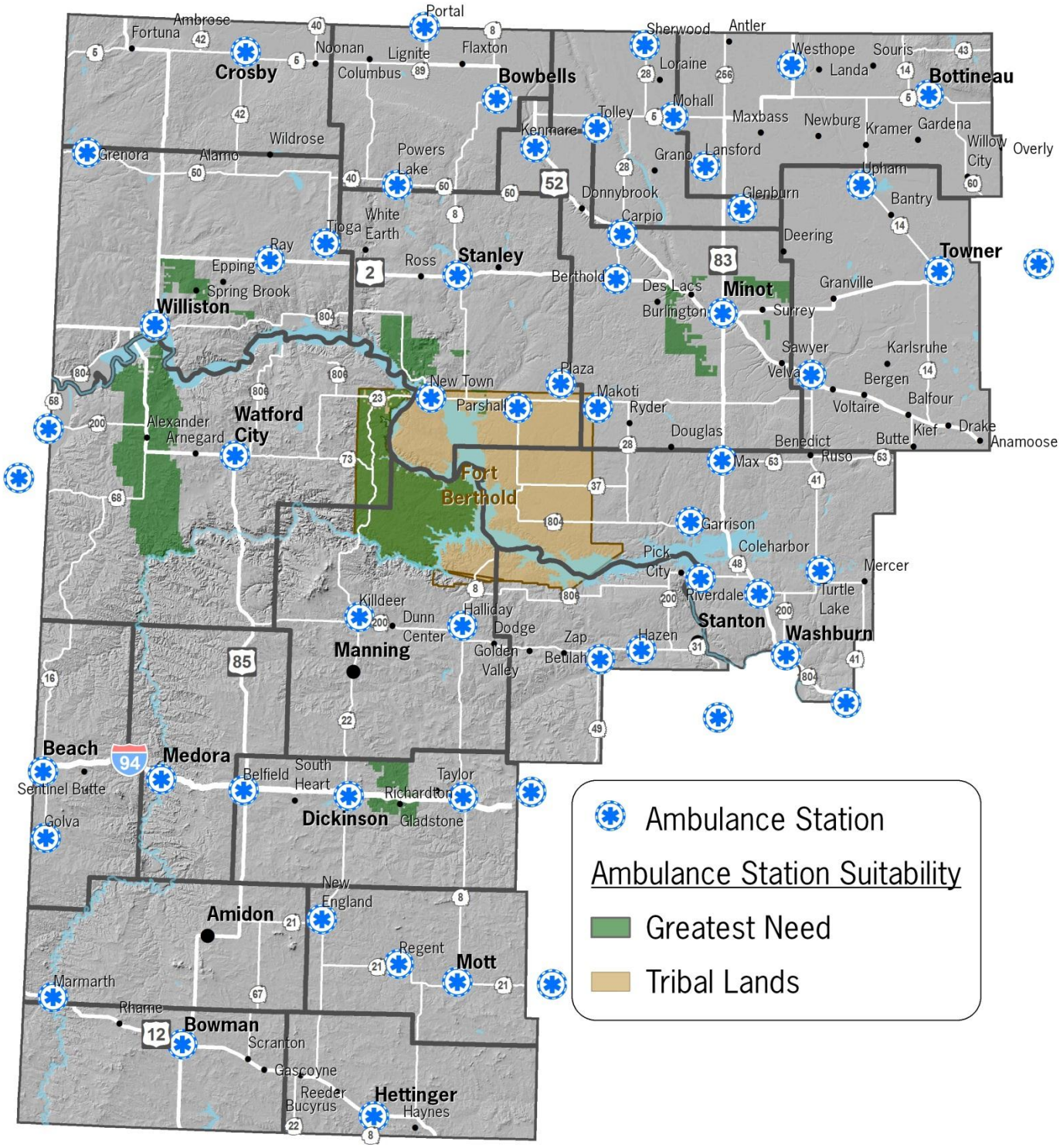
Results

The results of the weighted overlay analysis found several areas of high suitability: west central McKenzie county centered around Alexander, western area of the Fort Berthold reservation, southwestern area of Mountrail County, area near Gladstone, the area surrounding Spring Brook in Williams County, and the outlying areas of Minot (Figures 7 and 8). This data also corresponds to the location of oil well activity which can be a large source of ambulance runs (Figure 9). Finally, mapping the high suitability areas and the existing 14.7 minute drive-time coverages helps identify which greatest need areas are simply bordering existing coverage areas versus those lacking any nearby ambulance stations (Figure 10).



*Areas in green represent highest need for ambulance service based on the model (population, crashes, proximity to cities, & ambulance runs). Grey areas represent where ambulance service is currently provided or where model lacked data (SE Adams Counties).

Figure 7 – Greatest Needs Analysis Suitability


Ambrose
Fortuna
Portal
Crosby
Noonan
Columbus
Lignite
Flaxton
Bowbells
Sherwood
Antler
Loraine
Westhope
Souris
Landa
Bottineau
Mohall
Tolley
Maxbass
Newburg
Kramer
Gardena
Willow City
Overly
Kenmare
Grano
Lansford
Upham
Bantry
Glenburn
Donnybrook
Carpio
Deering
Towner
Granville
Minot
Des Lacs
Burlington
Surrey
Sawyer
Velva
Karlsruhe
Bergen
Balfour
Voltaire
Kief
Drake
Anamoose
Benedict
Butte
Ruso
Max
Douglas
Ryder
Makoti
Plaza
New Town
Parshall
Garrison
Coleharbor
Pick City
Mercer
Turtle Lake
Riverdale
Stanton
Washburn
Hazen
Zap
Beulah
Golden Valley
Halliday
Dodge
Killdeer
Dunn Center
Manning
Grenora
Alamo
Wildrose
Powers Lake
Tioga
White Earth
Ray
Epping
Spring Brook
Williston
Ross
Stanley
Berthold
Watford City
Alexander
Arnegard
Fort Berthold
Beach
Sentinel Butte
Golva
Medora
Belfield
South Heart
Dickinson
Richardton
Taylor
Gladstone
New England
Amidon
Regent
Mott
Marmarth
Rhame
Bowman
Scranton
Gascoyne
Reeder
Bucyrus
Hettinger
Haynes
52
83
85
2
94
Ambulance Station
Ambulance Station Suitability
Greatest Need
Tribal Lands

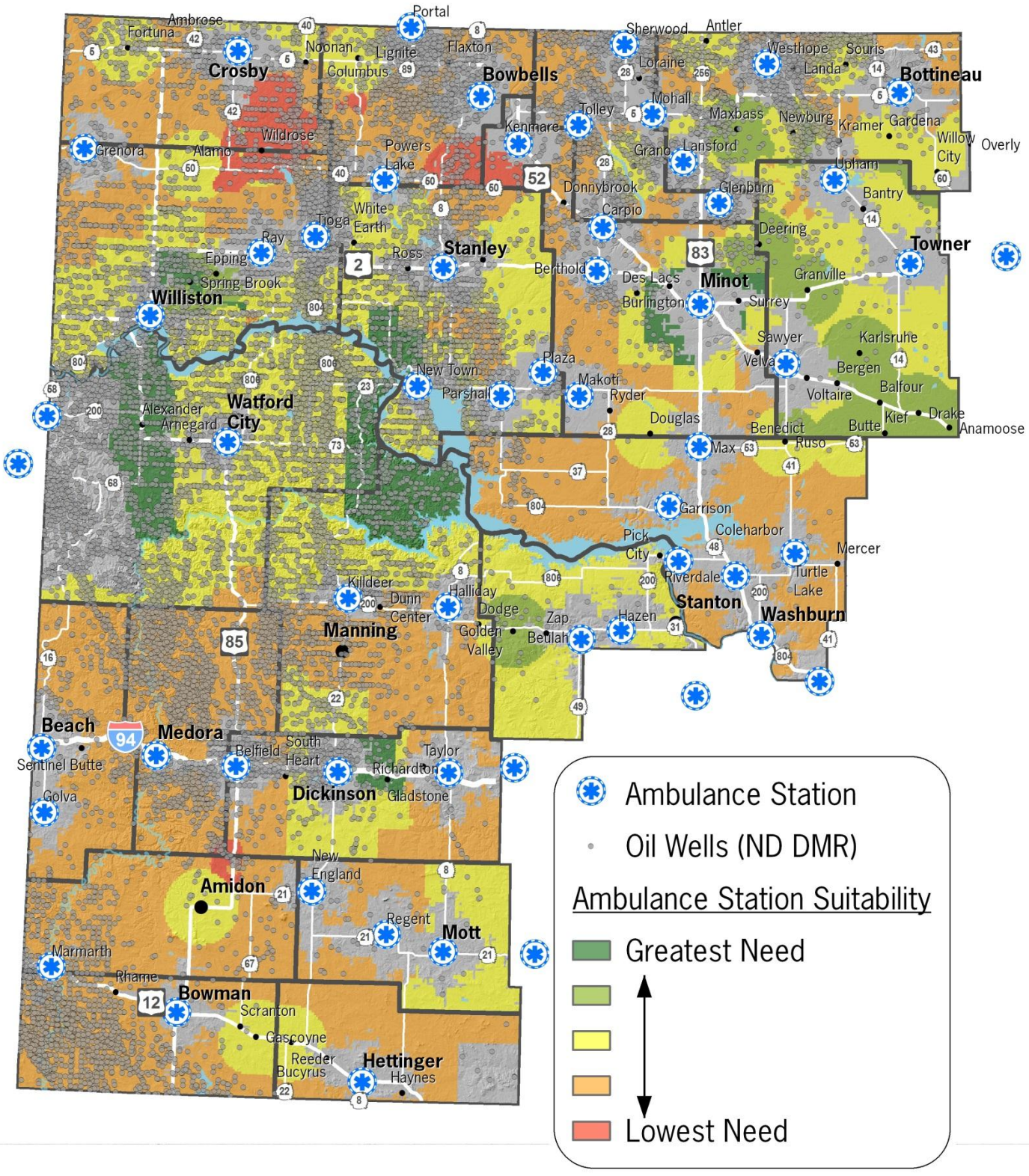
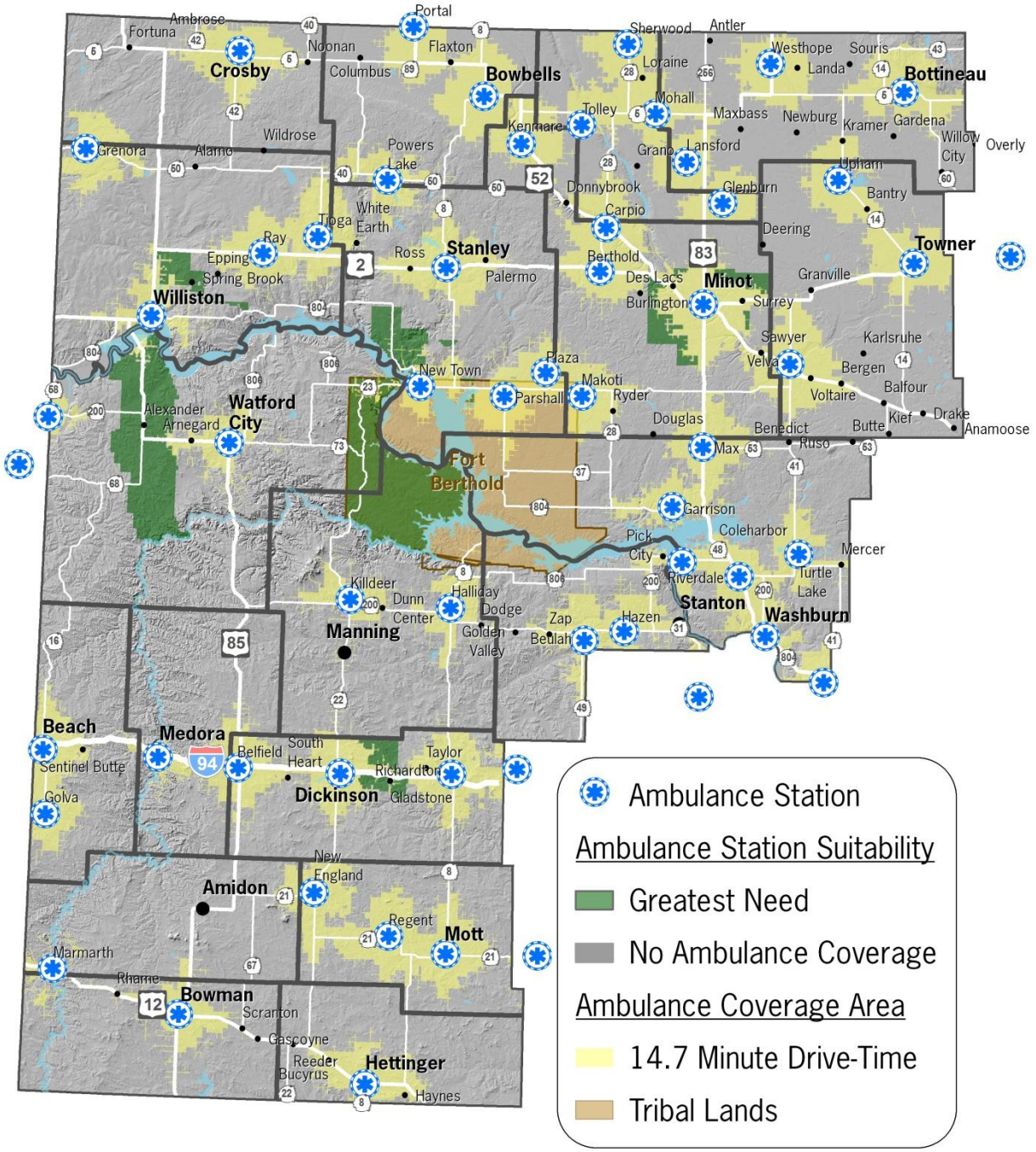


Figure 9 – Greatest Needs Analysis Suitability and Oil Well Activity



*Based on the model, the green areas have the greatest need for ambulance service. The areas in yellow currently have ambulance coverage within acceptable response times and all areas in grey are not served within acceptable response times.

Figure 10 – Highest Suitability and existing ambulance coverage areas