

AN ECOLOGIC STUDY OF THE HABITAT TYPES OF
THEODORE ROOSEVELT NATIONAL MEMORIAL PARK, NORTH DAKOTAGeorge R. Hoffman
University of South DakotaObjectives

The objectives of this study, begun in May 1978, are to delimit the habitat types of Theodore Roosevelt National Memorial Park (TRNMP), North Dakota, list the plants present, and assess the animal components of the habitat types. For TRNMP a comprehensive study of the habitat types has not been done previously. The habitat type concept was developed to assess the ecologic status of forest vegetation of the Northern Rockies (Daubenmire 1952, Daubenmire and Daubenmire 1968); and the same concept was later used to assess steppe vegetation of Washington (Daubenmire 1970). The habitat type approach to assessing the ecologic status of vegetation has been used in a number of studies throughout the Rocky Mountain region (Pfister *et al.* 1977, Reed 1971, 1976, Wirsing and Alexander 1975, Hoffman and Alexander 1976). The basic ecologic nature of the habitat type concept lends itself to studying forest and grassland vegetation as well as interspersed shrublands (Daubenmire 1973). It has been shown that once established for a given region, habitat types provide the framework for establishing relationships between the habitat types and productivity, disease susceptibility, potential for forage production, soil moisture relations, and small mammal distributions (Daubenmire 1973, Hoffman 1960, Layser 1974, Mackee 1970, Rickard 1960). The study at TRNMP will provide data on habitat types and their major animal components and will offer opportunity for future assessment of soil moisture relations, productivity and other characteristics of a basic or applied nature.

Procedures

During 1978 we did much travel and reconnaissance throughout the Park. We collected approximately 1000 plants distributed among 450 species. Additionally, we collected 5 species of amphibians and 5 species of reptiles, and 6 species of small mammals. We made notes on 71 species of birds, and made a tentative list of habitat types based on our 1978 field data. In 1978 we tried three methods of sampling bird populations (Bond 1957, Emlen 1971, Kendigh 1944) and concluded that for this study the method of Bond (1957) would be most suitable.

Quantitative sampling of vegetation will be done in 1979. Within each of at least 4 stands of each habitat type (stands selected to represent the full range of distribution of each habitat type) we will set up a 15 x 25 m plot with the long axis oriented parallel to contours of the slope. The plot corners will be marked by small, inconspicuous stakes made of concrete reinforcement rod. Each plot will be located so it can be revisited in the future. The plot will then be subdivided into 3 - 5 x 25 m subplots to facilitate sampling. For the low growing shrubs and herbaceous species

we will determine canopy coverage within 50 - 2 x 5 dm plots placed systematically at one meter intervals along the 25 m sides inside the central subplot. We will count all large shrubs, and trees in forest stands within all three 5 x 25 subplots. We will tally trees within dm diameter size classes, and keep the sizes separated to provide data on population structure. Also, within the entire macroplot, we will list all plant species that did not occur in one of the 2 x 5 dm plots. Finally, mineral soil samples taken to a depth of 1 dm will be collected at 20 points within the central subplot and composited for each stand.

Small mammal populations will be assessed within the same stands in which vegetation is sampled. A grid technique similar to that of Rickard (1960) and Hoffman (1960) will allow rather even sampling over the stand. Amphibians and reptiles will be sampled as they are found in the Park with notes made on specific habitats where they occur.

Soil samples will be collected from each stand studied. Within the central subplot we will take 20 soil cores to a depth of 1 dm. These will be composited and air-dried in the field. In the laboratory during the winter, 1979-80, we will determine for each sample the pH of the paste, cation exchange capacity, percent base saturation, readily available Ca, Mg, K, and P. We will also determine particle size distribution by mechanical analysis. We plan to send some of the samples to the South Dakota Soil Testing Laboratory for organic matter and total nitrogen determinations which we are not equipped to do here.

Data analysis and final report preparation will be done during the winter, 1979-80, following a second field season of intensive sampling.

Results

Results at this writing are tentative, based on first season reconnaissance and sampling. The habitat types are tentatively identified, the dominant species of which are the following:

Steppe:

1. Andropogon gerardi
2. Andropogon scoparius
3. Stipa comata
4. Distichlis spicata
5. Agropyron smithii

Shrub-steppe:

6. Artemisia tridentata
7. Artemisia cana

Forest:

8. Populus deltoides
9. Fraxinus pennsylvanica
10. Populus tremuloides
11. Juniperus scopulorum
12. Betula occidentalis

The above list is subject to modification depending upon results of intensive sampling. Additional plant communities that appear to be long-lived seral are dominated by Typha latifolia, Prunus virginiana, Prunus americana and Salix spp. The topography of the Park is characterized by uplands, alluvial plains, and badlands. The diversity of this landscape has allowed diverse plant communities to form a complex mosaic in which most community boundaries are very distinct. Intensive sampling in 1979 will reveal the degree of similarity among the various communities in both vegetation and animal components. A list of plant species collected throughout the Park in 1978 is being compiled.

Among the animal components, the bird species list is most complete to date (Table 1). This list is tentative and will be expanded to include additional species of 1979 as well as density estimates for the various habitat types. The small mammals so far collected are shown in Table 2. This list will also be expanded considerably after the 1979 field season.

The third group of animals so far collected in this study are the amphibians and reptiles. At this writing 34 specimens among 5 species of amphibians and 11 specimens among 5 species of reptiles have been collected, as follows:

Amphibia

Bufo woodhousei (7)
Bufo cognatus (1)
Pseudacris trisperiata (2)
Rana pipiens (12)
Ambystoma tigrinum (12)

Reptilia

Coluber constrictor (4)
Pituophis melanoleucus (1)
Crotalus viridus (2)
Thamnophis radix (1)
Sceloporus graciosus (3)

Conclusions

This study has so far revealed preliminary lists of habitat types of steppe, shrub-steppe, and forest vegetation, birds, small mammals, amphibians, and reptiles. Following intensive sampling of stands in 1979, the habitat types, edaphic factors, and animals components will be described in detail.

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Table 1.

A checklist of the birds, Roosevelt National Park, Summer 1978

Species	June	July	August	Habitat				
				Aquatic	Steppe	Shrub steppe	Forest, Juniperus	Forest, deciduous
Order Anseriformes								
Mallard Duck	—	—		X				
Order Ciconiiformes								
Great Blue Heron		—	—	X				
Black Crowned Night Heron	—			X				
Order Charadriiformes								
Killdeer	—	—		X				
Spotted Sandpiper	—	—	—	X				
Order Coraciiformes								
Belted Kingfisher	—	—		X				
Order Falconiformes								
Turkey Vulture		—	—			X		
Sharp-shinned Hawk			—			X		
Red-tailed Hawk	—	—	—			X		
Marsh Hawk	—	—	—			X		
Sparrow Hawk	—	—	—			X		X
Golden Eagle	—	—				X		
Prairie Falcon	—	—				X		
Order Galliformes								
Ring-neck Pheasant	—	—	—		X	X		
Sharptail Grouse	—	—	—		X			
Wild Turkey		—	—					X
Order Gruiformes								
Sandhill Crane	—			X	X			
Order Strigiformes								
Burrowing Owl	—	—			X			
Order Caprimulgiformes								
Common Nighthawk	—	—	—					X
Poor-will		—	—			X		
Order Piciformes								
Yellow-shafted Flicker	—	—	—					X
Red-shafted Flicker	—	—	—					X
Red-headed Woodpecker		—	—					X
Hairy Woodpecker	—							X
Order Passeriformes								
Family Motacillidae								
Spragues Pipet		—	—		X			
Family Hirundinidae								
Barn Swallow	—	—	—		X			
Cliff Swallow	—	—			X			
Bank Swallow	—	—	—		X			
Family Alaudidae								
Prairie Horned Lark			—		X			
Family Tryannidae								
Eastern Kingbird	—	—	—		X			X
Western Kingbird	—	—			X			

Table 1, cont'd.

Family Sittidae								
Red-breasted Nuthatch			—					X
Family Corvidae								
Common Crow	—	—	—		X			X
Black-billed Magpie	—	—	—		X	X		X
Blue Jay		—	—					X
Family Paridae								
Black-capped Chickadee		—	—				X	X
Family Troglodytidae								
House Wren	—	—	—					X
Rock Wren					X			
Family Mimidae								
Brown Thrasher	—	—	—				X	
Family Turdidae								
Robin	—	—	—		X	X		X
Mountain Bluebird	—	—	—		X			
Family Bombycillidae								
Cedar Waxwing	—	—	—					X
Family Sturnidae								
Starling	—	—	—		X			
Family Vireonidae								
Red-eyed Vireo	—	—	—					X
Warbling Vireo	—	—	—					X
Family Icteridae								
Western Meadowlark	—	—	—		X	X		
Red-wing Blackbird	—	—	—		X			
Brewers Blackbird	—	—	—		X			X
Baltimore Oriole	—	—	—					X
Orchard Oriole	—	—	—					X
Common Grackle	—	—	—		X			
Brown-headed Cowbird	—	—	—				X	
Family Parulidae								
Black and White Warbler			—					X
Yellow Warbler	—	—	—					X
Myrtle Warbler			—					X
Ovenbird			—					X
Common Yellowthroat	—	—	—				X	X
Yellow-breasted Chat	—	—	—				X	X
Family Fringillidae								
Black-headed Grosbeak	—	—	—					X
American Goldfinch			—				X	
Lazula Bunting	—	—	—				X	
Rufous-sided Towee	—	—	—		X	X	X	X
Lark Bunting	—	—	—		X			
Chestnut-collared Longspur			—		X			
Grasshopper Sparrow	—	—	—		X	X		
Vesper Sparrow	—	—	—		X	X		
Lark Sparrow	—	—	—				X	
Chipping Sparrow	—	—	—				X	X
Clay-colored Sparrow	—	—	—		X	X		
Field Sparrow	—	—	—		X	X		
Song Sparrow	—	—	—				X	

Table 2. Small mammals trapped in selected habitat types during the field season of 1978.

Habitat types (dominant species listed)	Number of sites sampled	Species					
		<u>Microtus</u> <u>ochrogaster</u>	<u>Microtus</u> <u>pennsylvanicus</u>	<u>Peromyscus</u> <u>leucopus</u>	<u>Peromyscus</u> <u>maniculatus</u>	<u>Spermophilus</u> <u>tridecemlinea</u>	<u>Eutamias</u> <u>minimus</u>
<u>Agropyron smithii</u>	4	1.2					
<u>Stipa comata</u>	3	1.0		.33		.33	
<u>Andropogon scoparius</u>	1	1.0		1.0			
<u>Symphoricarpos</u> <u>occidentalis</u> thicket	3	1.0	.66	.66	1.6		
<u>Rosa spp.</u> thicket ^a	1	5.0					
<u>Artemisia cana</u>	6	2.2c	1.5			.16	.33
<u>Juniperus scopulorum</u>	6	1.2		1.2	1.8		.16
<u>Fraxinus pennsylvanica</u>	3	.33	.66	1.0	3.0		.66
<u>Populus deltoides</u>	3	.66	.33	.33			1.3

^a Includes Rosa woodsii and R. arkansana