

GRAND TETON NATIONAL PARK BREEDING BIRD MONITORING PROJECT



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♦ OVERVIEW: GTNP BREEDING BIRD MONITORING PROJECT

1. Following initial independent work by M. L. Cody and 3y funding from NPS, we instigated a scheme for long-term monitoring of breeding land bird populations in a wide variety of habitats representative of the northern Rockies and the Greater Yellowstone Ecosystem (GYE). Census sites are located almost entirely within Grand Teton National Park, where a broad range of representative vegetation types is accessible within close geographic proximity.

2. 30 monitoring sites are established within and adjacent to the park in pristine habitat. Sites range from the Jackson Hole lowlands to subalpine and alpine sites, from meadow, sagebrush and marshland, through willow scrub, cottonwood and aspen woodlands, to lodgepole pine and spruce-fir forests. Some sites have a monitoring history of >30 y; others were established in the mid-1990's.

3. The location and accessibility of the study sites permits all to be regularly and repeatedly censused during the short (6-week) breeding season. Census sites are standardized in area (5-10 ha in size) and mapped in detail (topographic features, vegetation). Census schedules, timing, and methodological protocols are established, and allow for controlled inter-site and inter-year comparisons in breeding bird populations, species composition, and densities.

♦ 2000 SEASON: COVERAGE AND PARTICIPANTS

Participants. Six persons participated in the 2000 census effort, as listed below.

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Site Coverage.

Nineteen of the 30 monitoring sites were assessed in 2000. Coverage was continued on those sites with the longest monitoring history, which in some cases covers several decades; coverage also spanned the full habitat range of GTNP's monitoring sites (see Table 1.).

Table 1. Coverage of GTNP Breeding Bird Monitoring Sites 1966-2000.

COVERAGE OF GTNP BREEDING BIRD MONITORING SITES 1966-2000

Site/Census	66	91	92	93	94	95	96	97	98	99 Who	Y2K Who	Tot Yrs
1:Wolf Rch			1	1	1	1	1	1	1		1 sw	7
2:JLJ Sedge			1	1	1	1	1	1	1	1 mlc	1 mlc	9
3:Elk Refuge				1	1	1	1	1	1	1 sp	1 sp	7
4:JLJ Gr-sage	1	1	1	1	1	1	1	1	1	1 mlc	1 mlc	11
5: Ant.Flats						1	1	1	1	1 rs	1 cjt	5
6: Alrpt Sage			1	1	1	1	1	1	1		1 mlc	7
7: 20L Meadow			1	1	1	1	1	1	1	1 gs	1 sw/mlc	8
8:Triangle X								1	1		1 cjt	3
9: RKO			1	1	1	1	1	1	1	1 mlc	1 mlc	8
10:JLJ Will	1	1	1	1	1	1	1	1	1	1 mlc	1 mlc	11
11: Oxbow			1	1	1	1	1	1	1	1 mlc	1 mlc	8
12: Elk Rch W	1		1	1	1	1	1	1	1			7
13: Elk Rch E	1		1	1	1	1	1	1	1		1 sw	9
14: Cow Lk	1		1	1	1	1	1	1	1	1 rs		8
15: Spread Ck			1	1	1	1	1	1	1		1 mlc	8
16: Schwabch			1	1	1	1	1	1	1	1 mk/sw		7
17: L. Granite								1	1		1 sw	4
18: Timbered ls				1	1	1	1	1	1	1 rs		6
19: AMK			1	1	1	1	1	1	1	1 gs	1 mlc	9
20: TaggartLk			1	1	1	1	1	1	1			5
21: Signal Mt			1	1	1	1	1	1	1	1 gs	1 sw	9
22: Spaulding								1	1			3
23: LizardCk			1	1	1	1	1	1	1			6
24: Bradley			1	1	1	1	1	1	1			4
25:JennyLk			1	1	1	1	1	1	1	1 mk/sw	1 sw/mlc	8
26:GranSpruce			1	1	1	1	1	1	1	1 mk/sw		5
27:Rendezvous			1	1	1	1	1	1	1	1 mk/sw		5
28:CodyBowl			1	1	1	1	1	1	1	1 mk/sw	1 sw/mlc	6
29:HeronLk					1	1	1	1	1	1 mh		3
30:Blacktail							1	1	1	1 mk/sw	1 sw/mlc	4
Total Sites:	5	2	12	17	24	28	30	30	15	19	19	6.93

The last column of the above table indicates the sites censused during the 2000 season; the selection continues an unbroken continuity at important "flagship" sites and also extends coverage of some less routinely censused areas. Overall, the 30 sites have been censused over seven calendar years.

The Y2000 Censuses.

The list of breeding species at the monitoring sites (Appendix A) was extended to 151, with the inclusion of Northern Oriole at Site 11: Oxbow Willow-Aspen.

Y2000 was a dry year, with wetlands especially showing this effect. A review of the climate data from the Moran weather station is given in Figure 1. Over the last 40 y, precipitation AUG-JUL (basically the 12 months preceding a breeding census survey) averaged 633 mm. Precipitation 1999-2000 was slightly below average (607 mm), and annual temperature somewhat above average (2.72 °C, cf. average 2.47 °C).

Breeding densities of representative common species are summarized in sites grouped into "meadow" (Figure 2a), "willow-aspen-cottonwood" (Figure 2b) and "pine-spruce-fir" Figure 2c) sites respectively. Densities at most sites were much like those of previous years, although densities in two forest sites (#s 21, 25) appeared to be sharply reduced.

Analyses of seven sparrow species (fam. Emberizidae) at the sites at or near Jackson Lake Junction (sites 2,4,10,11), and also near the Moran weather station, are analyzed further. A trends Figure (3) shows that Vesper Sparrows were low in density in Y2000, Brewer's, Lincoln's, and White-crowned Sparrows were higher in density relative to recent years, and Song, Fox, Savannah Sparrows similar in density.

It appears that a suite of sparrow species is higher in density in certain years, while other species are lower in density. Warmer and especially drier years seems to favor some species, which in turn are favored in cooler and especially wetter years.

Regression analyses were conducted on sparrow densities at the JLJ sites with climatic measures as the independent variables. I used a) summed precipitation in the wettest of the preceding winter months (NOV, DEC, JAN); b) summed precipitation in the months FEB through JUN; and c) summed MAY-JUN monthly average temperatures. Some combination of these independent variables, often just one of them, were significant contributors to sparrow density in most species, and least effective in Song, Fox and Lincoln's Sparrows (see Figure 4). Anomalous years, in which observed and predicted densities are more widely disparate, are noticed in the figure.

Densities of most species that occur at more than one of the JLJ sites are positively correlated among sites and within years. There are two exceptions: Savannah Sparrow density in site 2 increases in years following heavy winter precipitation, but declines in site 4 in such years, being higher there in years of light winter precipitation. It appears that this sparrow prefers the sedge meadow (2) in wet years, but in dry years the grass-sage site (4) is preferred. Lincoln's Sparrow, which breeds in sites 10 and 11, is also uncorrelated in density between sites within years. In fact, densities are correlated with 5/7 climatic variables with opposite sign at the two sites. In the Wet Willows site (10) Lincoln's Sparrow density is negatively correlated with all precipitation measures, but in the drier site (Oxbow Willow-Aspen, #11) positively correlated. It appears that this sparrow avoids the Wet Willows and settles preferentially in the drier Willow-Aspen site in wet years.

The three species with poor correlation with on-site weather variables are those *Melospiza* sparrows that are short distance or resident species, in contrast with the other sparrows that are longer distance migrants. Song and Fox Sparrow are particularly interesting, as both are usually common in site 10 and there is a mild antagonistic interaction between them over territories. Song Sparrow is usually denser following wet winters and cool springs, while the opposite is true for Lincoln's Sparrow. However, there appears to be a carryover of high density in Song Sparrow in a good Song Sparrow year to a high density the following year, even though the following years may not be a good Song Sparrow year according to local weather conditions. In 1997, for example, local weather predicted a high density of Song Sparrow, 2.04 pr/ha, and a high density was observed (2.14). The following year, 1998, was predicted about average for Song Sparrow density (1.72 pr/ha), but observed density was a high 2.57 pr/ha. It appears that the previous year's successes carried over to the following breeding season in this resident species.

Densities of Song and Lincoln's Sparrow are modestly and negatively correlated at this site. Not all of this negative correlation is due to their opposite responses to local weather. A regression analysis of Lincoln's Sparrow departure from predicted density, LS_{dev} , against that for Song Sparrow, SS_{dev} , reveals nothing significant, but a particularly strong negative correlation is apparent when LS_{dev} is plotted against SS_{dev} for the previous year: $LS_{dev} = 0.103 - 0.687 * SS_{dev}$; $p = 0.008$. It appears that Lincoln's Sparrows are reduced in density when Song Sparrows

were especially common the previous year, even though in the (present) year in question conditions may suit Lincoln's rather than Song Sparrows.

With additional years of data, more of these sorts of influences, of local weather on breeding densities and of present and prior densities of one species affecting those of another, will become discernible.

Figure 1.

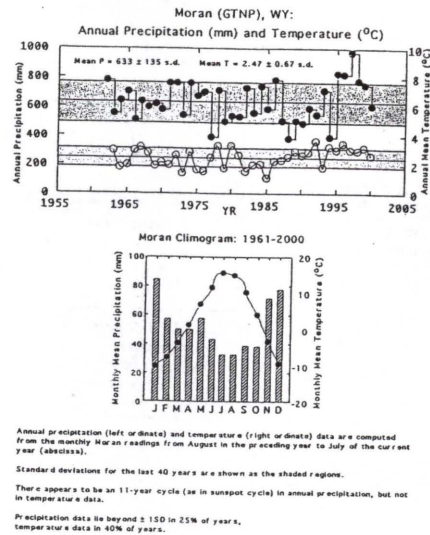


Figure 2a

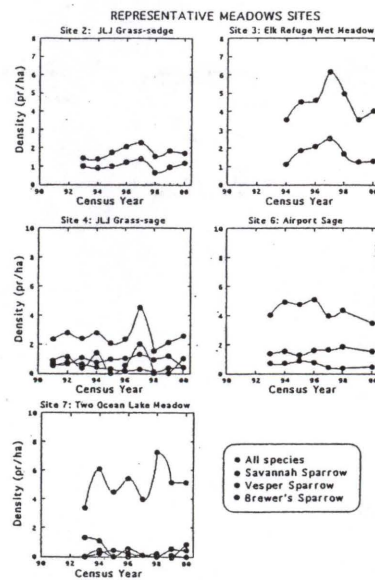


Figure 2b

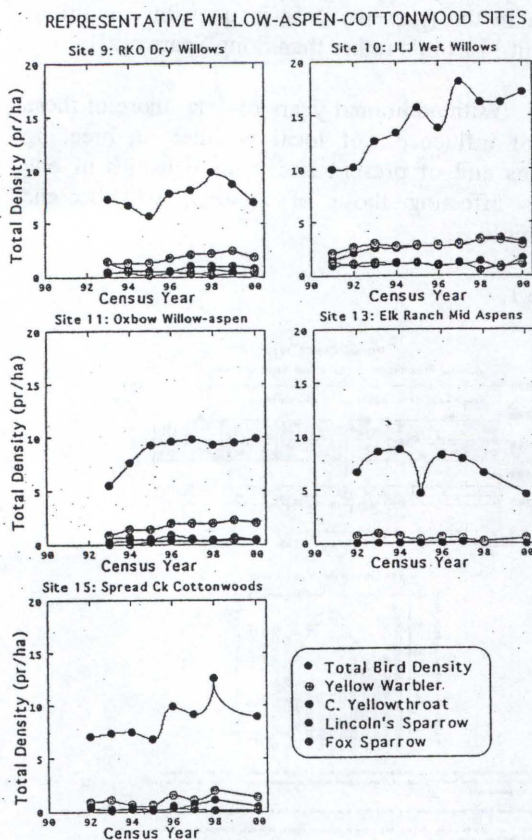


Figure 3

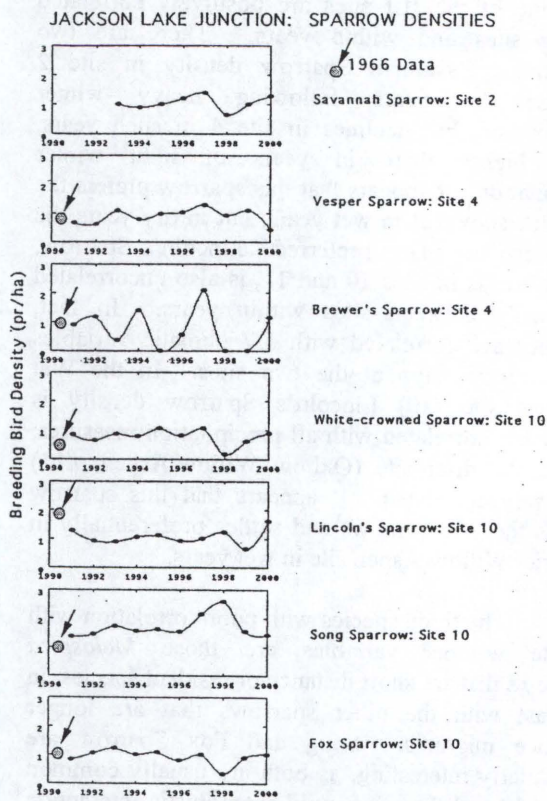


Figure 2c

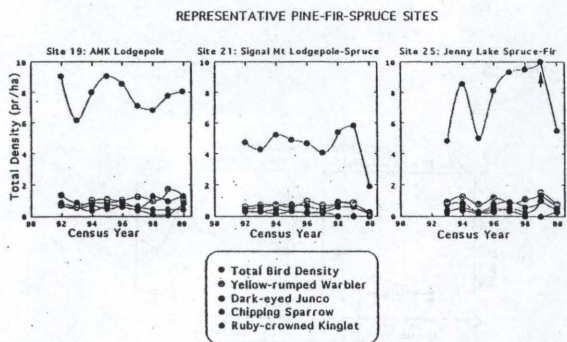
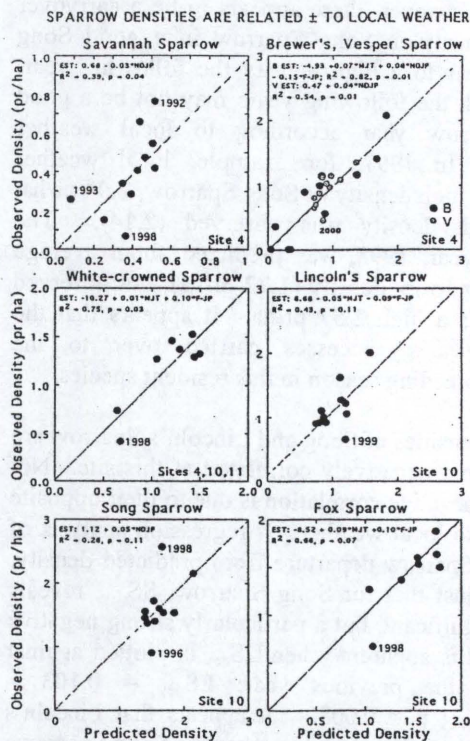


Figure 4



Appendix A

GTNP MONITORING SITES: SPECIES LIST 1995-2000		
PELECANIDAE	White Pelican	<i>Pelecanus erythrorhynchus</i>
ARDEIDAE	Great Blue Heron	<i>Ardea herodias</i>
GRUIDAE	Sandhill Crane	<i>Grus canadensis</i>
ANATIDAE	Trumpeter Swan	<i>Cygnus buccinator</i>
	Canada Goose	<i>Branta canadensis</i>
	Mallard	<i>Anas platyrhynchos</i>
	Gadwall	<i>Anas strepera</i>
	American Wigeon	<i>Anas americana</i>
	Cinnamon Teal	<i>Anas cyanoptera</i>
	Green-winged Teal	<i>Anas crecca</i>
	Blue-winged Teal	<i>Anas discors</i>
	Redhead	<i>Aythya americana</i>
	Ring-necked Duck	<i>Aythya collaris</i>
	Lesser Scaup	<i>Aythya affinis</i>
	Common Merganser	<i>Mergus serrator</i>
	Barrow's Goldeneye	<i>Bucephala islandica</i>
	Common Goldeneye	<i>Bucephala clangula</i>
	Bufflehead	<i>Bucephala albeola</i>
	Wood Duck	<i>Aix sponsa</i>
RALLIDAE	Virginia Rail	<i>Rallus limicola</i>
	Sora	<i>Porzana carolina</i>
	American Coot	<i>Fulica americana</i>
CHARADRIIDAE	Kildeer	<i>Charadrius vociferus</i>
	Willet	<i>Catoptrophorus semipalmatus</i>
SCOLOPACIDAE	Long-billed Curlew	<i>Numenius americanus</i>
	Spotted Sandpiper	<i>Actitis macularia</i>
	Wilson's phalarope	<i>Phalaropus tricolor</i>
	Common Snipe	<i>Gallinago gallinago</i>
LARIDAE	Franklin's Gull	<i>Larus pipixcan</i>
	California Gull	<i>Larus californicus</i>
	Ring-billed gull	<i>Larus delawarensis</i>
CATHARTIDAE	Turkey Vulture	<i>Cathartes aura</i>
ACCIPITRIDAE	Golden Eagle	<i>Aquila chrysaetos</i>
	Bald Eagle	<i>Haliaeetus leucocephalus</i>
	Northern Harrier	<i>Circus cyaneus</i>
	Red-tailed Hawk	<i>Buteo jamaicensis</i>
	Swainson's Hawk	<i>Buteo swainsoni</i>
	Osprey	<i>Pandion haliaetus</i>

Appendix A (continued)

	Sharp-shinned Hawk	<i>Accipiter striatus</i>	
	Cooper's Hawk	<i>Accipiter cooperi</i>	
	Northern Goshawk	<i>Accipiter gentilis</i>	
FALCONIDAE	American Kestrel	<i>Falco tinnunculus</i>	
	Prairie Falcon	<i>Falco mexicanus</i>	
PHASIANIDAE	Ruffed Grouse	<i>Bonasa umbellus</i>	
	Blue Grouse	<i>Dendrogeopys obscurus</i>	
	Sage Grouse	<i>Centrocercus urophasianus</i>	
COLUMBIDAE	Mourning Dove	<i>Zenaidura macroura</i>	
STRIGIDAE	Great Gray Owl	<i>Strix nebulosa</i>	
	Great Horned Owl	<i>Bubo virginianus</i>	
	Long-eared Owl	<i>Asio otus</i>	
	Short-eared owl	<i>Asio flammeus</i>	
	Northern Pygmy-Owl	<i>Glaucidium gnoma</i>	
CAPRIMULGIDAE	Common nighthawk	<i>Phalaenoptilus nuttalli</i>	
TROCHILIDAE	Calliope Hummingbird	<i>Stellula caliope</i>	
	Broad-tailed hummingbird	<i>Selasphorus platycercus</i>	
	Rufous hummingbird	<i>Selasphorus rufus</i>	
ALCENIDAE	Belted Kingfisher	<i>Ceryle alcyon</i>	
PICIDAE	Northern Flicker	<i>Colaptes auratus</i>	
	Williamson's Sapsucker	<i>Sphyrapicus thyroides</i>	
	Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>	
	Downy Woodpecker	<i>Picoides pubescens</i>	
	Hairy Woodpecker	<i>Picoides villosus</i>	
	Three-toed Woodpecker	<i>Picoides tridactylus</i>	
	Black-backed Woodpecker	<i>Picoides arcticus</i>	
TYRANNIDAE	Western Wood Pewee	<i>Contopus sordidulus</i>	
	Olive-sided Flycatcher	<i>Nuttallornis borealis</i>	
	Say's Phoebe	<i>Sayornis saya</i>	
	Dusky Flycatcher	<i>Empidonax oberholseri</i>	
	Hammond's Flycatcher	<i>Empidonax hammondii</i>	
	Least Flycatcher	<i>Empidonax traillii</i>	
	Willow flycatcher	<i>Empidonax difficilis</i>	
	Cordilleran Flycatcher	<i>Empidonax ex. difficilis</i>	
HIRUNDINIDAE	Tree Swallow	<i>Tachycineta bicolor</i>	
	Violet-green swallow	<i>Tachycineta thalassina</i>	
	Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	
	Cliff Swallow	<i>Hirundo pyrrhonota</i>	
	Barn Swallow	<i>Hirundo rustica</i>	

Appendix A (continued)

	Bank Swallow	<i>Riparia riparia</i>	
CORVIDAE	Steller's Jay	<i>Cyanositta stelleri</i>	
	Gray Jay	<i>Perisoreus canadensis</i>	
	Clark's Nutcracker	<i>Nucifraga columbiana</i>	
	Black-billed Magpie	<i>Pica pica</i>	
	American Crow	<i>Corvus brachyrhynchos</i>	
	Common Raven	<i>Corvus corax</i>	
PARIDAE	Black- capped Chickadee	<i>Parus atricapillus</i>	
	Mountain Chickadee	<i>Parus gambeli</i>	
CERTHIDAE	Brown Creeper	<i>Certhia americana</i>	
SITTIDAE	White-breasted Nuthatch	<i>Sitta carolinensis</i>	
	Red-breasted Nuthatch	<i>Sitta canadensis</i>	
TROGLODYTIDAE	Marsh Wren	<i>Cistothorus palustris</i>	
	Rock Wren	<i>Salpinctes obsoletus</i>	
	House Wren	<i>Troglodytes aedon</i>	
MUSCICAPIDAE			
Sylviinae	Golden-crowned Kinglet	<i>Regulus satrapa</i>	
	Ruby-crowned Kinglet	<i>Regulus calendula</i>	
Turdinae	Mountain Bluebird	<i>Sialia currucoides</i>	
	Townsend's Solitaire	<i>Myadestes townsendi</i>	
	Veery	<i>Catharus fuscescens</i>	
	Hermit Thrush	<i>Catharus guttatus</i>	
	Swainson's Thrush	<i>Catharus ustulatus</i>	
	American Robin	<i>Turdus migratorius</i>	
MIMIDAE	Gray Catbird	<i>Dumatella carolinensis</i>	
	Sage Thrasher	<i>Oreoscoptes montanus</i>	
MOTACILLIDAE	Water Pipit	<i>Anthus spinoletta</i>	
CINCLIDAE	American Dipper	<i>Cinclus mexicanus</i>	
BOMBYCILLIDAE	Cedar Waxwing	<i>Bombycilla cedrorum</i>	
STURNIDAE	European Starling	<i>Sturnus vulgaris</i>	
VIREONIDAE	Solitary Vireo	<i>Vireo solitarius</i>	
	Warbling Vireo	<i>Vireo gilvus</i>	
PASSERIDAE	House sparrow	<i>Passer domesticus</i>	
EMBERIZIDAE	Orange-crowned Warbler	<i>Vermivora celata</i>	