

Reservoir Use by Post-breeding Shorebirds in the South Platte River Valley of Northeastern Colorado

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Introduction

Despite Colorado's inland location, 42 species of shorebirds have been recorded in the state as of 1 July 2006. Most (68%) of the 37 shorebird species that are regularly observed in Colorado (i.e. those above casual or accidental in status) are spring or fall migrants; these migrants tend to be more abundant during fall than spring migration (Andrews and Righter 1992). Beyond reports from birders, little quantitative information on shorebird migration in Colorado has been published. Skagen et al. (1999) used shorebird surveys, including counts from the International Shorebird Survey (see <http://www.shorebirdworld.org/>), and casual observations to assess patterns of migration in midcontinental North America, and Johnson and Ryder (1977) documented the migration of Wilson's Snipe (*Gallinago delicata*) at four sites in Colorado. To provide information for the development of The Nature Conservancy's Ecoregional Plan for the Central Shortgrass Prairie, I conducted field surveys to determine species composition, migrant abundance, and timing of post-breeding shorebird migration through the South Platte River Valley in northeastern Colorado.

Study Area and Methods

Between 8 July and 21 October 2005, I conducted eight surveys (two per month) of reservoirs along the South Platte River Valley in northeastern Colorado. Based on accessibility and time constraints, I made repeated surveys, arranged from northeast to southwest, of Jumbo (Julesburg) Reservoir (including Little Jumbo Reservoir and the roadside wetlands west of Red Lion Wildlife Management Area), North Sterling Reservoir, Prewitt Reservoir, and Jackson Lake. Water stored in these human-made impoundments is used for irrigation, and water volume generally decreases through the summer (Sprague et al. 2002). These reservoirs vary somewhat in their size and holding capacity (Sprague et al. 2002; Table 1), but all have average depths of 20 feet except for North Sterling, which has an average depth of 30 feet and reaches a maximum depth of 55 feet (Sprague et al. 2002). All these reservoirs are generally eutrophic and experience

algae blooms in summer (Sprague et al. 2002). Much of the land surrounding these reservoirs is included in Colorado State Parks or State Wildlife Areas.

I selected viewing stations at each reservoir where I could survey as much of the shoreline as possible. At all reservoirs except for North Sterling, I was able to view >90% of the shoreline; at North Sterling, I surveyed the same area on each visit. I attempted to identify each individual shorebird to the species level, although some birds, generally the size of Lesser Yellowlegs or smaller, were observed at distances too large to allow the determination of specific identity. In those instances, I used species composition of the reservoir count on that survey day, from portions where it could be determined, to partition numbers where species could not be determined. Shoreline habitat (e.g., substrate composition and vegetation) at a given reservoir was relatively uniform, and I therefore believe that shorebird species composition along the entire shoreline was correspondingly similar. On each visit, I also recorded the presence or absence of motorized watercraft on the reservoir and recorded the percentage of the reservoir basin that was filled with water. After data were collected, I modeled the passage of post-breeding shorebirds by linearly interpolating numbers between adjacent counts at seven-day intervals beginning on 5 July. Nomenclature follows the recent American Ornithologists' Union Checklist update (see <http://www.aou.org/checklist/index.php3>), and scientific names of shorebirds are provided in Table 1.

Results and Discussion

Species composition and abundance

During the eight surveys I conducted in northeastern Colorado

Table 1. Locations and characteristics of reservoirs sampled in the South Platte River Valley of northeastern Colorado, and distribution of post-breeding shorebird observations in 2005.

	Location	Surface area (acres)	Capacity (acre-feet)	% boating activity (n = 8 visits)	% of all shorebirds observed
Jumbo	40.919°N, 102.662°W	1703	31,800	12.5	29.1
North Sterling	40.781°N, 103.267°W	2879	74,010	100.0	5.4
Prewitt	40.430°N, 103.370°W	900	28,840	12.5	42.6
Jackson Lake	40.373°N, 104.079°W	2600	35,629	62.5	22.9

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% of all shorebirds observed
29.1
5.4
42.6
22.9

in 2005, I recorded 10,699 individuals of 24 species; an additional nine species were detected by birders visiting the same reservoirs in the fall of 2005 (Table 2). These combined observations represent all of the non-breeding shorebird species above casual in status that can be expected as fall migrants in eastern Colorado. Baird's Sandpiper was the most numerous species I encountered, followed in abundance by Killdeer, Stilt Sandpiper, Lesser Yellowlegs, Least Sandpiper and Long-billed Dowitcher. Together, these six species constituted 90% of all shorebird observations. Solitary Sandpiper, Willet, Upland Sandpiper, Red Knot and Wilson's Snipe were observed only in small numbers (Table 2). Two-thirds of all of the individuals I counted were of species that bred in the arctic or boreal forest.

Abundances of post-breeding shorebirds generally followed those reported for eastern Colorado by Andrews and Righter (1992), with a few exceptions. In my study, Greater Yellowlegs and Stilt Sandpiper were more abundant and Western Sandpiper less abundant than reported by Andrews and Righter (1992). My low counts of Wilson's Snipe were likely due to their use of well-vegetated wetlands, which were generally not included in shoreline surveys. As indicated by birders' observations, Short-billed Dowitcher is likely a rare or uncommon fall migrant on the eastern plains as suggested by Andrews and Righter (1992).

Distribution

Shorebird migrants were not distributed equally among reservoirs. Although the smallest in size, Prewitt Reservoir contributed 43% of all shorebirds I observed (Table 2); Jumbo Reservoir had the second highest use (29%). Boating activity was greatest on Jackson Lake and North Sterling Reservoir (Table 1) and may have influenced migrant shorebird use of these sites. Also, the shoreline of North Sterling Reservoir is much steeper, in many parts, than that of the other reservoirs and may limit foraging habitat for post-breeding migrant shorebirds. The sandy shoreline of Jackson Lake contrasted with the muddy shorelines of Prewitt and Jumbo Reservoirs, which appeared to have higher insect and crustacean abundances.

Timing

Migrant shorebirds were present on the South Platte River Valley reservoirs from early July to the end of October. In early July, reservoir basins were almost completely filled and little shoreline was available to foraging shorebirds. Water levels generally decreased throughout the period to a low of about 50% filled on 7 October. Migrant shorebirds were most abundant between 16 August

Table 2. Numbers of shorebirds and proportion of total species recorded on South Platte River Valley reservoirs in northeastern Colorado, July–October 2005. Species indicated as “obs” were not seen during surveys but were reported from sampled reservoirs during the same time period in the January 2006 issue of Colorado Birds (Vol. 40, No. 2; five species) or on the CO Birds listserv (<http://lists.cfo-link.org/birding/COBirds.php>; four species seen by multiple observers).

Common name	Scientific name	Breeding area ¹	Total number observed	% of total
Black-bellied Plover	<i>Pluvialis squatarola</i>	A	74	0.7
American Golden-Plover	<i>P. dominica</i>	A	obs	
Semipalmated Plover	<i>Charadrius semipalmatus</i>	B	43	0.4
Piping Plover	<i>C. melodus</i>	C	obs	
Killdeer	<i>C. vociferus</i>	C	3,178	29.7
American Avocet	<i>Recurvirostra americana</i>	C	174	1.6
Spotted Sandpiper	<i>Actitis macularius</i>	C	83	0.8
Solitary Sandpiper	<i>Tringa solitaria</i>	B	6	0.1
Greater Yellowlegs	<i>T. melanoleuca</i>	B	183	1.7
Willet	<i>T. semipalmata</i>	C	3	<0.1
Lesser Yellowlegs	<i>T. flavipes</i>	B	895	8.4
Upland Sandpiper	<i>Bartramia longicauda</i>	C	2	<0.1
Whimbrel	<i>Numenius phaeopus</i>	B	obs	
Long-billed Curlew	<i>N. americanus</i>	C	20	0.2
Marbled Godwit	<i>Limosa fedoa</i>	T	18	0.2
Ruddy Turnstone	<i>Arenaria interpres</i>	A	obs	
Red Knot	<i>Calidris canutus</i>	A	2	<0.1
Sanderling	<i>C. alba</i>	A	45	0.4
Semipalmated Sandpiper	<i>C. pusilla</i>	A	95	0.9
Western Sandpiper	<i>C. mauri</i>	A	48	0.4
Least Sandpiper	<i>C. minutilla</i>	B	392	3.7
Baird's Sandpiper	<i>C. bairdii</i>	A	3,884	36.3
Pectoral Sandpiper	<i>C. melanotos</i>	A	115	1.1
Dunlin	<i>C. alpine</i>	A	obs	
Curlew Sandpiper	<i>C. ferruginea</i>		obs	
Stilt Sandpiper	<i>C. himantopus</i>	A	931	8.7
Buff-breasted Sandpiper	<i>Tryngites subruficollis</i>	A	obs	
Long-billed Dowitcher	<i>Limnodromus griseus</i>	A	358	3.3
Short-billed Dowitcher	<i>L. scolopaceus</i>	B	obs	
Wilson's Snipe	<i>Gallinago delicata</i>	C	3	<0.1
Wilson's Phalarope	<i>Phalaropus tricolor</i>	C	115	1.1
Red-necked Phalarope	<i>P. lobatus</i>	A	32	0.3
Red Phalarope	<i>P. fulicarius</i>	A	obs	

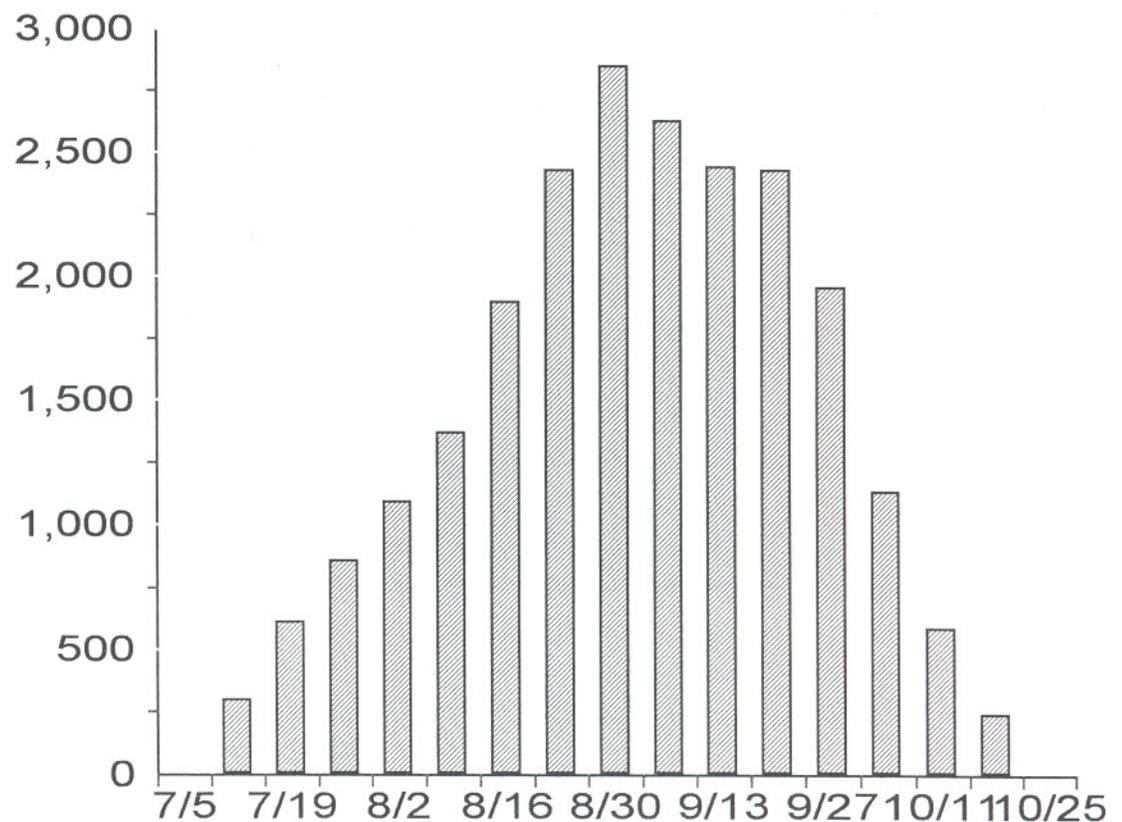
¹ breeding area in North America: A = arctic, B = boreal, C = Colorado, and T = temperate.

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ber	% of total
	0.7
	0.4
29.7	1.6
0.8	0.1
1.7	<0.1
8.4	<0.1
0.2	0.2
<0.1	0.4
0.4	0.9
3.7	0.4
36.3	3.7
1.1	36.3
8.7	1.1
3.3	0.3
<0.1	<0.1
1.1	1.1
0.3	0.3

and 27 September (Figure 1, modeled with an assumed seven-day turnover period). Five of the six most abundant species (Killdeer, Greater Yellowlegs, Lesser Yellowlegs, Baird's Sandpiper and Stilt Sandpiper) and Semipalmated Plover followed the same pattern, within 10%: 7% of all observed individuals of these species were seen in July, 39% in August, 45% in September, and 8% in October. However, most American Avocets (92% of all observations), Pectoral Sandpipers (68%), Wilson's Phalaropes (70%) and Red-necked Phalaropes (94%) were present on reservoirs in September, whereas virtually all Black-bellied Plovers (96% of observations), Sanderlings (100%) and Long-billed Dowitchers (98%) occurred during September and October. Species that tended to migrate earlier than the general pattern included Long-billed Curlew (100% of all birds observed were seen in July and August), Semipalmated Sandpiper (63% in August), Western Sandpiper (40% in July) and Least Sandpiper (55% in August). Passages of post-breeding shorebirds in the South Platte River Valley generally corresponded with those reported by Andrews and Righter (1992) and Skagen et al. (1999).

Figure 1. Passage of post-breeding shorebird migrants, modeled with an assumed seven-day turnover rate, through South Platte River Valley reservoirs, northeastern Colorado, during 2005

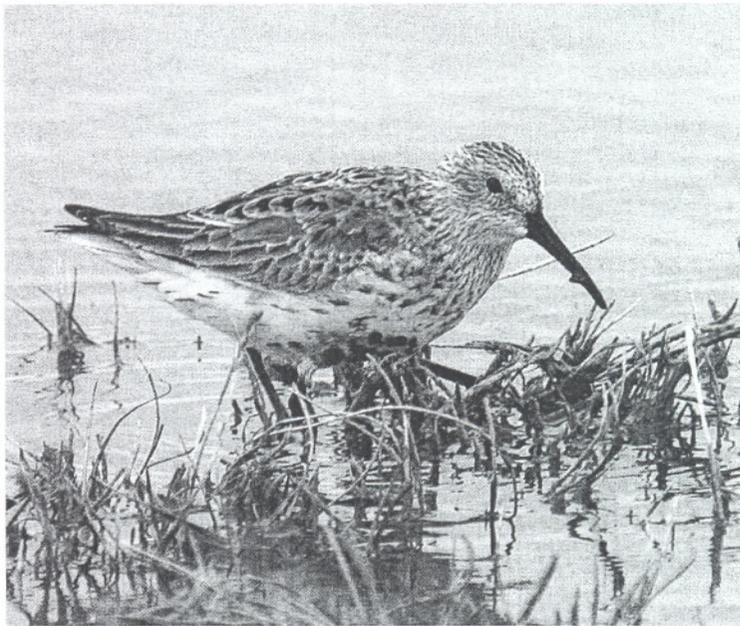


Populations

Assuming that migrants spend seven days on a reservoir, I estimate that about 23,000 shorebirds passed through sampled reservoirs during the post-breeding season. If the turnover period was only three days, the total population passing through sampled reservoirs could have been as high as 53,000 individuals. Recent observations of broad-scale departures of shorebirds from Prewitt Reservoir at dusk suggest that turnover may be quite rapid on these reservoirs (Todd Felix, U. S. Dept. Agric., pers. comm.). Clearly, reliable estimates of turnover rates are needed to determine the total population of post-breeding shore-

birds that use these reservoirs as migration stopovers.

If the two nearby reservoirs that I was unable to visit, Empire and Riverside, support similar numbers of shorebirds as Jackson and Jumbo Reservoirs (which are similar in size and shape), then the South Platte River Valley reservoir system might provide post-breeding stop-over habitat for 35,000 to 80,000 shorebirds. I did record more than 900 shorebirds on an



Dunlin, Weld County, April 16, 2006. Photo by Rachel Hopper

accessible section of Empire Reservoir, which subsequently dried out, on 20 July. At a minimum, the South Platte River Valley reservoir system would qualify as a site of regional importance in the Western Hemisphere Shorebird Reserve Network (at least 20,000 migrants annually; see <http://www.whsrn.org/>). Individually, Prewitt Reservoir, Jumbo Reservoir, and Jackson Lake would meet the criteria of an Audubon Colorado Important Bird Area (at least 750 migrants annually; see http://co.audubon.org/birdcon_iba.html).

Substantial loss of natural wetlands throughout the Great Plains likely increases the value of the South Platte River Valley reservoirs to post-breeding shorebird migrants. For example, more than 50% of natural wetlands have been lost in Colorado in the last two centuries (U.S. Geological Survey 1996), and climate change could dry

out wetlands in the western parts of the Great Plains (Johnson et al. 2005). Thus, shorebird conservationists should monitor how water allocation decisions along the South Platte River and other Colorado rivers will affect shorebird foraging habitat.

This article was peer-reviewed by Susan Skagen.

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Recent Avian Literature Pertinent to Colorado: 2005

Kim Potter

This review provides abstracts and citations for articles published during the year 2005 in peer-reviewed journals that involve Colorado avian populations. As usual, prairie birds (e.g., Mountain Plover and Horned Lark) and grouse (e.g., Gunnison Sage-Grouse and White-tailed Ptarmigan) were the primary subjects of research in the state. All studies reviewed here involve species or habitats of special conservation concern, and all have implications for management. It is the goal of this review to disseminate basic findings of ornithological research into the Colorado birding community, and