WINTER 1969

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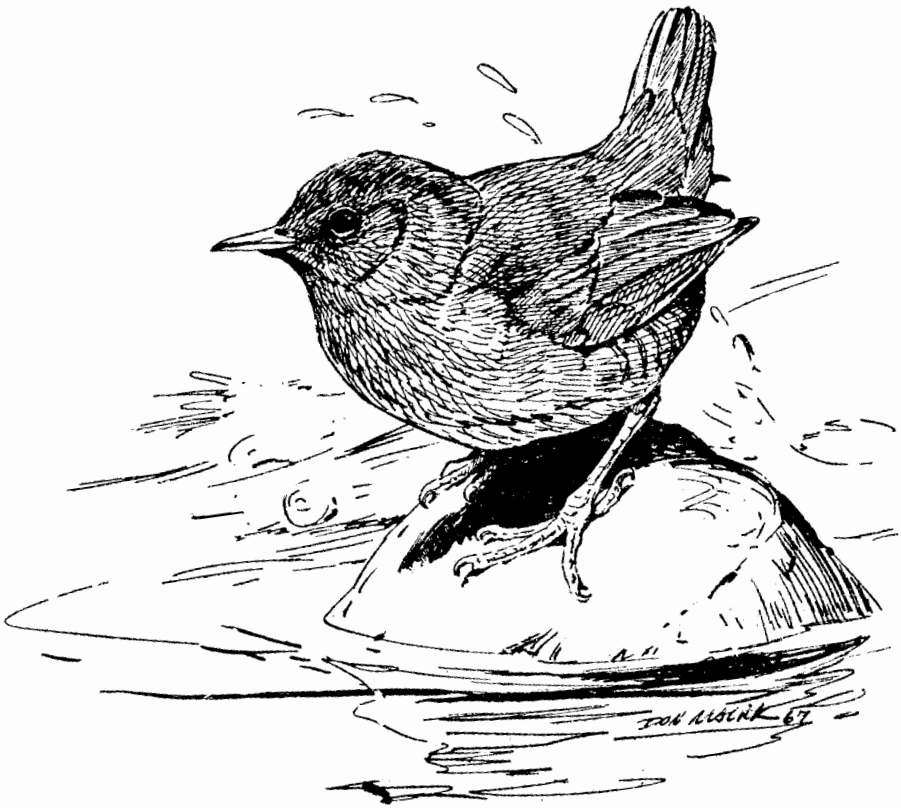
the

Colorado Field Ornithologist



WINTER, 1969 No. 5

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The *Colorado Field Ornithologist* is a semiannual journal devoted to the field study of birds. Articles and notes of scientific or general interest, and reports of unusual observations, are solicited. Send manuscripts, with photos and drawings, to R. H. Hamre, Editor, 3801 Royal Drive, Fort Collins, Colorado 80521. Membership and subscription fees: Full Member, $3.00; Library subscription fees, $1.50. Submit payments to Robbie Wright, Executive Secretary, The *Colorado Field Ornithologist*, 1895 Alpine, Apt. 16D, Boulder, Colorado 80301.

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SEASONAL MOVEMENTS OF SAGE GROUSE IN COLORADO

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Sage grouse (Centrocercus urophasianus) are the largest members of the family Tetraonidae native to North America. They occupy sagebrush (Artemisia spp.) ranges in the western United States from Oregon east to the Dakotas, and from New Mexico north to southern Alberta and Saskatchewan. These birds depend on sagebrush for their existence. Sagebrush makes up at least three-fourths of their diet throughout the year, after they are three months old. In addition to eating sagebrush, these grouse usually nest, hide, and roost in it.

Since sagebrush competes with grass for moisture, it is often killed to allow ranges to produce more grass for livestock. When large sagebrush eradication programs are carried out on prime sage grouse range, the birds are reduced in numbers and often "eradicated". Various studies

Netting a spotlighted sage grouse at night.

have been made to determine the effects of sagebrush control on sage grouse and to evaluate various patterns of sagebrush control. As of this writing, no methods or patterns of sagebrush control have been found which do not affect sage grouse.

The study reported on in this paper was financed by the Colorado Division of Game, Fish and Parks. The primary objective was to determine the seasonal movements of sage grouse from spring to fall. It was hoped that the distance hens traveled from communal breeding grounds (strutting grounds) to nest in the spring could be determined. Marked hens would then be followed until fall to determine timing, speed, and exact routes of migrations to hay meadows as well as the extent grouse use meadows.

The study area was located in North Park, Colorado. This area was chosen because the Bureau of Land Management had sprayed approximately 4000 acres of sagebrush with 2,4-D. Spraying had been done in patterns of strips and blocks in conjunction with previous studies carried out in the area. A secondary objective was to study grouse movements in or around these sprayed areas.

During earlier studies in North Park, many sage grouse had been trapped and marked in various ways but a relatively small number had ever been reobserved. To overcome this problem, small radio transmitters were placed on some grouse during the spring of 1968. Birds were captured at night with a long-handled dipnet and a spotlight. Each captured bird was banded, examined, and weighed. During the spring and summer of 1968, nearly 100 birds were

Female sage grouse, equipped with a radio transmitter (note antenna, arrow) on her nest.

Author follows radio signals from a grouse in typical habitat.

marked in this manner, but only 10 females were fitted with radio transmitters. Instrumented birds were then relocated with a radio receiver and a directional antenna.

From data collected in 1968, it was found that females began nesting in late May, and four of the radio-marked hens were followed to their nests. Observations indicated that sage grouse hens acted as individuals as opposed to following general patterns. In 1968, distances traveled from strutting grounds to nesting areas were quite variable--from 75 yards to 4.8 miles--while the average distance was 1.5 miles.

During the latter part of June, two of the nests under observation hatched. The chicks were quite precocious, and one hen immediately began moving her brood toward a meadow. In two days this brood traveled 1.5 miles. Six days after hatching they were about 2.3 miles from the nest and had crossed four irrigation ditches 1-4 feet in width. This is considered unusual, however, as most researchers believe that broods stay in the vicinity of the nest for about two weeks before moving toward hay meadows. The hen on the other nest under observation remained in the vicinity of the nest for 30 days before starting a very leisurely trek to a meadow about one mile away.

Sage grouse chicks are precocious!

Alternate wing beats produce characteristic "rolling" flight that confounds novice hunters.

A third hen that had chicks about 4 to 5 weeks old was captured and fitted with a radio transmitter. She probably was some distance from her nest at the time of capture. During the next 60 hours this brood moved about 3.6 miles to a meadow where it remained for most of the summer.

The 10 instrumented birds in this study were followed for a total of 432 observation days. During this time, no predation or other adverse effects caused by the radios were observed. Signals from radioed birds could be picked up from one-half mile away, even if the instrumented bird was behind a hill. Signals could often be received from greater distances if there were no obstacles between the transmitter and receiver. Some problems such as frequency drift, harness breakage, and interference from 2-way radios and lightning were encountered. Some radios stopped transmitting, apparently due to battery failure or physical damage to the transmitter.

This study will be continued in 1969. With better techniques to attach transmitters to the birds and more mobile receivers, hopefully more birds can be followed throughout the spring and summer.

Black Brant and Ross' Goose with Canada Geese and Mallards.

BLACK BRANT OBSERVED IN LARIMER COUNTY, COLORADO

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A Black Brant (Branta nigricans) was observed 30 November 1968 on College Lake near Fort Collins; this is the third record for Colorado. The senior author and Gurney I. Crawford, Colorado Division of Game, Fish and Parks, first observed the bird feeding with Canada Geese (Branta canadensis) near the lake shore. These geese were accompanied by an immature Ross' Goose (Chen rossii), also an uncommon species in the state. Two White-fronted Geese (Anser albifrons) and four Snow Geese (Chen hyperborea) were also on the lake. Many observers saw the Brant and subsequently photographs were taken 4 December. It was last observed on 7 December, flying with a flock of Canada Geese approximately four miles southeast of Fort Collins by Ronald A. Ryder.

The A. O. U. Check-list (1957) lists the breeding range for the Black Brant from eastern Asia and western North America, from the Taimyr Peninsula, the Yenisei River, and the New Siberian Islands east to northern

Alaska and northwestern Canada (Coronation Gulf, the arctic islands around Banks Island, and Melville east to about 110°W); south to Nelson Island, Alaska and northeastern Mackenzie. The species winters chiefly on the Pacific coast of North America from the Queen Charlotte Islands and Vancouver Island, British Columbia, south to Baja, California.

Einarson (1965) reported that the Black Brant is a rare straggler inland or on fresh water, and that the possibility of recording the species even a few miles from the sea edge is remote. However, records do exist from several inland states. An interesting fact about the Black Brant's distribution is that the first specimen collected and described was taken at Egg Harbor, New Jersey (Bent 1929).

Records from states surrounding Colorado include a single bird observed 2 April 1922 near Gate, Beaver County, Oklahoma (Sutton 1967) and one in Coffey County, Kansas in 1955 (Bailey and Niedrach 1965); Behle (1958) reported the species as an accidental or a rare migrant in the Great Salt Lake region of Utah, and Bailey and Niedrach (1965) reported it as a rare straggler in Wyoming.

The first record for Colorado was a bird that had been banded on Nelson Island, Alaska and recovered by a hunter at Union Reservoir near Longmont, Weld County, sometime between 1 November and 30 December 1954 (Ryder and Roper 1961). Bailey photographed an adult which stayed with Canada Geese in Denver City Park from 5 February to 22 February 1966 (Bailey and Niedrach 1967).

It should be noted that Bailey and Niedrach (op. cit.) list a Black Brant collected near Ft. Lyon, 11 April 1883. We are confident that this record is the one reported by Cooke (1897) and refers to the eastern form of the Brant (Branta bernicla).

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BIRD AND BUSH

George R. Shier, Golden

Shrubs and trees have definite personalities that have specific appeal to particular species of birds. The Van Bibber Creek Water Gap in which we have lived for 20 years has a natural wealth of native shrubbery and some trees, many of which attract birds as well as being suitable for landscape plantings. We have used most of these native shrubs about our buildings and have come to value some of them for their special ornithological appeal.

First among the native shrubs, we value the hawthorn, Crataegus succulenta, or its close relatives. This genus is irresistible to a wide variety of birds for protection, for food, and for nesting. The hawthorn becomes a small tree with numerous thickly twigged branches that bear attractive clusters of whitish flowers, followed by numerous clusters of tiny red apples in the fall. The leaves

color with the frosts and are born on attractive, dark, smooth twigs that have charm during the winter. For most warblers, hawthorn has no peer at our place. During spring migration, we look to hawthorn for the unusual warbler migrants, for the early kinglets and gnatcatchers. The fruit-eating birds throng amid its branches in the fall. During the winter it shelters the juncos and sparrows. Our occasional Mockingbirds prefer the hawthorn for nesting, as well as a scattering of other species. Crataegus is a must for the bird garden. It is tolerant to a variety of soils and locations and should grow most places below the lodgepole elevations.

For those who have ample space for larger shrubs and trees, I must mention the box elder, Acer negundo. As a landscape tree, it is generally unloved by the property owner, but to the birds, it provides a local paradise. A mature box elder with its dense foliage, insect populations, hollow trunks, and its protruding dead limbs, will serve more species and numbers of birds than most any other tree. We have two ancient box elders plus some younger ones in the Gap. Flickers, Sparrow Hawks, Lewis' Woodpeckers, House Wrens and probably other birds have nested in the hollow trunks. The major and minor branches always support nests. Warblers, vireos, and kinglets of every recorded species feed high and low in these box elders. The box elder should grow throughout the cottonwood belt and up the canyons.

For the small yard, there are three very desirable shrubs with attractive flowers, fruits, and fragrance, all adored by birds. These are the thimbleberry, Rubus deliciosus (named by Dr. James who was the first white man to ascend Pikes Peak in 1820 when the Long Expedition passed that way); the golden currant, Ribes aureum, and the chokecherry, Prunus virginiana. Planted close to our buildings, the thimbleberry is a favorite nesting shrub for the Lazuli Bunting. It is a lovely white-flowered shrub with sweet, edible fruits and graceful spreading branches which look nice during the winter. It does not enjoy crowding. If watered, it makes a rapid initial growth up to about four feet high and a bit wider. The golden currant lives up to its name with masses of fragrant yellow flowers, followed by yellowish currants of excellent flavor. It can be planted in mass or singly in the open where it assumes a graceful drooping stance about four feet high and six feet wide. The small birds seek its shelter all through the year, and towhees snitch its

fruits. Unlike the first two of these three, the chokecherry is very upright and will stretch to eight or 10 feet tall if favored with soil or water, or even make a small tree of four inches or more diameter at the end of many years. It stands pruning, and if cut back, quickly sends up new shoots. It provides an excellent screen or hedge without trimming, in sun or shade. Although most of our birds make use of the chokecherry, it is our favorite for Evening and Black-headed Grosbeaks. They come for the berries long before they are ripe. Berries that survive to dark ripeness make fine jelly if they escape the thrush family, or the towhees. The chokecherry bloom clusters are very fragrant and attract butterflies.

Around stone walls and foundations, we plant the common native gooseberry, Ribes inerme. It has many virtues. It is the first shrub to leaf in the spring and one of the last to color and drop in the fall. In between, its deep shade shelters the House Wren and other small birds. The towhees love the sweet dark berries. Half bush and half vine, it can be trained both ways with delightful effects. Few weeds can compete with its early growth and deep shade. On poor soils it will relish some fertilizer and help cover barren spots. We constantly find new uses for this gooseberry.

There are three more shrubs that are hard to resist if one has the space, and they do not need very much. These three are the serviceberry, Amelanchier alnifolia; the ninebark, Physocarpus monogynus; and the waxflower, Jamesia americana.

In the wild, the serviceberry is often a ragged bush, perhaps because it is a favorite browse shrub for large and small mammals. But when given a chance, it grows upright into a small tree of graceful proportions. Its cloud of white bloom comes early and is followed in the summer by soft, dark, sweet pulpy little fruits. The fruits make fine jelly and jam, and were often used in pemmican. The summer birds make quick work of these tasty fruits. The twigs have a very pleasing winter appearance. The serviceberry will grow at most elevations in sun or shade. Good soil and water produce rapid growth, as with most shrubs. It is a shrub you will enjoy if you have room after some of the foregoing list.

The ninebark, the second of these three, is a graceful shrub with spreading, thickly set foliage that has an attractive fall color. It requires a little less space than the golden currant, is perhaps a bit more showy in

bloom with its mass of cream-colored umbels, but lacks the edible fruits. It makes a good choice to interspace with the golden currant and is a good foundation shrub. We have had a Lazuli nesting in it, and it has the desirable style loved by the warblers. Its fall color lasts longer than the golden currant.

The waxflower, the third of the group, is in a class by itself. In growth, it needs about the same space as the golden currant, but has more attractive upright winter stance without losing a neat appearance about its base. The light-colored twigs have a rustic appearance. In the spring, a mass of sweet-scented, cream-colored blooms attract a daylong swarm of insects. The numerous small leaves have a sculptured contour, and they turn a most attractive purplish red and hang on a long time in the fall. For the birds, the waxflower, or Jamesia as I prefer to call it, is another shrub offering thick cover at all seasons. Mixed in with other shrubs, it adds a pleasant note of style to the garden, in either shade or partial sun.

Another shrub that can often be used is the three-leaf sumac, Rhus trilobata, although it has a very late leafing time in the spring, so that grass and weeds often come up before it is in leaf. This does offer an opportunity for bulbs around its edges. This shrub is aromatic, and bears in late summer a scattering of scarlet berries, or at least some of the shrubs do. Others may skip the berries, so it would be best to get a start with a berry producer. Like other sumacs, it has fine coloring in the fall, but unlike other sumacs, it forms a dense spread of branches and twigs about twice as wide as high and very attractive in a rounded growth which may in time reach four to six feet in height. It is very hardy, and will grow on hot, dry banks if given a start. Next to the hawthorn, it seems to have an especial attraction to birds. In banding, my nets set near trilobata have caught specimens of most of the smaller lower-level birds except the flycatchers, for which it is probably too dense. If trilobata is used, it is best to give it ample room, and while it is small, plant early flowering bulbs and perennials around its perimeter. But if you have the room, it will be a favorite with its steady stream of bird visitors. Perhaps the Rufous-sided Towhee will nest under it on the ground, if you live in its narrow, foothill nesting belt.

Lastly, there are two willows that should be mentioned. First there is the mountain willow, Salix monticola, common in the canyons. It likes water and if it gets water, it produces a splendid specimen plant when given ample room. It may grow as much as 10 to 15 feet in diameter both vertically and horizontally. When not crowded, it fills out at ground level to the full diameter. Almost all of the lower-level birds including the small flycatchers love this species and some of its similar relatives. I consider it the most attractive of the shrubby willows, and if you have space and moisture for it, you will enjoy many an exciting moment with its bird guests.

The other willow, the peach-leaf willow, Salix amygdaloides develops into a medium-sized tree, usually with a number of trunks of rather equal size, but sometimes only one trunk develops. This is a stream-valley tree of the cottonwood belt. Like the box elder, it may become ragged in its mature years, but new growth springs up around the old. This is a tree of no special beauty, but apparently the birds, including the upper-level warblers, find it irrestible, as it has presented us with a number of rare finds such as the Black-and-white, Blackpoll, Black-throated Blue, Parula, and Yellow-throated Warblers. Its foliage is thin, providing easy visibility.

There are many other species of shrubs and small trees that are attractive to some species of birds including the cultivated fruits, but my intention has been to list the native plants that have virtues for either birds or landscaping and usually both. These native plants are less demanding in their culture and most of them, once started, will manage by themselves with occasional pruning and watering. They won't die if neglected, and the birds will continue to appreciate their foods and shelters.

Sometimes these species of plants are common and easily obtained locally. Occasionally, there is a nursery that can furnish most of them, as is the case with the Swift Nursery, 14201 West 44th Avenue, Golden, Colorado, 80401. This nursery has many other native plants. Most of the shrubs and trees that I have mentioned have considerable range in altitude. They are listed in Pesman's book, Meet the Natives, according to their natural habitat and will be found in more than one elevation range. All of them do best when not crowded; then they can fill out and be most productive for attracting birds. For the many families that have some acreage, these native plants offer many rewards in birds and landscaping.

FIELD NOTES

"Boreal Year" in the Pike's Peak Region

Irruption of montane birds to low elevations has included a Gray Jay (Nov. 8, west Colorado Springs; S. Gadd), Clark's Nutcrackers (rather numerous in the foothills), Rosy Finches (January, flock near the town of Monument, and a few in Colorado Springs; Mahlon Speers and others), and Pine Grosbeaks (December-January, foothills of Colorado Springs; Betty Fields, Alice Dennis, and others).

Possibly related to this movement has been the unusually high species count in the Black Forest, north and east of Colorado Springs (Christmas count); Crossbills have been numerous there. Also, Ravens have been regularly present (with Crows) as scavengers in the town of Woodland Park (Christmas count).

Northern species: Bohemian Waxwings have been present in Colorado Springs in flocks of 20 to perhaps 500 birds since November and have occurred well out on the plains also. Redpolls were found five miles east of Falcon on February 16 (flock of 250, S. Gadd) and one mile northwest of Monument on February 18 (flock of 150 with about 25 Goldfinches, Aileen Catlett, Mahlon Speers, and others). A male and a female were picked up DOR by Margaret Ewing near the Falcon location, which is unusual in being so far out on the plains and some four miles from the nearest timber (southeast edge of Black Forest). It is possible that the Falcon and Monument flocks were in part the same; the two towns are about 20 miles apart, with the Black Forest intervening. Except for some reports, which require authentication, of Redpolls occurring individually near Woodland Park in recent years, the species is not definitely known to have visited El Paso County since a flock of 25 wintered in Colorado Springs in 1910-11 (O. A. Knorr, "The Birds of El Paso County, Colorado," University of Colorado Studies, Series in Biology, No. 5 (March 1959). In fact, the literature generally indicates that Redpolls have not wintered in Colorado, even in the mountains, in any numbers since the 1930's.

The winter here has been marked, too, by the lack of Cassin's Finch and a severe decline of the Pine Siskin.

--Sam Gadd, Colorado Springs

Species	BlFo	Bldr	CoSp	Dnvr	Drgo	FtCo	GrJn	Hotc	IdSp	Lgmt	Love	Nunn	RMNP	Weld
Horned Grebe										2				
Pied-billed Grebe		2		2										
Great Blue Heron			1	5				2		4				
Mute Swan				8										
Canada Goose		1500		872		12611				261	700			
White-fronted Goose						1								
Snow Goose						2								
Ross' Goose						1								
Mallard		4000	278	1013	48	3336	115	47		5290	2600		56	7
Black Duck				1[a]										
Gadwall				4		18		4		2				
Pintail		6	3	6	20	21		1		60	800[b]			
Green-winged Teal		16		13		90		6		28	5			
European Widgeon										5[b]				
American Widgeon		6	311	316		113		17		49	15			
Shoveler				37		11				1				
Wood Duck		1		22										
Redhead				84		2				1				
Ring-necked Duck				236[a]			16			1				
Greater Scaup				6										
Lesser Scaup		11	25	22				1						
Common Goldeneye		1		70	32	44	58	39		16	19		26	
Barrow's Goldeneye													4	
Bufflehead				1			1	37						
Ruddy Duck				3		2								
Hooded Merganser				3										
Common Merganser		16		24	8	28	5	1		24	197		2	
Red-breasted Merganser										7				
Goshawk			1	2					1					
Sharp-shinned Hawk		1	1	1	1	2	3	1		1	1			
Cooper's Hawk		1					2							
Red-tailed Hawk	4	2	11	14	2	7	12	2	1	5			1	1
Harlan's Hawk				2[a]										
Swainson's Hawk		1[a]												
Rough-legged Hawk	10	2	4	3		7				5	1	24	1	4
Ferruginous Hawk												2		1
Golden Eagle	7	1	2	4	2	2		2	1	3		10		
Bald Eagle	1				3									
Marsh Hawk	3	5	8	10		16	10	4		9	5	15	1	5
Prairie Falcon	2	1	2	3	1	1	1			1	1			1
Peregrine Falcon					1					1				
Pigeon Hawk	1			1								2		
Sparrow Hawk	1	3	7	16	1	9	31	3		9	3			4
Blue Grouse				2[a]									1	
White-tailed Ptarmigan									2[a]				10	
Scaled Quail			62											
Gambel's Quail							17	20						
Ring-necked Pheasant		3	3	52	2	47	20	6		34	3	4		12
Chukar		12					15	7						
American Coot			18	141		11								
Killdeer		6	24	27	2	15	4	11		36	2			2
Common Snipe		4	29	35	3	9				9	1			1
Western Sandpiper								1[a]						
Herring Gull		1		3		4				10	3			
Ring-billed Gull		11		131						8	9			
Bonaparte's Gull		1												
Mourning Dove		1				8	17	1		10				
Barn Owl		2												
Screech Owl		1		1										
Great Horned Owl	3	2	3	6		3		2		2	2	1		3
Pygmy Owl					1									
Long-eared Owl		2								8		2[b]		
Short-eared Owl	1					2				1				
Belted Kingfisher		2	4	5	3	7		7		13	1		1	
Yellow-shafted Flicker														1
Red-shafted Flicker	7	64	69	154[a]	12	102	53	16	1	145	14		1	12
Lewis' Woodpecker			1		6	1	4	4		6				
Yellow-bellied Sapsucker			1											
Hairy Woodpecker	4	6	20	28	4	4	2	1	4	7	1			1
Downy Woodpecker	7	2	30	54	4	5	5		3	16		1	2	2

SUMMARY OF COLORADO'S 1968 CHRISTMAS COUNTS

Species	BlPo	Bldr	CoSp	Dnvr	Drgo	FtCo	GrJn	Hotc	IdSp	Lgmt	Love	Nunn	RMNP	Weld
Say's Phoebe								1[a]						
Horned Lark	124	2	1686	392	292		498	68		15	5	4293		600
Gray Jay				1[a]					12				1	
Blue Jay	9		7	1		26				4				1
Steller's Jay	42	154	240	391[a]	26	26		4	86	52	2		15	
Scrub Jay	32		130	31	88		8	11		4	1			
Black-billed Magpie	170	153	592	452[a]	135	187	204	75	28	295	45	34	25	28
Common Raven			3	18	13		2	3	35	2			1	
Common Crow	54	6	41	65	451	1141	15		12	5	154		2[b]	
Pinon Jay			15					1						
Clark's Nutcracker		1	1						6				2	
Black-capped Chickadee	37	22	162	347[a]	12	119	19	15	11	136	18		3	14
Mountain Chickadee	104	56	137	326[a]	12	53	15	7	110	61	20		35	
Plain Titmouse							2	1						
Common Bushtit		18[a]	56	35[a]	6			6						
White-breasted Nuthatch	24	12	27	53[a]	3	2	1	1	2	4			5	
Red-breasted Nuthatch		2	1	2									2	
Pygmy Nuthatch	186	46	160	251[a]					6				25	
Brown Creeper	5	12	14	21		13	3		2	3	1		2	
Dipper		1	4	21[a]	12	15		4	6	47[b]	9		27	
Bewick's Wren							6	1						
Long-billed Marsh Wren			2[a]											
Canon Wren		1	4	5		3				1	1			
Rock Wren						2								
Mockingbird				2[a]		1[a]				1				
Brown Thrasher						1[a]							1[a]	
Robin		24	16	37	5	27	88	7	8	14				23
Townsend's Solitaire		16	38	71[a]	6	8	2		57	3			8	
Golden-crowned Kinglet		24	1	31					4					
Ruby-crowned Kinglet				3[a]										
Water Pipit							8	3						
Bohemian Waxwing		4200[a]	111[a]	2922[a]	202	933	375	200	145	9	300	2		
Cedar Waxwing		3	38		3	21								
Northern Shrike	4	1	1	11		5	1	1	3	6	1		3	4
Loggerhead Shrike		1[b]	1[a]		1		9	2						
Starling	24	560	980	444	211	884	2509	1149	20	1433	700	78	1	88
Audubon's Warbler							1							
House Sparrow	9	123	569	580	134	1098	496	170	115	1208	132	102	37	120
Western Meadowlark		67	36	162	88	48	292	11		247	60	1		12
Yellow-headed Blackbird				1[a]										
Red-winged Blackbird		960	539	986	74	129	27400	1031		1666	6			1500
Rusty Blackbird			1[a]	7										
Brewer's Blackbird				95		3	314	11			26			9
Evening Grosbeak		51	131	13	20	112	71		8	26				
Cassin's Finch		18		17	15	5			1	1				
House Finch		199	571	365	7	87	164	45	10	96	6			
Pine Grosbeak			8[a]	2[a]					16				11	
Gray-crowned Rosy Finch		2		2		280[a]			275			151[a]	60	30[a]
Black Rosy Finch									1			1[a]	1	
Brown-capped Rosy Finch						10[a]			6				6	
Common Redpoll		2											1[a]	
Pine Siskin	2	4	44	18	200	2	226	75						6
American Goldfinch	32	4	60	117	146	56	30	27		89	2	1		40
Lesser Goldfinch			1							20[b]				
Red Crossbill	55													
Rufous-sided Towhee	3	2	21	41	3		5			1				
White-winged Junco	128	22	16	110		2[a]				8	2			2
Slate-colored Junco	1	35	56	167	3	5	7		15	29	8		5	
Oregon Junco	213	98	1152	630	1348	135	399	276	41	495	22		3	15
Gray-headed Junco	12	33	526	228	160	7	11	54	1	43	5		1	
Tree Sparrow	64	50	167	259	2	236		2		734	210			106
Harris' Sparrow		1		2						8				5
White-crowned Sparrow	1	11	18	57	49	73	357	59		179	2			34
White-throated Sparrow		1	1						2					
Fox Sparrow										1[b]				
Lincoln's Sparrow					1[a]									
Song Sparrow	5	2	71	191[a]	10	56	43	40		54	12			50
Lapland Longspur							1					6		3
Total	38	77	71	92	52	71	54	58	37	75	47	20	38	36

BlFo = Black Forest (Aiken Ornithological Society) - 11 observers
Bldr = Boulder Bird Club - 22 observers
CoSp = Colorado Springs (Aiken Ornithological Society) - 33 observers
Dnvr = Denver Field Ornithologists - 54 observers
Drgo = Durango - 9 observers
FtCo = Fort Collins Bird Club - 27 observers
GrJn = Grand Junction - 14 observers
Hotc = Hotchkiss - 3 (?) observers
IdSp = Idaho Springs (Denver Field Ornithologists) - 21 observers
Lgmt = Longmont Bird Club - 14 observers
Love = Loveland - 2 observers
Nunn = Nunn (Fort Collins Bird Club) - 7 observers
RMNP = Rocky Mountain National Park (Fort Collins Bird Club) - 19 observers
Weld = Weldora (Denver Field Ornithologists) - 8 observers

[a] Unusual species or number; documented or verified.
[b] Unusual species or number; not documented or verified. This is a continuing problem that some compilers are ignoring!

BREEDING BIOLOGY OF THE GRAY-HEADED JUNCO, *Junco caniceps* (Woodhouse) IN THE COLORADO FRONT RANGE

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Although a detailed life history study of the Gray-headed Junco emphasizing its breeding activities has not been done, numerous observations of the biology of this species are scattered in the literature. These, and many unpublished observations, have been summarized in the Life Histories of North American Fringillidae recently published by the Smithsonian Institution.

The observations reported here were made while investigating nest microenvironments during the summers of 1965 and 1966 in the vicinity of the Science Lodge Mountain Research Station (9,500 feet), 25 miles west of Boulder, Colorado.

Arrival at Nesting Area

The Gray-headed Junco is one of four juncos which winter in Colorado; however, it is the only species which nests in the Colorado Front Range. It winters on the plains and foothills, and begins its move to higher elevations for breeding in late April and early May. Late spring storms

Fig. 1.-- Nest of Gray-headed Junco located beneath spruce seedling (9,650 ft.).

play an important role in determining the time of this altitudinal movement. Because of cold and inclement weather during May 1965, nest building started three weeks later than was observed for juncos in 1966. Storms after the birds have moved to higher elevations can cause them to return temporarily to lower elevations.

Location of Nests

Thirty-four nests of the Gray-headed Junco were found between May and September of 1965 and 1966. Although the majority of nests were found in the upper montane and subalpine zones (9,300-11,000 ft.), nests were not uncommon at the lower levels (7,300 ft.) and timberline (11,500 ft.). Nests above and below these latter elevations have been reported (Bailey and Niedrach, 1966; Thatcher, 1968). Most nests were located in fairly dry areas, but a few were located in moist habitats comparable to those selected by the Lincoln's Sparrow and White-crowned Sparrow.

The junco is an "edge" species. Although dense stands of Engelmann spruce and subalpine fir predominate at these elevations, all nests were found in habitats adjacent to these stands. At the lower elevations, the junco selected

dry meadows adjacent to aspen and lodgepole pine stands. Other areas for which this species demonstrated a preference were fire-caused clearings, open areas resulting from power line cuttings, and open areas along roads or trails through forested regions. Where the clearings or meadows were large, nests were invariably located toward the edge. Thus, trees were available from which the juncos could sing and proclaim their territory.

Junco nests were all located on the ground, usually well concealed under some form of shelter. Favorite locations for the construction of nests were beneath fallen logs, rocks, stumps, coniferous shrubs or seedlings, tufts of grass, and banks of gulleys or streams (Fig. 1). Nests tended to be somewhat "tunneled" into the ground; the aperture for the entrance and exit of the female was usually very small. The placement of the nest on the ground, its specific location, and the direction faced are all important factors in determining the environment experienced by the incubating bird and nestlings (Hadley, in press).

Nest Materials

The junco utilizes a variety of materials in its nest construction. The outside of the nest is usually composed of coarse grasses and decayed leaves; the inside is composed of finer grasses and always lined with some type of hair or feathers. In addition to the usually cited cattle and horse hairs (Gale, n.d.), nests were found to contain hairs from cervids (deer or elk), snowshoe hares, dogs, and humans.

Clutch Size

The usual number of eggs per nest was four (average - 3.9); a few nests with two, three, and five eggs were found (Table 1). Most nests were discovered after the full complement of eggs had been laid; thus, information regarding the period and sequence of laying is incomplete. Generally, a single egg is laid each morning until the final clutch size is reached. The original clutch size was not re-established in those instances where one or two of the eggs were destroyed or removed by predators.

Incubation: Period and Rhythm

The incubation period for the junco averages approximately 10-11 days. Incubation periods of 8 1/2 and 13 days were observed, however. Weather conditions and time of day appear to be the important factors which determine

TABLE 1.--CLUTCH SIZE AND BREEDING SUCCESS OF THE GRAY-HEADED JUNCO

Year	Nests	(2)	(3)	(4)	(5)	Eggs Laid	Eggs Hatched	Young Fledged
1965	16	1	1	14	0	61	58 (95%)	*26 (45%)
1966	18	0	2	15	1	71	62 (87%)	30 (49%)
Totals	34	1	3	29	1	132	120 (91%)	56 (47%)

*Partially estimated

how long the female remains on the nest at one sitting. For example, during the morning hours when the sun's illumination is at its peak (due to slope and nest exposure), the female tends to cover the young or eggs to prevent their overheating. On the other hand, during rain periods and throughout the night, the female sits continually on the nest.

The female alone incubates the eggs. The male occasionally flies down to the nest and feeds the female while she incubates, or deposits food outside the nest. The female may fly away with the male or leave on her own to feed. The time away from the nest varies according to the conditions mentioned above, but generally averages from 10-15 minutes. The female returns to the nest cautiously. She often perches above the nest and scans the nest area before flying down to a point outside the nest. From here the female moves on the ground towards the nest, feeding and checking the immediate area in the process.

While on the nest, the female continually changes her position as well as those of the eggs. Eggs are turned, with the bill and feet, as often as every 5 to 10 minutes. The female will feed from an incubating position if the opportunity presents itself.

The times and number of eggs hatching vary considerably. In the majority of nests all eggs hatched in the morning; however, in some nests one or two eggs hatched in the morning and the remainder in the afternoon or following morning. Hatching times for eggs of the same clutch also vary; uniform spacing between subsequent hatchings is not the rule. Unhatched eggs are moved by the female so

that their position in the nest is optimum for continued incubation.

Hatching

A junco hatches from the egg rapidly. The female assists the young, pulling the egg shell with her bill. As soon as the young is freed, the female eats the egg shell. The possible protective significance of such behavior as well as dietary benefits for the female have been discussed for other species (Welty, 1962:317).

Development of Young and Nest Behavior

The young spend approximately 10 days in the nest. During this time they are fed almost continually, the feeding rate increasing as they reach the latter stages of their stay in the nest. Both parents feed the young. The bright red color of the mouth linings, plus the wide yellow bills, provide a readily visible target for the feeding parents. No feeding sequence for the nestlings was observed. The same individual is fed three or four times in a row if it is the most aggressive. The diet appears to consist entirely of insect material.

The female devotes considerable time to nest sanitation. After returning from each feeding trip, she scours the nest and removes the fecal sacs. The sacs are often deposited on limbs of nearby lodgepole pine or spruce. As the birds grow older (7-10 days), they come out of the nest, turn and deposit the fecal sac, and then return to the nest. The female removes the sac instantly. The possible attraction of predators presented by this white object glistening in the sunlight may prompt this rapid removal. The young move outside the nest to receive food from the parents as they become older, and also leave the nest temporarily to "try out their wings" or possibly to relieve the cramped feeling from such close quarters.

Although inticement with food will cause the young to leave the nest, they finally depart on their own, often when parents are not around. Not all nestlings leave at the same time. One or two birds may remain for several hours after the others have left. Once they have left the nest, the young become very difficult to follow. They spend at least three to four days running around on the ground before they are able to fly with any degree of coordination. During this time they are carefully watched by the parents, which fly down to feed them from nearby trees and bushes.

Number of Broods

The number of broods raised by the Gray-headed Junco depends upon the time when initial nesting begins, weather conditions at the time a second brood is to be initiated, and possibly the success of the first attempt. In 1965, it appears that only one brood was attempted by the majority of pairs observed; in 1966, evidence suggests a second brood being raised. When second broods were attempted, the nests were usually placed very near the first nest, and constructed beneath a similar shelter.

Predation

Evidence for predation is mainly indirect. Because nests are on the ground, they are subject to a much greater variety of potential predators than are nests in trees in the same area. The rate of predation increases greatly as soon as the eggs hatch. This increase is possibly a result of sounds created by new nestlings, and also increased traffic to and from the nest due to feeding of young and nest sanitation.

Mammalian predators are probably the most significant group in reducing nesting success. Among the mammals, the short- and long-tailed weasel were observed taking young from nests. Other small mammals such as chipmunks, ground squirrels, various species of mice and voles, shrews, and spruce squirrels are abundant in the nesting area, but their role in predation is open to question. Adult juncos will drive chipmunks and ground squirrels away from the nest vicinity. It is possible that these mammals might take eggs if they found the nest unguarded. Larger mammals such as skunks, coyotes, foxes, and bobcats no doubt take their share of eggs and nestlings. Evidence of predation by these species can be assumed by the observation that many nests which were constructed beneath logs or stumps are often found pulled out from their original location as if a paw had been used.

Predation by other bird species is probably insignificant although several attacks by owls have been observed (Thatcher, 1968). Corvids are well represented in the area and take a large number of eggs, but most of their activities are confined to trees. Juncos will aggressively drive out other bird species.

Only one potential reptilian predator is found in areas where juncos nest, the wandering garter snake (Thamnopis elegans vagrans). These snakes were observed swallowing young of the Lincoln's Sparrow at the nest.

Nesting Success

The nesting success of the Gray-headed Junco for the two summers is summarized in Table 1. A high percentage (91%) of eggs hatched, while less than half of the nestlings (47%) survived the developmental period in the nest. Because of the nature of this study, the percent of fledged young is partially estimated. It was not possible to inspect each nest every day; therefore, some nests which were in later stages of nestling development were assumed to be successful, when actually predation may have been responsible for the absence of young. The few observations of young recently out of the nest indicate that predation continues to be severe during this time. Overall, it is quite likely that the number of juncos which reach their first molt is probably comparable to that of other passerine species (Nice, 1937).

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