Section-based Monitoring of Grassland Birds on National Grasslands


Photo by T. Leukering

A Pilot Project Conducted on Five Great Plains National Grasslands in 2002

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David Hanni, Chrissy McConnell &
Tony Leukering
Rocky Mountain Bird Observatory
14500 Lark Bunting Lane
Brighton, CO 80601

John Sidle
USDA Forest Service
125 North Main Street
Chadron, NE 69337

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EXECUTIVE SUMMARY

In 2002, Rocky Mountain Bird Observatory (RMBO), under contract with the USDA Forest Service (Forest Service), implemented a grassland bird monitoring strategy as a pilot project on five National Grasslands in the Great Plains. The objectives are to monitor population trends and distribution of grassland birds at the scale of a National Grassland. With this information, land management decisions can be directed in a more effective manner to conserve Great Plains birds on National Grasslands.

We surveyed five National Grasslands using road based point counts conducted at the section level (1x1 mile) from roads (n=276 sections), and interior line transects, conducted at the section level along and away from roads (n=7 sections). General habitat characteristics within the section were recorded: percent shrub cover, grass height and cover, and ditch vegetation height. Black-tailed prairie dog colonies were also located and surveyed specifically for Burrowing Owls and Mountain Plover, both species of special concern. We surveyed five National Grasslands: Pawnee National Grassland, Colorado; Kiowa National Grassland, New Mexico; Rita Blanca National Grassland, Oklahoma and Texas; and, Grand River and Fort Pierre National Grasslands, South Dakota.

We used program DISTANCE to determine density estimates for individual species on all five grasslands (23 species) in addition to the five individual grasslands. The five grasslands had five species in common. We provide graphs comparing species densities on each of the grasslands.

We collected data using the section-based inventory technique that allowed us to calculate density estimates for 23 species. Included in the list of 23 species are five species that are listed as sensitive species by the Forest Service. This information can be used in the future to indicate trends and shifts in distribution of grassland birds.

INTRODUCTION

Grassland birds have experienced steeper, more consistent, and geographically more widespread declines than any other guild of North American avian species (Sampson and Knopf 1996). Partners in Flight has found that 11% of short grass prairie birds are declining and 66% lack enough data to assess population trends, and therefore determine stability (Partners in Flight Species Assessment Database 2002). Conversion of native prairie to cropland is one of the factors contributing to these declines.

The Forest Service administers 3.5 million acres of National Grasslands in the Great Plains. Under various statutes the agency must ensure the viability of all species on these public lands, including all grassland birds. Within the grassland bird community, some species have been designated as sensitive by the Forest Service because there is a viability concern. This concern is evidenced by either significant current or predicted downward population trends or density, or significant current or predicted downward trends in habitat capability that would reduce the species' existing distribution. Sensitive species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing. There must be no impacts to a sensitive species without an analysis of the

significance of adverse effects on its population, its habitat, and on the viability of the species as a whole. Adequate monitoring information is central to environmental impact analyses and effective avian conservation and management. However, comprehensive avian monitoring data does not exist for National Grasslands.

Some managers have relied on data derived from the Breeding Bird Survey (BBS), currently the best and most extensive bird-monitoring program, to monitor bird populations (Robbins et al. 1989, Sauer 1993). The BBS, operational in the Great Plains since 1967, uses volunteers to conduct roadside surveys of birds across North America and produces indices of population abundance at the continental scale for many common bird species (Robbins et al. 1986). BBS data and analyses are free and have proven to be a very valuable source of information on bird population trends. BBS data can be used to produce continental-scale relative abundance maps. These maps provide a reasonably good indication of the relative abundances of species that are well sampled by the BBS. However, many species and habitats are inadequately sampled by the BBS (Robbins et al. 1993, Sauer 1993), and BBS data do not reliably predict population trends at small geographic scales such as a National Grassland (Sauer 2000). For these and other reasons, BBS data are generally insufficient to guide local and regional management decisions (Leukering et al. 2000).

Some Great Plains states have begun more intensive monitoring using the section (1 mi X 1 mi) as the sampling unit (Hanni 2002) (Figure 1). This unit was selected based on it being the common unit of land management in Colorado, the layout of roads in Colorado, and for the ease of location. Sections of short grass prairie were identified and different layers were combined in a geographical information system to identify 35,145 sections of short grass prairie that contained between 600 and 700 acres of short grass prairie. From these sections, 2,000 sections were randomly selected to survey. If the section was not accessible from at least one road the sample was relocated to the closest section of short grass prairie in a randomly selected direction that met the criteria. The avian monitoring methodology for National Grasslands is based upon the Colorado section-based monitoring technique.

The Forest Service recognizes the importance of establishing a coordinated avian monitoring program (Manley 1992). Management of National Grasslands to protect migratory birds simply requires a more detailed monitoring strategy than offered by the BBS. In 2002, the Forest Service and RMBO entered into an agreement to establish a monitoring protocol for surveying grassland birds that will be consistent with current section-based monitoring programs in Colorado, Nebraska, Kansas and Oklahoma. This survey was carried out over five National Grasslands: Grand River, Fort Pierre, Pawnee, Rita Blanca, and Kiowa. The cost of this work to the Forest Service was $23,500. The anticipated annual cost for all grasslands is $131,950 (Appendix D).

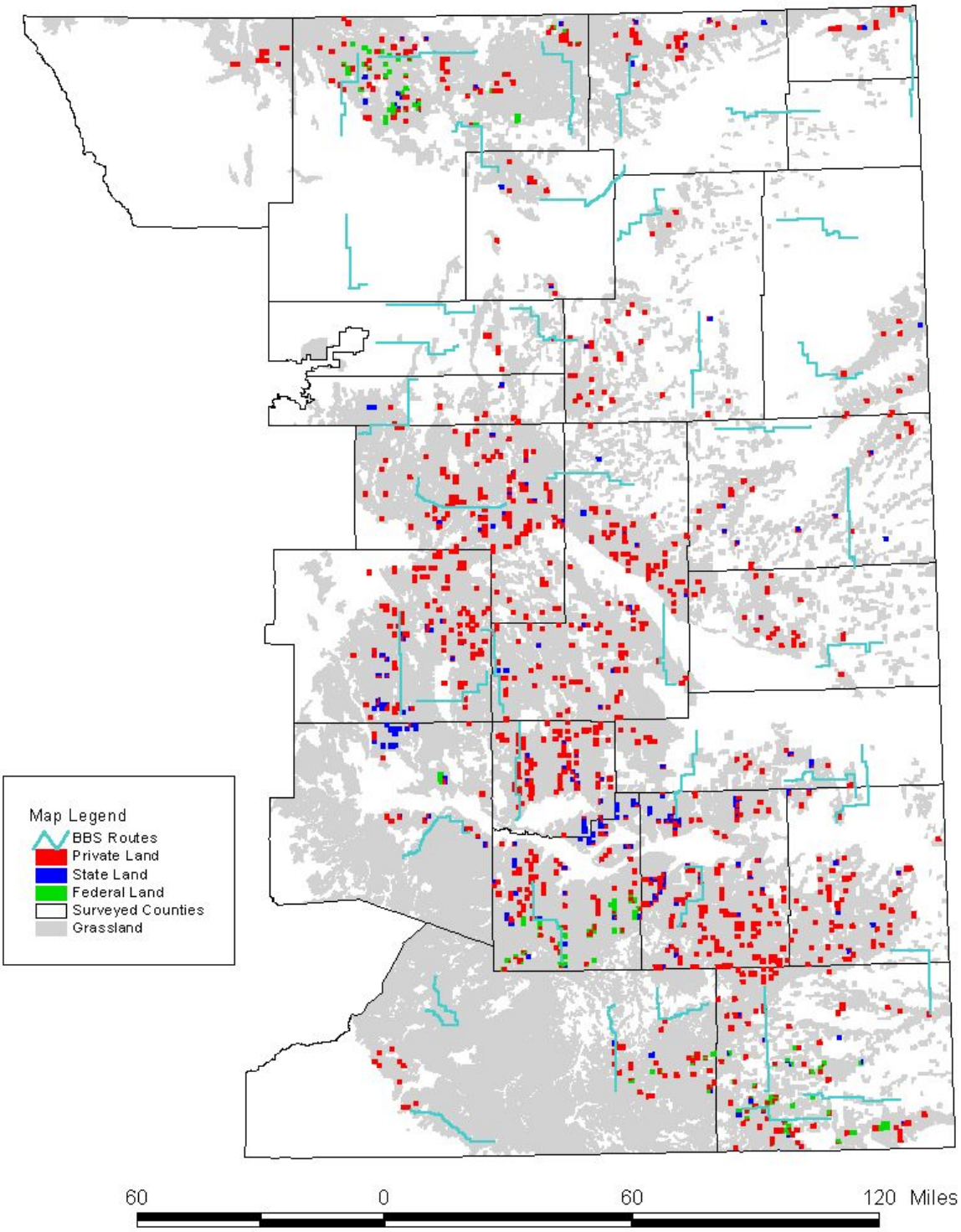

Figure 1. Random sections surveyed for grassland birds in eastern Colorado during 2001, illustrated by ownership. This work was done at the behest of the Colorado Division of Wildlife in order to provide better monitoring of grassland birds. The green sections occur on Comanche and Pawnee National Grasslands. The monitoring of grassland birds on National Grasslands would increase the number of green sections to provide adequate monitoring at the National Grassland scale. BBS routes are also depicted.

METHODOLOGY

The road-based point count technique was chosen as the primary technique to collect data on population trends and distribution of grassland birds. This technique was found to be the most efficient option for collecting bird data over a large area (Hanni 2002). Both road-based point counts and interior line transects were conducted at the section level (1x1 mi) on five National Grasslands. These five grasslands comprise 280,200 hectares in nine counties. In addition to the road-based point counts and interior line transects, surveys for raptor nests and black-tailed prairie dog colonies were conducted to document nest locations and colonies to monitor in the future. Vegetation measurements were collected through visual estimates of proportion and height of grass cover, percent shrub cover, type of shrub cover, and ditch vegetation height.

Section Selection:

A point count data collection process modified from Buckland et al. (1993) was established based on the use of PLSS (Public Land Survey System) 1x1 mi sections as sampling units. Using Geographic Information Systems (GIS), we randomly selected homogenous sections of grassland adjacent to at least one road (Figures 2-7). We conducted three point counts for each section (four point counts per section versus three does not yield a statistically significant difference in the number of species detected (Hanni 2002)). Point count locations were distributed around sections based on the number of roads surrounding the selected sections. For example, on sections adjacent to only one road, three counts spaced at least 0.2 mi (322m) apart along the road were conducted. On sections with two roads, two counts were conducted along one road, and one count was conducted along the other; the road on which two counts were conducted was randomly selected using a random number table. On sections bordered by three roads, one count was conducted along each road. Where four roads surrounded the section, one road was randomly selected and eliminated using a random number table, and the section was then treated as a three-road section. We used a random number table to select point count locations along each road.

National Grassland Sections Surveyed 2002

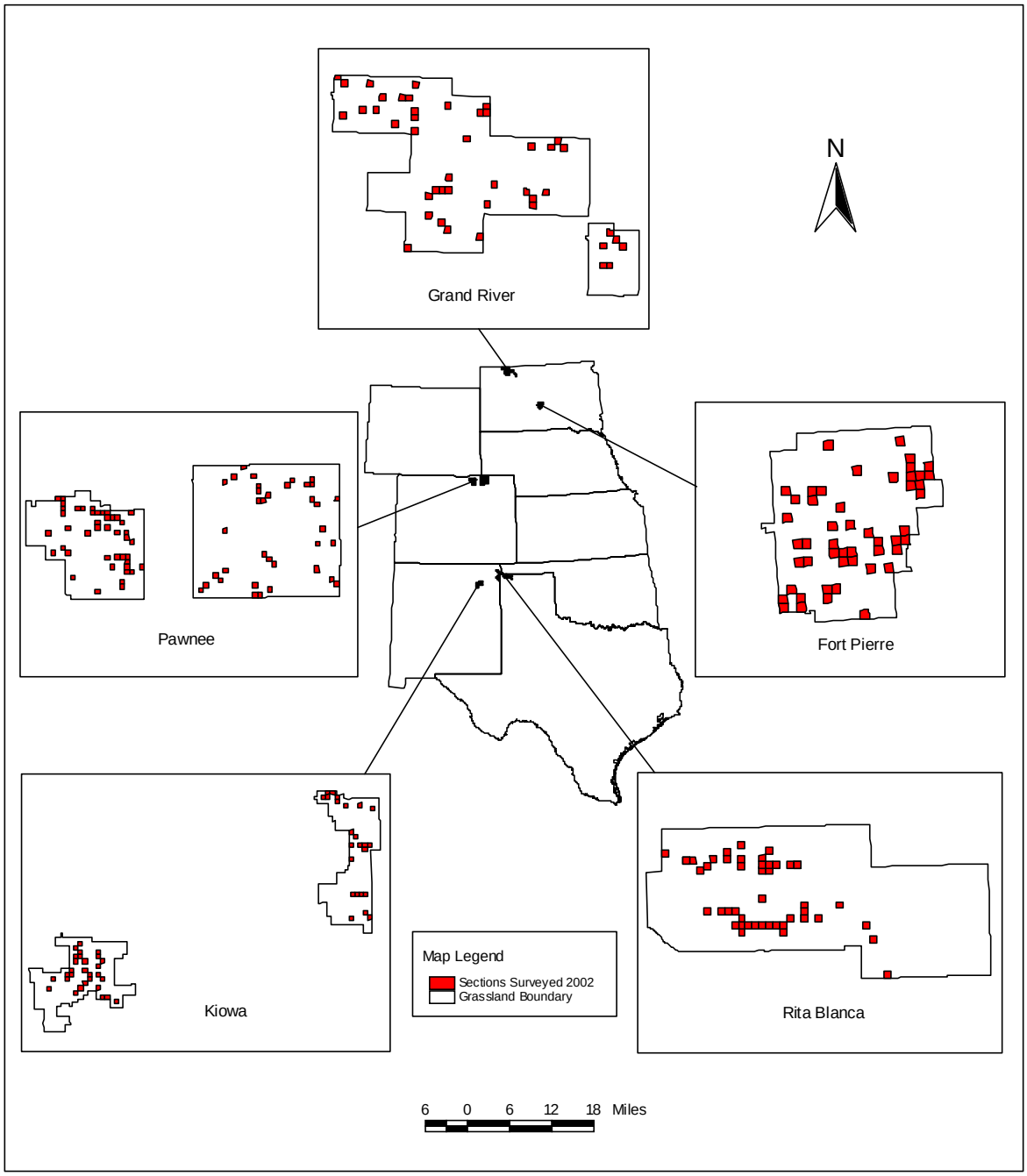

Figure 2. Locations of the sections that were surveyed for birds during 2002.

Grand River National Grassland - PLSS and Roads

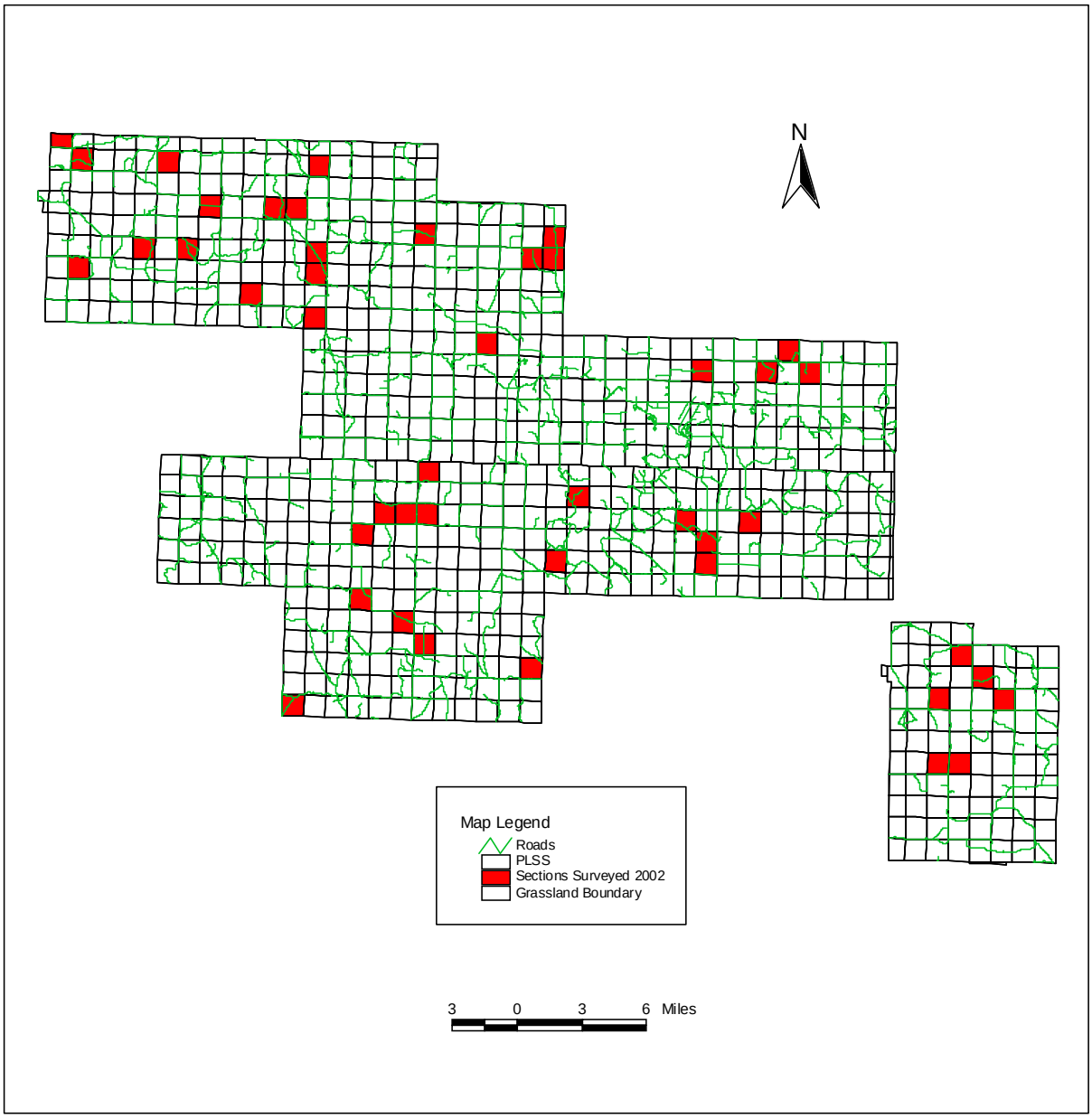

Figure 3. The Public Land Survey System PLSS, roads, and selected sections on Grand River National Grassland.

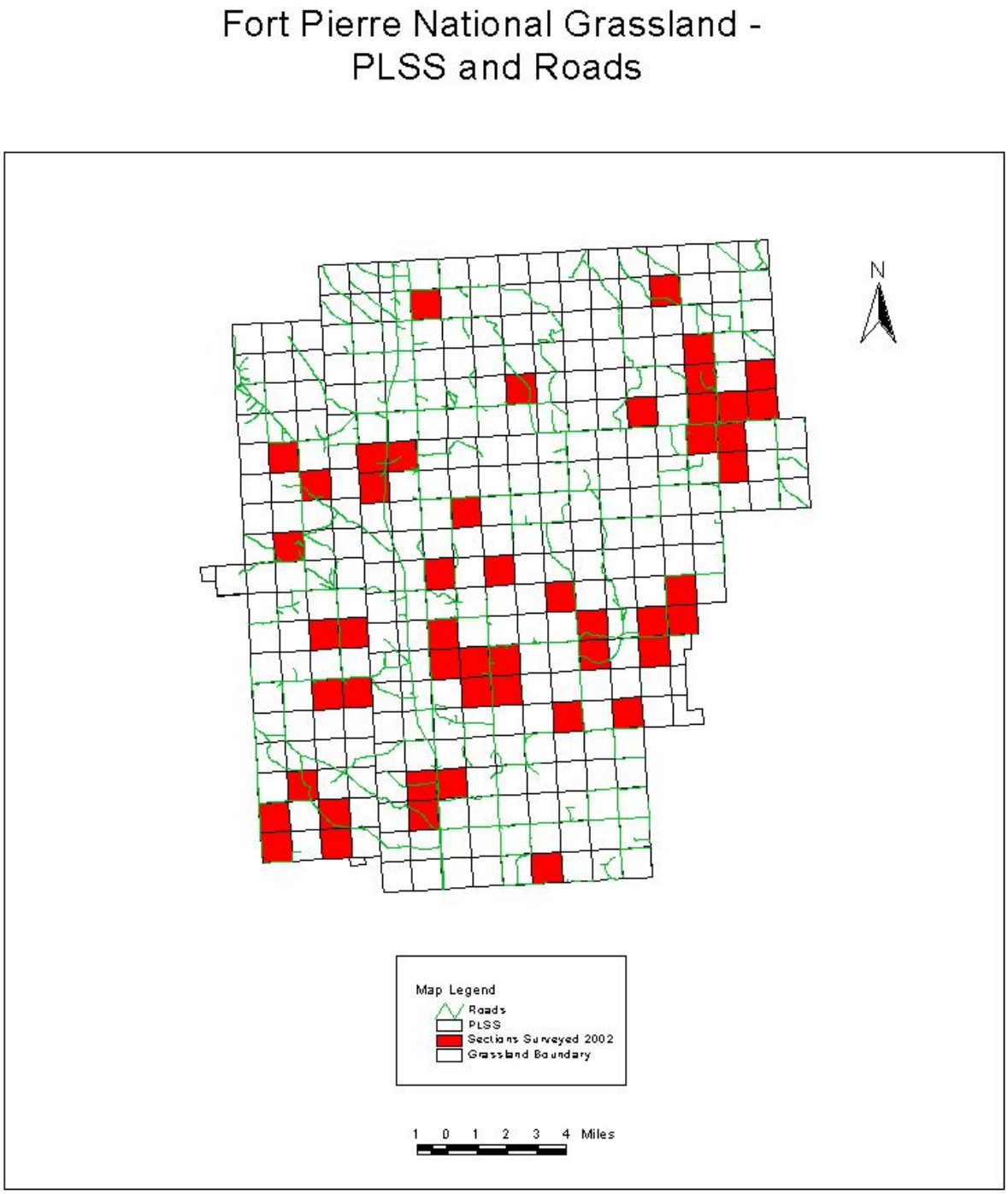

Figure 4. The Public Land Survey System PLSS, roads, and selected sections on Fort Pierre National Grassland.

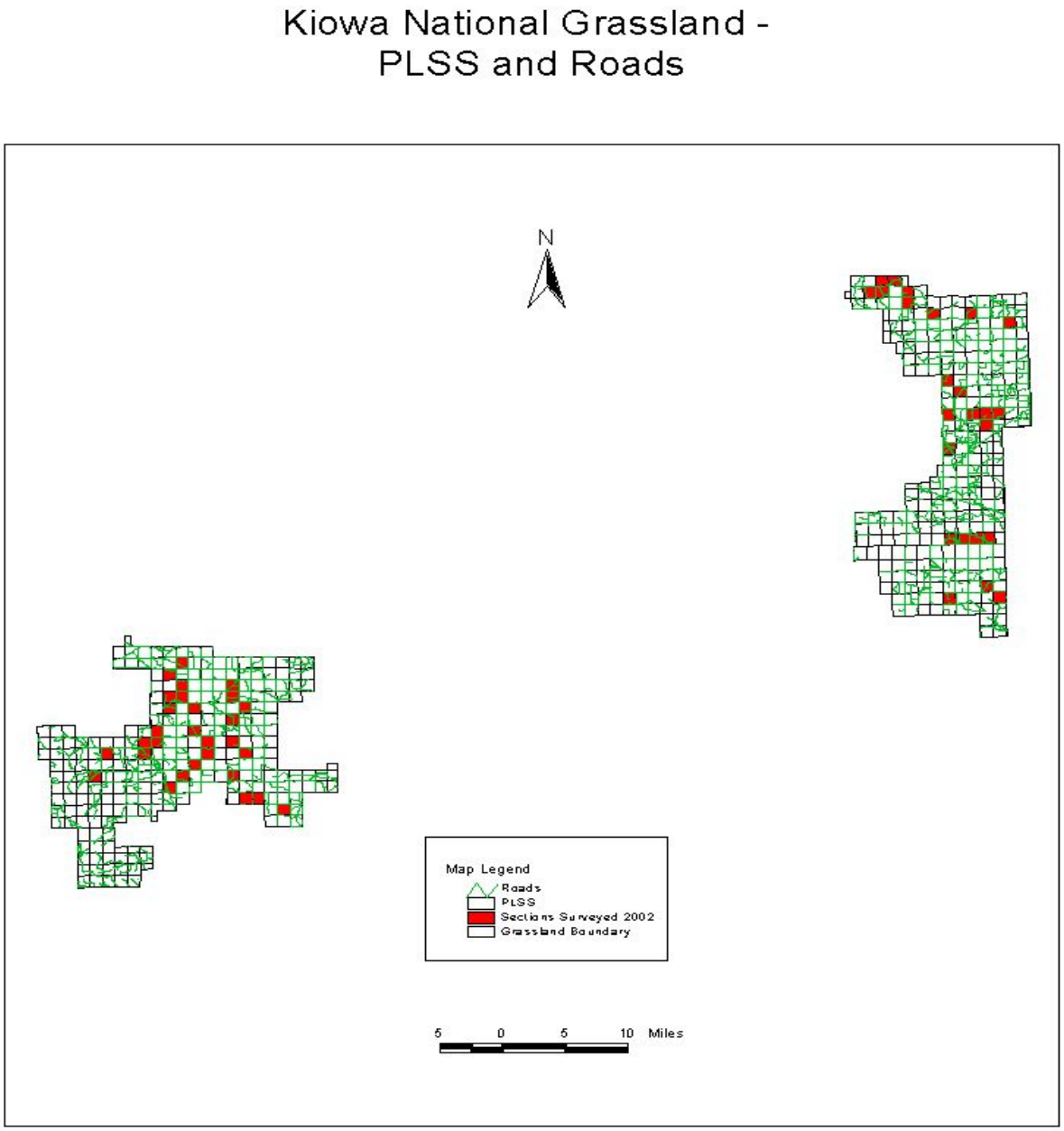

Figure 5. The Public Land Survey System PLSS, roads, and selected sections on Kiowa National Grassland.

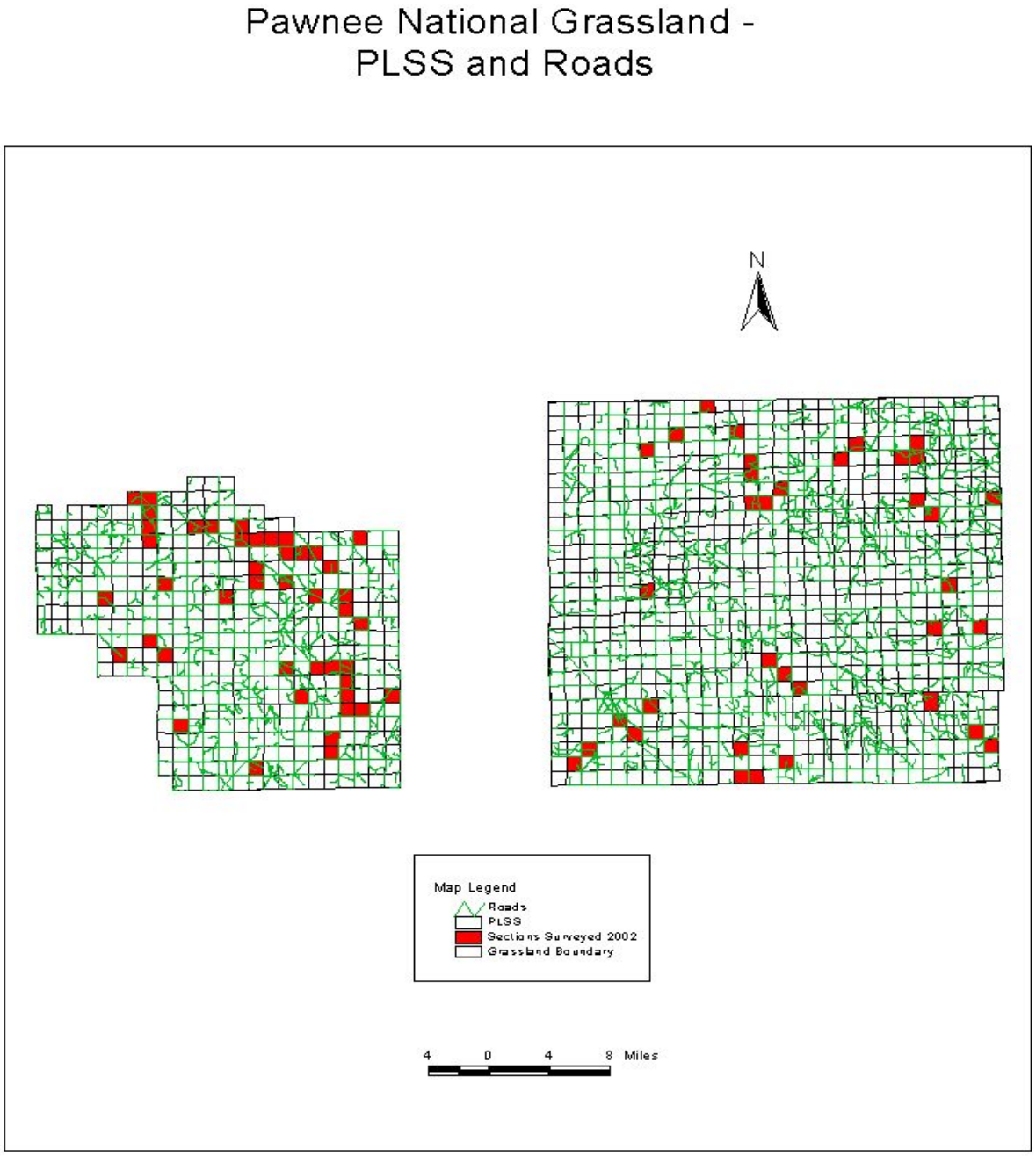

Figure 6. The Public Land Survey System PLSS, roads, and selected sections on Pawnee National Grassland.

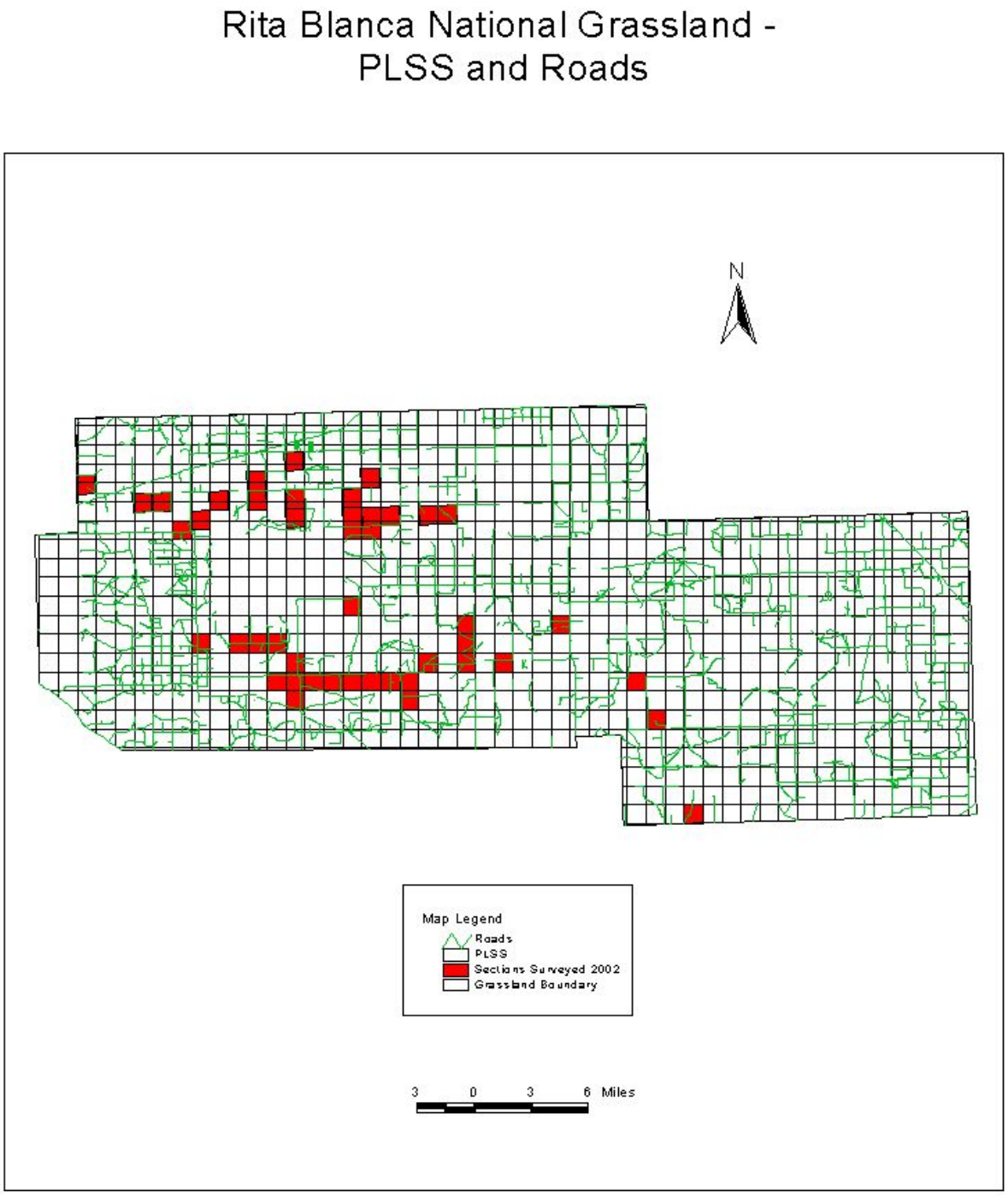

Figure 7. The Public Land Survey System PLSS, roads, and selected sections on Rita Blanca National Grassland.

Road-based Point Counts and Interior Point Transect:

Point counts were conducted for five minutes looking from the road 180° into the section. All species of birds seen and/or heard within this area, in the section, were recorded. Distances of the birds from the observer to the points of first detection were also recorded. Distances were determined using a Bushnell Yardage Pro 500 Rangefinder. How the bird was detected (i.e. visually, aurally), sex of the bird if known, and habitat being used (i.e. shrub, ground, fence, etc.) were all recorded. Birds flying over the section were tallied separately. Locations of the points were recorded using a Garmin *etrex* global positioning system (GPS) unit. Township, range, and section (TRS) were also noted.

We established interior point transects to attempt to correct for the road bias in the road-based point count technique. All transects contained 12 point count stations 250 m apart; six along the road and six placed at a random distance from the road so it was parallel to the road. Overall, we completed 7 point transects using the interior point transect technique. The observer initiated the point transect at either edge of the section conducting the 180˚ point counts along the road first. Secondly, the observer completed the interior portion of the point transect. Observers recorded all birds seen or heard during the count period recording birds, radial distances, how birds were detected, sex, and habitat type. Weather and times of individual surveys were also recorded.

Point count data collection was set to follow the breeding seasons of grassland bird species, mid-May thru early July in the 2002 field season. We considered arrival times of early and late-breeding species to assure that the majority of the species were detected. We initiated the study in the southern most grasslands (Rita Blanca, and Kiowa), and later in the season we surveyed the more northerly grasslands (Fort Pierre, and Grand River). We adopted this schedule to account for geographically governed seasonal differences among geographical grassland distribution, and the distribution of breeding birds. Observers conducted point counts from sunrise until no later than 11:00 am when detectable activity typically slowed or ceased. We also recorded survey “start” and “end” times. Materials used for the surveys included binoculars, Bushnell yardage pro 500, GPS unit, and Robel pole. Surveys were not conducted during times of rain or winds in excess of 18 mph. Observers recorded weather conditions such as cloud cover, wind speed, and temperature.

All black-tailed prairie dog colonies and playas visible within the section were sketched by the observer onto the data sheet. All black-tailed prairie dog colonies were documented on maps and in notes, regardless of location on National Grassland, private land, or state-owned land. All black-tailed prairie dog colonies, either occupied or abandoned by prairie dogs, and playas were searched with binoculars for both Burrowing Owls and Mountain Plovers. Nests of any raptors (mainly Ferruginous and Swainson’s Hawks) were documented with both GPS and on maps (Figure 8).

Point Locations for Species of Management Interest

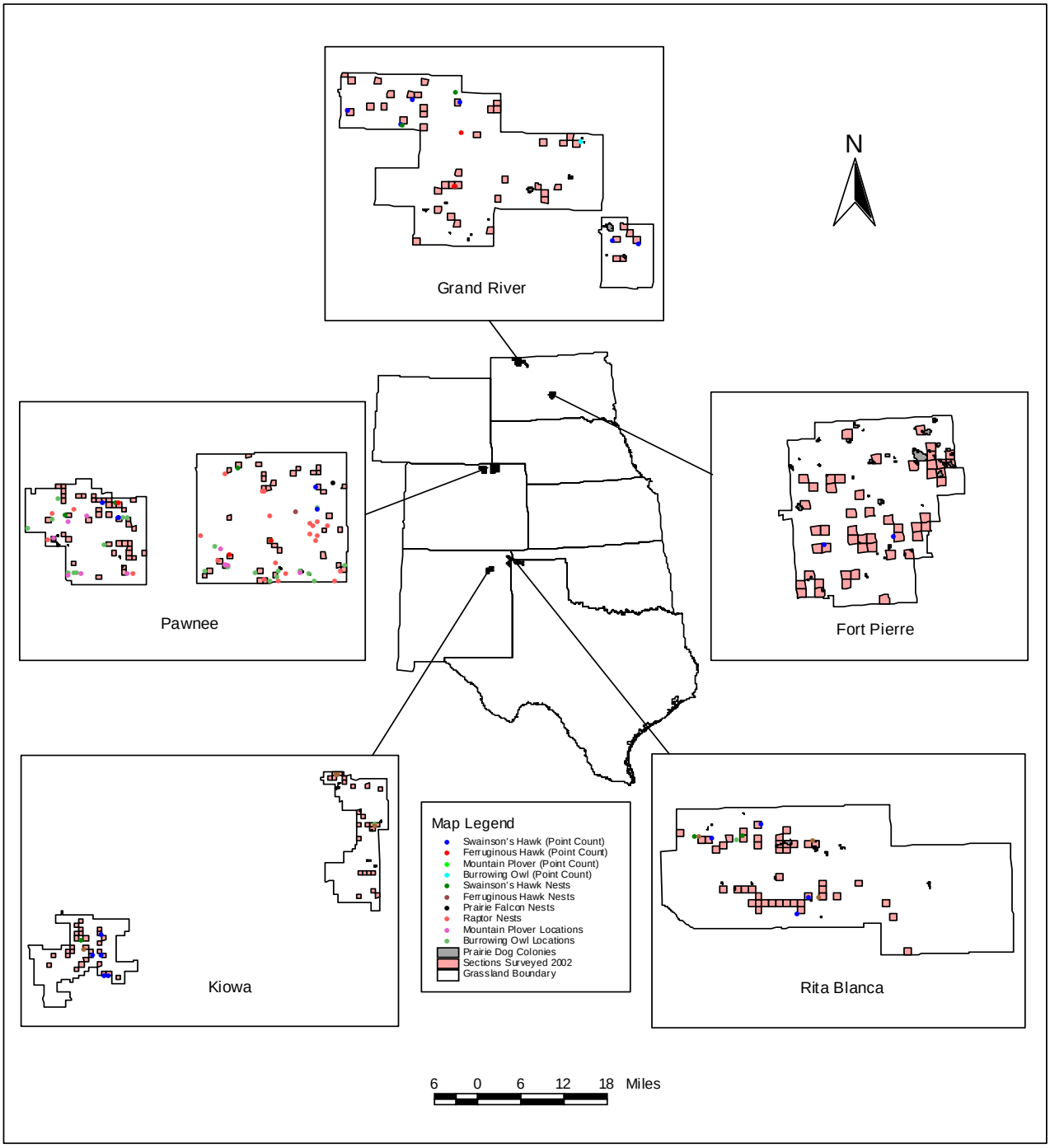

Figure 8. Locations of some species of management interest to the Rocky Mountain Bird Observatory and the United States Forest Service.

Training was provided by RMBO at the Central Plains Experimental Range near Pawnee National Grassland. The technicians were trained for three consecutive days through lecture and in the field on Pawnee National Grassland. Technicians were deemed proficient in grassland bird identification (visual and aural), distance estimation with rangefinders, GPS use, mapping skills, methodologies, vegetation identification, and ground cover estimation. Recordings of the songs and calls of grassland birds were provided to each technician for skill-sharpening outside of the three-day training period.

Vegetation sampling:

The area surveyed included the vegetation located within a semi-circle (150 m radius) of the point count looking into the surveyed section. We recorded grass height, proportion of grass in each height category, and shrub cover percent. Data for grass height were collected using two categories, <15 cm and >15 cm (~ankle height). If there was a combination of the two heights, the proportions in each category were recorded. Shrub cover data were recorded only where a shrub community was present. Technicians were provided with a reference guide to shrub percent that gave examples of shrub percent for each of the different shrub species to be encountered in the field. The categories were <1%, >1%-3%, >3%-10%, and >10%. These percentages were recorded for sagebrush, rabbit brush, four-winged salt bush, greasewood, cholla, and yucca.

Data Analysis:

We used the program, DISTANCE (Thomas 1998-99), to analyze the road-based point count and point transect data. The notation, concepts, and analysis methods of DISTANCE were developed by Buckland et al. (1993). We used DISTANCE to estimate density (D) on species that had a minimum of 25 observations or had a CV of less than 50%, indicating robust data. During analyses, DISTANCE assigns a unique detection function to avoid some potential problems associated with traditional analysis of point counts (e.g., varying detectability among habitats, species, and different years). Analysis using DISTANCE assumes that 1) all birds at distance 0 are detected; 2) distances of the birds close to the points or line are measured accurately; and, 3) birds do not move in response to the observer's presence. In this analysis, we adjusted the sampling effort to 0.5 due to the area the birds were recorded in. Birds were recorded only in the focal section 180˚ instead of within the entire 360º of the point count.

The index of relative abundance used in the distribution maps was calculated from data collected using the road-based point count technique. The index of abundance, represented by graded map symbols, was defined as the total number of individuals for each species detected on the section divided by the number of point counts (three) conducted on that section.

We used program MONITOR to determine the statistical power of the monitoring program on the five National Grasslands.

RESULTS

We conducted 816 point counts on 272 sections on five National Grasslands, detecting a total of 64 species (Appendix B). Density estimates for 23 species were calculated (Table 1). There were 5 grassland species consistently found throughout all five National Grasslands; Western Meadowlark, Horned Lark, Grasshopper Sparrow, Lark Bunting, and Western Kingbird (Figure 9).

Table 1. Estimated densities for birds found on all five grasslands surveyed.

Name	D	D LCL	D UCL	D CV	n
Swainson's Hawk	1.44	0.77	2.72	33%	24
Ring-necked Pheasant	0.58	0.32	1.06	31%	33
Killdeer	2.49	1.44	4.33	29%	19
Upland Sandpiper	22.53	14.89	34.09	21%	91
Mourning Dove	7.93	6.05	10.39	14%	149
Burrowing Owl	0.15	0.07	0.33	41%	12
Common Nighthawk	0.43	0.29	0.64	20%	29
Western Kingbird	6.39	4.60	8.86	17%	70
Eastern Kingbird	4.23	1.66	10.77	49%	24
Chihuahuan Raven	0.41	0.26	0.66	25%	36
Cliff Swallow	1.66	0.76	3.65	42%	12
Barn Swallow	9.83	5.60	17.24	29%	29
Horned Lark	87.30	78.97	96.51	05%	1029
Cassin's Sparrow	5.42	4.14	7.10	14%	188
Lark Sparrow	3.17	1.71	5.88	32%	46
Lark Bunting	14.98	11.86	18.91	12%	223
Grasshopper Sparrow	15.91	12.32	20.53	13%	157
McCown's Longspur	7.17	5.54	9.27	13%	224
Chestnut-collared Longspur	20.95	16.90	25.99	11%	241
Bobolink	0.76	0.36	1.62	40%	10
Red-winged Blackbird	10.68	7.55	15.11	18%	93
Western Meadowlark	32.32	28.33	36.88	07%	861
Brown-headed Cowbird	35.67	28.50	44.63	11%	299

D = Density estimate expressed in birds/km^2, DLCL & DUCL = lower and upper confidence limits of D, n = number of detections, DCV = coefficient of variation.

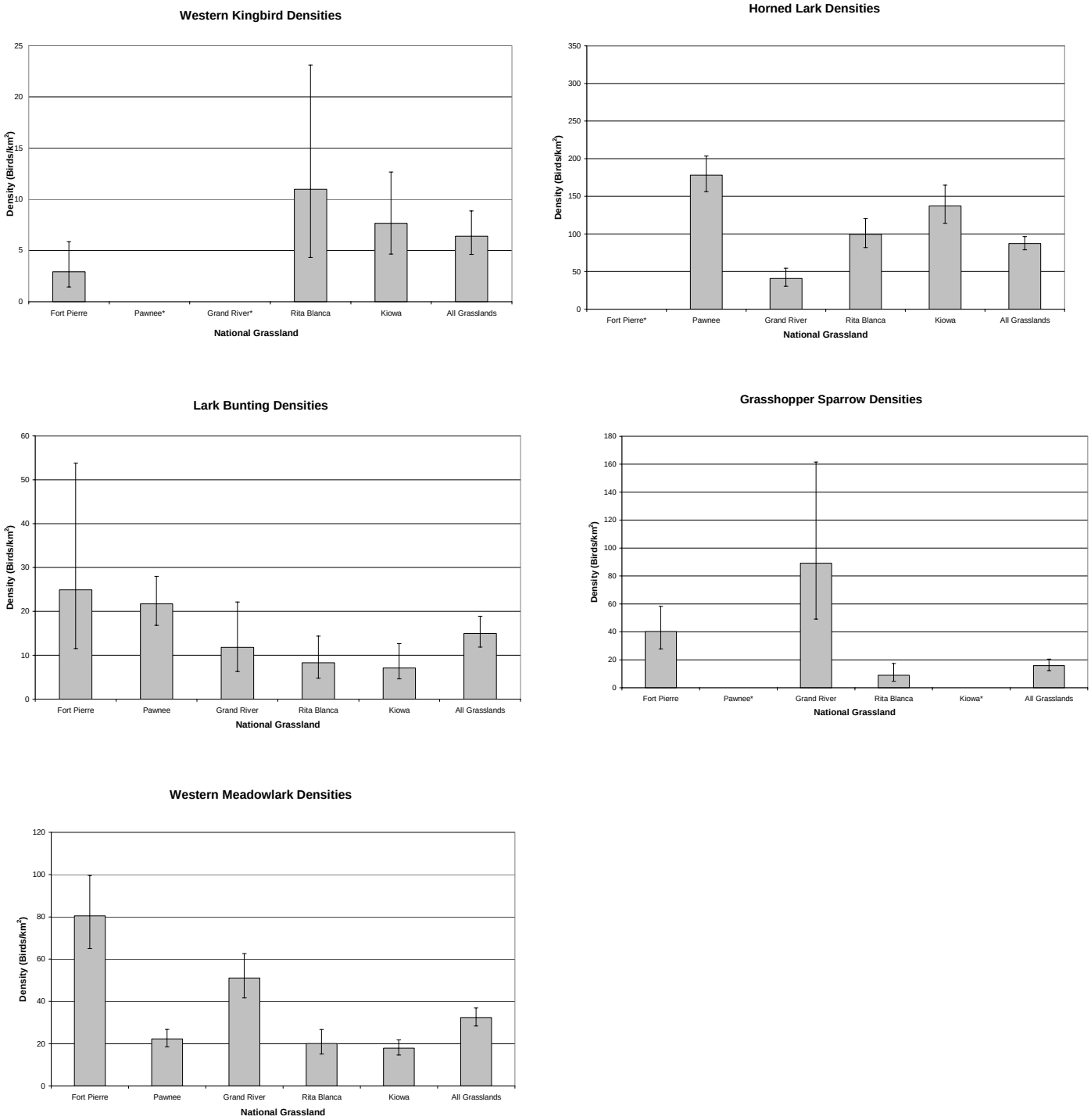

Figure 9. Graphs showing differences between the grasslands by species. The corresponding common names can be found in Appendix B.
*indicates that the grassland did not generate enough detections to analyze the data in program DISTANCE

Kiowa National Grassland:

We conducted 159 point counts on 53 sections on Kiowa National Grassland, and observed a total of 31 species. We calculated density estimates for 8 of these species (Table 2).

Table 2. Estimated densities for birds found on the Kiowa National Grassland.

Species	D	D LCL	D UCL	D CV	n
Morning Dove	5.20	2.95	9.17	29%	29
Western Kingbird	7.66	4.64	12.66	26%	27
Chihuahuan Raven	2.29	1.40	3.75	25%	29
Horned Lark	137.20	114.13	164.93	09%	299
Cassin's Sparrow	14.49	10.31	20.37	17%	80
Lark Sparrow	7.90	3.97	15.73	36%	24
Lark Bunting	7.09	4.09	12.29	28%	30
Western Meadowlark	17.89	14.69	21.79	10%	110

D = Density estimate expressed in birds/km^2, DLCL & DUCL = lower and upper confidence limits of D, n = number of detections, DCV = coefficient of variation.

Rita Blanca National Grassland:

We conducted 144 point counts on 48 sections on Rita Blanca National Grassland, and observed a total of 23 species. We calculated density estimates for 10 of these species (Table3).

Table 3. Estimated densities of birds found on the Rita Blanca National Grassland.

Species	D	D LCL	D UCL	D CV	n
Morning Dove	10.08	6.15	16.51	25%	40
Long-billed Curlew	0.82	0.42	1.59	34%	12
Common Nighthawk	1.08	0.61	1.94	30%	12
Western Kingbird	10.97	4.33	27.77	48%	21
Horned Lark	99.35	81.90	120.52	10%	191
Cassin's Sparrow	12.07	8.32	17.52	19%	93
Lark Sparrow	9.27	3.79	22.68	47%	22
Lark Bunting	8.29	4.77	14.38	28%	32
Grasshopper Sparrow	9.06	4.73	17.37	33%	19
Western Meadowlark	20.06	15.10	26.65	15%	128

D = Density estimate expressed in birds/km^2, DLCL & DUCL = lower and upper confidence limits of D, n = number of detections, DCV = coefficient of variation.

Pawnee National Grassland:

We conducted 240 point counts on 80 sections on Pawnee National Grassland, and observed a total of 22 species. We calculated density estimates for 6 of these species (Table 4).

Table 4: Estimated densities of birds found on the Pawnee National Grassland.

Species	D	D LCL	D UCL	D CV	n
Morning Dove	9.62	6.34	14.60	21%	45
Horned Lark	178.08	155.96	203.34	07%	436
Lark Bunting	21.70	16.83	28.00	13%	110
McCown's Longspur	24.83	19.65	31.38	12%	224
Chestnut-collared Longspur	5.10	2.38	10.95	40%	19
Western Meadowlark	22.23	18.45	26.79	10%	160

D = Density estimate expressed in birds/km^2, DLCL & DUCL = lower and upper confidence limits of D, n = number of detections, DCV = coefficient of variation.

Fort Pierre National Grassland:

We conducted 138 point counts on 46 sections on Fort Pierre National Grassland, and observed a total of 38 species. We calculated density estimates for 11 of these species (Table 5).

Table 5: Estimated densities of birds found on the Fort Pierre National Grassland.

Species	D	D LCL	D UCL	D CV	n
Ring-necked Pheasant	2.23	1.16	4.30	34%	20
Killdeer	9.72	4.12	22.94	45%	19
Upland Sandpiper	101.73	67.53	153.26	21%	69
Mourning Dove	8.41	4.50	15.72	32%	21
Western Kingbird	2.91	1.44	5.85	37%	10
Grasshopper Sparrow	40.34	27.92	58.27	19%	72
Lark Bunting	24.91	11.53	53.84	40%	28
Chestnut-collared Longspur	49.34	25.32	96.16	35%	34
Red-winged Blackbird	42.52	27.42	65.93	23%	61
Western Meadowlark	80.49	65.08	99.57	11%	278
Brown-headed Cowbird	151.33	112.29	203.96	15%	216

D = Density estimate expressed in birds/km^2, DLCL & DUCL = lower and upper confidence limits of D, n = number of detections, DCV = coefficient of variation.

Grand River National Grassland:

We conducted 135 point counts on 45 sections on Grand River National Grassland and observed 32 species. We calculated density estimates for 10 of these species (Table 6).

Table 6: Estimated densities of birds found on the Grand River National Grassland.

Species	D	D LCL	D UCL	D CV	n
Upland Sandpiper	16.06	7.59	33.98	39%	38
Morning Dove	4.35	1.85	10.23	45%	10
Horned Lark	40.78	30.59	54.37	15%	95
Barn Swallow	3.69	1.46	9.33	49%	12
Lark Bunting	11.81	6.30	22.15	33%	23
Grasshopper Sparrow	89.14	49.21	161.45	31%	53
Chestnut-collared Longspur	94.81	71.64	125.47	14%	178
Red-winged Blackbird	6.61	3.61	12.10	31%	25
Western Meadowlark	51.10	41.68	62.65	10%	123
Brown-headed Cowbird	54.98	36.04	83.87	22%	86

D = Density estimate expressed in birds/km^2, DLCL & DUCL = lower and upper confidence limits of D, n = number of detections, DCV = coefficient of variation.

DISCUSSION AND RECOMMENDATIONS

Year 2002 was a pilot year to determine the potential for breeding bird monitoring on National Grasslands in the Great Plains. The section-based monitoring technique collected data that allowed us to calculate density estimates for 23 species detected on the surveyed National Grasslands. Included in the list of 23 species are five that are designated as sensitive species by the Forest Service. This is the list (Table 1) of species that we will potentially be able to monitor in the future using this technique. Information gathered using this technique could be used in the future to determine population trends and show shifts in distribution of these individual species at local scales.

There are noticeable differences in the composition and distribution of species on each of the five grasslands. In the northern most grasslands surveyed (Grand River and Fort Pierre) the grass structure was noticeably higher than that of the southern most grasslands (Rita Blanca, Kiowa). This is probably due to the distribution of the grasslands across different ecoregions (short grass prairie and mixed-grass prairie) and latitudes. Structure is important to grassland birds and there are noticeable differences in the species composition as the percent shrub increases in eastern Colorado (Hanni 2003). The differences in the structure of the grasslands change with latitude, offering different habitat types that are preferred by certain species.

For example, in 2002, Lark Bunting observations were uncharacteristically low in eastern Colorado (Hanni 2003). The estimated density of Lark Buntings, in this study, was 8 times lower in 2002 than 2001. It is hard to determine where these birds went, but this pilot study shows that densities were higher in the northern range of the survey area. The grassland with the highest Lark Bunting density was Fort Pierre National Grassland (D = 24.91, CV=40%), the lowest was Kiowa National Grassland (D = 7.09, CV=28%). In future years, data collected at the landscape level will enable us to detect these differences to determine if the species are

shifting geographically or experiencing a decline in population. The section-based monitoring gives a view of the avian community and can be used to identify areas that could be managed to demonstrate the most effective results in the conservation of Great Plains birds on National Grasslands. According to Program Monitor analyses, we should be able to detect a +/- 3% change in population trend with 90% certainty in 6 years.

Currently, the section based-inventory technique generates reliable data to monitor five species. Observations were too small to generate reliable analysis for the other Forest Service sensitive species. These species would require more intensive surveying techniques, such as lek counts, prairie dog colony monitoring, and raptor nest surveys. These surveys are more suitable for monitoring species such as Lesser Prairie-Chicken, Greater Prairie-Chicken, Ferruginous Hawk, Short-eared Owl and other low-density sensitive species occurring on National Grasslands.

One disadvantage to the road-based point count technique, which is shared by the BBS, is that several species of grassland birds are biased toward roads (e.g., Horned Lark and Western Meadowlark) (Hanni 2003) and some are biased away from roads (e.g., McCown's Longspur, Chestnut-collared Longspur) (Hanni, unpublished data). We attempted to generate a correction factor in order to make the density estimates more accurate. Unfortunately, due to the large amount of variables that may contribute to the road bias in the technique, we were unable to calculate a dependable correction factor. Work in Colorado may help address the road bias matter. Currently, we are working toward determining a correction factor to adjust for the selection that some species show for or against roads. The road-based point counts are being compared to un-biased point transects to determine a variable for each species for which there are density estimates from both techniques. The correction factor will compensate for the density estimate generated, from road-based point counts, and should offer a more accurate population estimate for individual species.

This pilot project can serve as a basis for linking treatment effects (management plan implementation and effectiveness) on National Grasslands to grassland bird counts. Point counts are marked using GPS and such points can be related to base vegetation and range layers in National Grassland geographical information systems. Correlations can then be drawn among avian trends, densities, diversity and management prescriptions. Because all of the counts are conducted based on a common unit of management, the section, it is foreseeable that in future years bird population trends and distribution derived from the section-based inventory technique can be tied to management practices. Evaluating management practices based on population trends and distributions will enable us to focus conservation efforts and help land managers to make decisions that conserve prairie birds on National Grasslands.

The pilot project was inexpensive, defensible, site-specific, and habitat-specific. It fills an important management need at a modest cost. About $140,000 per year would fund the survey on all Great Plains National Grasslands. Appendix D details the costs per National Grassland. There should be no expectation that this technique will detect and develop trends for all grassland bird species. No single technique can accomplish such an assessment of all grassland birds. The section-based monitoring provides an overview of the avian community as well as information on several sensitive grassland bird species.

ACKNOWLEDGEMENTS

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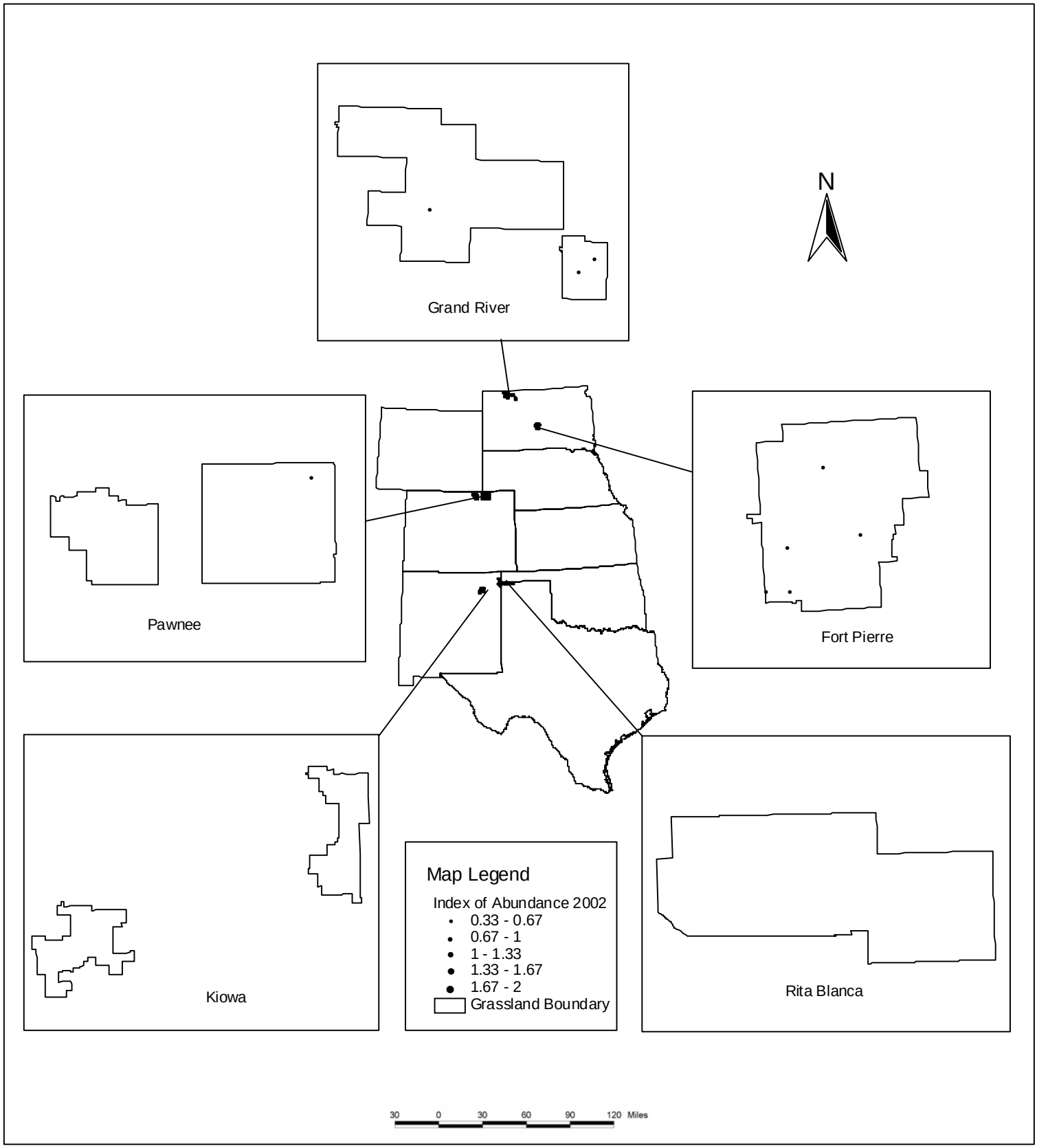
APPENDIX A. SPECIES DISTRIBUTION MAPS

The following distribution maps were derived from data collected using the road-based point count technique. The distribution map for each species shows locations of all observations graded by an index of abundance of the species for each of the sections The index of abundance was created to account for effort, and is defined as the total number of individuals for the species per point count conducted on a section (i.e. # of each species / # point counts). These maps show information on the general distribution and relative abundance of the species.

Northern Harrier

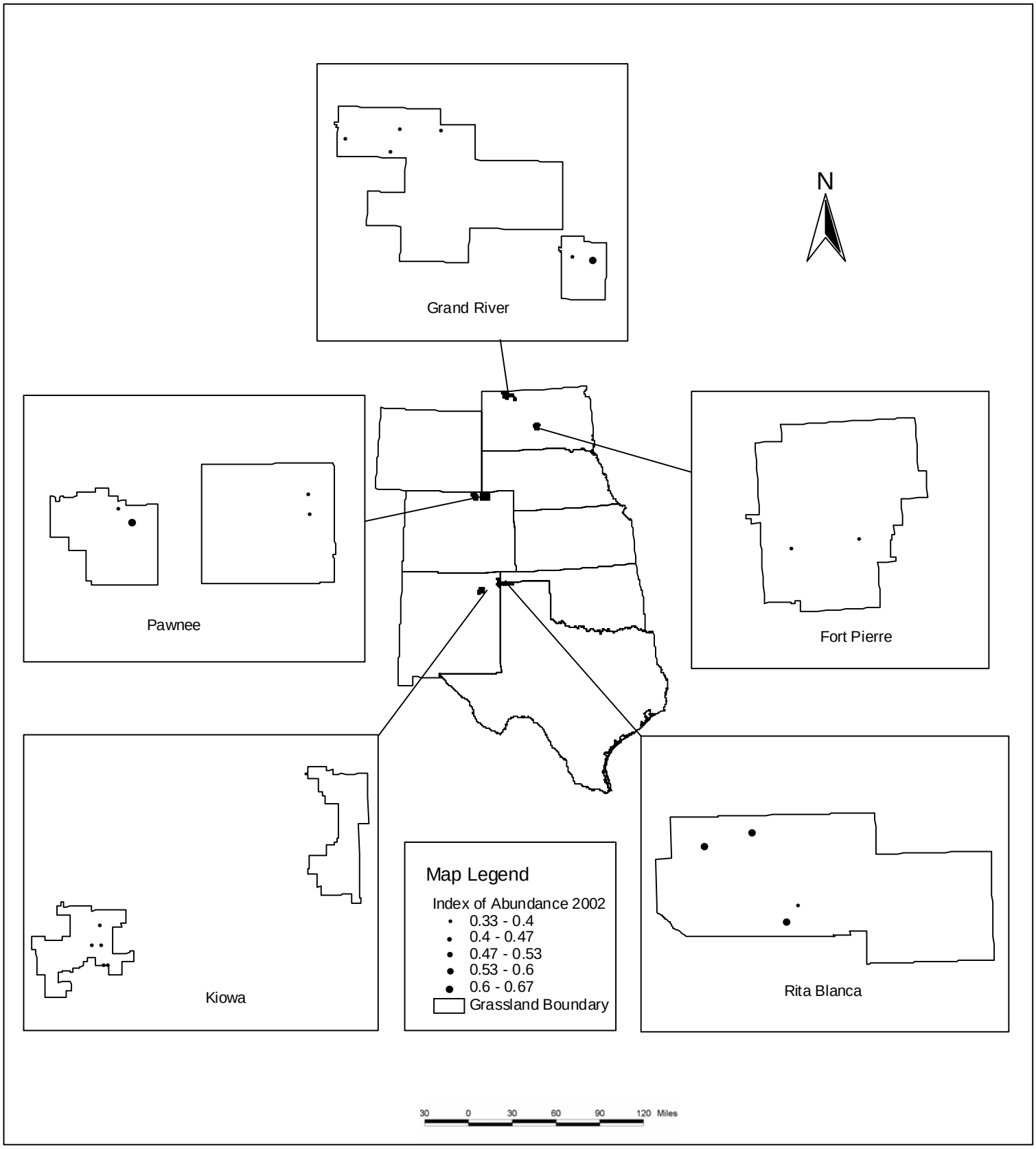
(Circus cyaneus)



Map shows the distribution and relative abundance of the Northern Harrier on selected National Grasslands throughout the Great Plains regions, 2002.

Swainson's Hawk

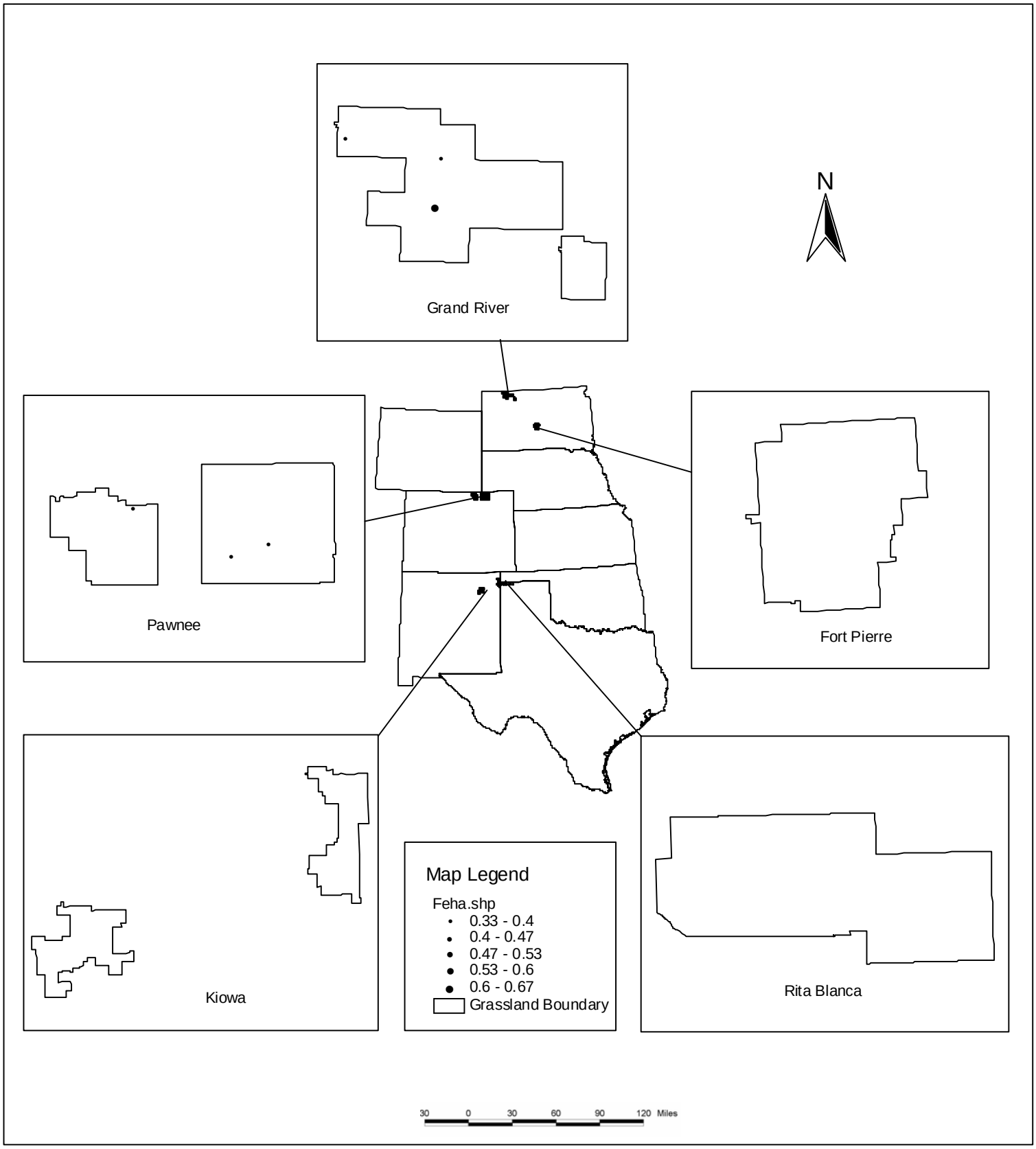
(Buteo swainsoni)



Map shows the distribution and relative abundance of the Swainson's Hawk on selected National Grasslands throughout the Great Plains regions, 2002.

Ferruginous Hawk

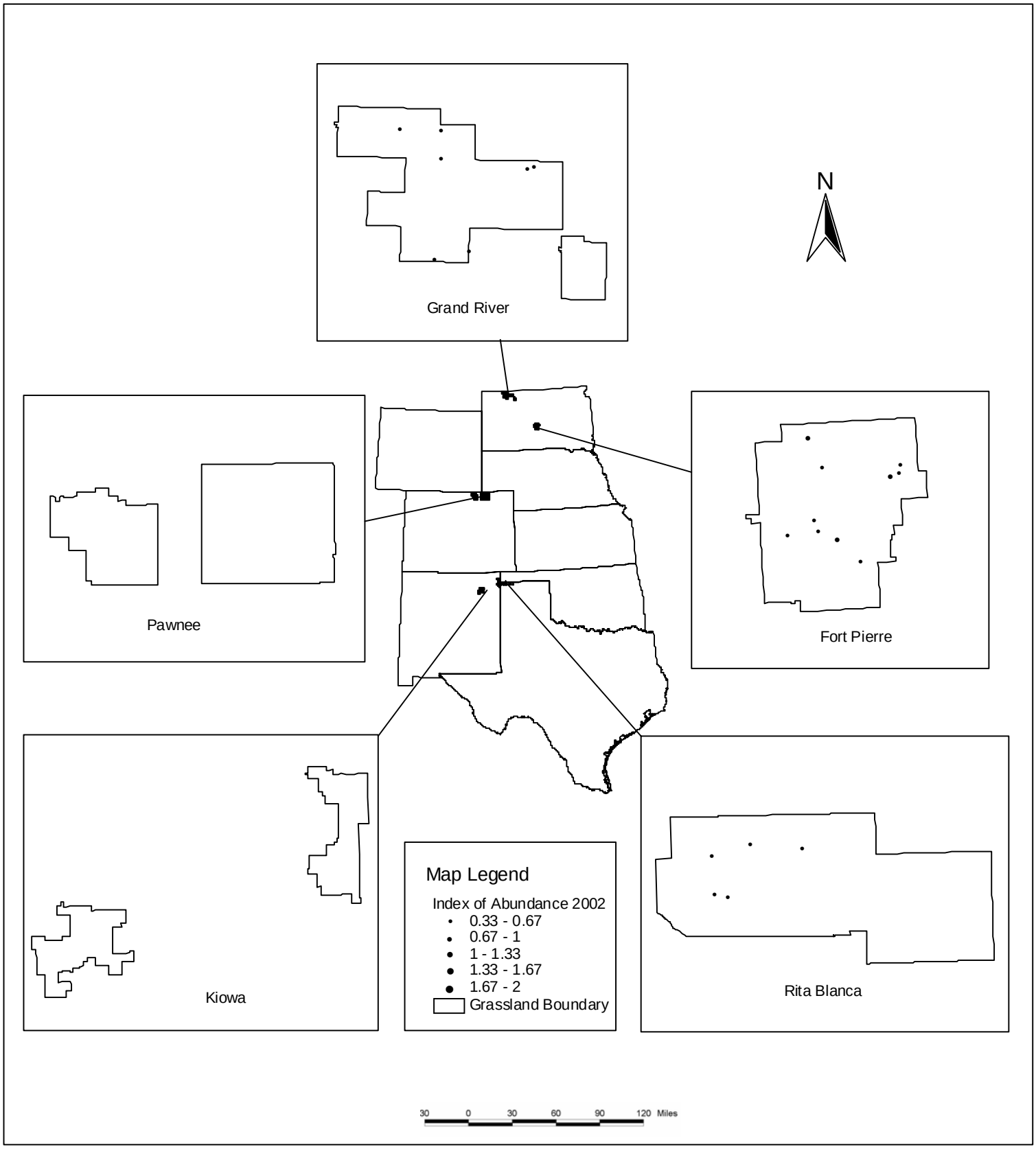
(Buteo regalis)



Map shows the distribution and relative abundance of the Ferruginous Hawk on selected National Grasslands throughout the Great Plains regions, 2002.

Ring-necked Pheasant

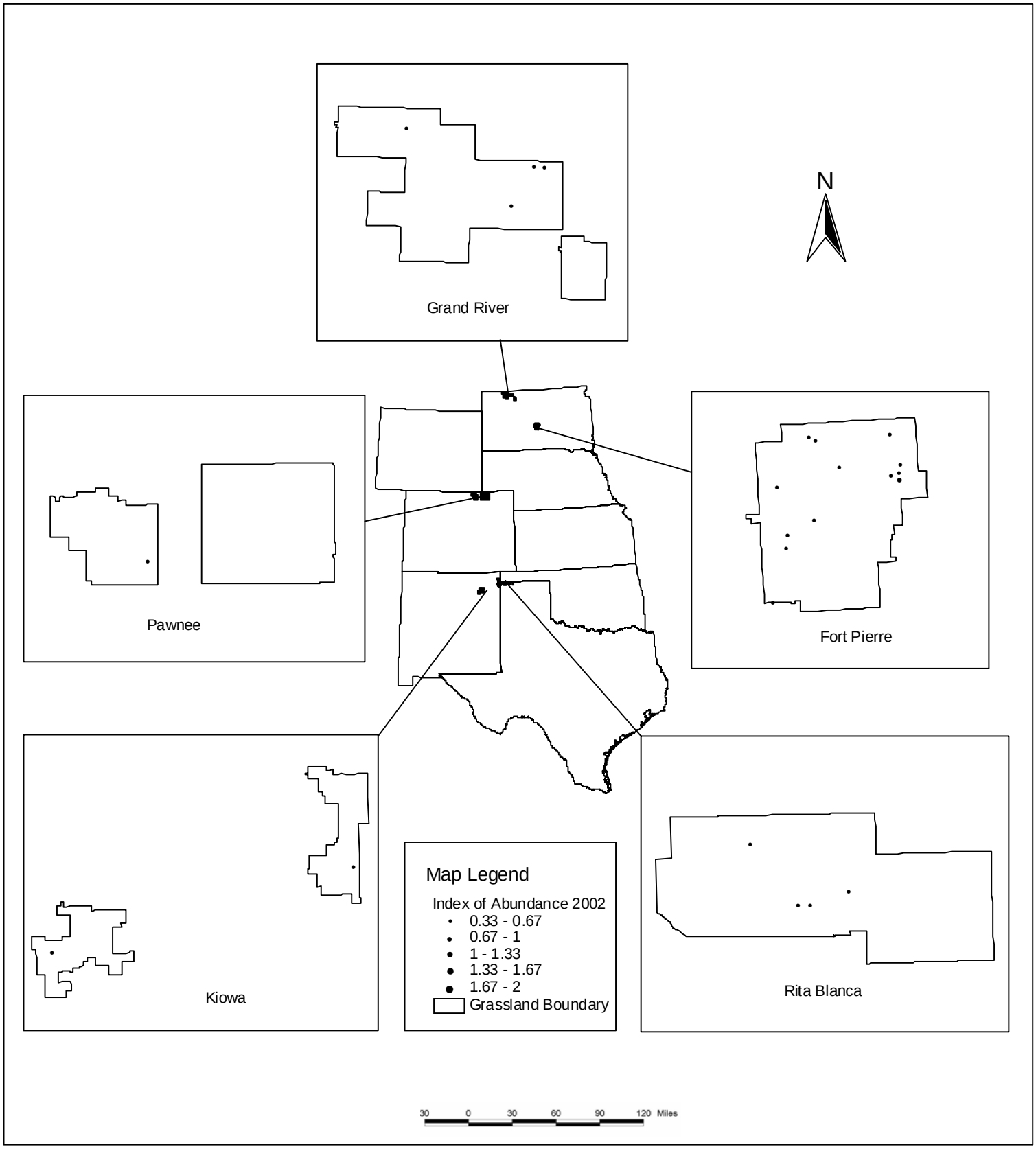
(Phasianus colchicus)



Map shows the distribution and relative abundance of the Ring-necked Pheasant on selected National Grasslands throughout the Great Plains regions, 2002.

Killdeer

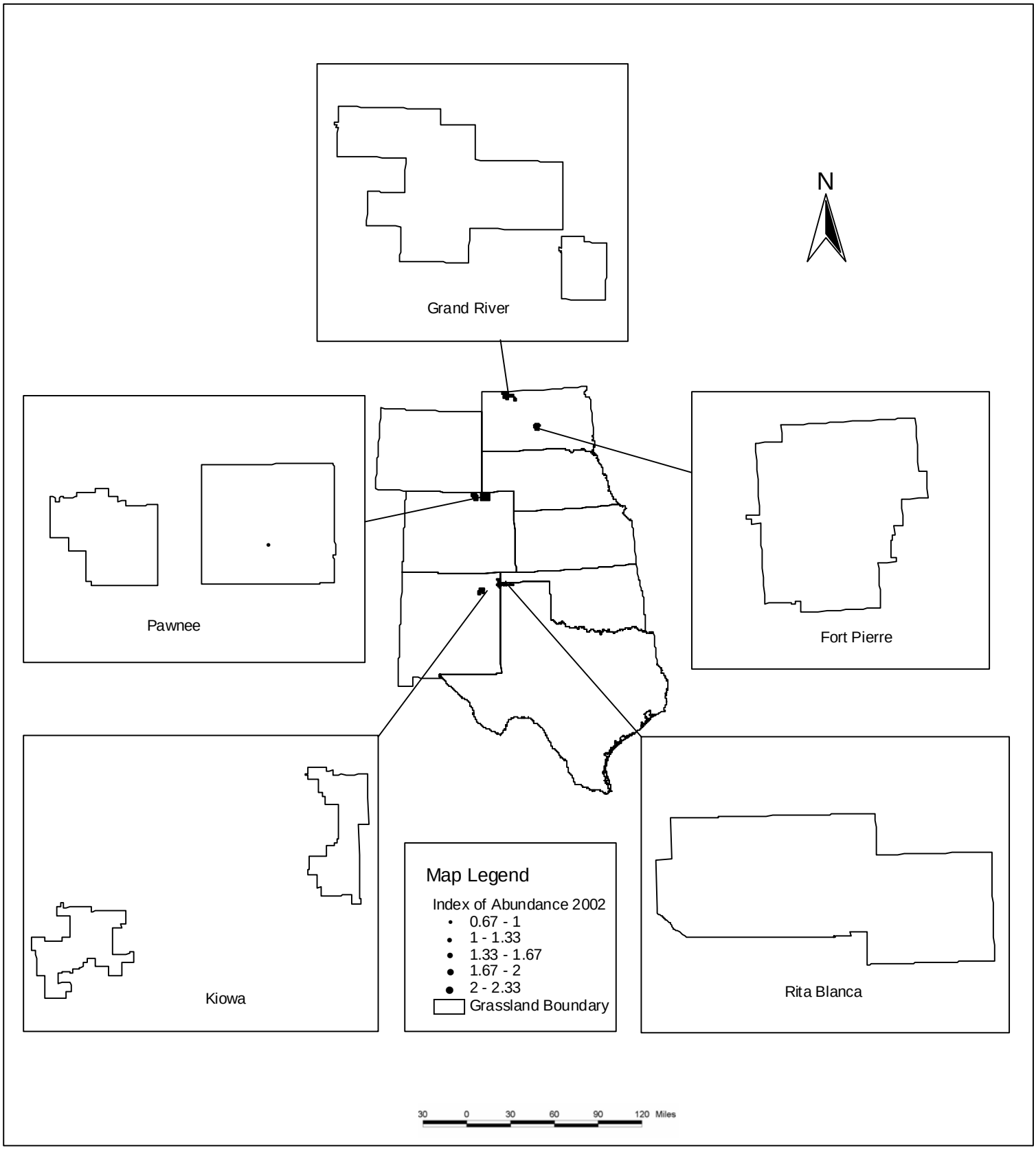
(Charadrius vociferous)



Map shows the distribution and relative abundance of the Killdeer on selected National Grasslands throughout the Great Plains regions, 2002.

Mountain Plover

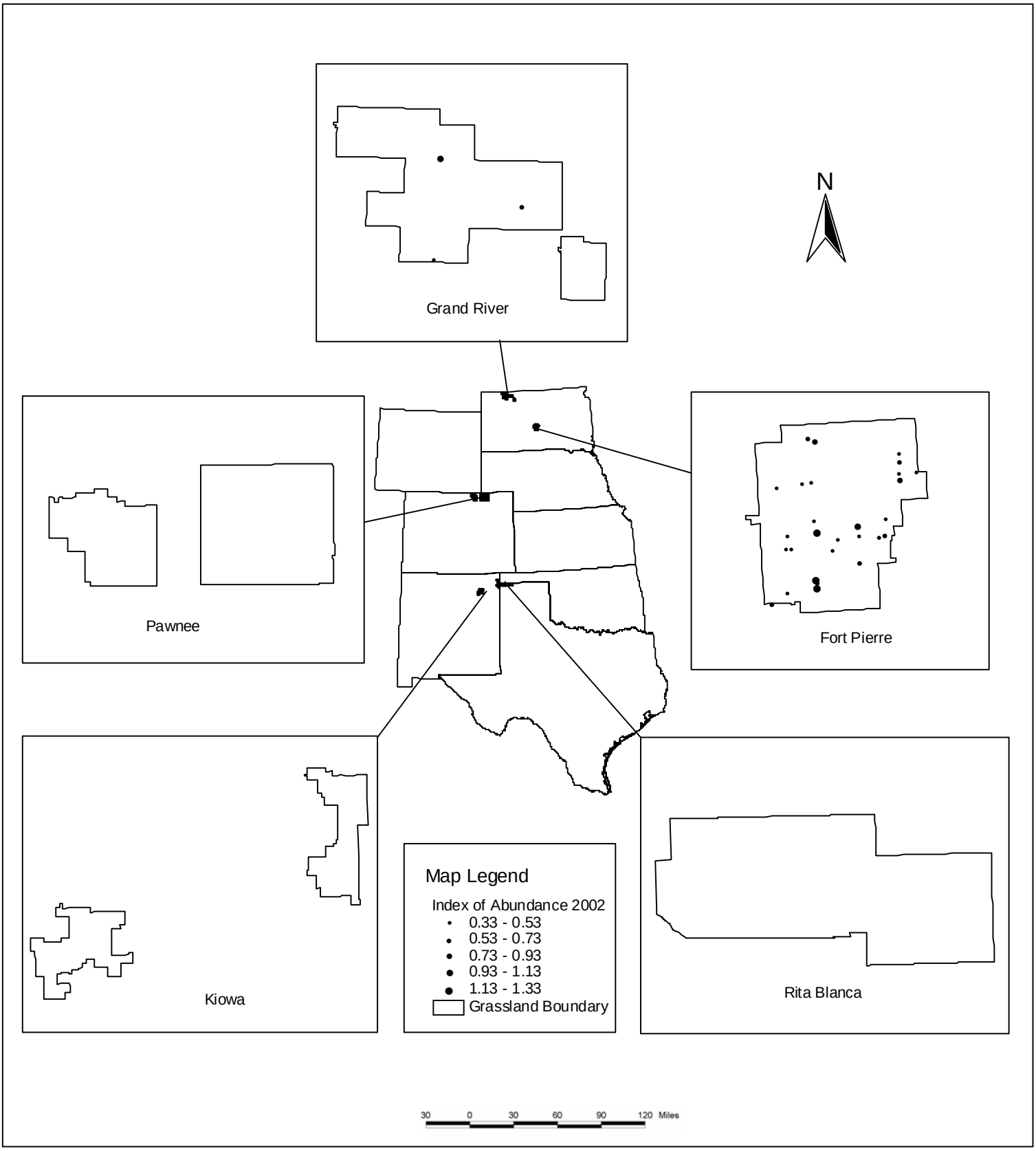
(Charadrius montanus)



Map shows the distribution and relative abundance of the Mountain Plover on selected National Grasslands throughout the Great Plains regions, 2002.

Upland Sandpiper

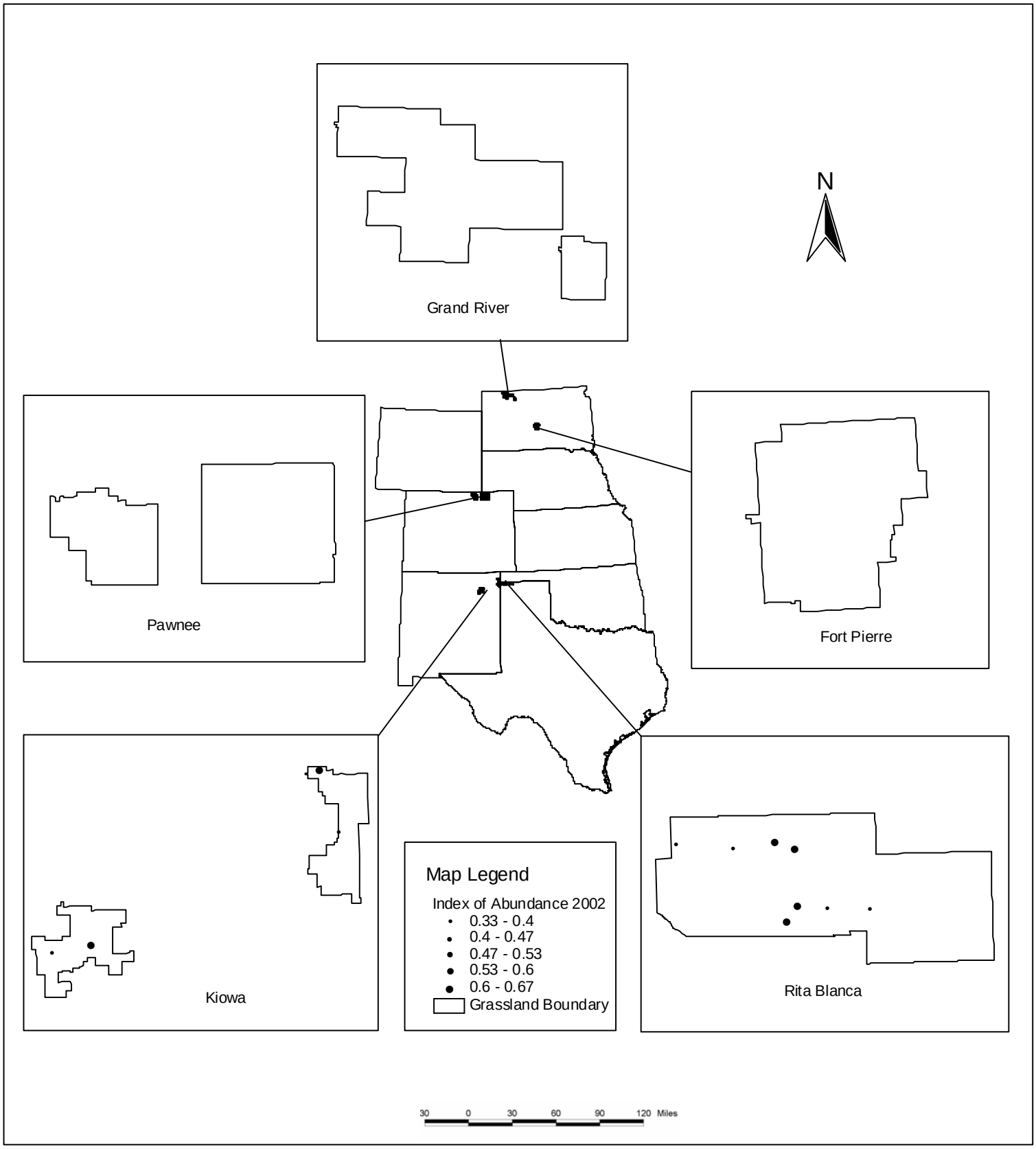
(Bartremia longicauda)



Map shows the distribution and relative abundance of the Upland Sandpiper on selected National Grasslands throughout the Great Plains regions, 2002.

Long-billed Curlew

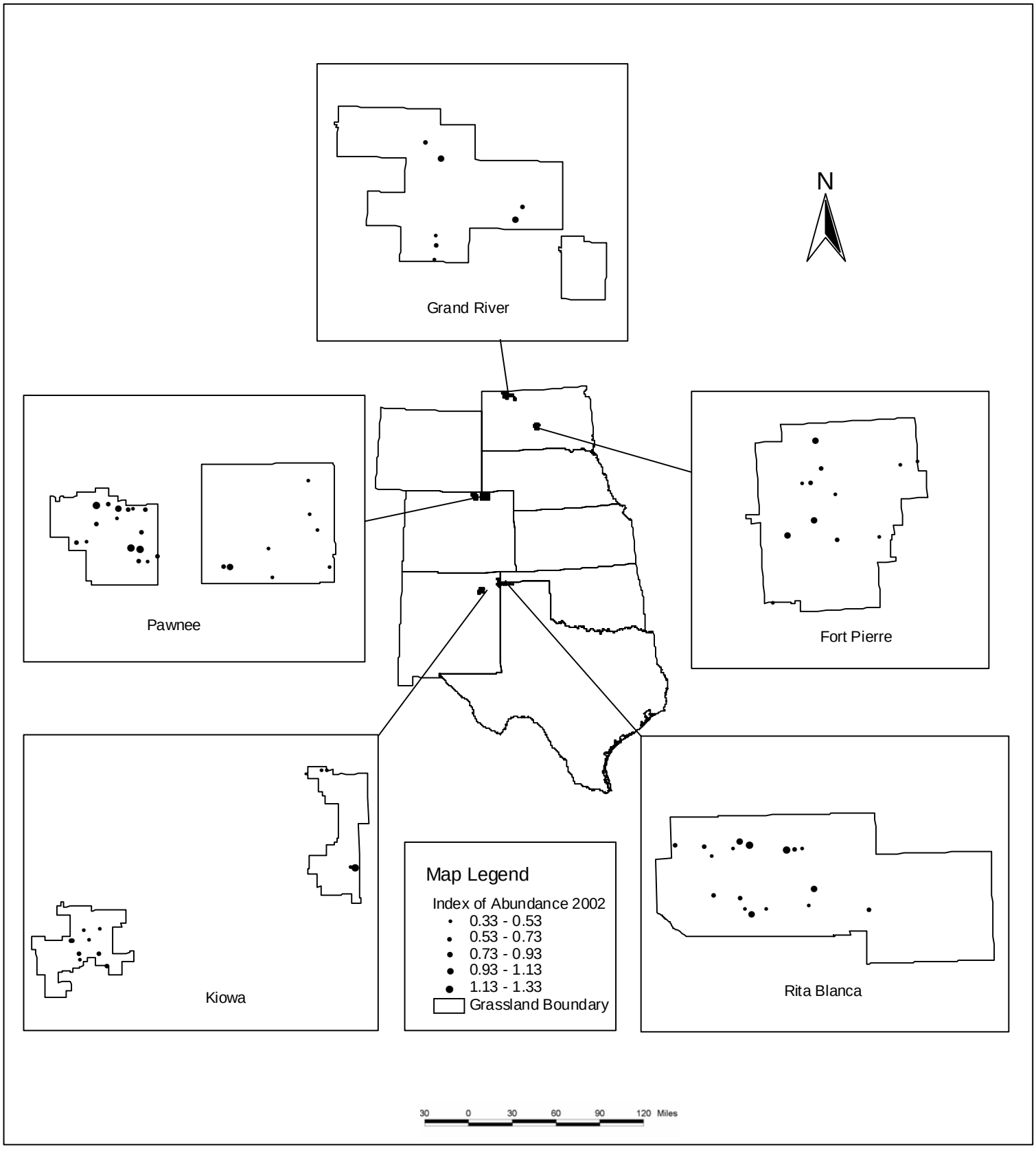
(Numenius americanus)



Map shows the distribution and relative abundance of the Long-billed Curlew on selected National Grasslands throughout the Great Plains regions, 2002.

Mourning Dove

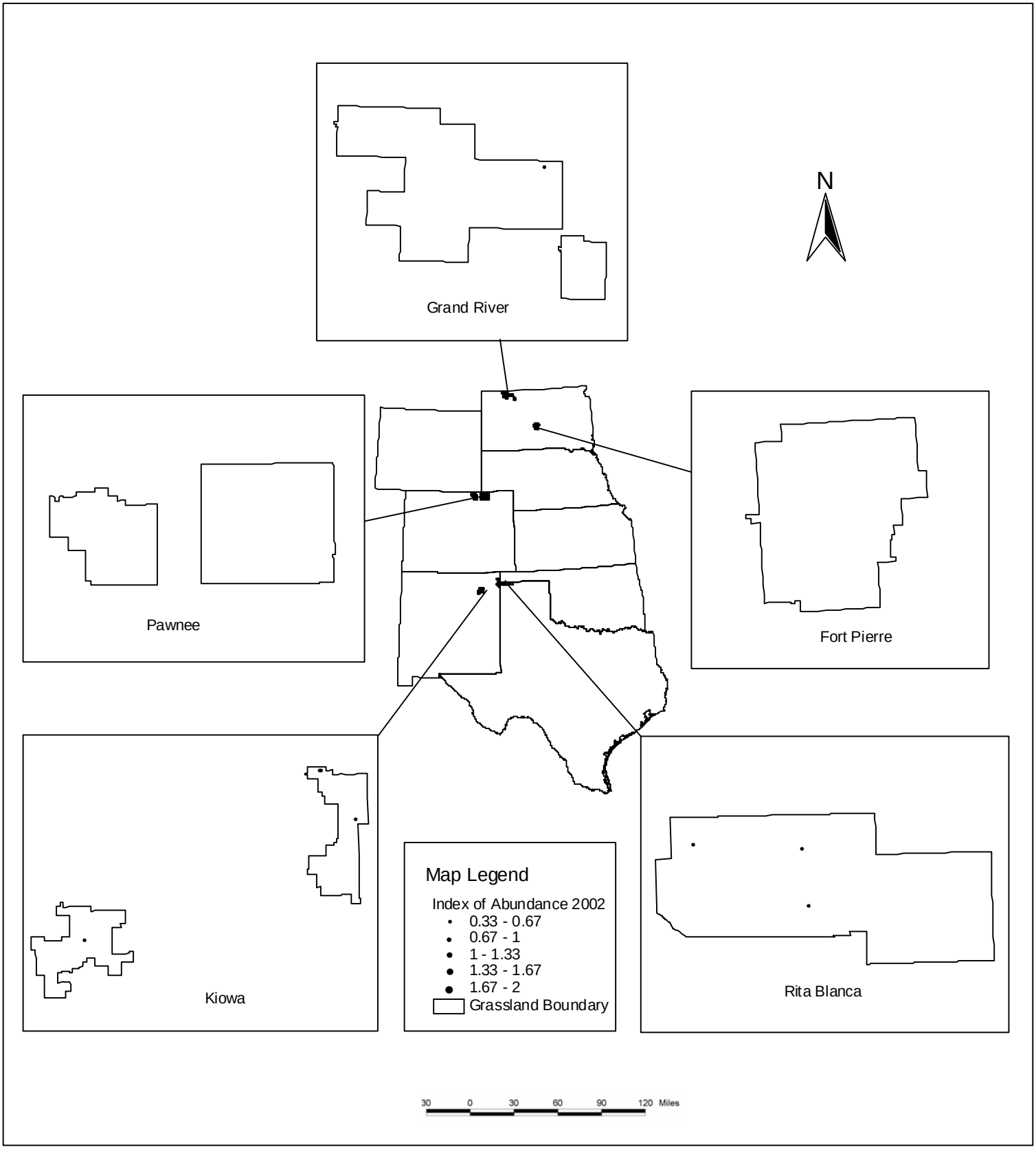
(Zenaida macroura)



Map shows the distribution and relative abundance of the Mourning Dove on selected National Grasslands throughout the Great Plains regions, 2002.

Burrowing Owl

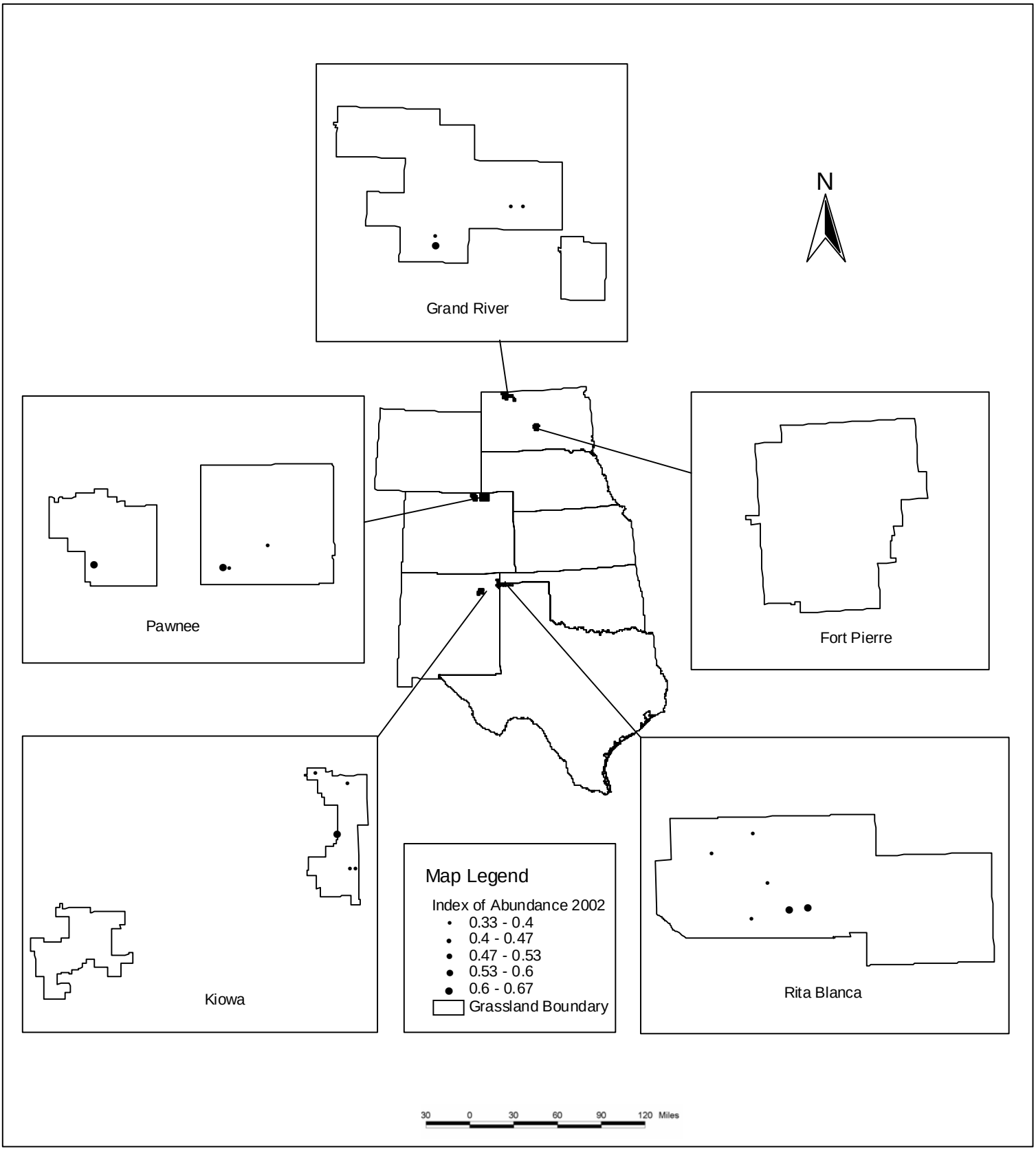
(Athene cunicularia)



Map shows the distribution and relative abundance of the Burrowing Owl on selected National Grasslands throughout the Great Plains regions, 2002.

Common Nighthawk

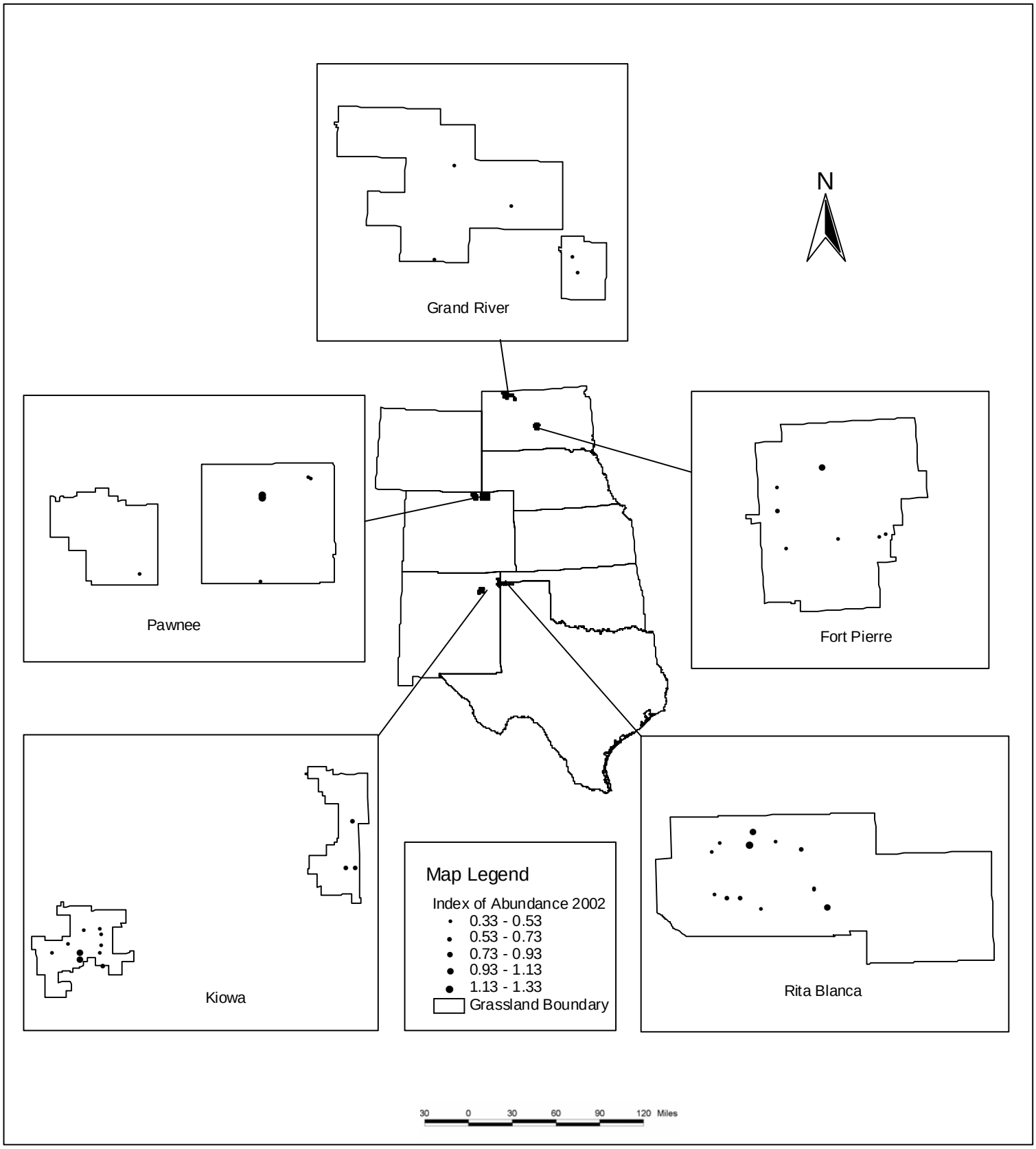
(Chordeites minor)



Map shows the distribution and relative abundance of the Common Nighthawk on selected National Grasslands throughout the Great Plains regions, 2002.

Western Kingbird

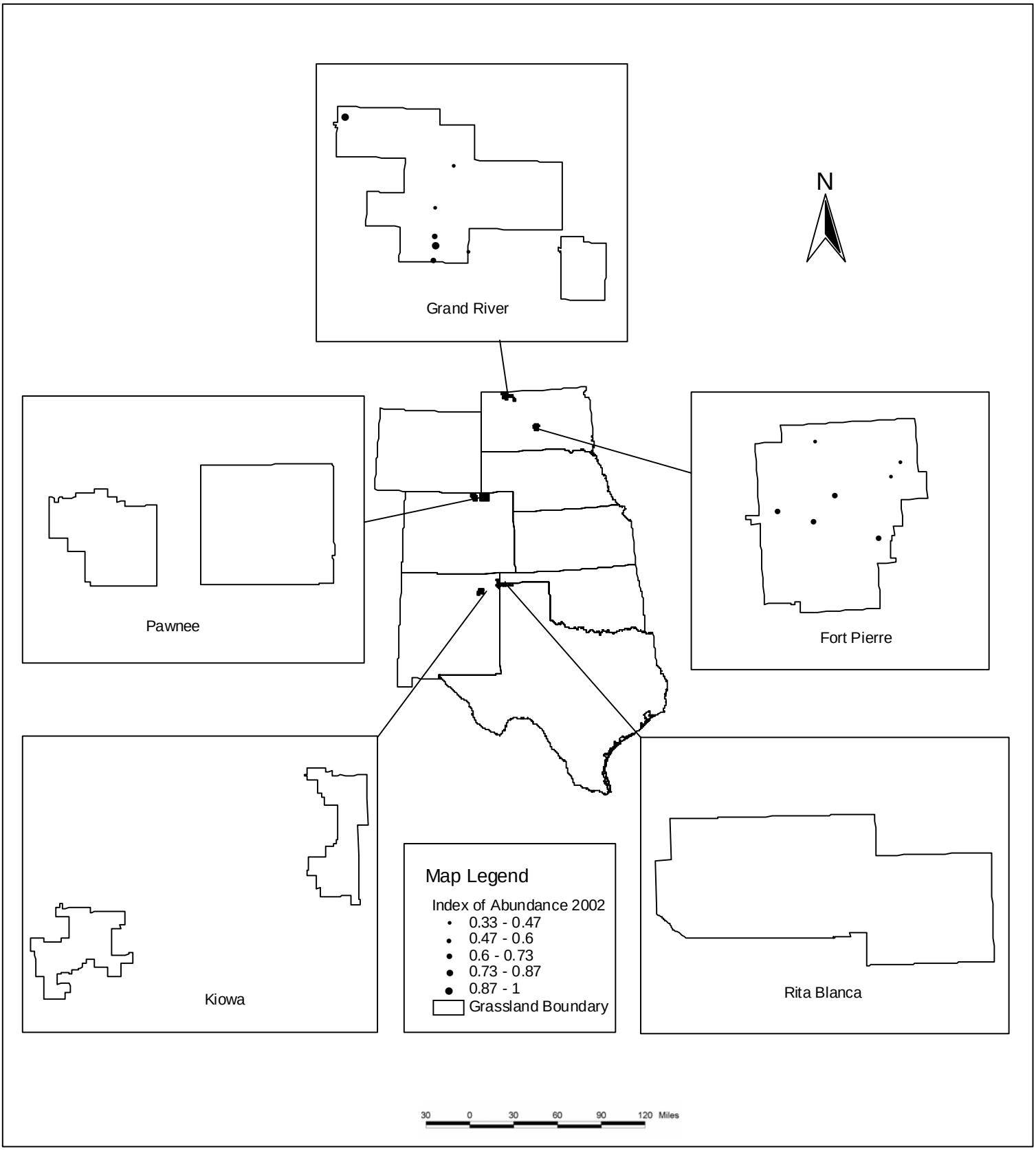
(Tyrranus verticalis)



Map shows the distribution and relative abundance of the Western Kingbird on selected National Grasslands throughout the Great Plains regions, 2002.

Eastern Kingbird

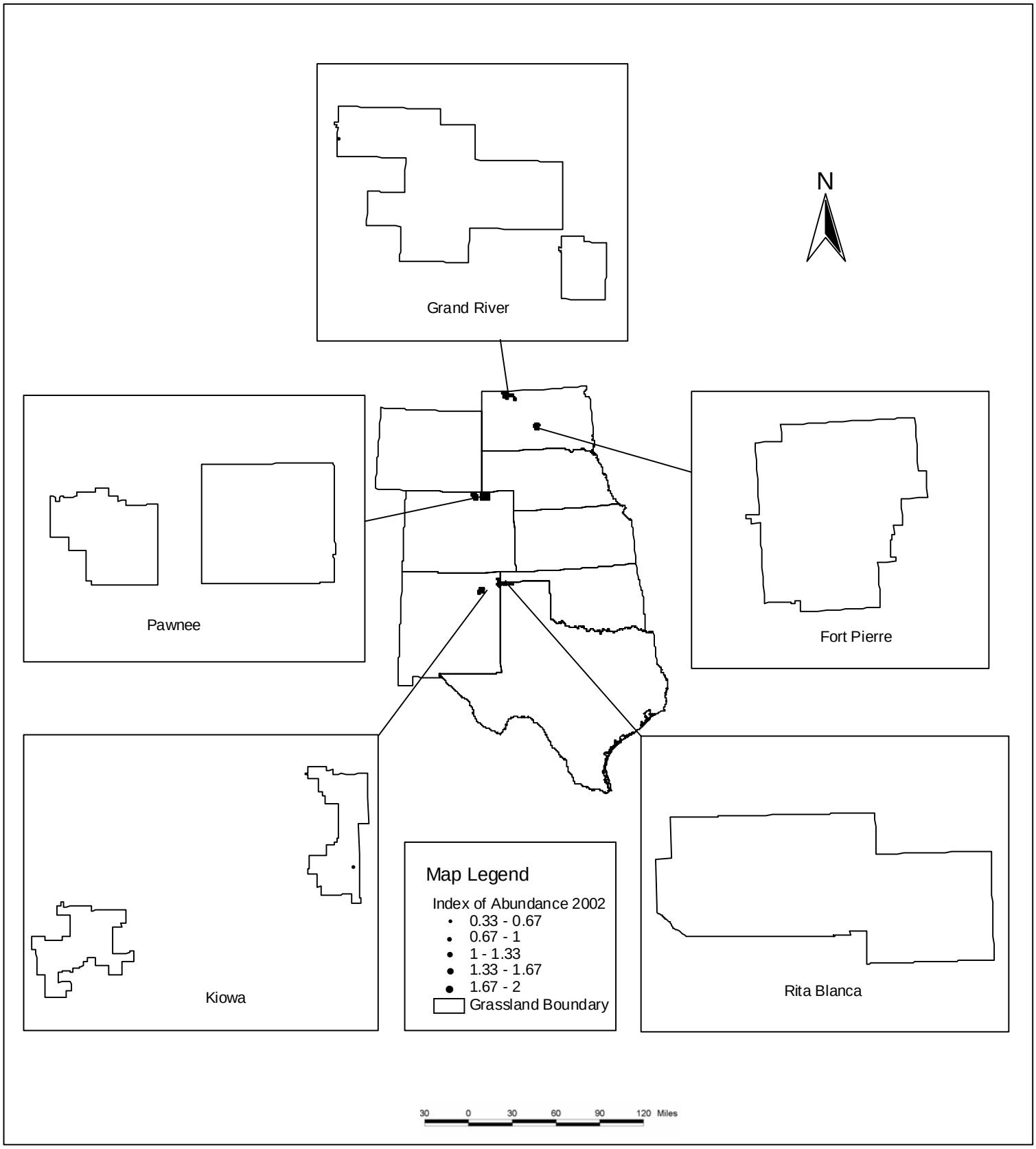
(Tyrannus tyrannus)



Map shows the distribution and relative abundance of the Eastern Kingbird on selected National Grasslands throughout the Great Plains regions, 2002.

Loggerhead Shrike

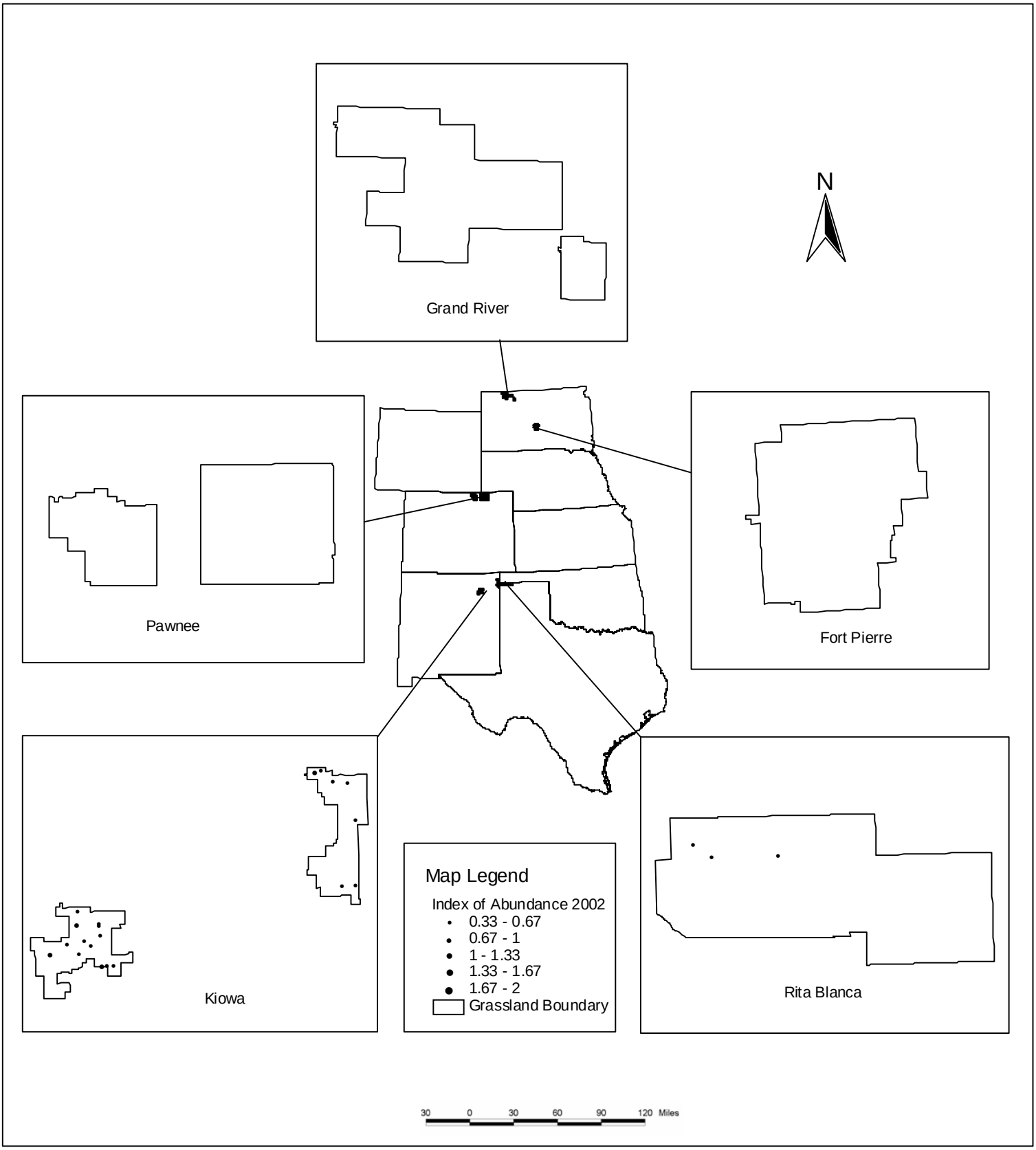
(Lanius ludovicianus)



Map shows the distribution and relative abundance of the Loggerhead Shrike on selected National Grasslands throughout the Great Plains regions, 2002.

Chihuahuan Raven

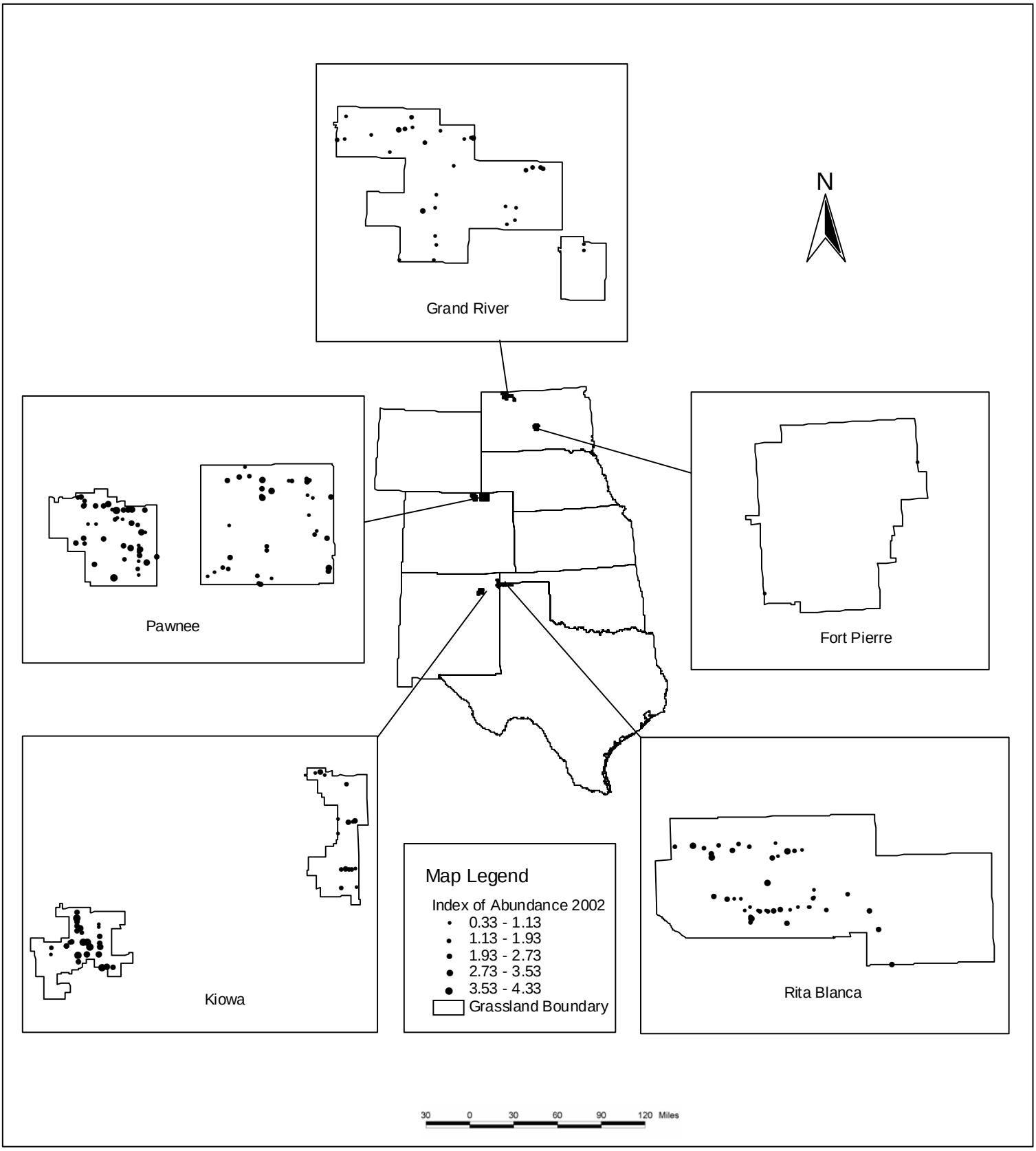
(Corvus cryptoleucus)



Map shows the distribution and relative abundance of the Chihuahuan Raven on selected National Grasslands throughout the Great Plains regions, 2002.

Horned Lark

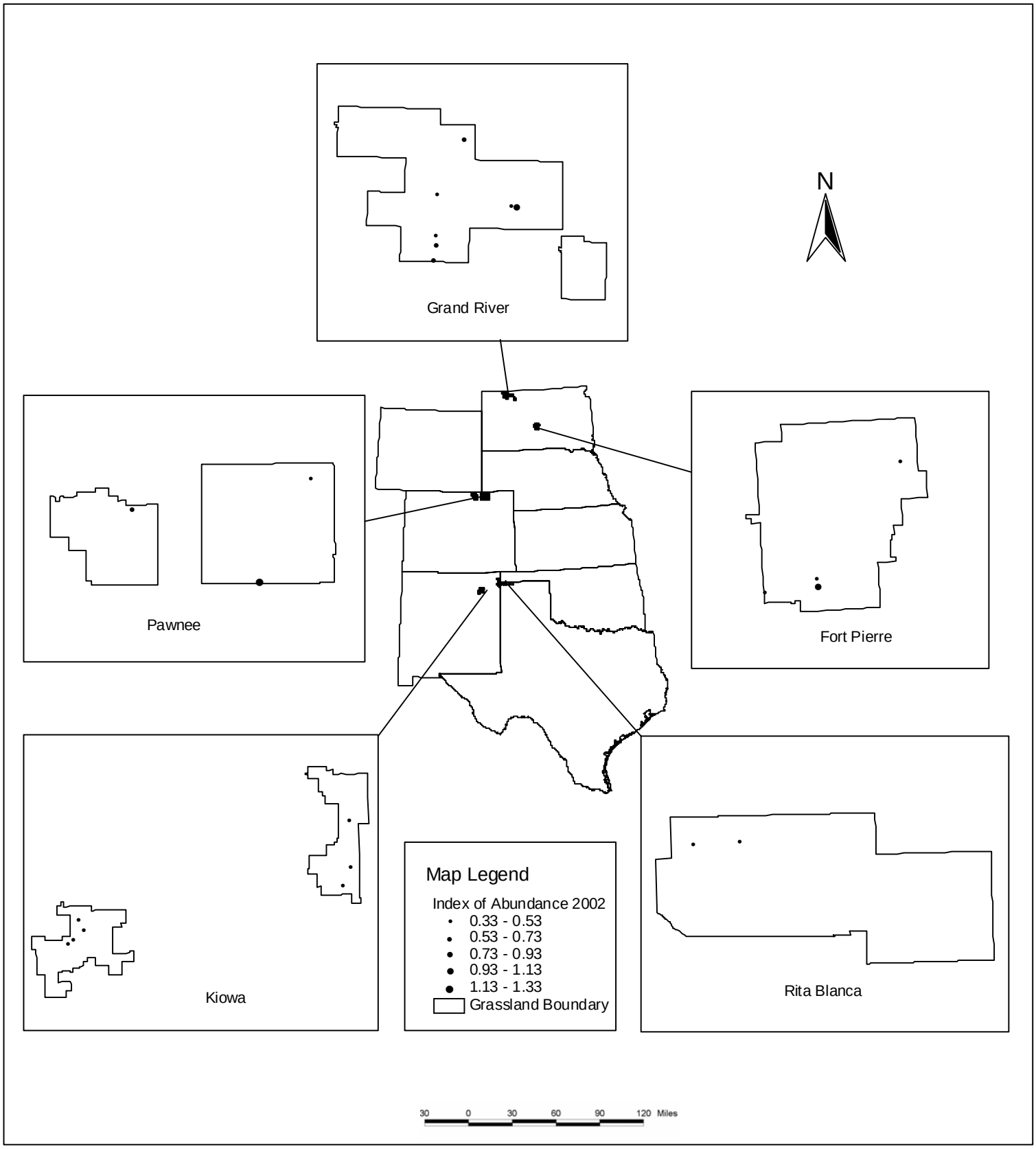
(Eremophila alpestris)



Map shows the distribution and relative abundance of the Horned Lark on selected National Grasslands throughout the Great Plains regions, 2002.

Barn Swallow

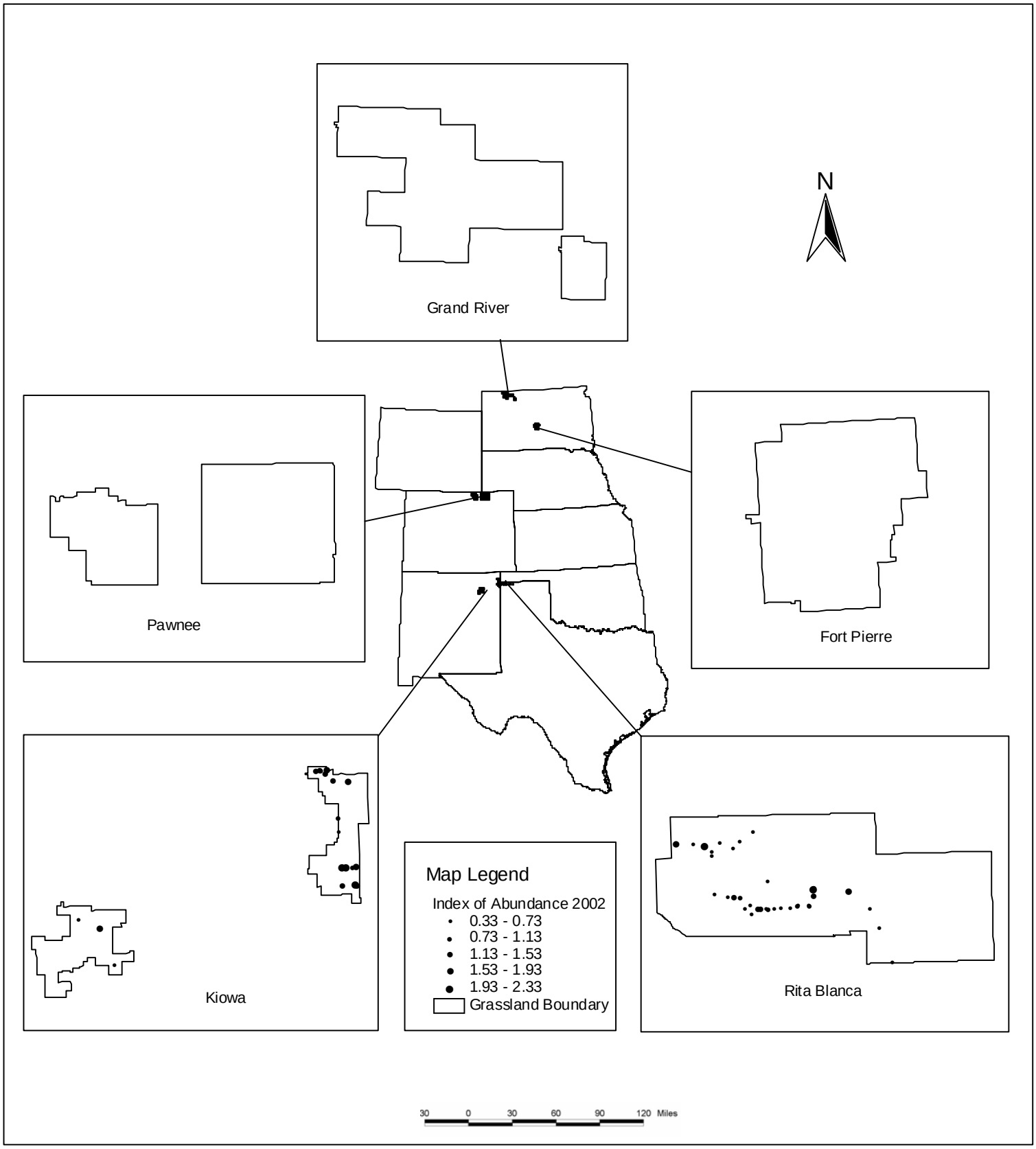
(Hirundo rustica)



Map shows the distribution and relative abundance of the Barn Swallow on selected National Grasslands throughout the Great Plains regions, 2002.

Cassin's Sparrow

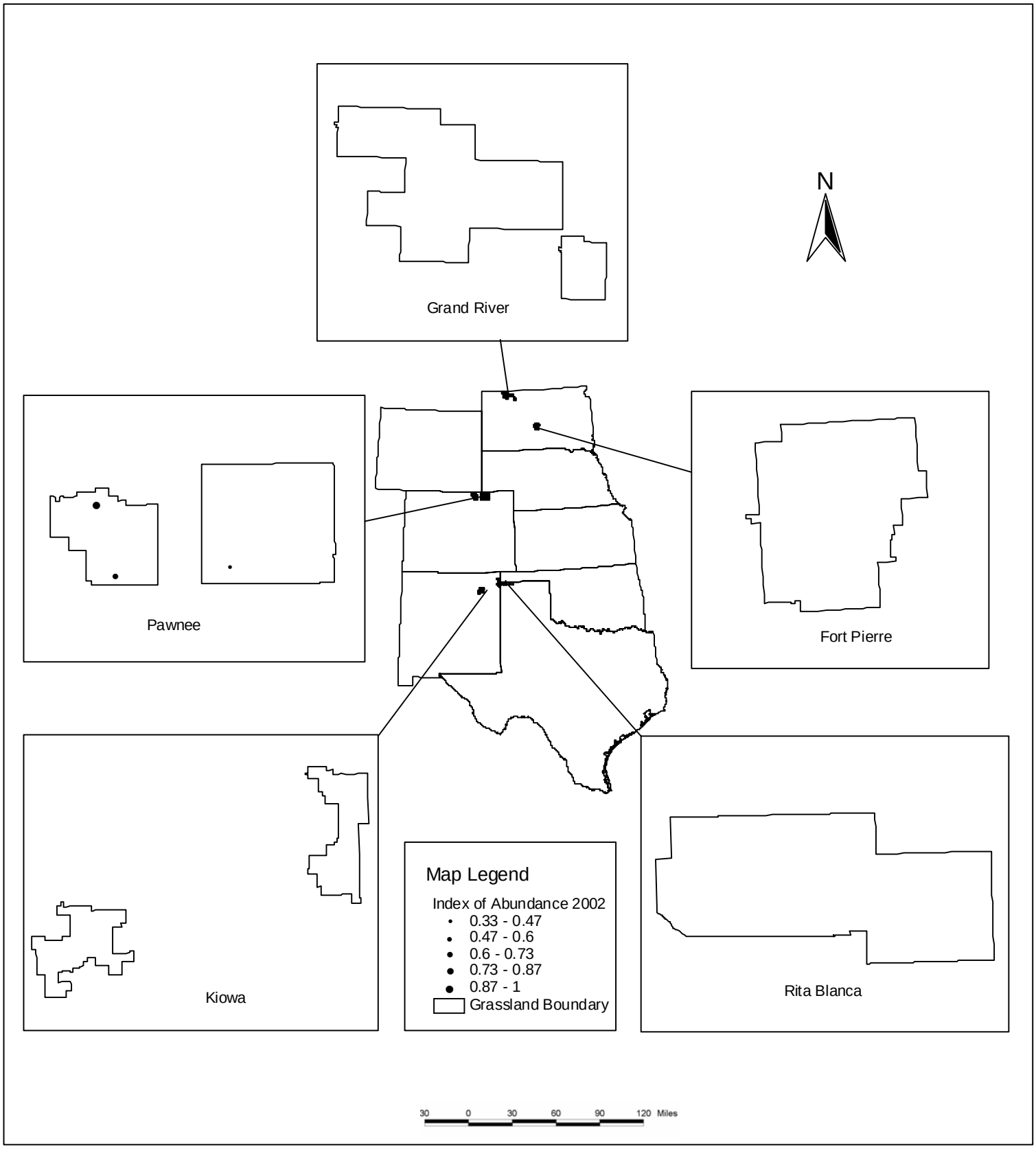
(Aimophila cassinii)



Map shows the distribution and relative abundance of the Cassin's Sparrow on selected National Grasslands throughout the Great Plains regions, 2002.

Brewer's Sparrow

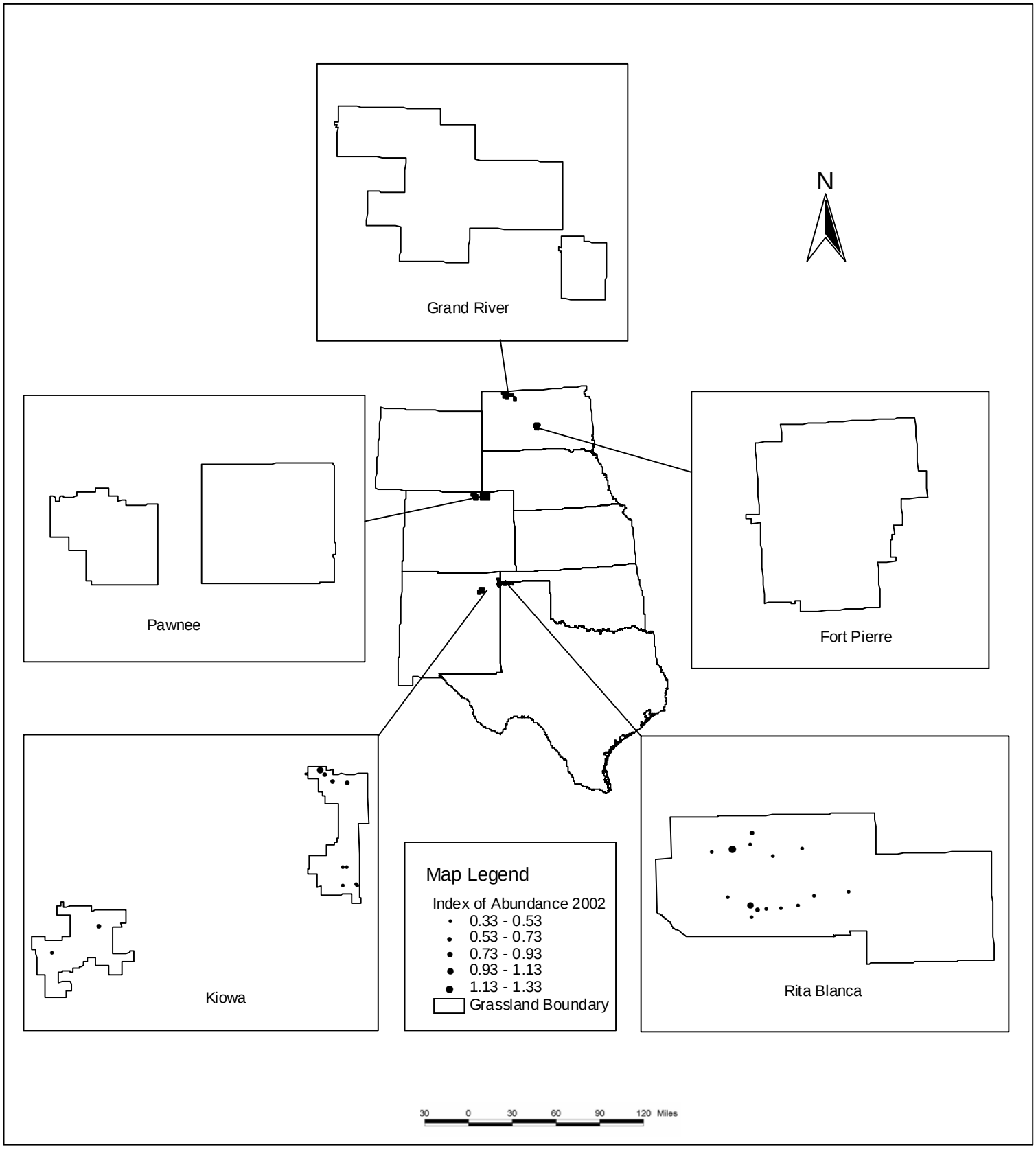
(Spizella breweri)



Map shows the distribution and relative abundance of the Brewer's Sparrow on selected National Grasslands throughout the Great Plains regions, 2002.

Lark Sparrow

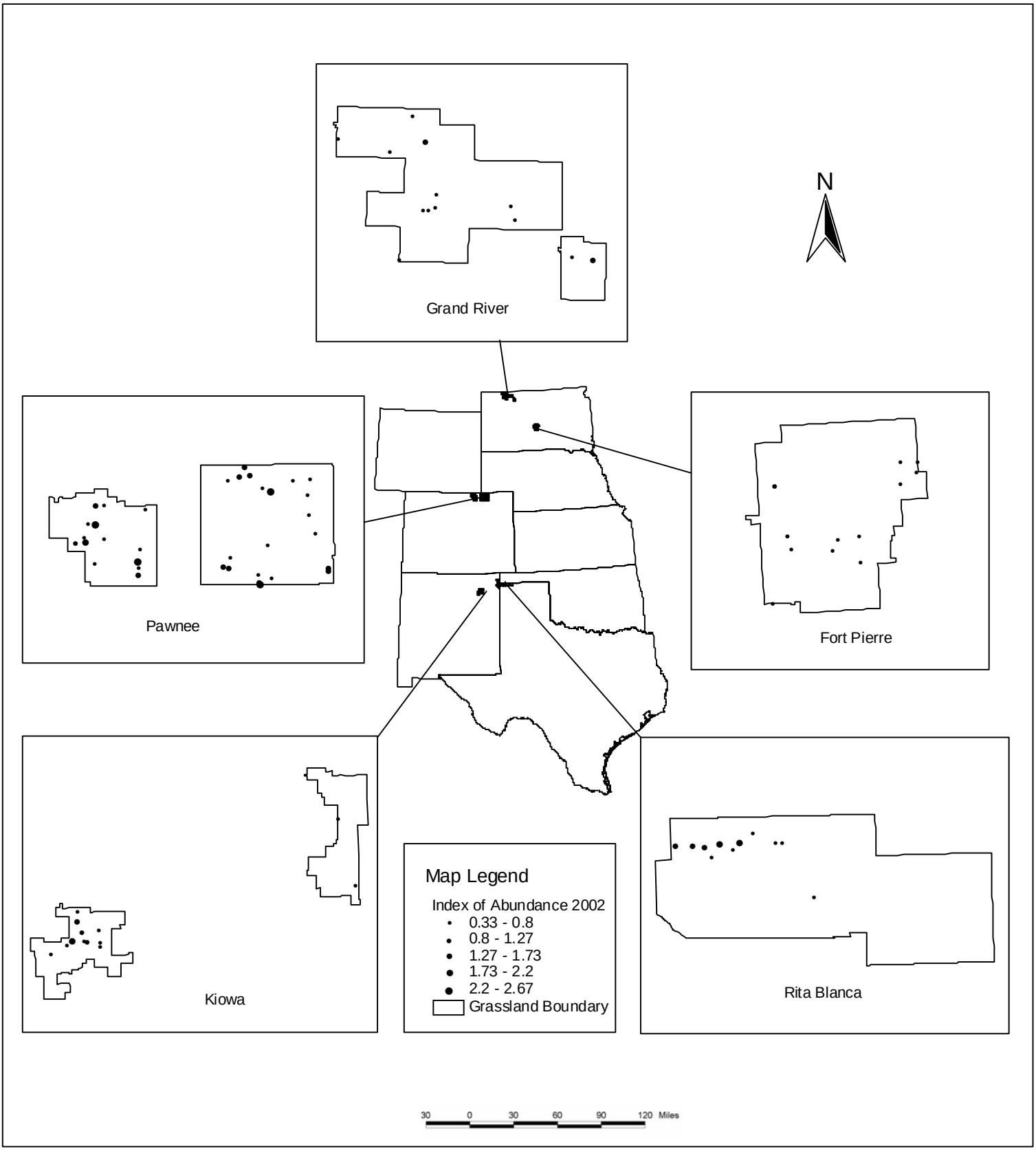
(Chondestes grammacus)



Map shows the distribution and relative abundance of the Lark Sparrow on selected National Grasslands throughout the Great Plains regions, 2002.

Lark Bunting

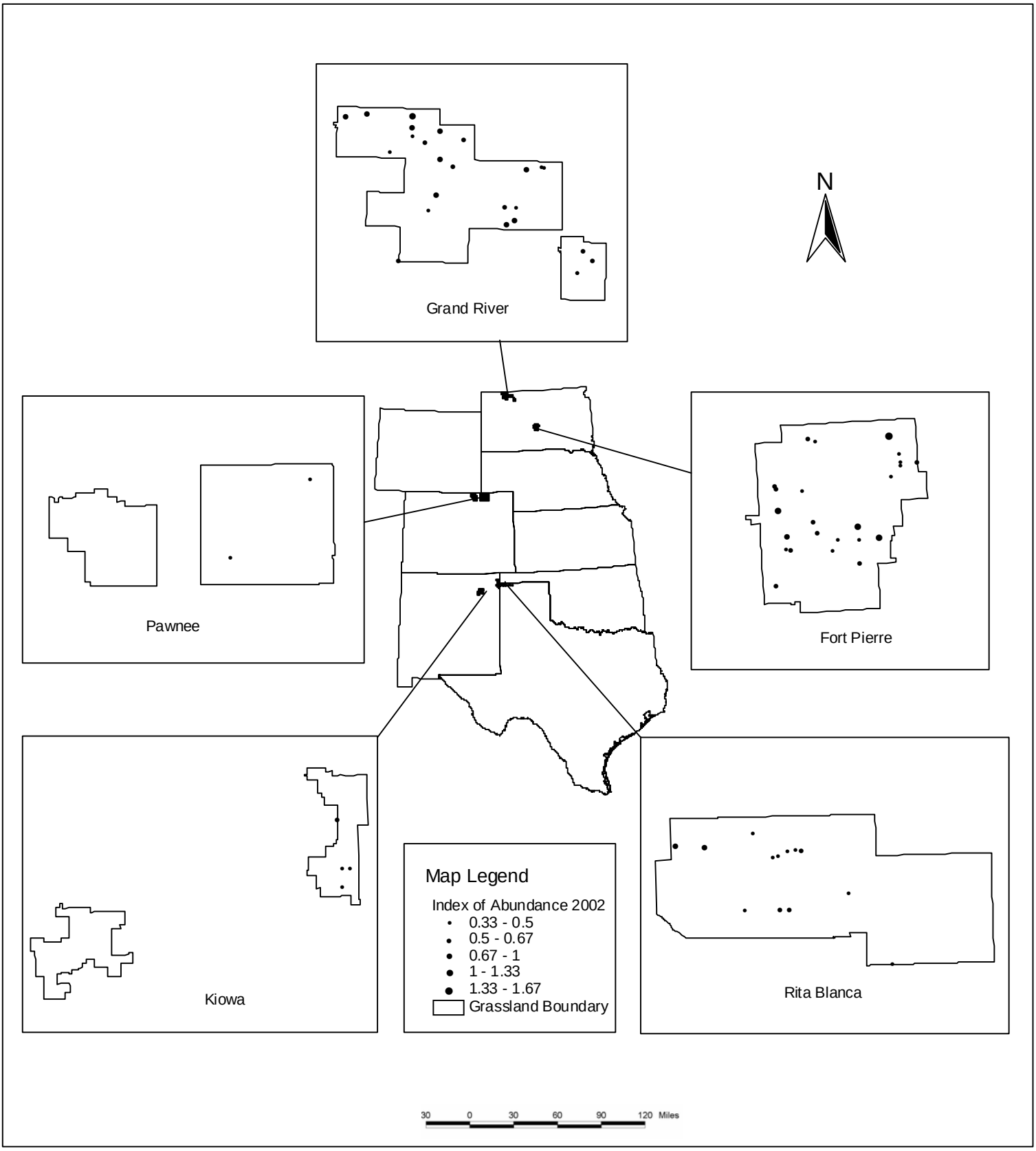
(Calamospiza melanocorys)



Map shows the distribution and relative abundance of the Lark Bunting on selected National Grasslands throughout the Great Plains regions, 2002.

Grasshopper Sparrow

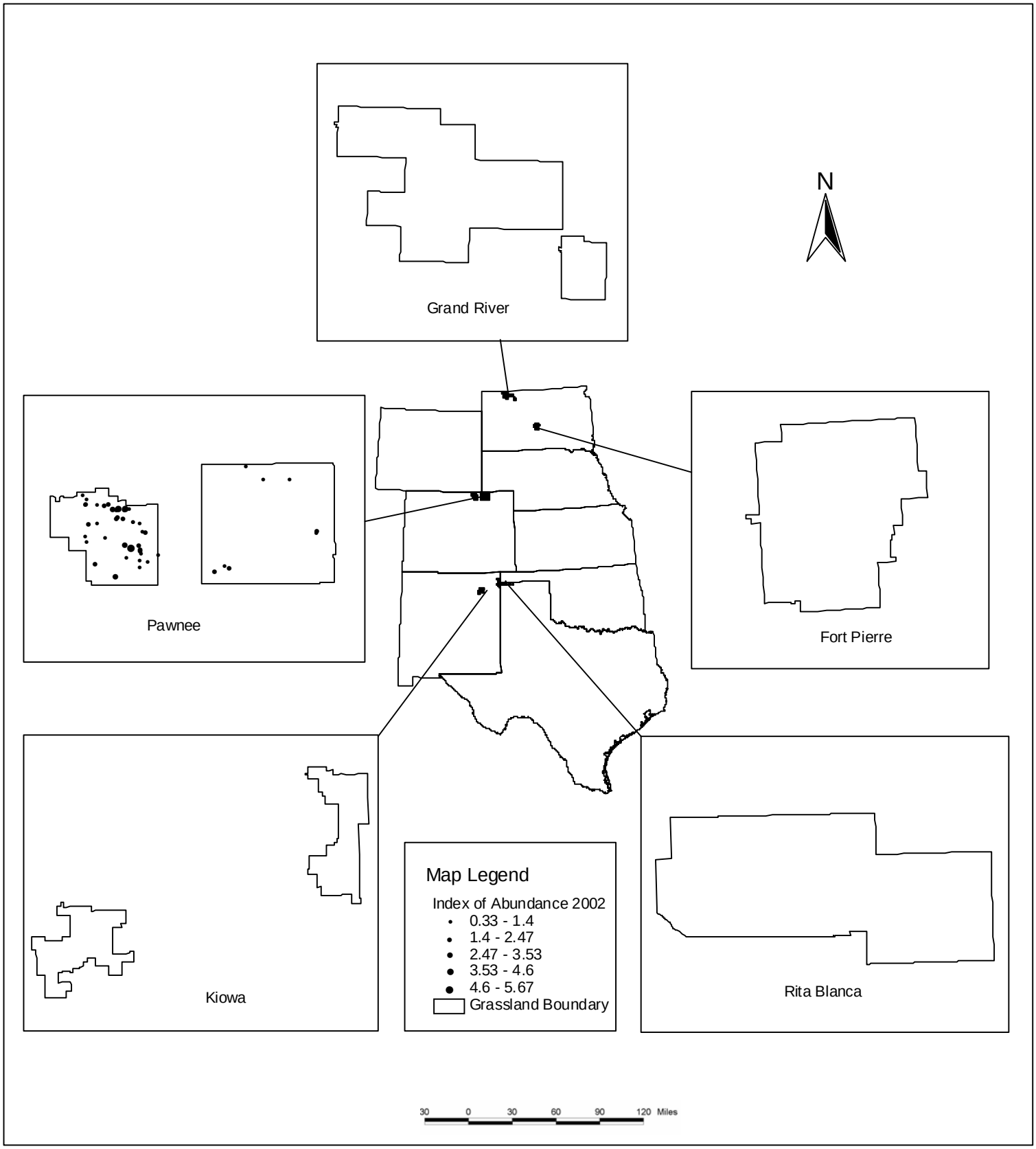
(Ammodrammus savannarum)



Map shows the distribution and relative abundance of the Grasshopper Sparrow on selected National Grasslands throughout the Great Plains regions, 2002.

McCown's Longspur

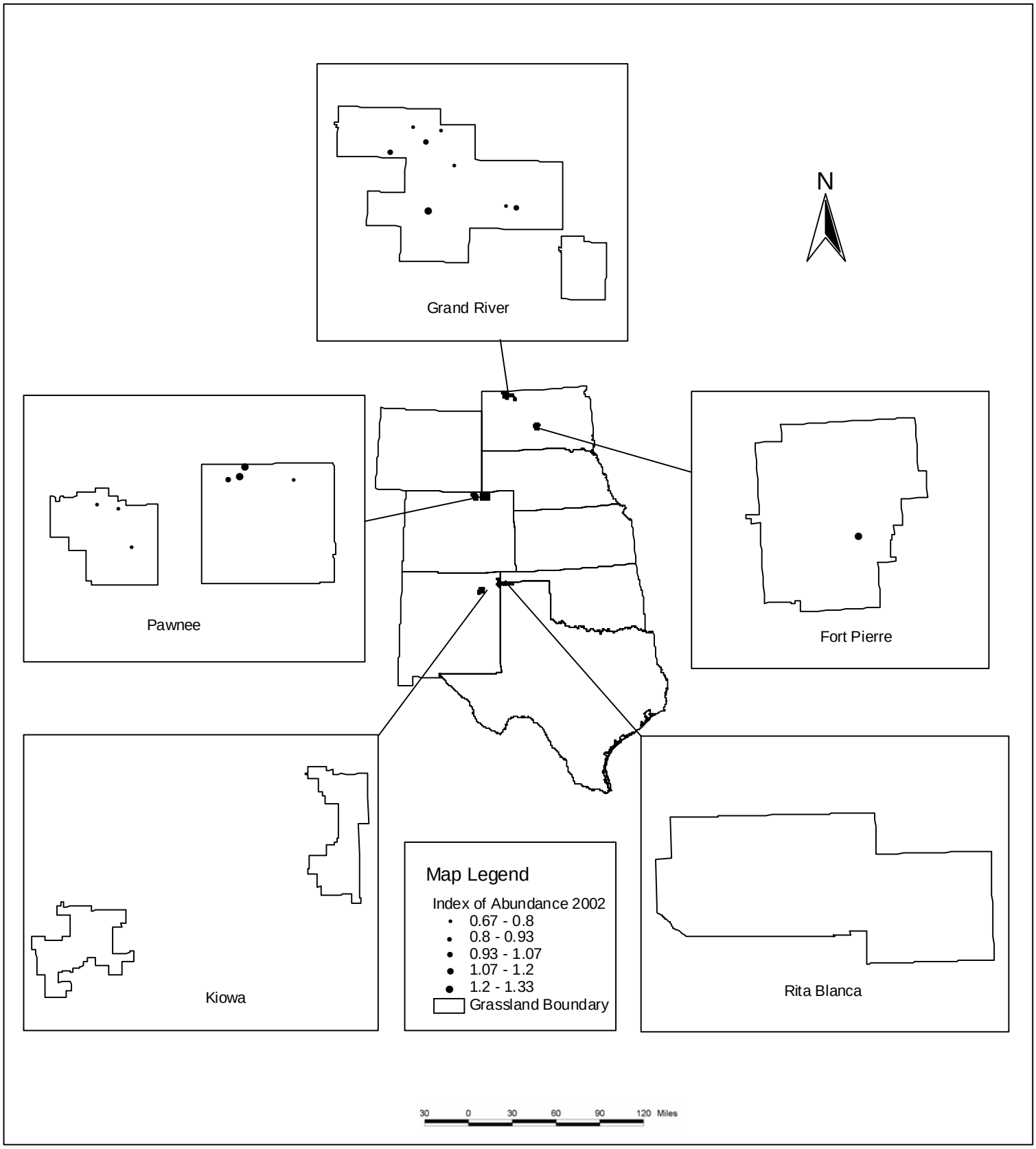
(Calacarius mccownii)



Map shows the distribution and relative abundance of the McCown's Longspur on selected National Grasslands throughout the Great Plains regions, 2002.

Chestnut-collared Longspur

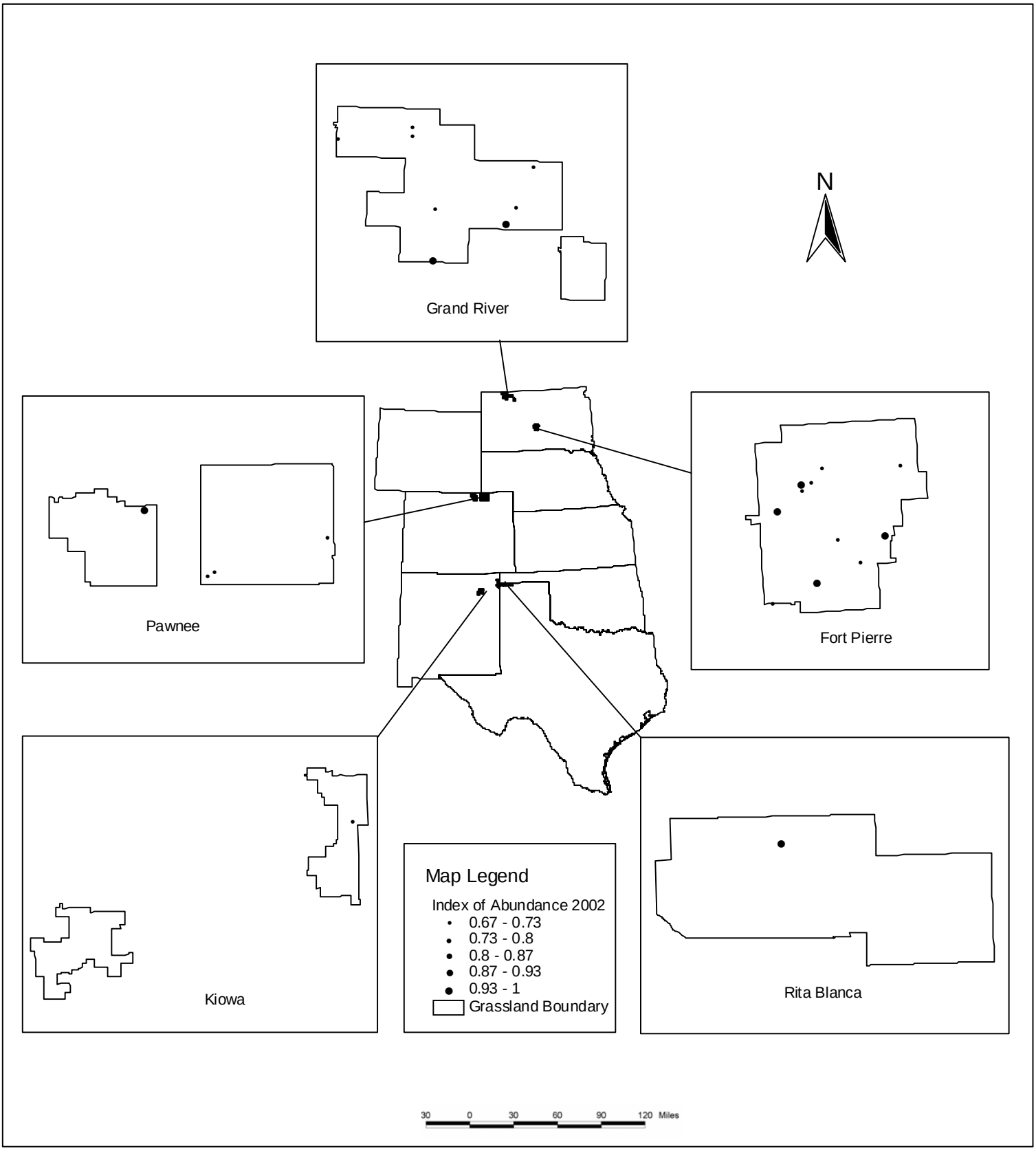
(Calacarius ornatus)



Map shows the distribution and relative abundance of the Chestnut-collared Langspur on selected National Grasslands throughout the Great Plains regions, 2002.

Red-winged Blackbird

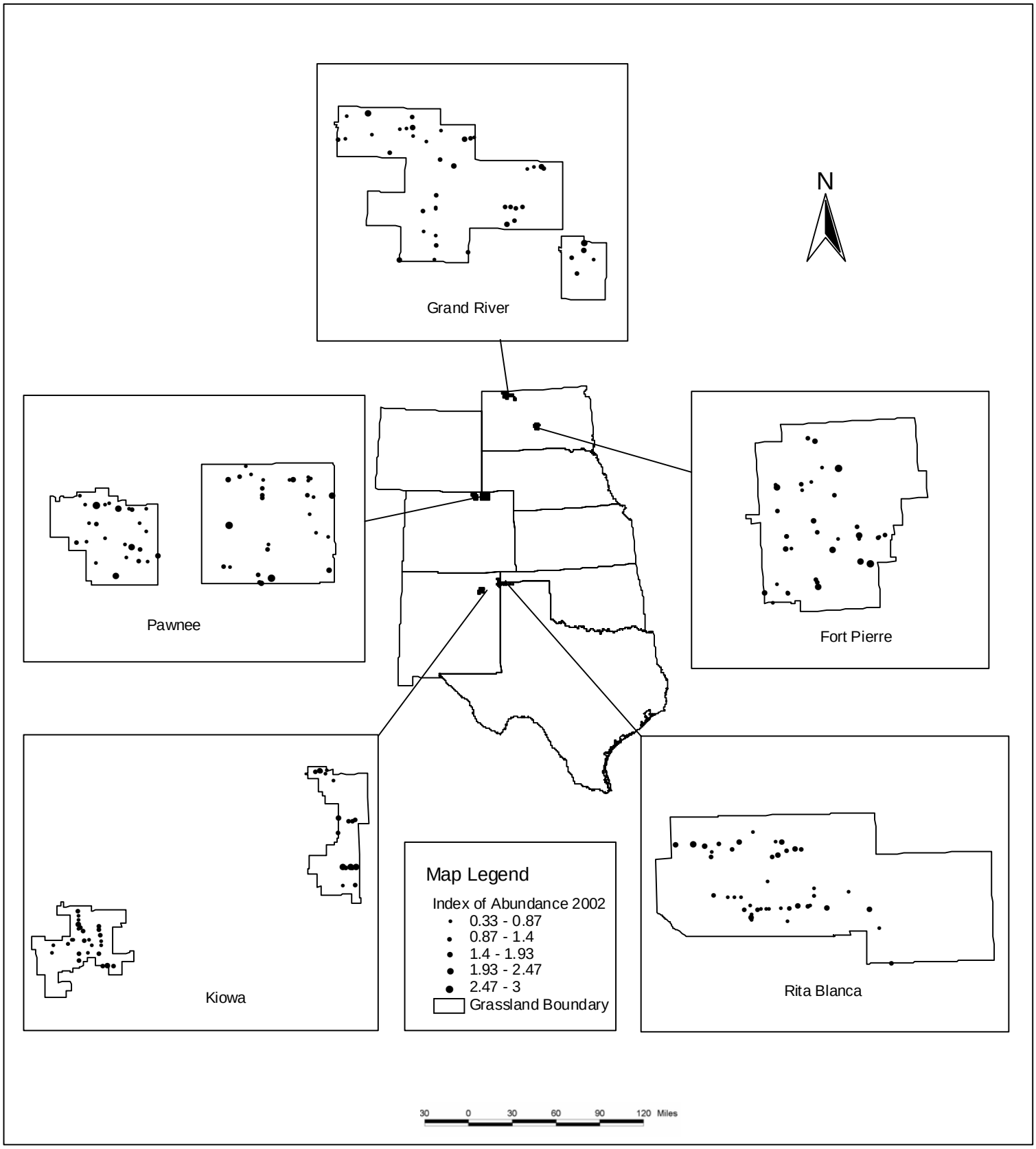
(Agelaius phoeniceus)



Map shows the distribution and relative abundance of the Red-winged Blackbird on selected National Grasslands throughout the Great Plains regions, 2002.

Western Meadowlark

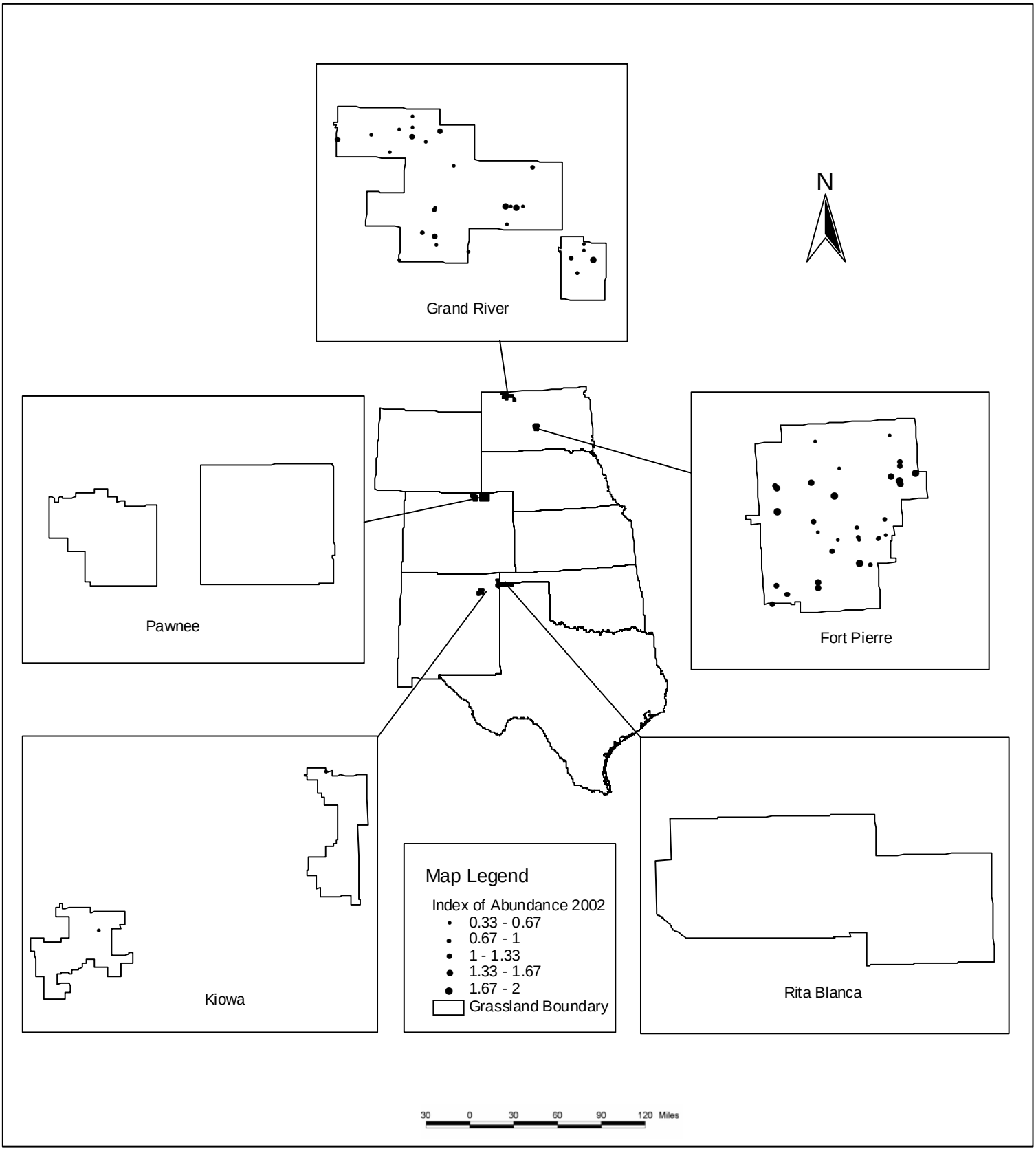
(Sturnella neglecta)



Map shows the distribution and relative abundance of the Western Meadowlark on selected National Grasslands throughout the Great Plains regions, 2002.

Brown-headed Cowbird

(Molothrus ater)



Map shows the distribution and relative abundance of the Brown-headed Cowbird on selected National Grasslands throughout the Great Plains regions, 2002.

APPENDIX B. Complete list of all species detected on the 5 grasslands (2002)

4 Letter Code	Common Name	Scientific Name
PBGR	Pied-billed Grebe	*Podilymbus podiceps*
GBHE	Great Blue Heron	*Ardea herodias*
TUVU	Turkey Vulture	*Cathartes aura*
MALL	Mallard	*Anas platyrrhynchos*
BWTE	Blue-winged Teal	*Anas discors*
NSHO	Northern Shoveler	*Anas clypeata*
NOHA	Northern Harrier	*Circus cyaneus*
SWHA	Swainson's Hawk	*Buteo swainsoni*
RTHA	Red-tailed Hawk	*Buteo jamaicensis*
FEHA	Ferruginous Hawk	*Buteo regalis*
GOEA	Golden Eagle	*Aquila chrysaetos*
AMKE	American kestrel	*Falco sparverius*
PRFA	Prairie Falcon	*Falco mexicanus*
RINP	Ring-necked Pheasant	*Phasianus colchicus*
STGR	Sharp-tailed Grouse	*Tympanuchus phasianellus*
KILL	Killdeer	*Charadrius vociferous*
MOUP	Mountain Plover	*Charadrius montanus*
SPSA	Spotted Sandpiper	*Actitis macularia*
UPSA	Upland Sandpiper	*Bartramia longicauda*
LBCU	Long-billed Curlew	*Numenius americanus*
MAGO	Marbled Godwit	*Limosa fedoa*
COSN	Common Snipe	*Gallinago gallinago*
MODO	Mourning Dove	*Zenaida macroura*
BUOW	Burrowing Owl	*Athene cunicularia*
NOFL	Northern Flicker	*Colaptes auratus*
CONI	Common Nighthawk	*Chordeiles minor*
SAPH	Say's Phoebe	*Sayornis saya*
CAKI	Cassin's Kingbird	*Tyrannus vociferans*
WEKI	Western Kingbird	*Tyrannus verticalis*
EAKI	Eastern Kingbird	*Tyrannus tyrannus*
LOSH	Loggerhead Shrike	*Lanius ludovicianus*
AMCR	American Crow	*Corvus brachyrhynchos*
CHRA	Chihuahuan Raven	*Corvus cryptoleucus*
HOLA	Horned Lark	*Eremophila alpestris*
TRES	Tree Swallow	*Tachycineta bicolor*
NRRS	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
CLSW	Cliff Swallow	*Petrochelidon pyrrhonota*

AMRO	American Robin	*Turdus migratorius*
BARS	Barn Swallow	*Hirundo rustica*
NOMO	Northern Mockingbird	*Mimus polyglottos*
BRTH	Brown Thrasher	*Toxostoma rufum*
YWAR	Yellow Warbler	*Dendroica petechia*
COYE	Common Yellowthroat	*Geothlypis trichas*
CASP	Cassin's Sparrow	*Aimophila cassinii*
BRSP	Brewer's Sparrow	*Spizella breweri*
VESP	Vesper Sparrow	*Pooecetes gramineus*
LASP	Lark Sparrow	*Chondestes grammacus*
LARB	Lark Bunting	*Calamospiza melanocorys*
SAVS	Savannah Sparrow	*Pooecetes gramineus*
GRSP	Grasshopper Sparrow	*Ammodrammus savannarum*
MCLO	McCown's Longspur	*Calcarius mccownii*
CCLO	Chestnut-collared Longspur	*Calcarius ornatus*
BLGR	Blue Grosbeak	*Guiraca caerulea*
DICK	Dickcissel	*Spiza americana*
BOBO	Bobolink	*Dolichonyx oryzivorus*
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*
WEME	Western Meadowlark	*Sturnella neglecta*
YHBL	Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*
COGR	Common Grackle	*Quiscalus quiscula*
BHCO	Brown-headed Cowbird	*Molothrus ater*
OROR	Orchard Oriole	*Icterus spurius*
BUOR	Bullock's Oriole	*Icterus bullockii*
AMGO	American Goldfinch	*Carduelis tristis*

APPENDIX C. Current (black) and proposed (red) sensitive bird species on National Grasslands in USDA Forest Service Region 2. Species in blue are proposed for removal from the current Region 2 sensitive species list. Current sensitive bird species for Regions 1 and 3 National Grasslands are shown in black.

Common Name	Scientific Name	R1	R2	R3
American Bittern	*Botaurus lentiginosus*		+	
Ibis, White-Faced	*Plegadis chihi*		+	+
Yellow-billed Cuckoo	*Coccyzus americanus*		+	+
Long-billed Curlew	*Numenius americanus*		+	+
American Peregrine Falcon	*Falco peregrinus anatum*		+	
Ferruginous Hawk	*Buteo regalis*		+	+
Northern Harrier	*Circus cyaneus*		+	
Merlin	*Falco columbarius*		+	
Mississippi Kite	*Ictinia mississippiensis*			+
Osprey	*Pandion haliaetus*		+	
Owl, Burrowing	*Athene cunicularia*	+	+	+
Owl, Short-eared	*Asio flammeus*		+	
Longspur, Chestnut-collared	*Calcarius ornatus*		+	
Longspur, McCown's	*Calcarius mccownii*		+	
Pygmy Nuthatch	*Sitta pygmaea*		+	
Sage-grouse, Greater	*Centrocercus urophasianus*	+	+	
Prairie-Chicken, Greater	*Tympanachus cupido*	+	+	
Prairie-Chicken, Lesser	*Tympanachus pallidicinctus*		+	+
Martin, Purple	*Progne subis*		+	
Loggerhead Shrike	*Lanius ludovicianus*	+	+	+
Pipit, Sprague's	*Anthus spragueii*	+		
Plover, Mountain[1]	*Charadrius montanus*		+	+
Plover, Western Snowy[2]	*Charadrius alexandrinus nivosus*		+	
Sandpiper, Upland	*Bartramia longicauda*		+	
Sparrow, Baird's	*Ammodramus bairdii*	+	+	+
Sparrow, Brewer's	*Spizella breweri*		+	
Sparrow, Cassin's	*Aimophila cassinii*		+	
Sparrow, Fox	*Passerella iliaca*		+	
Sparrow, Grasshopper	*Ammodramus savannarum*		+	
Sparrow, Sage	*Amphispiza bellii*		+	
Vireo, Bell's	*Vireo bellii*			+
Trumpeter Swan	*Cygnus buccinator*		+	
Black Tern	*Chlidonias niger*		+	
Woodpecker, Lewis's	*Melanerpes lewis*		+	

[1]Should the current proposal to list the mountain plover under the ESA be withdrawn, the mountain plover will be retained on the sensitive species list.

APPENDIX D. Cost (actual 2002 and projected 2003) to implement section-based monitoring on individual National Grasslands in the Great Plains. The minimum coverage of the surveys is 20% of the area of the individual grassland. The minimum of 20% of the area on a few of the grasslands would not allow for an adequate sample size and the number of sections was increased to 50. The cost was then determined by multiplying the number of sections by the cost per section (~$90). This cost only includes section based monitoring. Additional surveys would require additional funds (surveys on black-tailed prairie dog colonies and playas), raptor nest searches and other special surveys). The costs to add additional projects should only require additional monies for mileage.

Grassland Name	**~ Acreage**	**# of sections**	**2002 Cost**	**2003 Cost**
Thunder Basin	572,000	179	N/A	$16,950
Comanche	435,028	136	N/A	$12,850
Pawnee	193,060	62	$5,500	$5,850
Buffalo Gap/Oglala	591,000	200	N/A	$18,900
Grand River	160,000	50	$4,500	$4,750
Fort Pierre	116,078	50	$4,500	$4,750
Cimarron	108,175	50	N/A	$4,750
Little Missouri	1,200,000	375	N/A	$35,450
Kiowa	136,505	50	$4,500	$4,750
Rita Blanca	93,323	50	$4,500	$4,750
Sheyenne	70,180	32	N/A	$3,200
McKelvie NF[1]	116,000	50	N/A	$5,000
Nebraska (Bessey)[1]	95,010	50	N/A	$5,000
Black Kettle	31,300	50	N/A	$5,000
Total	**3,917,659**	**1384**	**$23,500**	**$131,950**

[1]McKelvie and Nebraska are National Forests in the Nebraska Sandhills region, however, they are predominantly grassland.