

GEOGRAPHIC VARIABLES AFFECTING NEST LOCATIONS
OF BALD EAGLES (*Haliaeetus Leucocephalus*)
IN THE RED RIVER VALLEY OF THE
NORTH

FINAL NORTH DAKOTA VIEW MINI-GRANT REPORT
RFP #39-2007



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INTRODUCTION

A North Dakota View grant (RFP# 39-2007) was obtained to further document the distribution of bald eagle nest sites and adjacent land cover types in the Red River Valley of North Dakota and Minnesota. The purpose of this research was to determine which geographic variables (land cover type, distance from water and distance from human disturbances) best predict the location of bald eagle nest sites in the Red River Valley (Figure 1). The funding was used to conduct aerial surveys of bald eagle nests along the entire Red River corridor in North Dakota. Bald eagle nest locations were also verified and updated from Josh Johnston's surveys in 2006. A land cover classification surrounding documented nest sites was performed using aerial photography.

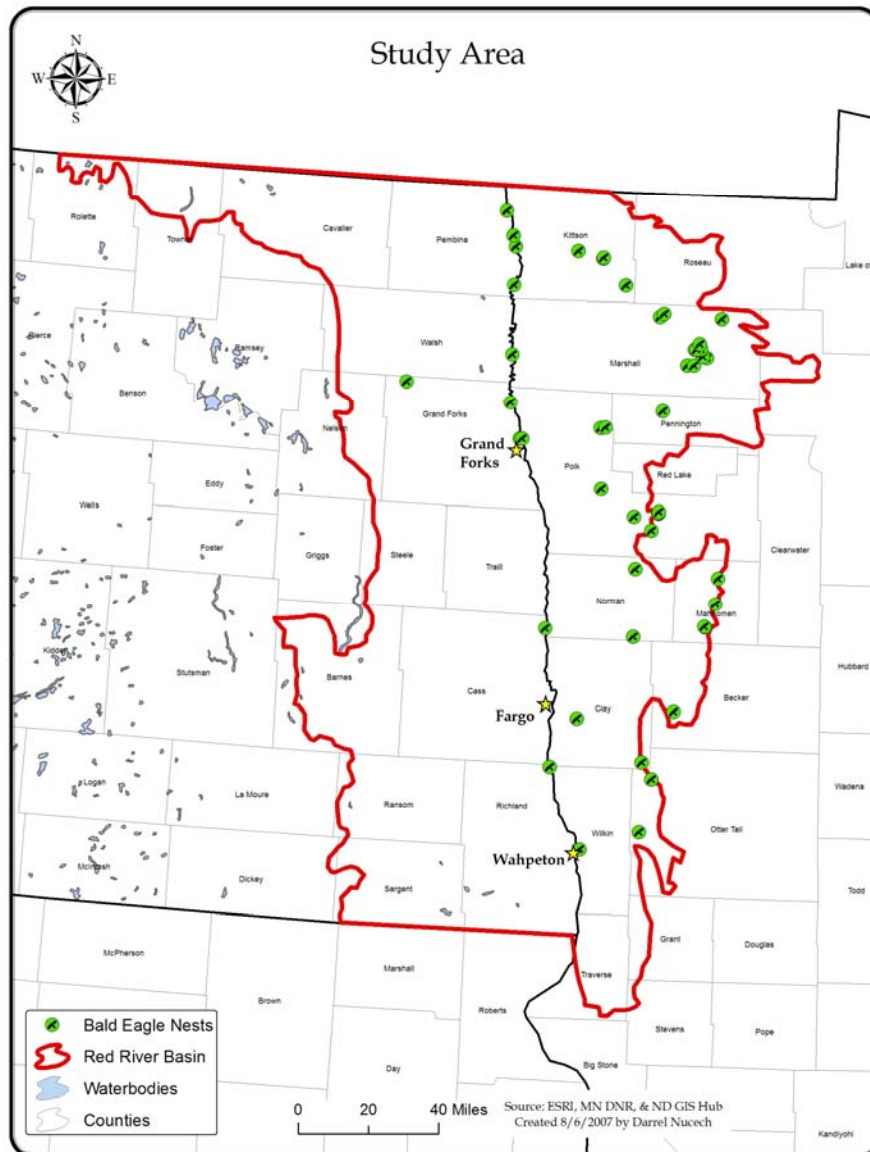


Figure 1. Location of Study Area.

METHODS

Bald Eagle Nest Site Locations

The locations of bald eagle nests within the study area were determined from three sources. An ArcView shapefile from the Minnesota Department of Natural Resources was utilized to identify previously known locations (MN DNR 2005). In spring of 2006, Josh Johnston conducted one aerial survey (in cooperation with University of North Dakota flight services) from Grand Forks, ND, to the Canadian border and back again (Johnston 2006). Similar methods were used to conduct three additional surveys focusing on the riparian corridor of the Red River in the spring and summer of 2007 by Darrel Nucech. Two flights were first conducted between Grand Forks, ND, and the South Dakota/North Dakota border, since the northern portion of the river was already surveyed. Another flight was conducted on the northern portion of the river again, as there was still funding available. These surveys were conducted April 27, June 12, and July 2, 2007, using a Decathlon airplane from the university. Since it is easier to view from one side of the plane at a time, both sides of the river were flown. Observations were made by the pilot and passenger (Darrel Nucech). Nests were recorded using a tablet personal computer equipped with ArcGIS and a Transplant™ GPS receiver. Being able to use ArcGIS allows the observer to have the capability to view the current track of the aircraft and its location on aerial photography.

Land Cover Analysis

Similar to Johnston's studies, a modified USGS Level 1 land cover classification was conducted of the nest locations (Anderson et al. 1976). Land cover types were digitized (using ArcGIS) into the following categories: water, agriculture, transportation, forested, grassland, wetland and human development. These types were determined within 500 m, 1 km, and 1500 m of each nest to examine if certain categories increased in coverage farther from nests, such as human development. Guinn (2004) suggested that a 1 km buffer was a critical distance for nesting habitat. The land cover types were digitized from 1 m resolution orthorectified aerial photography from the National Agricultural Imagery Program (NAIP) 2006 Farm Service Agency (USDA FSA 2006, ND GIS Hub 2007).

RESULTS

Aerial Survey

Only three new nests were observed during the surveys in 2007. This brings the total number of nests observed within the Red River Valley up to 51 (Figure 2). Two of those new nests were observed south of Grand Forks, while one new nest was located north of Grand Forks.

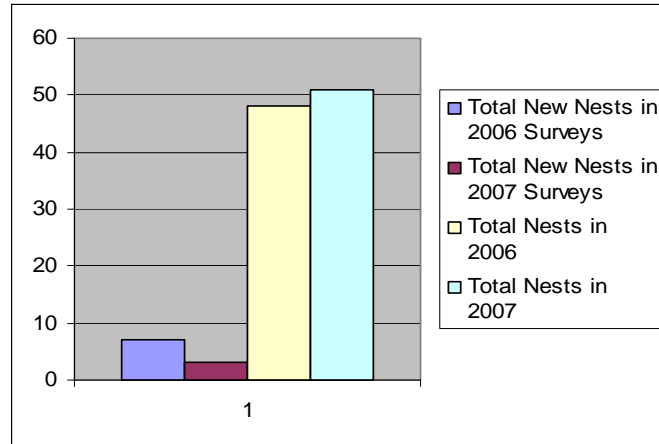


Figure 2. Total Nests in the Red River Valley.

Another nest on the northern portion was found approximately 1 km from its previously recorded location, meaning that either the nest was recorded in the wrong position or it has been relocated since 2006 (Figure 3). Gende (1998) has shown that bald eagle territory density correlates with prey availability. One possible reason for the lower nest densities south of Grand Forks, is that as the Red River decreases in size towards the source, the quality of the foraging areas for bald eagles is lower also.

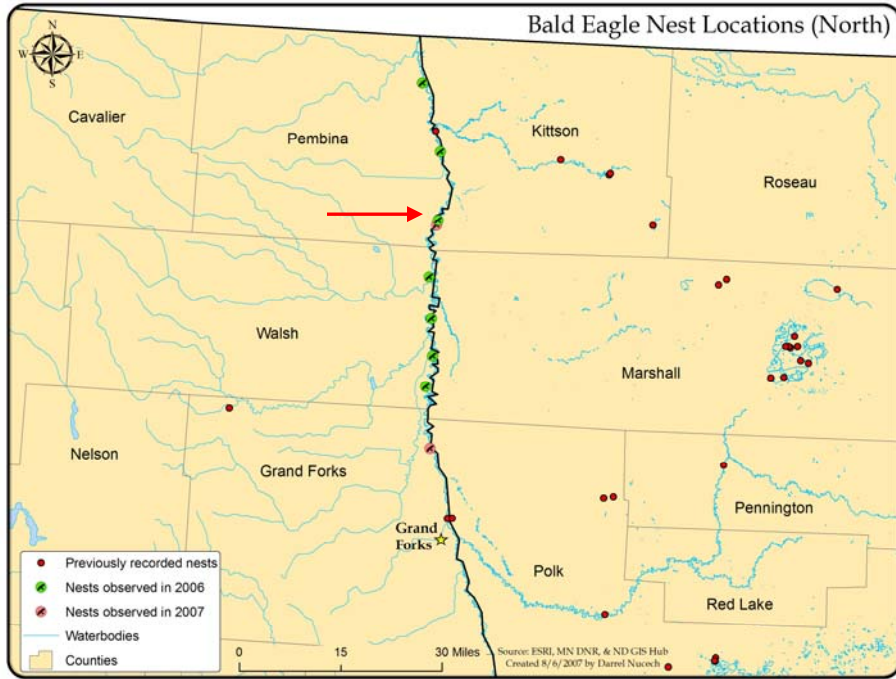


Figure 3. Nests North of Grand Forks.

Land Cover Classification

By classifying land cover in proximity to each nest, it is hoped that certain landscape influences on nest sites will be found. Since agriculture dominates this landscape, it is no surprise that it makes up the largest amount of land surrounding nests (72.4%); therefore, farming practices seem to have little effect on nest locations. However, habitat preservation, especially maintaining shelterbelts and forest, are critical for sustaining healthy populations of bald eagles in the Red River Valley (Tables 1-3). Human development consisted of the least amount of land cover surrounding nests at each buffer distance (Figures 4-6). It is believed that bald eagles tend to nest in areas farther from human development. For example, nest 5 was located very close to an abandoned farmstead. Distances from nests to human development and water will be calculated and analyzed later for an independent study presented by Darrel Nucech.

Table 1. Land cover within 500 m of each nest site.

Land cover (Hectares)							
Nest Number	Agriculture	Forest	Grassland	Water	Wetland	Human Development	Transportation
1	66.63	6.02	0.99	4.78	0.00	0.00	0.00
2	55.53	14.23	2.12	6.32	0.00	0.20	0.22
3	42.53	21.97	8.47	7.30	0.00	0.69	1.16
4	54.34	12.89	7.57	1.96	0.00	0.00	0.45
5	59.17	1.17	5.46	7.61	0.00	1.01	0.00
6	82.84	49.74	1.66	9.99	0.00	0.08	0.32
7	58.32	23.68	0.12	10.08	0.00	0.00	0.00
8	44.36	9.99	0.04	9.31	1.05	0.00	0.00
9	14.37	11.94	4.09	12.18	0.00	0.08	0.32
10	67.67	7.81	3.68	0.00	5.87	0.00	0.00
Total	545.76	159.44	34.2	69.53	6.92	2.06	2.47

Table 2. Land cover within 1000 m of each nest site.

Land cover (Hectares)							
Nest Number	Agriculture	Forest	Grassland	Water	Wetland	Human Development	Transportation
1	266.52	17.02	10.47	12.10	1.28	1.40	4.97
2	215.88	57.82	10.71	24.44	1.34	2.53	2.93
3	214.13	58.36	28.87	17.76	0.00	4.65	3.50
4	244.74	21.25	36.08	2.64	1.27	0.76	7.18
5	245.56	30.84	17.64	18.62	0.00	2.51	2.71
6	255.20	49.82	7.97	35.29	0.00	0.08	0.69
7	237.36	38.45	2.51	30.35	0.00	4.09	0.85
8	196.32	74.87	7.65	25.94	8.94	0.12	0.28
9	146.70	143.75	16.11	26.75	0.28	0.85	1.01
10	255.00	26.18	7.49	16.27	7.41	0.00	1.30
Total	2277.41	518.36	145.5	210.16	20.52	16.99	25.42

Table 3. Land cover within 1500 m of each nest site.

Land cover (Hectares)							
Nest Number	Agriculture	Forest	Grassland	Water	Wetland	Human Development	Transportation
1	609.60	26.77	29.35	17.07	1.28	14.29	7.65
2	500.20	103.45	35.82	41.55	2.29	14.12	10.20
3	515.67	79.71	46.36	26.54	0.89	6.20	8.04
4	547.24	82.18	65.47	12.35	1.27	1.38	9.22
5	583.76	56.13	28.09	32.42	0.00	4.29	6.11
6	564.72	96.36	20.11	55.40	0.00	2.87	3.52
7	544.65	222.10	8.09	56.86	0.00	4.09	2.02
8	389.73	147.39	57.67	66.05	38.28	2.31	5.95
9	404.21	190.29	31.36	52.00	1.58	0.85	3.56
10	557.47	81.42	16.43	42.90	8.58	0.16	5.14
Total	5217.25	1085.8	338.75	403.14	54.17	50.56	61.41

Note: Nest numbers in the above tables are ordered from south to north, with nest #1 being the first nest found from the source.

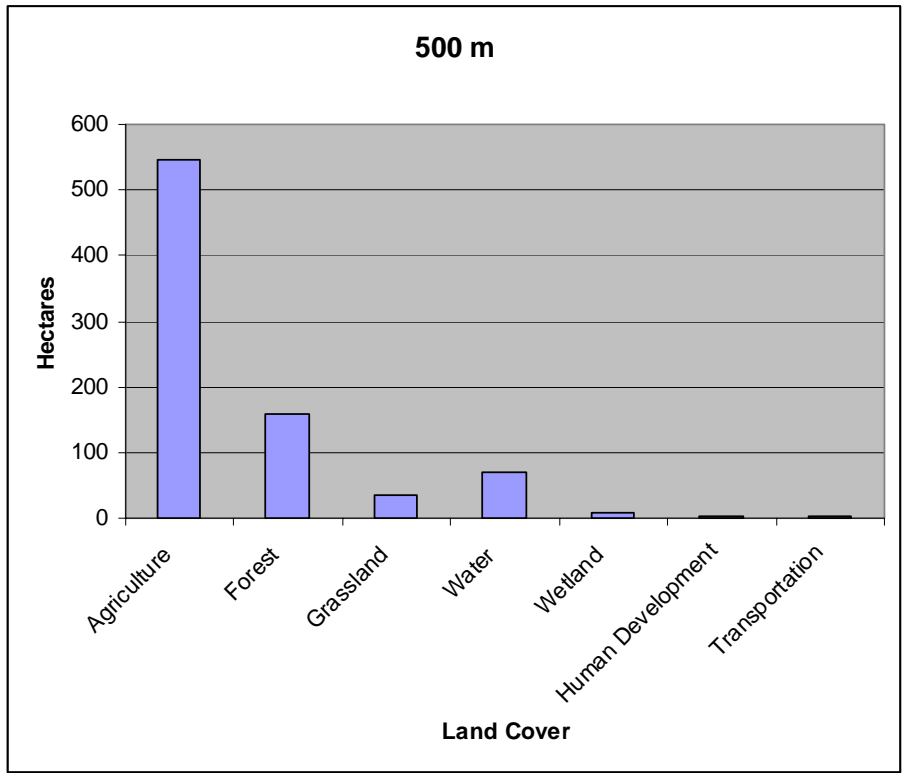


Figure 4. Total Number of Hectares at 500 m.

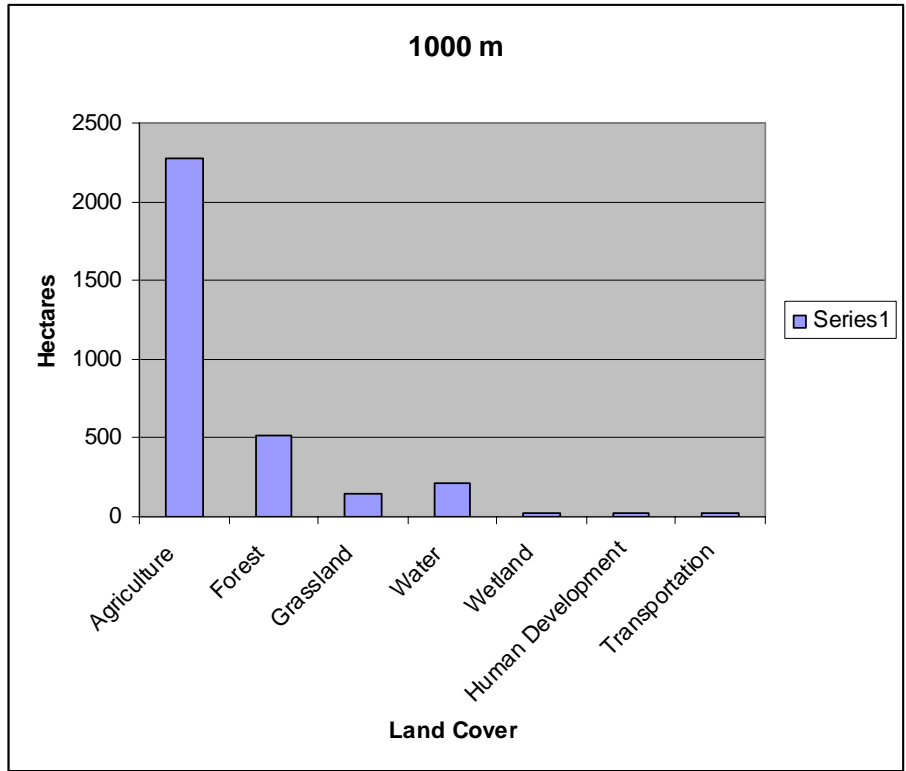


Figure 5. Total Number of Hectares at 1000 m.

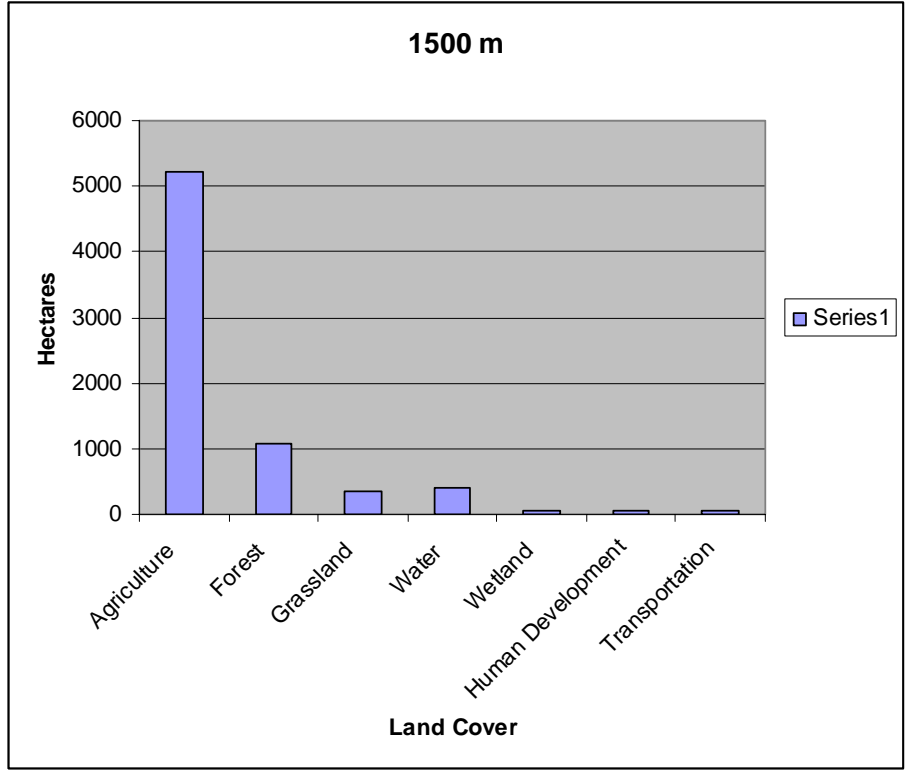


Figure 6. Total Number of Hectares at 1500 m.

BUDGET

A total award of \$3595 was received including \$469 for overhead costs. The total dollars spent was approximately \$2,413.07 including \$314.75 in overhead costs (Table 4). We tried to schedule one additional flight, but were not able to do so because of scheduling conflicts with the plane. Approximately \$700 of the award was not spent.

Table 4. Study costs.

Project Item	Date	Cost	Comments
Flight 1	4/25/07	\$701.06	Grand Forks to SD border
Flight 2	6/12/07	\$689.16	Grand Forks to SD border
Flight 3	7/02/07	\$702.1	Grand Forks to Canadian border
Subtotal		\$2098.32	
Overhead (15%)		\$314.75	
Total Costs		\$2413.07	

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