SUMMER INTERNSHIP, 2018

Report

ABSTRACT

It is always exciting to learn new things; and learning become much fun when you get chance to travel, work, and make some money. Additionally, when you have a chance to use the sophisticated mapping tool, your workplace becomes a place where you want to be forever. Thanks to Andrew Canham, Mid Dakota Vegetation Management and Dr. Robert Watrel, Department of Geography for this wonderful opportunity.

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GEOG 794 Internship Summer 2018

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Introduction

This is a summer internship report. I worked for Mid-Dakota Vegetation Management (MvM) as a GIS technician throughout the summer. It was a wonderful experience working with them because this internship did not only give an opportunity to learn and explore my GIS knowledge but also provided me an opportunity to travel across South Dakota. The places I visited for my internship includes: Sioux Falls, Madison, Miller, Aberdeen, Pierre, Rapid City, Sturgis, Spearfish, Black Hills National forest, Cluster State Forest, Kadoka, Fort Pierre National Grassland, and more.
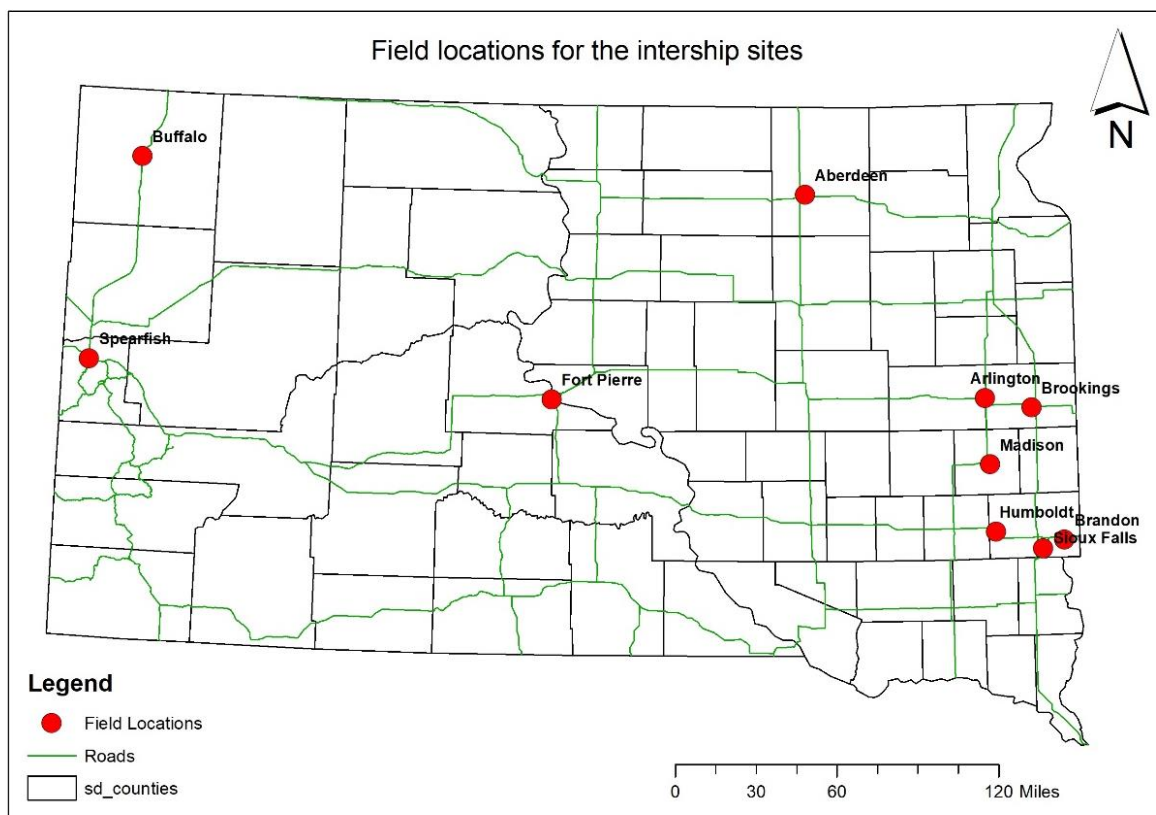

Figure 1: Intern sites in South Dakota state. The sites include: Brookings, Arlington, Madison, Humboldt, Sioux Falls, Brandon, Miller, Pierre, Buffalo, Rapid City, and Spearfish.

Figure 2: Some pictured from different sites: (Top) Fort Pierre National Grassland, (Lower Left) Cluster National Forest, and (Lower Right) Fort Pierre National Grassland

Internship details

This summer internship started from 15th May 2018 and last for 12 weeks until 15th August 2018. The internship required GIS knowledge which was fulfilled by the classes I took in the school: GEOG 483-GIS Data Creation and Integration and GEOG 767-Geographic Information Systems. Additionally, it required us to use a handy and sophisticated mapping tool—MapItFast. MapItFast simplifies and streamlines the entire mapping process accessing maps, collecting data, applying attributes, managing information, sharing and reporting. The fun part to use MapItFast was we can drive at 60mph and map the noxious weeds.

At the beginning of the internship, my job was to go to field and collect the data. The data collection was followed by medical treatment of the weeds. This job was labor intensive meaning that I had to go to the field in the daylight and collect data. This job required the two most important things: a Valid US driver's license, and a valid South Dakota Applicators

license. Later, I begun to assist the GIS officer Devon in data management, maintenance of GIS equipment, and planning of the work schedule.

Basic Company Facts

Mid-Dakota Vegetation Management (MvM) was established in 1995 and has been working in the control and eradication of noxious weeds since then. The company strives to control and eliminate noxious weeds in its contracted areas. MvM is biggest recipient of government commercial application contracts, in the state of South Dakota (Canham, 2016). Offices are located in Miller and Spearfish, South Dakota. The size of the company shifts seasonally, with approximately 5 full time employees and 15-20 who work seasonally. Work is highly seasonal, as the vast majority of plant growth occurs during the warmer months and not over the frigid South Dakotan winters. MvM customers include the Federal, State, and County governments, but also includes larger corporate entities.

Job Summary

As an intern I had two jobs: 1) map the noxious weeds using MapItFast tool and 2) treat the weeds with chemicals. I could first map, and then spray or spray and then map. But mapping it first was sensible because I could make maps and pass them to other sprayers as well. The maps showed which area (hotspot) to spray first. I used MapItFast tool to collect the data. The tool was compatible with my mobile phone. The tool was handy and easy to use. The collected data could be downloaded as a kmz file or shape file. These files were used to prepare the hotspot maps which were used by the commercial applicators to spray. The commercial applicators used truck with water tanks mounted on them. The trucks had hose and sprayer connected to them. We also used Utility Terrain Vehicle (UTVs) and All-Terrain Vehicle (ATVs) to spray. These UTVs and ATVs are used for spot spraying. Besides, this equipment were equipped with first aid box and safety manuals.

Typically, we start our day just after the sun rise and end the day just before the sunset. The work was weather dependent—meaning that we had to stop spraying when the wind speed exceeds 15 mph and temperature exceeds 90^0 F. Besides spraying we had to keep records of the chemicals used, weather, noxious weeds, time and date of the application, and specific site names.

GIS Technician

As a GIS technician, I used MapItFast tool to map the noxious weeds. The collected data could be downloaded as a .kmz file or shape file. These files were used to prepare the hotspot maps which were used by the commercial applicators to spray. This way I took charge of data management and maintenance of GIS equipment. I worked with the GIS officer Devon in analyzing the data, and making the maps. These maps were used to planning of the work schedule.
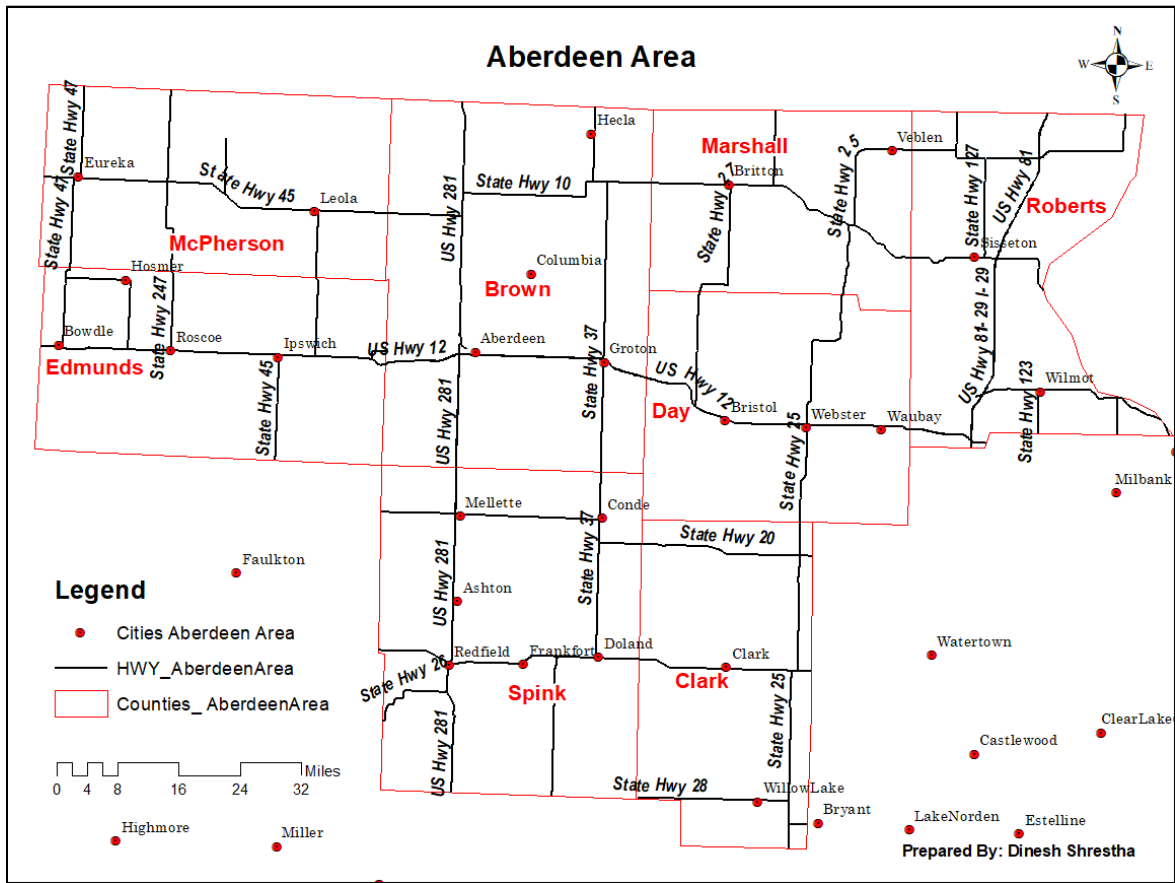

Figure 3: Map of Aberdeen Area

MapItFast tool: MapItFast simplifies and streamlines the entire mapping process accessing maps, collecting data, applying attributes, managing information, sharing and reporting. MapItFast operates on low cost hardware your users probably already know how to use. It is the affordable system that combines a Free Android app with an enterprise-based cloud mapping and record-keeping system. With a single tap or click, spatial data features *(points, lines, polygons, geo-tagged photos)* may be captured using the app and/or

via a web browser. These data are automatically synchronized and remain current in real-time with a live data connection. Additionally, everything, including the photos, may be exported to shapefile, KMZ and other formats to use in any other GIS system.

Some salient features of MapItFast include:

- No special GPS hardware to buy
- All your mapped features and form filled data are synced in real time with your map dashboard
- Multiple people can work on the same project at the same time and export to your favorite GIS mapping software
- Virtually no training to get users mapping and filling forms.
- One Tap to Map: Easily GPS or draw points, lines, and polygons and add photos and attributes with only a single tap. No need to go through complicated menus or start an editing session.
- Collect, Collaborate, Share: With all your team members and share contributions in real-time across all devices simultaneously.
- Work Offline in Remote Areas with No Restrictions: Collect mapping data and complete digital forms and reports from the field, regardless of whether or not a data connection is available.

Figure 4: Screenshot of MapItFast

- Use High-Quality Basemaps: Use the built-in basemaps (or your custom built basemap) and add layers from your imported shapefile or KMZ data.
- Get Turn-By-Turn Directions: Click on any point and get turn-by-turn direction using your preferred default navigation tool.
- Do Name, Date and Form Search: Quickly locate objects on a map by filtering on name, date or form content.
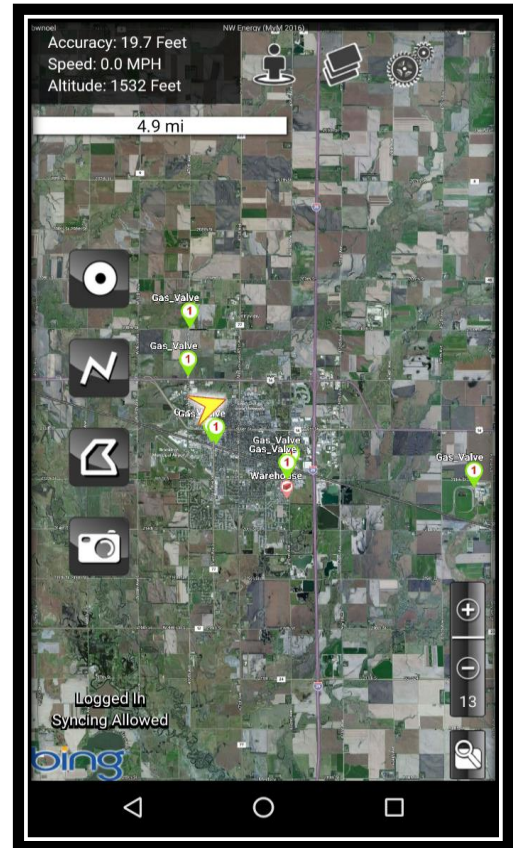- Calculate Distance and Area: Instantly calculate distance and area on the go for any GPS or drawn object.
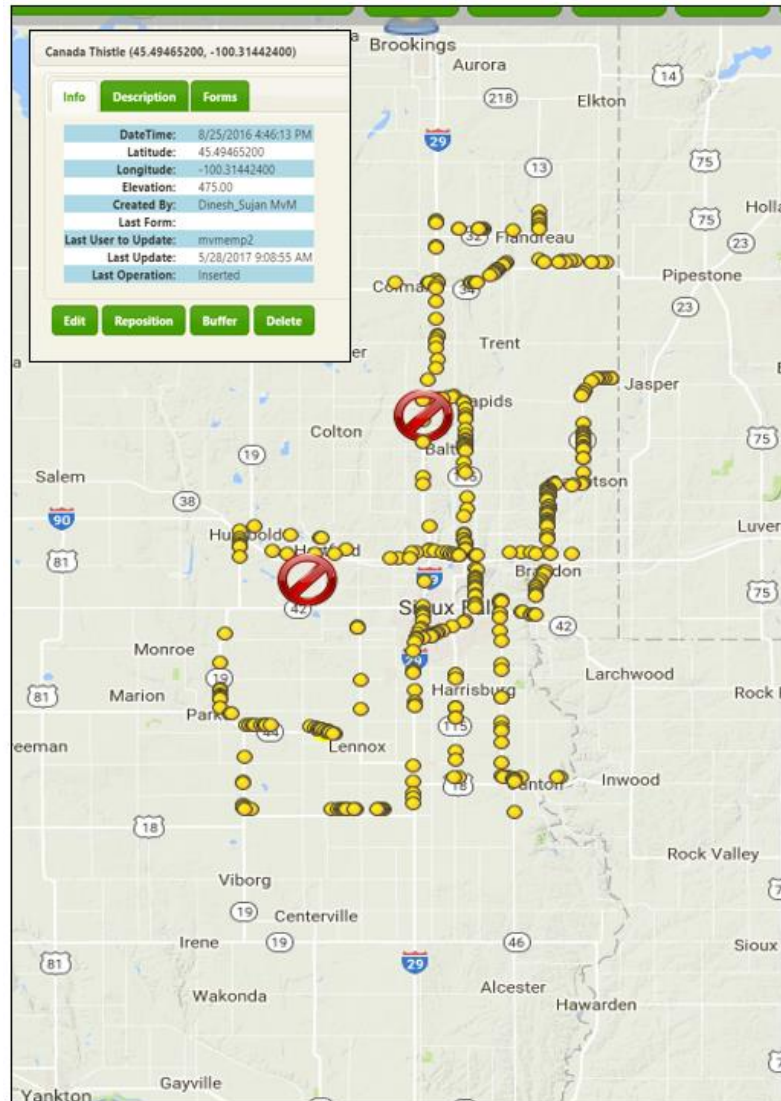
Figure 5: Screenshot of data points collected by MapItFast tool.

Commercial Applicator

The first thing a commercial applicator requires is a Applicator License. The license can be obtained by taking exams. The exams are usually 6-8 hours long. The company also has a policy to give trainings. The training includes: identification of the noxious weeds, identification of chemicals and precaution while using them, safety and first aid training, training to ride UTVs and ATVs, and so on. We are required to wear personal protection equipment such as boots, gloves, glasses, helmets, and full sleeved dresses every time they spray the chemicals. We used trucks with water tanks mounted on them. The trucks had hose

and sprayer connected to them. We also used Utility Terrain Vehicle (UTVs) and All-Terrain Vehicle (ATVs) to spray. These UTVs and ATVs are used for spot spraying. Besides, this equipment were equipped with first aid box and safety manuals.

Figure 6: All-Terrain Vehicle (ATV) training at Oahe Dam in Pierre, SD

There are many things that we needed to consider while spraying the chemicals. The spraying work was weather dependent—meaning that we had to stop spraying when it rained, when the wind speed exceeded 15 mph, and the temperature exceeded 90^0 F. Also, we should be careful while spraying near the cropland—the wind should not be blowing towards the cropland especially the soybean because soybean is very susceptible to those chemicals. We were also required to keep records of the chemicals used, weather, noxious weeds, time and date of the application, and specific site names.

Leadership

The internship was the great opportunity for me to excel my leadership. I got chance to work with very genuine boss who took care of all his employees. He was nice and decent. Besides, I got chance to lead my team members. Usually, we were 4 to 6 people in a team. I had the responsibility to plan for the day, set the target, and meet the target by the end of the day. I feel very lucky to have these people in my team.

Learnings

Besides learning to use MapItFast, some GIS stuffs, and spraying, I learnt many other things. I learnt about the geographic distribution of the noxious weeds such as: Canada thistle, Spurge, Mullen, Bull Thistle, and others. These weeds usually grow in the ditches— basically the swampy areas. They are also considered as the invasive species because they can hamper the agricultural crops. Most noxious weeds were introduced into an ecosystem by ignorance, mismanagement, or accident. Some noxious weeds are native. Typically, they grow aggressively, multiply quickly without natural controls (native herbivores, soil chemistry, etc.), and display adverse effects through contact or ingestion. Noxious weeds are a large problem in many parts of the world, greatly affecting areas of agriculture, forest management, nature reserves, parks and other open space.

I also learnt about different landscapes in South Dakota. The eastern side being all plain, and the western side especially the Black Hills raising up to 7,000 ft. I experienced the highest temperature of 102 F, and swiftest wind of 83mph in this summer. I got chance to see different wild animals from very close. Some of these animals include deer, antelope, bison, and others. I had some of the wildest experience of my life where I spent days without mobile networks. The days when I worked in Cluster National Forest and Grand Pierre National Grassland are always memorable.
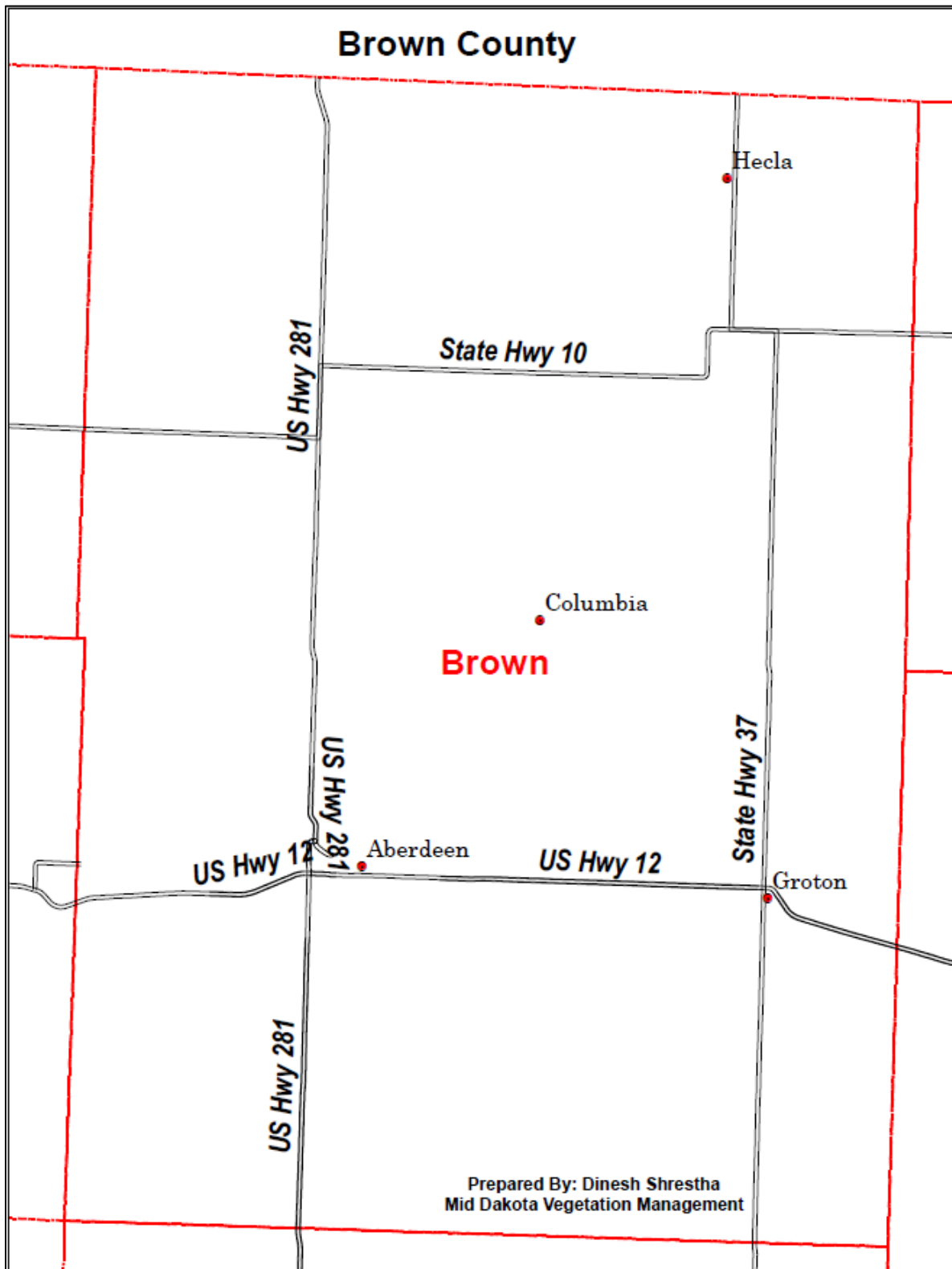
Besides, I learnt how to safely drive cars, trucks, ATVs and UTVs. I learnt the about the road network in the US—the differences between highways (state Vs US highways), county highways, and interstate. I learnt about people and places. I leant about people's lifestyles, say American lifestyles.
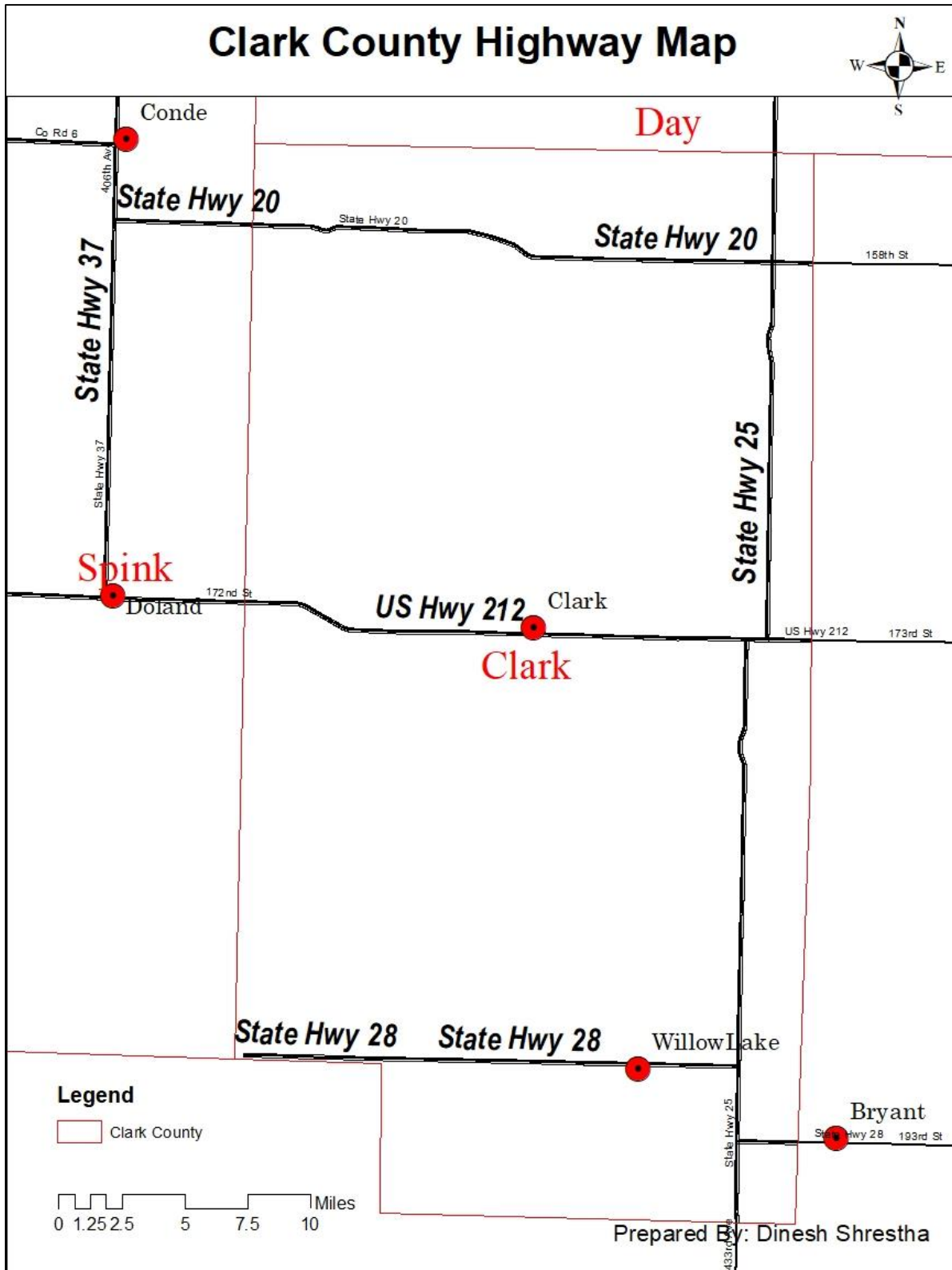
Conclusion

The internship was completed on August 15, 2018. We submitted all the maps and reports to the company before we finish. This internship was beneficial for me because it gave an opportunity to use my GIS knowledge in the field. The GIS techniques I learnt in the classroom (Geography 473 and 767) could be applied to the real world. The Environmental Geography 515 gave a broader and wider perspective to understand the landscapes and the environment throughout the places I visit.
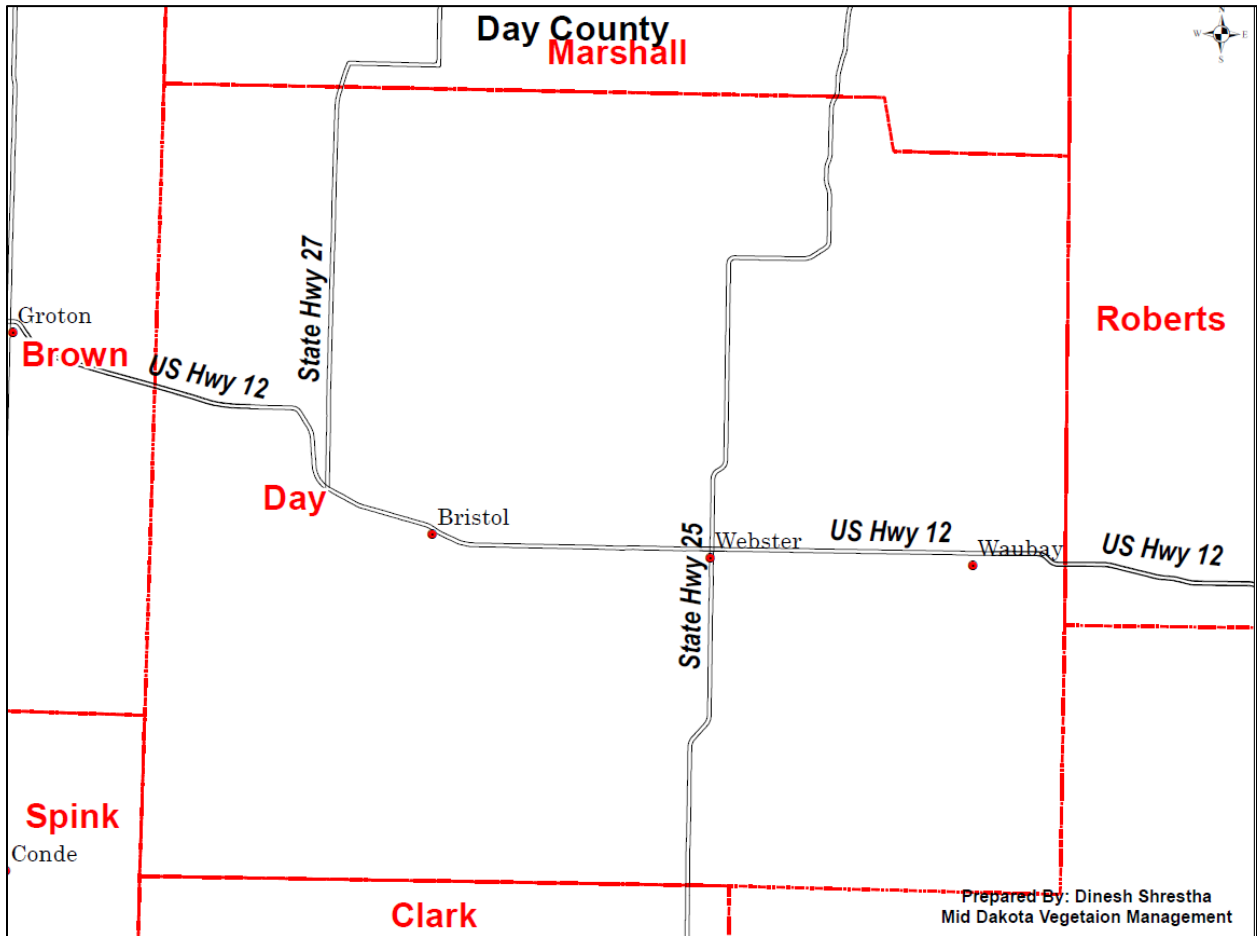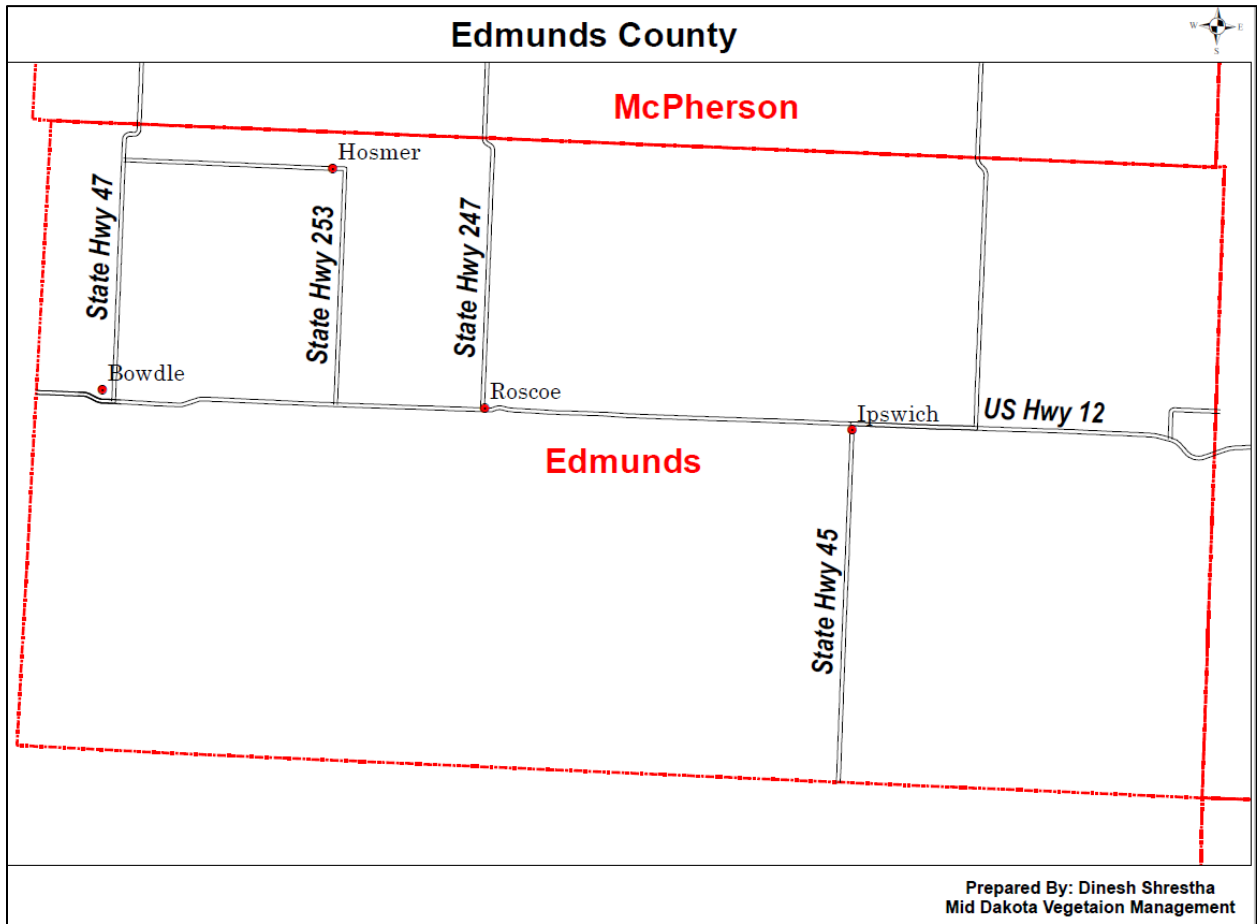
Appendix: Maps of the sites
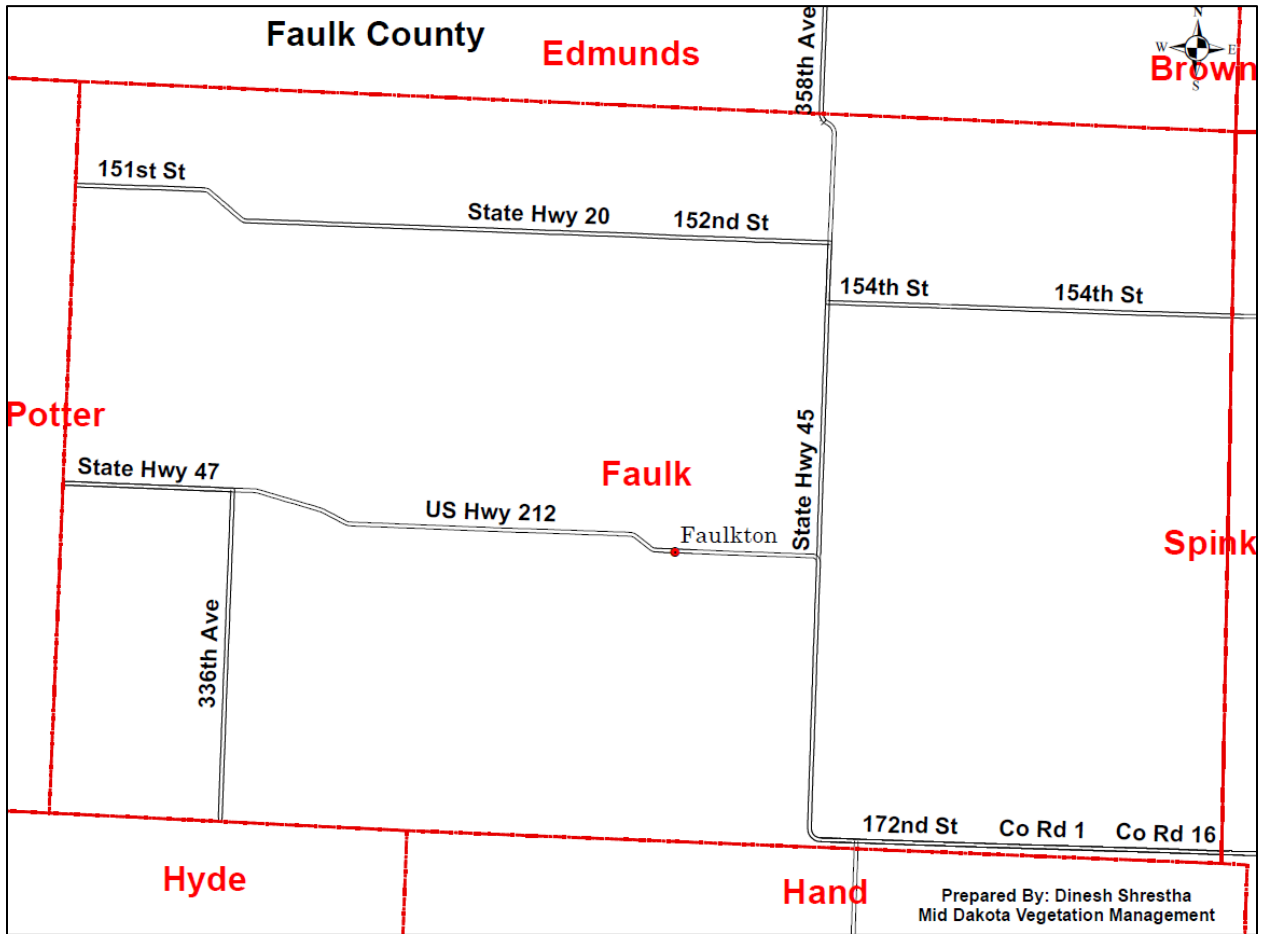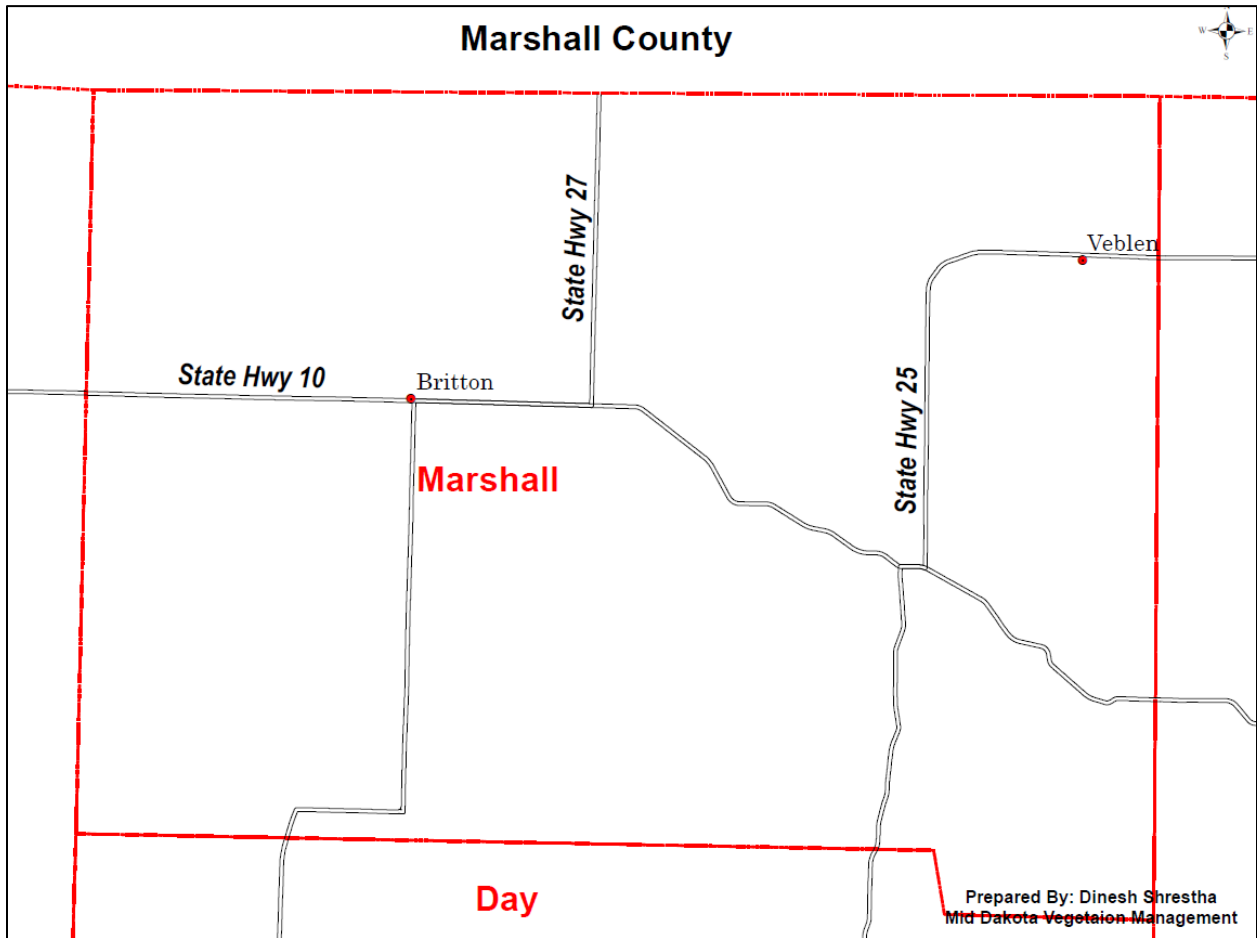
Brown County

Clark County

Clark County Highway Map

Day County

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Edmunds County

Edmunds County

McPherson

State Hwy 47

State Hwy 253

State Hwy 247

Hosmer

Bowdle

Roscoe

Ipswich

US Hwy 12

Edmunds

State Hwy 45

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Faulk County

Marshall County

McPherson County
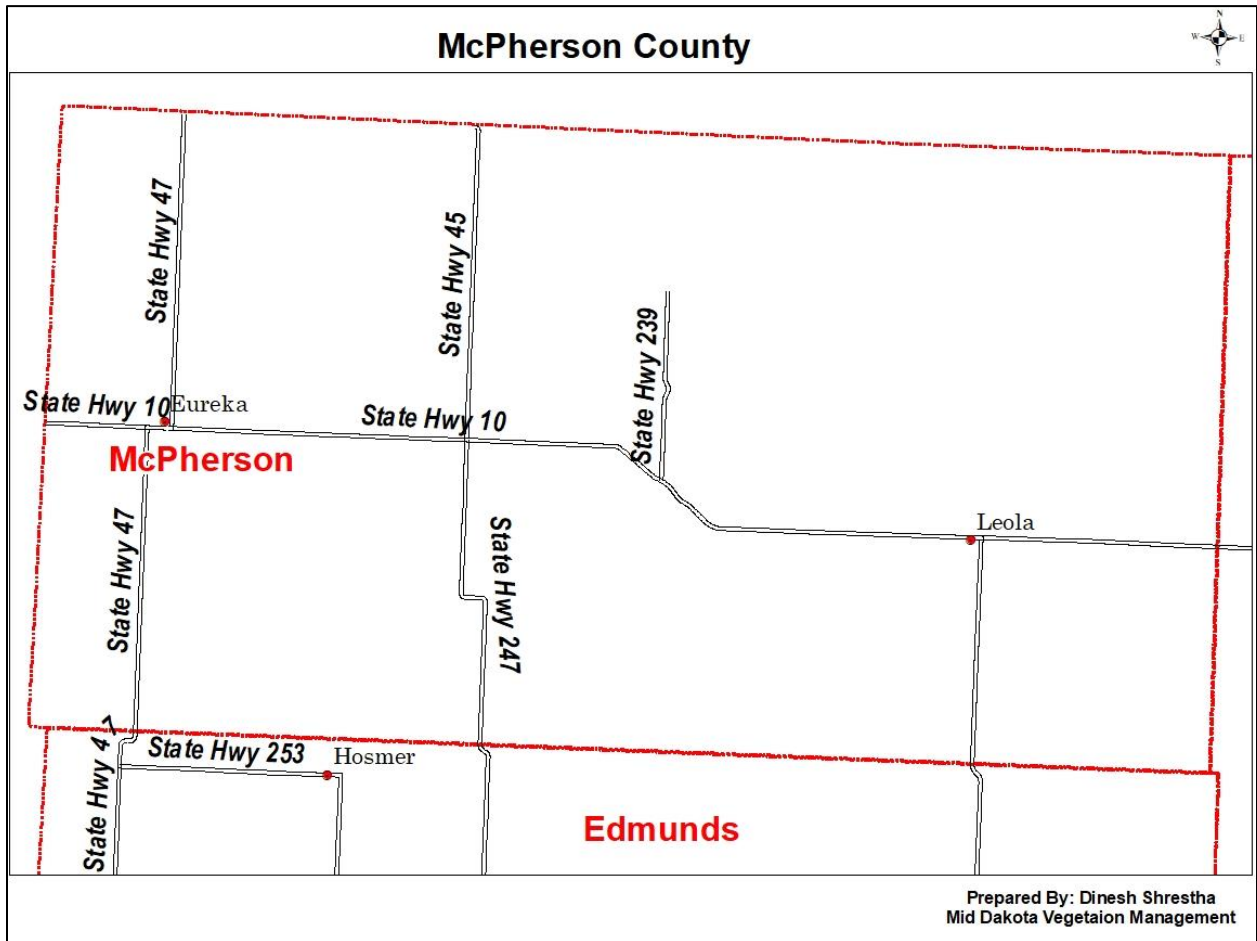
Roberts County

Spink County

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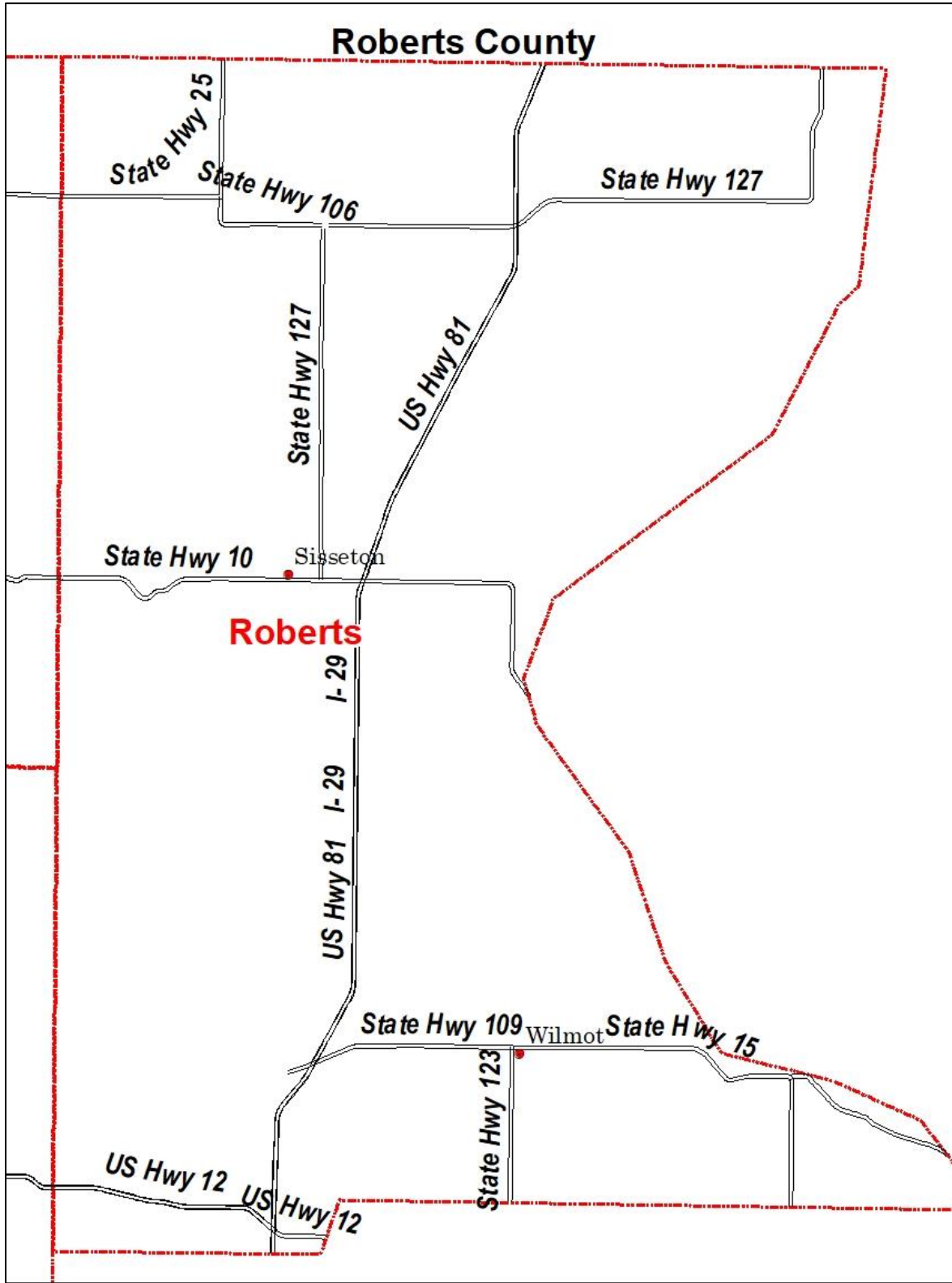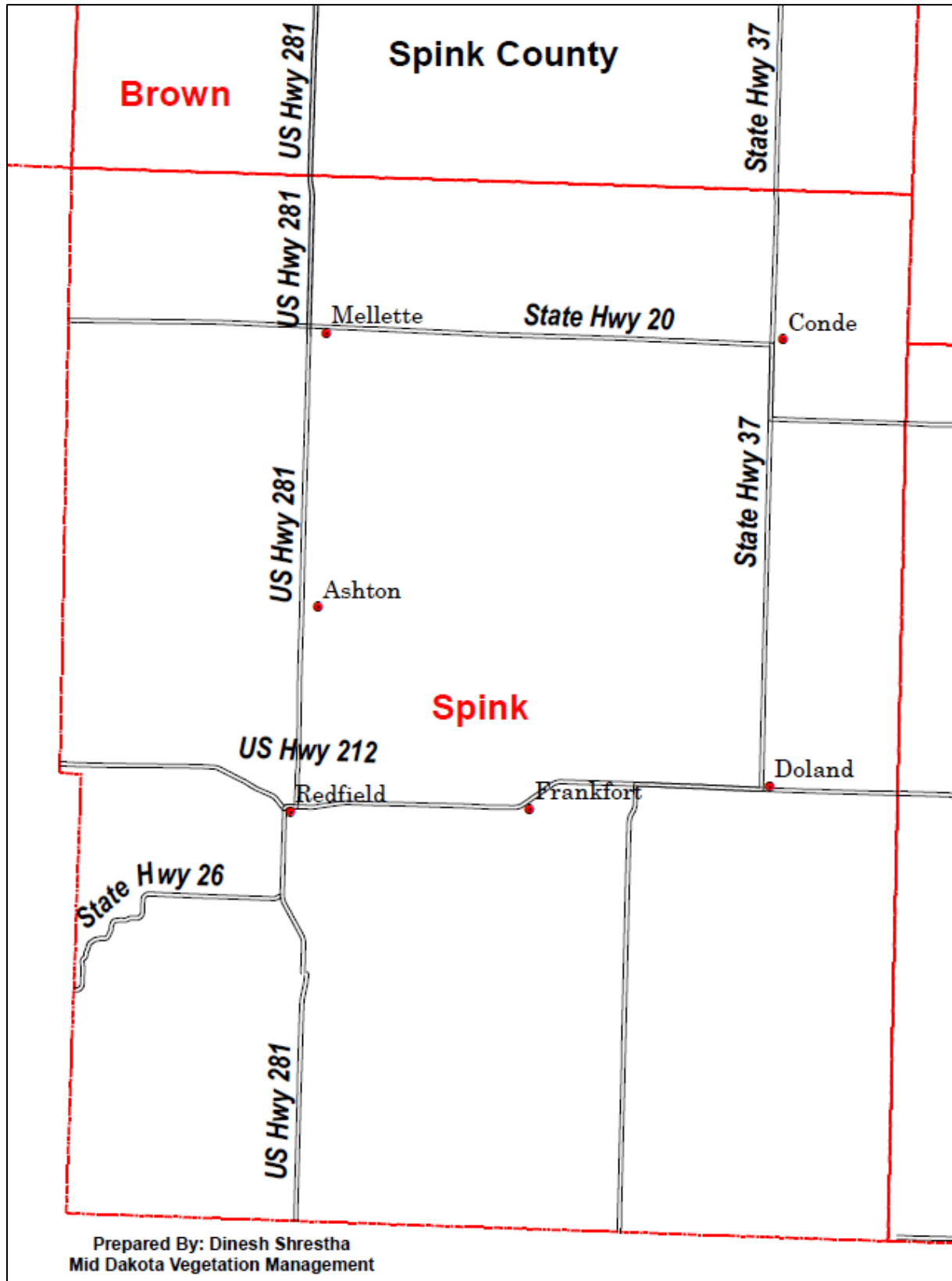
References

Canham, Andrew. *Conversation*, Miller SD (Summer 2018)

Shrestha, Dinesh. *Internship Photos* (Summer 2018)