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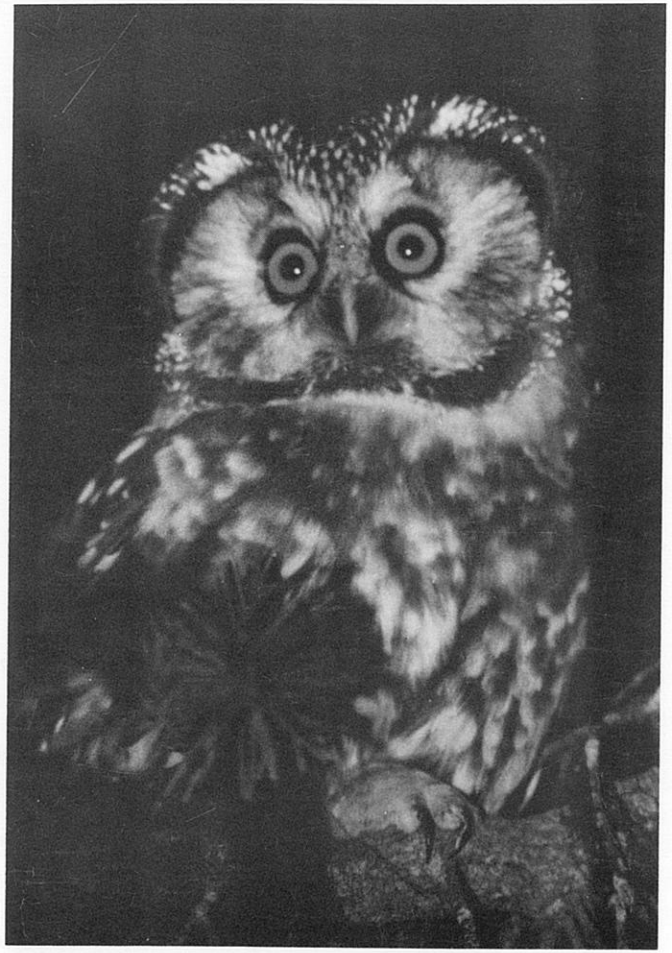

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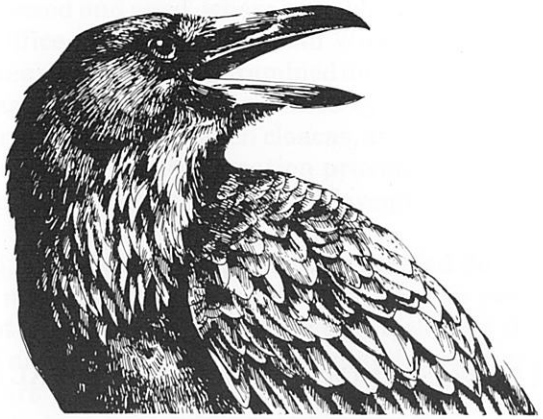

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COVER PHOTO OF BOREAL OWL
IN BLUE MOUNTAINS, WASHINGTON, OCTOBER 15, 1991,
BY MERRY LYNN DENNY

FIVE YEARS OF BANDING BIRDS AT DIAMOND POINT, WASHINGTON

Eugene Kridler
952 E. Spruce St., Sequim, Washington 98382

For five years (1986-1990) I operated a bird-banding station at Diamond Point, Gardiner, Clallam County, Washington, to determine the presence and abundance of both resident and migratory birds. Banding activities were confined to my home, a high bluff lot on the Strait of Juan de Fuca overlooking Protection Island. About 60 m above the water, the steep bluff was wooded with second-growth Douglas-fir and western red cedar. The edge was covered primarily with salal, ocean spray, wild rose and wild currant. A lone red elderberry proved very attractive to some species. Between the bluff and the house was a lawn with low ornamental plants.

Several Figure-8 wire ground traps baited with white proso millet and small sunflower seeds were used to trap seed-eating birds. A bird bath with water drip near the trap also served as an attractant. Thirty-meter nylon mist nets of 30- and 35-mm mesh were strung at right angles to the bluff to intercept lines of flight along it.

Birds were sexed and aged, where possible using keys provided by the Bird Banding Office of the U. S. Fish and Wildlife Service and Pyle et al. (1987). Skull pneumatization was examined during breeding and postbreeding seasons if age could not be determined by plumage. Birds were also examined for brood patches, swollen cloacas, and obvious presence of eggs to determine breeding; this information provided data for the Breeding Bird Atlas. Wing-chord measurements and weights were taken from 1988 through 1990.

A total of 5,425 birds of 72 species was banded during the five-year period. As so many conditions varied from year to year, the numbers captured do not represent yearly population trends of the species. The species banded are primarily those of forest and second-growth (Table 1), and the numbers reflect relative abundances of species with similar susceptibilities to trapping and netting.

Large numbers of passerines must be banded to get meaningful data from recoveries because of high mortality rates during their first year. Also, being small, they are easily overlooked, their bodies are found by predators and scavengers, and they decompose quickly. On the West Coast there are relatively few banders, especially in Washington and Oregon, and there is no cooperative effort during migration as is found on the East Coast. However, the following recovery reports, obtained for birds banded at this station or elsewhere, show the value of even meager recovery data.

Table 1. Birds banded at Diamond Point, Clallam County, Washington, 1986-1990, by Eugene Kridler.

SPECIES	1986	1987	1988	1989	1990	TOTAL
Sharp-shinned Hawk	1	1	2	1	5	10
California Quail		18	6			24
Western Screech-Owl	1			1	1	3
Northern Pygmy-Owl	3	1	1	1		6
Northern Saw-whet Owl		2	3	1	1	7
Common Nighthawk		2			1	3
Belted Kingfisher		1				1
Red-breasted Sapsucker		2				2
Downy Woodpecker				3		3
Northern Flicker			1	4		5
Olive-sided Flycatcher		1	2	1	4	8
Western Wood-Pewee	1	6	5	2	5	19
Willow Flycatcher	1	5	5	14	6	31
Hammond's Flycatcher	4					4
Pacific-slope Flycatcher	13	26	15	37	39	130
Tree Swallow		3	2	5		10
Violet-green Swallow	1	29	12	9	24	75
No. Rough-winged Swallow		3	1	14	4	22
Cliff Swallow		2		2	1	5
Barn Swallow	5	7	5	1		18
Steller's Jay	2	2	8	5		17
Northwestern Crow			1			1
Black-capped Chickadee	5	2		1	3	11
Chestnut-backed Chickadee	51	34	16	24	15	140
Bushtit	16	12	5	25	21	79
Red-breasted Nuthatch	5		1	3	3	12
Brown Creeper	1	2	2	2	1	8
Bewick's Wren	6	6	8	21	20	61
Winter Wren		1	1	11		13
Golden-crowned Kinglet	11	27	31	66	5	140
Ruby-crowned Kinglet	8	30	53	23	12	126
Swainson's Thrush	18	25	22	33	33	131
Hermit Thrush		2	2	3	4	11
American Robin	9	35	28	15	14	101
Varied Thrush	2	9	5	14	1	31
Cedar Waxwing	5	28	34	16	38	121
Northern Shrike				1		1
European Starling		6	6	3	10	25

Table 1 (continued).

SPECIES	1986	1987	1988	1989	1990	TOTAL
Solitary Vireo		2	1		1	4
Hutton's Vireo	2	15	11	8	6	42
Warbling Vireo	7	4	4	19	28	62
Orange-crowned Warbler	30	61	31	132	191	445
Yellow Warbler		2	5	54	44	105
Yellow-rumped Warbler	1	4	5	15	21	46
Black-throated Gray Warbler		3		8	2	13
Townsend's Warbler		5	9	13	12	39
MacGillivray's Warbler		1	2	4	8	15
Common Yellowthroat				2		2
Wilson's Warbler	19	19	18	79	62	197
Western Tanager		3	7	16	8	34
Black-headed Grosbeak			5	2	6	13
Rufous-sided Towhee	33	50	32	45	24	184
Chipping Sparrow			1	1		2
Savannah Sparrow	2	10	2	5	2	21
Fox Sparrow	10	17	16	25	6	74
Song Sparrow	31	64	41	59	45	240
Lincoln's Sparrow		1		1	2	4
White-throated Sparrow		1				1
Golden-crowned Sparrow	5	45	58	37	17	162
White-crowned Sparrow	67	49	79	96	27	318
Dark-eyed Junco	94	152	226	162	119	753
Red-winged Blackbird			2			2
Brewer's Blackbird					1	1
Brown-headed Cowbird	11	37	20	44	40	152
Northern Oriole			2		3	5
Purple Finch	28	28	43	84	59	242
Cassin's Finch		1	1			2
House Finch	54	95	73	76	37	335
Red Crossbill	4		1	1		6
Pine Siskin	7	3	26	71	199	306
American Goldfinch	11	44	35	41	46	177
Evening Grosbeak					6	6
TOTALS	585	1046	1039	1462	1293	5425

MacGillivray's Warbler (*Oporornis tolmiei*). Banded as an AHY (after hatching year) male 12 May 1989 at Diamond Point. Found dead 13 June 1989 at Shelton, Mason County, Washington. Moved 125 km south during breeding season, perhaps a failed breeder beginning to migrate.

Wilson's Warbler (*Wilsonia pusilla*). Banded as an AHY female 11 May 1989 at Diamond Point. Trapped and released 27 May 1990 near Perris, Riverside County, California. Still in southern California 16 days later than it was present at Diamond Point the year before.

White-crowned Sparrow (*Zonotrichia leucophrys pugetensis*). Banded as an HY (hatching year) bird on 3 August 1987 at Diamond Point. Found dead 24 December 1991 at San Anselmo, Marin County, California. Wintered about 1200 km south of breeding site.

White-crowned Sparrow (*Zonotrichia leucophrys gambelii*). Banded as an AHY bird on 9 May 1990 at Diamond Point, presumably in spring migration. Flew into a building on 18 November 1991 at Sonoma, Sonoma County, California. Note these individuals of two different subspecies were wintering in adjacent counties.

Brown-headed Cowbird (*Molothrus ater*). Banded as an AHY female 11 May 1989 at Saticoy, Ventura County, California. Trapped and released at Diamond Point 11 May 1990. Arrived at breeding ground on same date present on wintering ground previous year, the reverse of the tendency in the Wilson's Warbler described above during the same two years.

Purple Finch (*Carpodacus purpureus*). Banded as an AHY male 22 March 1987 at Grants Pass, Josephine County, Oregon. Trapped and released 17 April 1987 at Diamond Point. Apparently a migrant (or wandering?) individual in a species considered resident in this area.

Besides recoveries, the capturing of birds often leads to the detection of unusual species. An AHY female Cassin's Finch (*Carpodacus cassinii*) was trapped and banded on 15 May 1987 at Diamond Point, and then photographed by Stan and Dory Smith (*American Birds* 41: 481, 1987). Another bird, a fledgling, was captured 16 August 1988. This species is a rare and difficult-to-document visitor to western Washington.

Handling birds also allows the detection of well-marked subspecies. During this period, I handled 753 Dark-eyed Juncos (*Junco hyemalis*), of which 5 (0.7%) were of one of the "slate-colored" subspecies. Of 5 Northern Flickers (*Colaptes auratus*) captured, 2 showed characteristics intermediate between "Red-shafted" and "Yellow-shafted" types. I recorded subspecies of Yellow-rumped Warblers (*Dendroica coronata*)—56% "Audubon's" to 44% "Myrtle"—and White-crowned Sparrows—93% "Puget Sound" to 7% "Gambel's"—during the last two years of banding.

Running a banding operation provides excitement in many ways. Two albinistic young House Finches (*Carpodacus mexicanus*), possibly from

the same brood, were taken in 1987. Both were a very light beige with red eyes. A MacGillivray's Warbler that I released was taken by a Sharp-shinned Hawk (*Accipiter striatus*) before it had flown 3 m. The sudden, loud noise made by the hawk as it rushed by my head was startling.

Many research projects involve banding as a tool. While carrying out a banding program at Malheur National Wildlife Refuge in Oregon in the early 1960s, we captured four species that were first state records and many other rare migrants. Nothing is more satisfying than when a recovered band tells us something significant about bird life. A Black Noddy (*Anous stolidus*) that I banded on Midway as a nesting adult in 1964 was recovered in 1988, a longevity record for the species. And a Short-tailed Albatross (*Diomedea albatrus*), banded on Tori Island near Japan in 1964, was caught by us on Midway in 1974, still largely in immature plumage! The over 50,000 birds of 276 species I have banded have enriched my life greatly as well as serving the cause of ornithology.

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Manuscript received 10 December 1991

Black-capped Chickadee. Reifel Refuge, British Columbia, January 11, 1992 (Dennis Paulson).

THE DISTRIBUTION OF THE NORTHERN FORK-TAILED STORM-PETREL

Dennis R. Paulson
Slater Museum of Natural History
University of Puget Sound, Tacoma, Washington 98416

Fork-tailed Storm-Petrels (*Oceanodroma furcata*) vary geographically, with a larger, paler subspecies (*O. f. furcata*) that breeds in the Aleutian Islands and a smaller, darker one (*O. f. plumbea*) that breeds from southern Alaska south to northern California (Grinnell and Test 1939). Those from southern Alaska, although considered *plumbea*, are slightly larger and paler than those from California. Specimens in the Burke Museum, University of Washington (UWBM), and Slater Museum of Natural History, University of Puget Sound (PSM), extend the known breeding and nonbreeding distribution of the northern subspecies.

The breeding range of the northern subspecies was known to extend east to Sanak Island, off the tip of the Alaska Peninsula. Gabrielson and Lincoln (1959: 89) stated that it would be "necessary to secure more specimens from the region between Sitka and the Aleutians before the race that frequents this area can be determined." Two specimens are now available from the Barren Islands: UWBM 30191 and 31999, males from East Amatuli Island collected 30 May 1977 and 13 July 1979. They are large and pale as is typical of *furcata*, with wing measurements of 157 and 160 mm. Doubtless this form is the one that breeds all the way east to the Wooded Islands. There is then a substantial hiatus before the next population, on St. Lazaria Island in the Alexander Archipelago (Sowls et al. 1978); these are *plumbea*.

To date no specimens of *O. f. furcata* have been reported from south of Alaska (American Ornithologists' Union 1957, Palmer 1962), although Jewett et al. (1953: 75), writing about the species in Washington, stated "it is possible that collecting of migrant and wintering specimens might reveal the presence of an occasional example of the northern race *furcata* ..." In fact, there was such a specimen in existence as they wrote their prediction, UWBM 11304, a male from 10 miles off Westport, collected 20 September 1932. It was labelled *plumbea* by J. W. Aldrich in 1946, but there is no reason to believe that it is an individual of that subspecies. Measurements on this specimen are: wing 160 mm, tail 88 mm, tarsus 27 mm, culmen 16 mm.

Another specimen of *O. f. furcata* from south of its breeding range is PSM 4386, a female from Bayocean, Tillamook County, Oregon, found on the beach 6 March 1951. Its measurements are: wing 160, tail 87, tarsus

28.2, and culmen 16.6. In both specimens, the wing, tarsus, and culmen fall at or above the means for *furcata* and at the upper edge of or above the range of *plumbea* given by Grinnell and Test (1939). The tail length of both birds is between the means of Aleutian *furcata* and Sitka *plumbea* but within the range of variation of the former. The specimens are identical in coloration to a series of six birds from the breeding range of *furcata* and distinctly paler than four breeding *plumbea* from Washington and Oregon.

Two additional specimens are also of interest: UWBM 11305, a female collected at Westport on 12 September 1934, and PSM 10622, an unsexed specimen collected in Clallam County, Washington, 27 October 1921. They are pale like *furcata* but, with measurements, respectively, of wing 146 and 152, tail 79 and 86.5, tarsus 24 and 25.2, and culmen 14 and 16.2, are smaller than typical *furcata*. They may be from the intermediate southern Alaska population now considered *plumbea*, which varies in coloration (Grinnell and Test 1939).

One other Fork-tailed Storm-Petrel from offshore waters was examined, UWBM 36072, an unsexed specimen collected 8 September 1982 off Westport. Its measurements (wing 134, tail 83, tarsus 25, and culmen 14) as well as its dark coloration clearly place it with *plumbea*.

The Fork-tailed Storm-Petrel is resident in Alaska waters (Gabrielson and Lincoln 1959), but at least some individuals must move well south of the breeding grounds. Collection of additional specimens of this species from autumn, winter, and spring would further elucidate the relative abundance of the two forms in our waters, and anyone finding dead storm-petrels on the beach should make every effort to save them.

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Manuscript received 1 September 1990

BALD EAGLE RAIDS GREAT BLUE HERON COLONY

Richard D. Droker
2035D Fairview E, Seattle, Washington 98102

On 1 April 1990, Tom Eckert and I heard unusually loud calls from the Great Blue Herons (*Ardea herodias*) nesting above McAllister Creek, Nisqually National Wildlife Refuge, Thurston County, Washington. On reaching the dike opposite, we observed an adult Bald Eagle (*Haliaeetus leucocephalus*) perched high in a Douglas-fir about 50 m north of the red alders in which the colony is located. Six to eight herons perched in trees surrounding the eagle.

After a few minutes, the eagle flew directly into the center of the colony and landed in an alder filled with nests. It immediately advanced upon a nest, displacing the loudly protesting occupant, which made several ineffectual attempts at stabbing the intruder with its bill. The eagle then spent several minutes hunched over the nest, occasionally looking up. With binoculars we were not able to see that it was eating eggs, but our impressions were that that was what occurred. The eagle then advanced upon a second nest, and the incident was repeated.

Besides those herons that occupied other nests in the tree, others flew in and perched nearby. The eagle could be easily located by the convergence of their pointing bills. However, besides the two individuals that were driven off their nests, none made any attempts to defend the colony.

Why do Great Blue Herons nests colonially? Some species that depend on local and unpredictable food resources apparently use the colony as an information center. Bayer (1982) discussed some problems with this hypothesis, for example that Great Blue Herons defend their foraging territories. That coloniality provides defense against predators has also been questioned (Rodgers 1987). The incident at Nisqually indicates that even the center of a Great Blue Heron colony is not safe from a raiding Bald Eagle.

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Manuscript received 24 July 1990

Washington Birds 2: 8, 1992

ATTEMPTED PREDATION OF ROCK DOVES BY MERLINS

Joseph B. Buchanan and Jennifer D. Horn
Cascadia Research Collective
218-1/2 W. Fourth Ave., Olympia, Washington 98501

The Merlin (*Falco columbarius*) is typically a predator of small birds (Cade 1982). During winter periods, it is known occasionally to use larger prey species such as Rock Doves (*Columba livia*). Warkentin and Oliphant (1988) reported observations of Richardson's Merlin (*F. c. richardsonii*) chasing (4 times) and capturing (once) Rock Doves and discussed four instances of Merlins feeding from carcasses obtained by other or unknown means (e.g., one carcass was a road kill). Lange (1985) also provided records of attempted and successful predation of Rock Doves. Accounts of this predation have not been reported for other regions or subspecies in North America, although Wetmore (1965) observed predation by *F. c. columbarius* on the Pale-vented Pigeon (*C. cayennensis*) in Panama. Here we describe 5 observations of apparent predation attempts (we assume serious intent) by the subspecies *columbarius* and *suckleyi* in western Washington.

At 12:44 (PST) on 12 January 1990, JBB observed a flock of seven Rock Doves flying at 15 m in a residential area of Olympia, Thurston County. A distance of 25 m separated this flock from a trailing group of four birds, and a single bird followed another 20 m behind. In rapid pursuit was a Merlin of the *suckleyi* subspecies. A male (noticeably smaller than the doves), its age could not be determined. When the Merlin closed to within one meter of the trailing bird, the dove tumbled abruptly and plummeted into a thicket of blackberry (*Rubus* spp.) vines and overgrown vegetation in a vacant lot. The Merlin circled quickly to the spot where the dove had gone down and hovered in place, descending from 15 to 13 m. It then left and continued in the direction the other doves had flown. The fate of the targeted dove was not determined, although it was assumed to have escaped because it was not struck by the Merlin.

This chase occurred in an area where JBB had seen wintering Merlins in two previous winters (21 sightings 1987-89). The falcon that chased the doves later used a perch often used by the Merlin(s) in the previous two winters, but it is unknown whether these were the same birds. Hunting flights by Merlins observed in previous winters occurred in areas occupied by European Starlings (*Sturnus vulgaris*) and House Sparrows (*Passer domesticus*). A roost site used by up to 40 doves each winter is near the center of the area where Merlins were seen and within 200 m of two known

hunting perches.

At 13:27 on 26 January 1990, JBB saw a female of the *columbarius* subspecies chasing a flock of ±15 Rock Doves in downtown Olympia (a business district with one- to four-story buildings). The Merlin was flying ± 10 m behind the rear of the flock when observed. It was not possible to monitor this flight, but we noted that ±150 doves in a 10-block square area continued to engage in predator-evasion behavior until at least 13:30.

At 12:35 on 30 January 1990, JDH saw a female of the *columbarius* subspecies chasing a tightly bunched flock of ±50 doves at the same downtown Olympia location (involving birds from the same roosting flock as before). The doves flew at 8-15 m and circled within a 40 m^2 area above the street and a parking lot, as well as an adjacent two-story building. The Merlin passed through the flock, and, after flock structure disintegrated, it briefly chased a group of four doves before landing on a 9 m utility pole. It remained there until 12:43, then left.

At 08:16 on 14 February 1990, JBB saw the female Merlin land on a utility pole less than two blocks from where the two previous chases had occurred. At 08:18 it flew directly to the utility-pole perch noted by JDH on 30 January. A flock of ±40 doves in this area flushed and began circling at and above the height of the Merlin's perch site. The Merlin watched the doves for less than 15 seconds and then attacked the flock when it passed within ±30 m. It made one pass through the flock and continued away until lost from view.

At 19:45 on 22 July 1990, JBB saw a female of the *suckleyi* subspecies seven blocks east of where the previous observations were made in downtown Olympia. After landing and perching briefly atop a utility pole, this Merlin flew five blocks west and attacked a flock of ±30 doves that had been roosting on a rooftop two blocks from the roost area of the previous observations. The Merlin veered up sharply after either passing through or very near the body of the flock and at that point was lost from view. Other flocks of doves in the vicinity reacted to the Merlin's presence, and at 19:46, ±90 doves were circling over a six-block-square area.

These latter four flights occurred near roosts of >30 Rock Doves and adjacent to Olympia's waterfront in an area that supports a population of >200 doves within 0.5 km^2. Merlins had been observed in this area the two previous winters (six sightings 1987-89, plus four observations in 1989-90 prior to those described above) and were seen hunting for House Sparrows there.

Attempted or successful predation by Merlins of such large prey is uncommon and appears to occur most often during winter. Warkentin and Oliphant (1988) discussed several factors related to this apparent seasonality of predation on Rock Doves. Among these factors, they suggested that predation of Rock Doves (or other large prey) in winter occurs when the risk

associated with such predation attempts is balanced by high energy demands and low prey availability. In addition, they stated that attacks at large or "inappropriate" prey should be more common in winter when first-year birds are still relatively inexperienced hunters.

The significance of these factors in the predation attempts we observed is unknown. A period of high rainfall preceded the first observation, and the fourth chase occurred following a 72-hour period in which overnight low temperates ranged between -2° and -6° C, and some snow had fallen. At the time of the second and third flights, weather conditions were typical of the mild winters in the Puget Sound region. The fifth chase occurred during summer, when the temperature was 30° C. We did not estimate the abundance of potential prey species in the two areas, but our impression was that prey populations were no different than usual (House Sparrows and European Starlings were abundant in both areas).

The wide range of weather conditions and the apparent availability of suitable prey suggests that other factors also may have influenced the observed chases. In fact, we believe that adverse weather conditions potentially influenced only one (12 January) or two (14 February) chases, and that scarcity of prey was probably not a factor in these instances. Because we were unable to age the Merlins involved in these chases, we cannot comment on the "inexperience hypothesis" of Warkentin and Oliphant (1988). We suggest that attempted predation of large prey such as Rock Doves may be opportunistic and involve factors such as surprise or prey condition.

We thank I. G. Warkentin and D. R. Paulson for making helpful comments that improved the manuscript.

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Manuscript received 11 September 1990

Note added in proof: We have at least six reports of Merlins attacking Rock Dove flocks in the same area in Olympia in winter 1990-91. One successful attack was seen, and observations of several plucked and partially eaten dove carcasses (The Olympian, 20 March 1991, pages A1-A2) suggest that additional succesful hunts occurred.

WINTER ABUNDANCE OF SHOREBIRDS AT COASTAL BEACHES OF WASHINGTON

Joseph B. Buchanan
Cascadia Research Collective
218-1/2 W. Fourth Ave., Olympia, Washington 98501

The diversity and abundance of shorebird assemblages during winter have been described for coastal (Widrig 1979) and Puget Sound (Buchanan 1988) estuaries in Washington. On the outer coast, Widrig (1979) monitored shorebird abundance for one year at Leadbetter Point on Willapa Bay, Pacific County. Although he censused both estuarine and beach shoreline areas, he did not specify the number of birds seen in each habitat.

During winter diurnal high tides at Willapa Bay and Grays Harbor, shorebirds move to the outer beaches, where they roost and forage for the duration of the high-tide period. The magnitude of this movement is unknown. Recognizing that coastal beaches are potentially important roosting and feeding areas for wintering shorebirds, the purpose of this project was to document shorebird abundance in this habitat. I present here results from a series of annual censuses made during an eight-year study of shorebird abundance on the Washington coast.

STUDY AREA

Censuses were conducted along three beaches on the outer coast: Ocean Shores, Grayland Beach, and Long Beach. These beaches are continuous and relatively flat, and in most areas the sand is fine-grained. At high tides above ca 2.3 m, all tidal flats in the adjacent estuaries are inundated. The majority of diurnal high tides during November-February are >2.3 m and range as high as 3.2 m. High tides on census dates ranged from 2.5-3.2 m.

METHODS

I usually conducted censuses from a vehicle but covered certain sections of beach on foot. I visited the beaches once each winter (December-February) during the period 1982-1990, with the exception of 1983-84 when no visits were made. Completed censuses covered at least 12 km of shoreline and were conducted in the period from three hours before to three hours after high tide at various times of day. Annual census coverage at each beach is summarized in Table 1. The abundance of shorebirds was determined by counting or estimating birds as they were encountered along the beach.

Abundances of the four most common species are reported using a

linear density index (birds/km) that allows comparisons of abundance while controlling for differences in beach length and census coverage. I also present actual high and cumulative counts for these species. Actual counts for all years can be calculated using data in Tables 1 and 2. All records of the less-commonly encountered species are included below.

Table 1. Winter census coverage (in km) at three Pacific beaches in Washington.

Year	Ocean Shores	Grayland	Long Beach
1982-83	24.5	22.5	29.0
1984-85	24.2	20.9	32.2
1985-86	21.7	20.9	37.0
1986-87	18.0	13.4	37.0
1987-88	20.0	13.5	36.7
1988-89	14.3	12.1	35.1
1989-90	12.8	13.4	29.5

RESULTS AND DISCUSSION

Species Accounts

Black-bellied Plover (*Pluvialis squatarola*). This species was consistently abundant at Long Beach and common at Ocean Shores and Grayland. The mean abundance at Long Beach was 5.8 times higher than at Ocean Shores and 9.3 times higher than at Grayland (Table 2). Actual counts ranged as high as 1642 birds at Long Beach in 1986-87, 700 at Ocean Shores in 1984-85, and 144 at Grayland in 1985-86. This species was occasionally seen in roosting flocks of >300 birds at Long Beach. The highest coastal Christmas Bird Count (CBC) total during my study was 872 birds at Willapa Bay in 1986.

Snowy Plover (*Charadrius alexandrinus*). A group of five birds was observed near the south end of Grayland beach on 16 January 1988. Widrig (1979) did not see this species during winter at Leadbetter Point, but it was recorded there during CBC's in 1982 (2) and 1987 (6). Although the species nests adjacent to the Ocean Shores study area, there is only one previous winter record north of Leadbetter Point (Jewett et al. 1953).

Semipalmated Plover (*C. semipalmatus*). This species was observed during five years and was recorded on all three beaches (Table 3). Only two were seen before 1985-86, but since 1986-87 total numbers ranged from 14-92. Recent CBC data suggest this species is an irregular and uncommon winter resident on the Washington coast; however, the counts here represent higher numbers than previously reported.

Table 2. Yearly and average winter abundance (birds/km) of four species of shorebirds at three coastal beaches in Washington, with coefficient of variation between years for each species. An asterisk indicates incomplete count data not included.

	Ocean Shores	Grayland	Long Beach
Black-bellied Plover			
1982-83	0.2	4.0	33.8
1984-85	28.9	0.0	46.0
1985-86	11.4	6.9	*
1986-87	1.6	7.5	44.3
1987-88	0.3	4.1	43.8
1988-89	5.6	2.6	28.4
1989-90	2.1	6.3	55.2
MEAN	7.2	4.5	41.9
C.V.	142.2	58.9	22.7
Sanderling			
1982-83	94.4	71.3	30.9
1984-85	42.4	25.9	37.8
1985-86	66.7	21.0	30.0
1986-87	20.3	48.3	61.9
1987-88	55.3	59.0	56.2
1988-89	54.1	53.4	64.8
1989-90	18.3	23.9	44.7
MEAN	50.2	43.3	46.6
C.V.	52.9	45.5	31.1
Western Sandpiper			
1982-83	7.9	93.3	7.9
1984-85	0.0	2.0	0.1
1985-86	0.5	5.3	*
1986-87	0.7	65.3	9.4
1987-88	1.0	4.7	4.1
1988-89	8.7	3.6	17.7
1989-90	0.7	2.1	0.6
MEAN	2.8	25.2	6.6
C.V.	135.8	150.4	99.4
Dunlin			
1982-83	279.9	400.0	1152.6
1984-85	41.3	419.6	351.4
1985-86	438.8	154.4	*
1986-87	69.7	635.1	349.1
1987-88	525.8	351.5	771.8
1988-89	1231.8	871.1	381.2
1989-90	273.4	419.3	706.2
MEAN	408.7	464.4	618.7
C.V.	98.7	49.1	52.0

Table 3. Winter counts of Semipalmated Plovers at three coastal beaches in Washington.

Winter	Ocean Shores	Grayland	Long Beach	Total
1982-83	0	0	0	0
1984-85	0	0	2	2
1985-86	0	0	0	0
1986-87	1	0	20	21
1987-88	25	0	11	36
1988-89	61	17	14	92
1989-90	6	1	7	14

Killdeer (*C. vociferus*). A single bird at Ocean Shores on 1 December 1989 was the only record during the study. This species winters commonly in upland habitats in the region.

Greater Yellowlegs (*Tringa melanoleuca*). The only record during this study was of two at the south end of Grayland beach on 16 January 1983. This species is locally common in winter in estuarine habitats in the region.

Long-billed Curlew (*Numenius americanus*). The only record during the study involved 60 roosting with Marbled Godwits near the south end of Grayland beach on 16 January1988. A mixed flock of Long-billed Curlews and Marbled Godwits regularly winters <10 km away at Tokeland (records in *Am. Birds*).

Marbled Godwit (*Limosa fedoa*). The 105 birds roosting near the south end of Grayland beach on 16 January 1988 and 4 at Long Beach on 30 January 1988 were the only records during this study.

Sanderling (*Calidris alba*). This was usually the second most abundant species, with a similar mean abundance on all three beaches (Table 2). Abundance varied among both years and beaches, and few patterns are evident. Abundance at Long Beach since 1986-87 is about twice that of the preceding years there, contrary to an apparent overall decline in populations of the species (Sanderling News, No. 23, 1987). Counts ranged as high as 2312 at Ocean Shores (1982-83), 1604 at Grayland (1982-83), and 2292 at Long Beach (1986-87). Counts of >2000 were made three consecutive winters (1986-87 through 1988-89) at Long Beach. This species is generally more common in Washington and Oregon than at other Pacific beaches in North America (Myers et al. 1985).

Western Sandpiper (*C. mauri*). This species was usually found in low numbers but occasionally was abundant (Grayland in 1982-83 and 1986-87). When the two high counts at Grayland are excluded, the mean

abundance of this species there falls between the values for Ocean Shores and Long Beach (Table 2). Counts ranged as high as 194 at Ocean Shores (1982-83), 2100 at Grayland (1982-83), and 623 at Long Beach (1988-89). The highest cumulative total was 2524 in 1982-83.

Least Sandpiper (*C. minutilla*). Twelve near the south end of Grayland beach on 16 January 1983, and 21 on the middle of that beach on 13 January 1990 were the only records during this study. Least Sandpipers winter locally in small numbers in other habitats in the region, and birds observed in 1990 may have been forced to the outer beach by record high water levels that flooded salt marshes in adjacent estuaries for long periods during the high-tide phases. Even when abundant in migration, Least Sandpipers rarely use outer beaches (D. Paulson, pers. comm.).

Dunlin (*C. alpina*). With few exceptions, this was the most abundant species on all beaches (Table 2). The mean abundance was 1.3 and 1.5 times higher at Long Beach than at Ocean Shores and Grayland, respectively. Despite this overall pattern of abundance, linear density was highest at Long Beach in only three of seven years. In comparison, the other beaches each supported the highest densities in two different years (Table 2). Counts ranged as high as 17,615 at Ocean Shores (1988-89), 10,540 at Grayland (1988-89), and 33,424 at Long Beach (1982-83). The highest cumulative total was 49,281 in 1982-83, and totals >40,000 were recorded also in 1987-88 and 1988-89.

Short-billed Dowitcher (*Limnodromus griseus*). This species was recorded twice at Long Beach. Three were seen together on 30 January 1988 and four on 8 January 1989. All identifications were based on vocalizations. There were no winter records of this species in Washington prior to this (D. Paulson, pers. comm.), and there are none in Oregon (Nehls 1989).

Long-billed Dowitcher (*L. scolopaceus*). Twelve were present at Long Beach on 27 December 1986, the only record during this study. The species winters in small numbers in both salt and fresh marshes in the region.

Richness, Abundance, and Behavior

I observed 13 shorebird species during this study; yearly winter totals ranged from 4-9 species. I saw 6 species at Ocean Shores (range 3-6), 10 at Grayland (range 3-7), and 8 at Long Beach (range 4-7). This species richness is lower than at coastal estuaries. For example, Widrig (1979) recorded 12 species at Leadbetter Point during one winter. This difference in species richness may result from differences in 1) census effort, 2) habitat diversity, and 3) behavior/energetics. I visited the beaches only once each winter, in contrast with the 12 visits made by Widrig (1979) to Leadbetter Point in 1978-79. Second, I censused only those birds on the outer beaches, in contrast with Widrig, who also included estuarine totals.

Finally, the flight from feeding to roosting areas requires energy output and involves unknown costs and benefits. Species able to roost or forage in habitats adjacent to estuarine tideflats (e.g. Greater Yellowlegs, Least Sandpiper) may have less incentive to move to the outer beach.

Because the beaches in this study were not censused simultaneously, I was unable to account for possible movement among them. No flights between beaches were observed, and any such movement probably occurs indirectly as a result of movement within either harbor prior to high tide (e.g., movement of birds from Bowerman Basin, at the east end of Grays Harbor, to the tideflats behind Westport, at the southwest end of the harbor, could result in those birds roosting at Grayland instead of Ocean Shores; see Brennan et al. 1985). Dunlins make these flights, but typically in smaller flocks that would not greatly alter beach counts and cumulative totals (J. Buchanan, unpubl. data). In addition, recent research in California indicates that Sanderlings rarely wander from coastal wintering areas; individuals remain within 5 km of the core of their home range 95% of the time (Myers et al. 1986). This suggests that movement along the beaches is minimal for this species.

Differences among beaches in the abundance and variability of counts were substantial. Coefficient of variation (C.V.) values (Table 2) indicate that counts for the four most common species were less variable among years at Long Beach than at other beaches. Only Sanderlings exhibited similar C.V. values among sites; counts of the other three species were extremely variable at one or more beaches. It is unknown whether this variability reflects abundances in adjacent estuaries or is simply the result of variable movement patterns to the respective beaches. A number of ecological or environmental factors (prey availability, tide height, evasion of predators) may also have influenced the observed variability (see below).

Chapman (1984: 30) listed three factors that influenced the distribution of shorebirds on Texas barrier beaches: 1) composition of the beach substrate, 2) presence of storm-tidal passes, and 3) presence of oil. Although I did not measure the linear distribution of shorebirds on the beaches, some comments about these and additional factors can be made.

The linear distribution of shorebirds was rarely uniform but typically irregular on these Washington coastal beaches. Beach substrate appeared to influence shorebird distribution only at the north end of Grayland beach (the area within 1 km of the mouth of Grays Harbor). That section of beach was primarily pebble/sand, and I saw only roosting shorebirds there. Concentrations of shorebirds often gathered to forage at storm-tidal passes or roost at adjacent berms, and to bathe at the confluence of small, freshwater creeks on all three beaches. Human disturbances (pedestrians, vehicles, aircraft) probably also influenced distributions along the beaches. For example, Sanderlings were often observed at heavily used beach-

access points, but large roosts of Black-bellied Plovers and Dunlins were always far from such areas of human activity.

Perhaps the most significant factor influencing the distribution of shorebirds on coastal beaches was the presence of hunting falcons. Merlins (*Falco columbarius*) and Peregrine Falcons (*F. peregrinus*) regularly hunt at coastal beaches, and the evasion flights by shorebirds often cover substantial distances. For example, on 12 December 1989 I followed a hunting flight by a Peregrine Falcon for >7 km along the beach. The Dunlin flocks under attack always flew north ahead of the falcon, and this resulted in an unoccupied expanse of beach 7 km in length. The beach beyond the point where the falcon plucked its kill supported 10,500 Dunlins in 2.5 km.

The major limitation of this study comes from the lack of repeated censuses within each winter. I have no way of knowing if the numbers I counted were representative of shorebird populations using the area throughout the winter or whether there were alternative roost sites that might have been in use on the day of the census. For these reasons, comparisons with CBC data or analysis of trends is difficult. Apparent abundance cycles like those observed in south Puget Sound (Buchanan 1988) were not evident. It is clear, however, that large numbers of shorebirds forage and roost on coastal beaches during winter high tides. The magnitude of these numbers indicates that coastal beaches are an important winter habitat for several common species.

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Dunlin flocks. Ocean Shores, Washington, 3 November 1979 (Dennis Paulson).

EASTERN PHOEBES IN WASHINGTON

Dennis R. Paulson
Slater Museum of Natural History
University of Puget Sound, Tacoma, Washington 98416

Philip W. Mattocks, Jr.
915 E. Third Avenue
Ellensburg, Washington 98926

We document herein the two known occurrences of the Eastern Phoebe (*Sayornis phoebe*) in Washington.

THE BAY CENTER PHOEBE

On 16 December 1989 Richard Wilson observed a small flycatcher in his yard in Bay Center, Pacific County, Washington, that was later determined to be an Eastern Phoebe.

Figure 1. Eastern Phoebe. Bay Center, Washington, 23 December 1989 (Richard Wilson).

He first saw the bird when it landed 3 m above the ground in a crabapple tree less than 10 m from him. At that time he noted the flycatcher crest and yellow-washed throat and breast. The bird made two sallies of about 2 m each from its perch. Even though it was December, this corner of his property was warm and protected and insect activity was evident. The bird seemed unconcerned with his close presence as it moved about the yard.

He was able to note the following characteristics of the bird during a 40-second observation period: length about that of a Golden-crowned Sparrow (*Zonotrichia atricapilla*); faint or no eyering or wing bars; head appeared darker than back; tail fairly long; and basically an unhurried foraging activity. Later in the day and on 17 January his wife Jan and he observed the bird again. It perched in small alders but made no foraging flights, as the day was relatively cool. At the time, because of the yellowish belly and his infrequent contact with flycatchers, he thought it was a Western Flycatcher (*Empidonax difficilis*) and so reported it.

On learning from Alan Richards of the unlikeliness of occurrence of a Western Flycatcher in winter and some of the discrepancies between that species and the bird he observed, he made an attempt to get photographs

of the bird, which was still present.

He was able to do this on 23 December, when he and Eric and Marc Wilson again saw the same bird. He took several photographs at distances of as little as 6 meters. The best photo (Fig. 1) shows the bird in characteristic flycatcher pose, with dark crown, white throat, dusky sides and faint wingbar. The record was listed by Tweit and Johnson (1990).

THE CHILLOWIST PHOEBE

The second Eastern Phoebe reported from the state was found near Chillowist, Okanogan County, Washington, on 22 June 1991 by Thais Bock, Pat Knopp, Mary Jane Cooper, and Rosemary Lenigan. TB found the bird by its loud, repetitive and unfamiliar call, an unmistakable "FEE-be" with accent on the first syllable (the following day varied to accenting the last syllable and with an upward slur on the end). The weather at the time was a mixture of sun and clouds, with temperatures ranging from mid-50s to low 60s (F.), with light breezes.

The bird was described by TB as larger than an empidonax, chunkier than Say's Phoebe (nesting nearby), and with a very dark head that looked black; head contrasted with grayish-brown back and scapulars; wingbars faint, showing little contrast with brownish coverts, primaries and secondaries; dark eye and all-dark bill added additional emphasis and contrast to rest of body; throat whitish, as was breast and belly, with olive-gray wash along upper side of breast; legs and feet dark. Aside from voice and distinctive shape, most noticeable feature was frequent tail wagging.

The bird remained at least until 3 July and was seen by numerous other observers (Tweit and Johnson 1991). According to TB, the primary habitat was dry, rocky hillside with sagebrush, but there was also a small stream nearby with associated aspens and willows. The phoebe spent much time perching on a telephone wire but also sang and foraged from a corkscrew willow next to a cabin, the branches of a dead sumac, other shrubs and rocks on the hillside. A photograph taken of it is inconclusive, but its *phoebe* song was tape-recorded.

DISCUSSION

Other than undated sight reports from Pullman, Camas, and Yakima in Bent (1942: 154)—which cannot be considered acceptable—these are the only records of the species from Washington.

Although a common breeding species in the Peace River parklands of northeastern British Columbia (Munro and Cowan 1947) and a regular winter visitor to California, with 42 records from that state during the period 1975-1979 (Roberson 1980), the Eastern Phoebe has been recorded

surprisingly rarely north of California near the Pacific coast: the two Washington records, one at Reifel Island, Vancouver, British Columbia, 13 May 1989 (Tweit and Heinl 1989), and one at Revelstoke, British Columbia, early July 1989 (Rogers 1990). There is little in the way of pattern in these four sightings, no two in the same month.

A report that the species was common north of Terrace, in west-central British Columbia, 28 May 1970 (Crowell and Nehls 1970) seems quite anomalous, as there is only one other northerly record west of the breeding grounds, a bird briefly on territory at Camden Bay, Alaska, 29 June-6 July 1990 (Gibson and Kessel 1992). Furthermore, there are no confirmed records for Oregon, where eastern vagrants are reported in numbers each year. Eastern Phoebes were reported during six springs and one autumn in southwestern Oregon from 1962-1972 (Nehls 1981), but these records are not entirely credible, in particular because a pair was reported nesting in a tree, a very unlikely site for this species. Nehls (1981) also reported one near Brothers, Deschutes County, Oregon, 11 May 1966. No objective documentation is available for any of these records, and they have not been accepted by the Oregon Bird Records Committee.

ACKNOWLEDGMENTS

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INTERTIDAL NEST OF NORTHERN ROUGH-WINGED SWALLOW

John H. Michael Jr.
Washington Department of Fisheries
P. O. Box 43154, Olympia, Washington 98504

Although Wahl and Paulson (1991) considered the Northern Rough-winged Swallow (*Stelgidopteryx serripennis*) a common nesting bird in Washington, they made no mention of its presence in saltwater habitats. Harrison (1979) described rough-wings as nesting in banks, generally in pre-existing holes, and implied, although did not state, their association with fresh water. Bent (1942) mentioned coastal nesting in the Southeast. Recently I observed a pair of rough-wings at a nest on the saltwater shore of Puget Sound.

On 24 May 1992 I saw two of these swallows carrying nesting material about 3 km north of Three Tree Point (T23N, R3E, section 12), King County, Washington. The nest site was a 100-mm-diameter plastic drain pipe located in a concrete bulkhead wall at about the 4 m tide level. Terres (1980) listed drain pipes among the human structures used by this species. At times wavelets from a high tide actually covered the opening, although the pipe curved upward as it extended back into the bank. Tidal flooding has been listed as a source of mortality in the eggs and young of this species (Bent 1942). The pair of swallows was observed again on 31 May, and on 2 July one was seen to enter the drain. Upon emergence it flew over the water and dropped a fecal sac, indicating young in the nest.

It is worth noting that Harrison (1979) commented that all Northern Rough-winged Swallow nests he observed were in holes dug by Belted Kingfishers (*Ceryle alcyon*). As the kingfisher nests widely along Puget Sound, it is possible that local swallows have learned to search for nest sites on salt water. Rough-wings have been found nesting in coastal kingfisher holes at the mouth of Grassy Creek, Grays Harbor County, and at Rosario Beach, Skagit County, Washington (D. Paulson, pers. comm.).

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LATE NESTING BY BARN SWALLOW

John H. Michael Jr.
Washington Department of Fisheries
P. O. Box 43154, Olympia, Washington 98504

I observed an active Barn Swallow (*Hirundo rustica*) nest on the surprisingly late date of 15 September 1991 at the Longmire Hotel (T15N, R8E, section 33) at 825 m elevation in Mount Rainier National Park, Pierce County, Washington. Four well-feathered young perched on the edge of the nest, being fed by at least one adult. Young were heard in another nest nearby.

Barn Swallows are regular breeders in Washington and are the latest of the swallows to migrate in fall (Wahl and Paulson 1991). Harrison (1979) noted that Barn Swallows produce one or two broods per year, and these birds were presumably from at least a second brood.

The lateness of the nesting points out that another dimension of the Washington Breeding Bird Atlas project could be to gather nesting dates, especially for potentially multiple-brooded species. Climatic changes, for example global warming, might have an impact on number of broods as well as nest timing. An extended nesting season, if accompanied by sufficient food resources, would prove advantageous to multiple-brooded species.

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BUSHTITS IN KITTITAS COUNTY, WASHINGTON

Hal Opperman
P. O. Box 286, Medina, Washington 98039

The first recorded nesting pair of Bushtits (*Psaltriparus minimus*) in Kittitas County, Washington, was discovered 3 June 1989 in the course of a Seattle Audubon Society field trip led by the author. The nest, with audible young, was suspended about 2 m above the ground in a Rocky Mountain maple, tended by two adults. It was located at Horlick in the Yakima River valley, along the John Wayne Trail that follows the old Milwaukie railroad right-of-way (T19N, R16E, section 24). This is a mostly open area of brushy vegetation, not grazed for years, adjacent to the riprapped riverbank and gravel roadbed, with mature ponderosa pines, cottonwoods, and other large trees scattered along the canyon wall that rises to the south.

On 7 April 1990, a single Bushtit was heard by the author and Robert Sundstrom near Horlick, about 100 m up the Morrison Creek drainage. The author observed a single individual at this same location and another across the Yakima about 250 m downstream from Horlick on 31 May and 2 June, and on 8 June 1991 the author and JoLynn Edwards observed a pair of Bushtits in the same vicinity, near where a small wooden bridge crosses Morrison Creek and up a steep, brushy slope to the west. Their behavior suggested a nearby nest. On 6 June 1992 the author and others found a pair conveying food to a nest in Morrison Creek canyon, about halfway between the water siphon and the footbridge; six or more were seen about 200 m below the nest, near the Yakima River; and a single individual was found about 0.7 km up the Yakima from Morrison Creek.

Two Bushtit pairs were found building nests several kilometers farther west by R. Sundstrom and the author in 1990. These, like the Horlick nest, were close by the Yakima River, right around 600 m elevation. The first nest was under construction on 7 April, just north of the Cle Elum River bridge less than 100 m west of Bullfrog Road (T20N, R15E, section 30); it was in use when observed again on 3 May and 9 June. On 8 April we found another nearly completed nest (Fig. 1) along the north side of East Masterson Road about 0.5 km east of the junction with West Masterson Road (T20N, R16E, section 34). On 9 June it contained eggs and was attended by two adults; the nest was later collected by Phil Mattocks. On 14 March 1992 the author found two Bushtits near the 1990 nest site along Bullfrog Road and another across the road from there.

Robert Thorn found this species at still another locality, the Northern Pacific ponds along the railroad tracks west of Cle Elum (west of the road

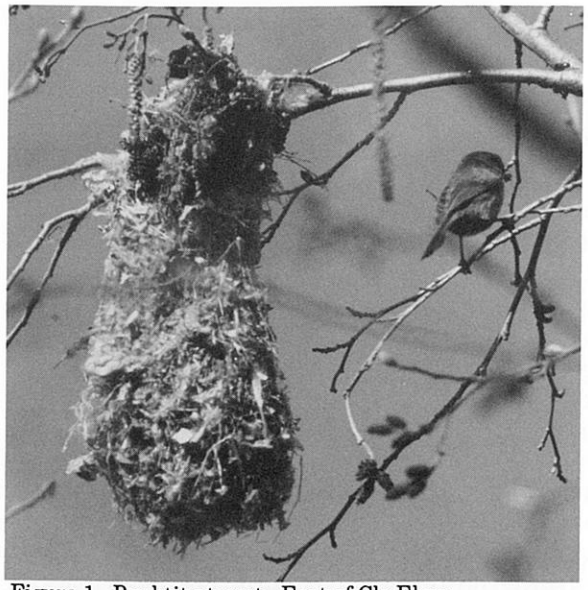

Figure 1. Bushtit at nest. East of Cle Elum, Washington, April 8, 1990 (Robert Sundstrom).

to South Cle Elum and north of where it crosses the Yakima River), on 19 September 1987. He further found a flock of 12-15 at this same site on 3 September 1989 and heard the species there again on 5 May and 1 June 1990. Bushtits were also observed here in January 1992 by David Batchelder (R. Sundstrom, pers. comm.). Though no nests have been found at these ponds, the straight-line distance from this site (T20N, R15E, sections 27-28) to the Bullfrog Road site is only about 3 km (following the essentially continuous riparian corridor up the Yakima and then up the Cle Elum to the Bullfrog Road site, the distance is about 6.5 km).

Thorn also heard several Bushtits on 21 May 1988 to the east of Cle Elum, at the point where highway 10 and the former Northern Pacific railroad cross the Teanaway River just before it joins the Yakima (T19N, R16E, section 3), in riparian habitat. This site is about 2.5 km south of the Masterson Road site, following the Teanaway, and 6.5 km above Horlick along the Yakima. Several individuals were present in the same area on 14 and 17 March 1992 (H. Opperman, R. Sundstrom, Sam Agnew).

In addition to these three areas near Cle Elum—around the Yakima/Cle Elum and Yakima/Teanaway confluences and the Yakima Canyon near Horlick—Bushtits have turned up recently at two additional sites farther south and east. R. Thorn observed at least two Bushtits along the Robinson Creek drainage where Robinson Canyon Road enters the L. T. Murray Wildlife Area (T18N, R17E, sections 27-28) on 15 May 1988, while JoEllen Richards was astonished to find a flock of 13 there while participating in the Ellensburg Christmas Bird Count (CBC) on 15 December 1990. Finally, on 4 April 1992 Andrew Stepniewski discovered an active nest at the confluence of Umtanum Creek with the Yakima River (T16N, R19E, section 20); R. Thorn saw a pair at the same locality on 31 May.

DISCUSSION

The Bushtit's appearance around Cle Elum was undoubtedly abrupt. Less than two hours drive from the major population centers of Puget Sound, the area is well frequented by birders. A regular pattern of occurrence, had there been one prior to the sightings of the past few years, would not likely have escaped notice. Under these circumstances the question of how, and from where, the species came presents an intriguing problem.

The most probable means of the Bushtit's arrival in previously unoccupied habitat is by the large and mobile foraging flocks this resident species forms outside the nesting season. Their sociable habits also allow them to survive cold winters—the climate can be extremely cold in some parts of their range—by huddling together in communal roosts to conserve heat (Chaplin 1982). If one were to posit an alternative hypothesis—that the Kittitas County populations descend from a single pair that strayed into the area—one would have to suppose that this pair somehow managed in a single season to raise at least one brood and probably two, with low mortality, to be able to attain sufficient numbers for the following winter's critical huddling mass. The odds of this happening are slight.

From present knowledge, the closest known Bushtit populations are ≥50 km away, one to the west and the other to the south. I will speculate about both as the points of origin of Kittitas County populations. The widespread coastal population extends as far east as North Bend in the Snoqualmie River drainage, with the Cascade Mountains separating it from the one in Kittitas County. However, mountains alone do not represent impassable barriers for Bushtits. Passes in the central Washington Cascades are not particularly high—900-1200 m—and they are free of snow in late summer and early autumn when Bushtits are moving about in their foraging flocks. In Oregon, coastal populations range almost to the Cascade crest in some watersheds (Nehls 1978).

Rather, the primary barrier to colonization of the upper reaches of westside valleys is dense coniferous forests. Bushtits nest in Douglas-fir forest clearcuts during early successional stages, about 8-16 years after cutting (Meslow and Wight 1975, cited by Nehls 1978). They will continue to forage in the forest even after it becomes unsuitable for nesting. Presumably a dense, continuous coniferous forest would have no Bushtits at all, as there would be no contiguous nesting habitat; this was surely the case in western Washington before white settlement. Although there are few records from these early times, it is certain that prior to systematic deforestation the Bushtit was a coastal and riparian species, probably of very local distribution; this was the case until relatively recently in some areas (Jewett et al. 1953).

By the beginning of this century the western lowlands had been logged and extensively settled, and numerous Bushtit specimens were collected in the Puget Sound region, for example from Steilacoom, Tacoma, Kirkland, Everett, Mount Vernon, and Bellingham during the period 1895-1918 (specimens in the National Museum of Natural History [NMNH], Washington, D. C.). S. F. Rathbun (in Bent 1946) characterized the Bushtit's preferred habitat around Seattle at that time as "old logged-off sections," more or less open, with small alders, ocean-spray, dogwood, and other low growth. The species seems to have been concentrated originally near the southern end of Puget Sound. As late as 1935 it was considered rare at Bellingham, but by 1944 it had become a regular permanent resident there, although still far from common, and its numbers increased steadily thereafter (Jewett et al. 1953, and CBC records in *American Birds*).

This northward movement is reflected in Canadian records as well. Taverner (1926) knew it only from a few specimens taken near the mouth of the Fraser River, but today it is a common resident of metropolitan Vancouver and the lower Fraser River valley up to Chilliwack, and it has colonized Vancouver Island as far north as Campbell River (Butler 1981). Butler suggested that the exponential population growth and rapid spread of the Bushtit in British Columbia in recent years may be due to a combination of land clearing and a warming trend. Interestingly, there are also a few recent sight records of Bushtits from interior British Columbia, where they all but certainly arrived via the Fraser Canyon (Cannings et al. 1987).

If the Kittitas County Bushtits are of the Puget Sound race, then one must ask whether they have spread from a single dispersal event, probably in the early to mid 1980s, or whether an active, continuous colonization is taking place. There are no Bushtit observations along the heavily frequented (by humans) Snoqualmie Pass highway east of North Bend. However, Bushtits could have migrated up the Cedar or Green river drainages, inside the Seattle and Tacoma city watersheds that are infrequently birded. Pursuing this route, they could have crossed the Cascades via Stampede Pass or Tacoma Pass, where continuous brushy vegetation of a most promising sort bridges the short gap between the upper tributaries of the Green and Yakima rivers. Coastal White-crowned Sparrows (*Zonotrichia leucophrys pugetensis*), which nest commonly in early clearcut succession in the Cedar River watershed, have crossed the Cascades into Kittitas County (I have found them nesting in the Morrison Creek drainage), and Bushtits could have followed the same route. Recent field work, however, has not turned up Bushtits in the Cedar River watershed (Duane Paige, pers. comm.).

The other population is isolated east of the Cascades, where it inhabits the Satus Creek drainage of southern Yakima County. It appeared just as suddenly as the one near Cle Elum, with the first nest discovered in April 1947 followed by numerous observations and nesting records from 1948 onward (Hurley 1949, Larrison 1949). It became established quickly and is thriving today, occurring also in the Toppenish River drainage (record from Fort Simcoe; R. Thorn, pers. comm.).

There are few barriers to Bushtit dispersal from the south and east; birds could use the Yakima River corridor to reach the farthest north and west location known in Kittitas County. However, if the population arrived from the south, it would seem to have done so in a series of jumps, assuming that intermediate populations would have been detected in well-surveyed areas. Satus Creek is a tributary of the Yakima River, but Bushtits have not been recorded upriver along the Yakima anywhere between Satus Creek and Umtanum Creek. Nor does the Satus Creek population appear to have extended its range by following the foothills northward. If so, individuals would surely have been observed in the much-studied Wenas Creek area. If Satus Creek were the origin of the new population, a flock must have found its way north in a single season, as there is no evidence of a gradual northward movement over a period of years.

The Robinson Canyon site is about 25 km northwest of the Umtanum Creek locality and isolated from it by arid country and farmland. Nevertheless, Bushtits could disperse up Umtanum Creek and through mixed woodland over to Robinson Canyon. The next site to the northwest, Horlick, is only about 13 km from Robinson Canyon, but there is again no riparian corridor between the two for Bushtits to follow. Once it leaves its lightly forested canyon at an elevation of about 650 m, Robinson Creek crosses about 6 km of open agricultural land, inhospitable to Bushtits, before reaching the Yakima River. If, on the other hand, one follows the 700-m contour from its intersection with Robinson Creek, tending roughly northwestward, one encounters canyon after canyon, carved out in parallel every kilometer or so, by a series of tiny creeks the seasonal flow of which is gathered into Taneum Creek. Crossing the latter, always on the same contour, looping back around the east end of South Cle Elum Ridge, one arrives at the intermittent Morrison Creek that drops directly into the Yakima at Horlick. One is never far from fine Bushtit habitat the whole way.

The question of the origin of the Kittitas County population might be settled by taking one or more specimens. The Satus Creek population is an outpost of the nominate race (*P. m. minimus*), described from the Columbia River, vicinity of Fort Vancouver (state not specified), and found from there south to the Mexican border (Jewett et al. 1953). Birds across the Cascades from Kittitas County have been called *P. m. saturatus*, described from Mount Vernon (Ridgway 1903) but not recognized by the

American Ornithologists' Union (1957). This northernmost population of the species has been diagnosed (Ridgway 1904, A. M. Rea in Phillips 1986) as being darker and more uniform brown than *minimus*, a difference that is especially evident on the underparts. In *P. m. minimus*, the underside is distinctly paler than the brown back, while *P. m. saturatus* has brownish flanks and sides (series in NMNH, including type specimen). To my eye *saturatus* appears slightly larger in size, reflected by measurements given by Ridgway (1904).

It seems possible, even likely, that *saturatus* was once geographically isolated from *minimus*, perhaps even in historical times. When it was first described, *saturatus* was thought to be restricted to the Puget Sound area (Ridgway 1904, Dawson and Bowles 1909). The exact distribution of the two races west of the Cascades is poorly known, and a thorough examination of old Washington and northern Oregon records and specimens, combined with new field work along the Columbia River, where the two races apparently meet, is needed.

At this time, observers should be on the alert for Bushtits in any of the range gaps: in the Cascade passes and headwaters; along the Yakima River between Toppenish and Umtanum Creek; in the Satus Pass area between Satus Creek and the Columbia River; or along the Columbia itself, east of Mount Hood.

ACKNOWLEDGMENTS

I would like to thank the many individuals who shared field observations with me, and who are named in the text. I would especially like to thank Phil Mattocks for several important literature references.

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Female Bushtit. Redmond, Washington, February 1971 (Dennis Paulson).

FALL RETREAT OF ROCK WRENS

Robert W. Ramsey
10511 Interlaaken Dr. S.W., Tacoma, Washington 98498

On 4 August 1991 I observed a substantial movement of Rock Wrens (*Salpinctes obsoletus*) on a rim above the Yakima Canyon, Kittitas County, Washington. Because of geological interests, I decided to explore a physiographic feature that I call the Punch Bowl, a steep-sided bowl connected to the river road. This was an extremely hot summer day, and, from the 120° temperature in the sun—there was no shade—it was easy to imagine that I was investigating an active crater.

As I ascended the slope, there was no sign of animal life, except for dried cow dung and cow tracks. Near the crest, I began climbing through short, ancient rock outcrops and loose, worn lava polygons long ago fallen away. Interspersed with sagebrush, buckwheat, and bunchgrass, they represented a different habitat from the sparse lower slopes.

In my peripheral vision, I began to see movement, furtive and quickly absent. Chipmunks? With little auditory sense to help, I stopped and kept watch as the movement passed me. Up on a rock for an instant, then gone. Another on a shrub, then gone. Movement along the ground, hopping across spaces between shrubs and rocks. Spaced apart, searching. At last, one up long enough to identify. Medium bill, obscurely streaked breast, pale brown corners on the tail—Rock Wrens. They passed me on both sides. One sat briefly on a neaby rock and calmly made up its mind about this oddity in the landscape. I counted again and again. Although I could never account for more than 20 at a time, there could have been as many as a hundred. Some passed within five feet. Some stopped and stared for 15-30 seconds. But most foraged their way past in a steady flow that soon ended, and I was alone again. What there must have been to hear for someone with good ears, for Rock Wrens have a diverse vocabulary!

Were they already on their way south? Why not? Most Rock Wrens winter out of state. Everything was so dry that it crunched underfoot, and feeding conditions may have been poor compared with the wetter times in spring. Was this just socializing or fattening up for the more serious business of migration? How did they gather up and pass the word that it was time to go? For the moment, their attention was concentrated on the rim of this natural amphitheater, and I was fortunate to be there.

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FOOT-QUIVERING BY A HERMIT THRUSH

Robert W. Ramsey
10511 Interlaaken Dr. S.W., Tacoma, Washington 98498

On 21 January 1991, Georgia Ramsey and I observed an interesting behavior in a Hermit Thrush (*Catharus guttatus*) on 21 January 1991 near the Drake Highway at Inverness Ridge, near Inverness, California. We watched the bird for some time at about 10 m distance in the open, and it did not appear alarmed by our presence. As we watched, the bird slowly reached its left foot forward toward a tuft of mixed live and dead grass. The old straws had been bent over several centimeters above the ground, and now patches of new grass were beginning to grow up through this natural, open cover. It appeared to be ideal habitat for insects, and this is what interested the thrush.

As the foot moved forward, it began to quiver violently, looking significantly larger than usual. At full reach, it touched down on the grass, still quivering. Then the bird stepped forward quickly and snapped up an insect breaking cover to the left. Again and again it stepped forward with quivering foot, vibrating insects out of the grass and snagging them in midflight. There was no uniformity in which foot would lead off—no inevitable alternation of use. We watched in fascination at the feeding tactic, wondering whether this was an individual discovery, a learned activity in the species, or an inherent trait.

Unfortunately, our chances of watching Hermit Thrushes in similar feeding activity is limited here in the Northwest. The situation is vastly different: they are here mostly in the nesting season, they are in mountain coniferous forest, and there is a different insect fauna. In fact, we thought it unlikely that foot-quivering would be used as a feeding tactic on the breeding grounds.

Interestingly, foot-quivering as a method of foraging has been reported only recently in thrushes, but it was observed by Yong and Moore (1990) in the other three North American thrushes of this genus. Gray-cheeked (*C. minimus*) and Swainson's (*C. ustulatus*) thrushes and Veerys (*C. fuscescens*) were all equally likely to practice foot-quivering during spring migration on the coast of Louisiana. Thus this is the first record of this foraging behavior in the Hermit Thrush, not unexpected.

Foot-quivering was reported previously in *Catharus* thrushes on both breeding (Dilger 1956) and wintering (Willis 1966) grounds, but both observers interpreted it as aggressive behavior toward conspecific individuals. Further observations of the behavior would obviously be of interest, and Washington observers are urged to watch foraging thrushes

whenever possible.

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Hermit Thrush. Ocean Shores, Washington, February 1973 (Dennis Paulson).

"NEW" KINGLET FIELD MARK

Ian Paulsen

9501 Moran Rd. NE, Bainbridge Island, Washington 98110

Most birders don't consider the kinglets a field-identification problem due to their distinctive head patterns. Some identification problems arise when Ruby-crowned Kinglets (*Regulus calendula*) are mistaken for Hutton's Vireos (*Vireo huttoni*). Separating these two species relies on differences in size and body and bill shape as well as slight plumage differences. Recently I came across a field mark that has been overlooked by all standard North American field guides, although described by Allan Brooks in Forbush (1929).

During January 1991 I examined three fresh cat-killed Golden-crowned Kinglets (*Regulus satrapa*) and found they had yellow tarsi and toes. The yellow extended about halfway up the tarsus. Later I determined that this yellow coloration is visible in the field. Ruby-crowns also show the yellow, but it is normally duller and limited to the toes and the very lower end of the tarsi. In that species the pattern reminded me of the pattern on adult Snowy Egret (*Egretta thula*) legs. Photographs of the kinglets illustrating the leg color can be found in Terres (1980: 1033), although the legs of the Golden-crowned are duller than what I observed in the field.

These leg-color patterns can be used to separate the kinglet species if seen clearly. The yellowish foot color of the Ruby-crowned Kinglet can be used to separate it from the Hutton's Vireo, which has blue-gray legs. Whether or not there are seasonal, sexual, or age differences in leg color is yet to be determined, but juveniles appear to have paler, perhaps uniformly pale, legs.

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THE WINTER EUROPEAN STARLING POPULATION IN SEATTLE, WASHINGTON, IN RELATION TO THE POPULATIONS OF THREE SPECIES OF WOODPECKERS

Susan E. Masta
3218 East Almartin St., Tucson, Arizona 85716

INTRODUCTION

European Starlings (*Sturnus vulgaris*; henceforth "starlings") were introduced into the eastern United States in the late 1800s. Their population increase and subsequent spread across the country has been extraordinary. From less than 100 birds originally introduced, they have grown in number to become one of the most numerous bird species in the United States (Feare 1984). Starlings were first reported in King County, Washington, in 1949 (Bennett and Eddy 1949); however, none was recorded in the annual Christmas Bird Count until 1957 (*Audubon Field Notes* 12: 230, 1958).

Starlings feed primarily in grasslands, gleaning invertebrates from foliage, the surface of the ground, and the top few centimeters of soil. They exhibit a marked preference for foraging in short grass, either grazed fields or mown lawns. When starlings are feeding their offspring, their diet consists almost exclusively of invertebrates, but in fall and winter they switch to a greater proportion of fruit and seeds. The successful invasion of starlings is directly linked to the expansion of human agriculture (Feare 1984). The birds' success also may be attributed to their large clutch size, diverse diet, rapidity of learning the location of food, and adaptability in choice of nest site.

Starlings are cavity-nesting birds, often nesting in holes in trees that have been excavated by woodpeckers, but also utilizing nest boxes, buildings with holes and even holes in streetlight poles. Historically, starling nests have been associated with woodpecker-excavated holes and have been viewed as detrimental to other cavity-nesting birds. Starlings have been documented attacking and displacing Northern Flickers (*Colaptes auratus*; henceforth "flickers") and Hairy Woodpeckers (*Picoides villosus*) in Maryland (Howell 1943), flickers in New Hampshire (Shelly 1935), Acorn Woodpeckers (*Melanerpes formicivorus*) in California (Troetschler 1976), and flickers in Nevada (Weitzel 1988). Recent work in Arizona showed that starlings did not displace flickers from their nests in saguaro cactus (Kerpez and Smith 1990). Brush (1983) found that breeding numbers of cavity-nesting birds remained stable in plots in Arizona,

Washington Birds 2: 36-41, 1992

despite the increased number of starlings. There appears to be significant regional variation in both starling behavior and interspecific interactions.

While much research has been devoted to starling populations and behavior in the eastern and southwestern United States, little work has been done in the Pacific Northwest. The effect of starlings on the population of flickers and other cavity-nesting birds of the Seattle area has never been examined.

OBJECTIVES

The objective of my research was to determine whether there is any correlation between the winter population numbers of three resident woodpeckers and starlings in Seattle, King County, Washington, using winter count data gathered before and after the arrival of the starlings. Seattle had been well established before winter counts began, with all of its major parks in existence for the past 50 years. This eliminates the possibility that observed differences in bird populations could be due to changes in habitat.

I chose to look at flickers, Hairy Woodpeckers and Downy Woodpeckers (*Picoides pubescens*) because they are cavity-nesting birds close enough in size to starlings so they could all be potential competitors for nest holes. These three species of woodpeckers are also well distributed across most of the United States, so population trends in Seattle may be pertinent to other areas of the country.

The flicker's life history has the strongest parallel with the starling's, both nesting in a variety of cavities and often foraging on open ground for insects. Flickers from the northern part of their range usually migrate south, but it is not known whether the Seattle population migrates. Hairy and Downy woodpeckers are essentially nonmigratory. Starlings vary in their migratory habits, with some migrating and others not. It is not known if, or what percentage of, the overwintering population in Seattle consists of migratory birds.

METHODS

The Christmas Bird Counts (CBCs) for Seattle were analyzed for the years 1939 through 1989. No counts were taken in Seattle in 1946 or 1949 through 1951, and in 1943 through 1947 only a portion of Seattle was censused, with less than 6 observers for each of those years. A number of factors may contribute to the uncertainty of interpreting CBC data. The weather, number of observers, time spent counting, and distance covered all have an influence on the accuracy of the counts. The number of observers and time spent, however, are probably the major sources of bias

when comparing data from different years. To compensate for these variables, I expressed counts as number of birds per party hour, as has been done by other researchers (Bock and Smith 1971, De Haven 1973, Schreiber and Schreiber 1973, Schreiber and Mock 1987). The counts were graphed on a log scale to allow comparison between woodpecker and starling numbers, which differed by one to two orders of magnitude.

The data were analyzed by comparing the number of each species of woodpecker per party hour for each year before the arrival of starlings (1939 through 1957) with the number of woodpeckers after starlings had become established (1969 through 1989). The counts from the years 1958 through 1968 were omitted from the analysis because the starling population was changing over that period. From 1969 onward the count always numbered at least 1,000 birds. An ANOVA on the number of woodpeckers before and after starling arrival was performed using StatView by Abacus Concepts.

RESULTS

Starlings did not appear in the Seattle CBC until 1958, after which their numbers increased exponentially until 1967 (Figure 1). The unusually large population in 1967 may have been due to a large roost occurring within the count boundaries. From 1969 onward the Starling population fluctuated approximately from 1,000-10,000 individuals.

The flicker population shows a small but significant ($p<.03$) decrease from an average of 0.978/party hour before starling arrival to 0.664/party hour thereafter (Figure 3). The actual number of flickers counted increased after the arrival of starlings, but so did the number of observers. When the data are plotted as number of birds per party hour, the number of flickers appears much more stable (Figure 2). The population of Downy Woodpeckers had a small but significant($p<.02$) increase from an average of 0.096/party hour to approximately 0.16/party hour. Hairy Woodpeckers, always scarce and frequently absent from the count, do not exhibit a significant change in population size ($p>.4$).

Seattle's CBC focuses on counting birds that are present in parks and urban areas. Traditionally the same Seattle parks have been censused, and there has been little change in the percentage of land censused that is residential or industrial. In 1952 10% of the area covered was residential, 15% woods and brush, and 10% fields and parks. In the 1980s about 8% of the count area was residential and 25-35% fields and woods. The remainder of the area consists of fresh and salt water and shorelines.

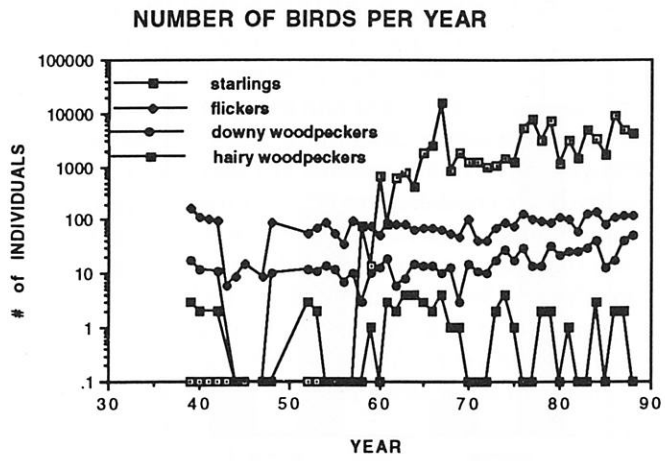

Figure 1. Total European Starlings, Northern Flickers, Downy Woodpeckers, and Hairy Woodpeckers on Seattle Christmas bird counts, 1939-1989.

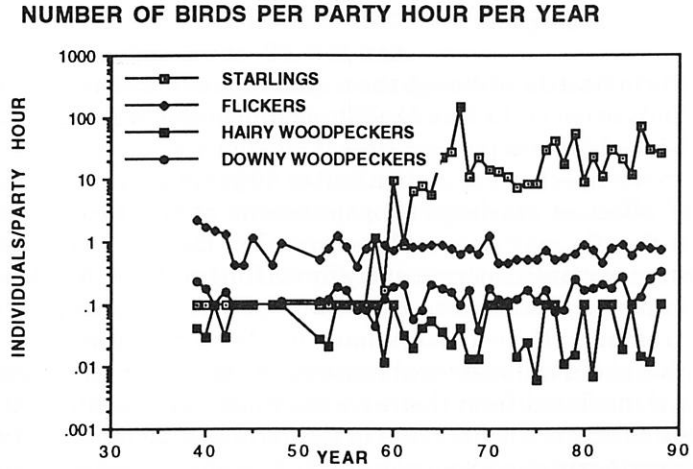

Figure 2. European Starlings, Northern Flickers, Downy Woodpeckers, and Hairy Woodpeckers per party-hour on Seattle Christmas bird counts, 1939-1989.

DISCUSSION

Starlings do not appear to have affected the populations of resident Hairy and Downy woodpeckers negatively since their arrival in the 1950s. While the flicker population has shown a small decrease, it continues to show a stable population size of approximately 100 individuals in the CBC area, even when outnumbered at least tenfold by starlings. Starlings

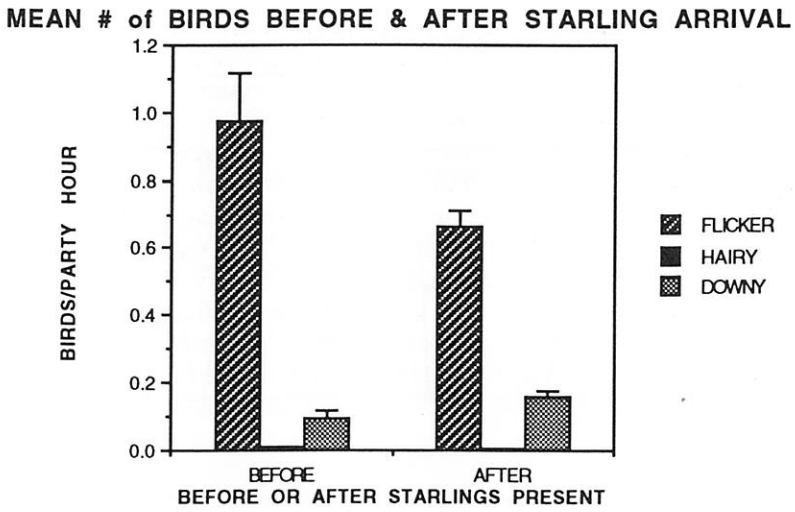

Figure 3. Mean woodpecker counts per party hour before and after starling arrival in Seattle.

breed abundantly in Seattle, although the winter census numbers may not be an accurate indication of the number of breeding birds. If starlings are competing with woodpeckers for nest sites, I would expect to see a much larger decline in woodpecker populations after 30 years of coexistence.

The lack of effect of starlings on populations of the two *Picoides* woodpeckers in Seattle may be simple to explain. Downy Woodpecker holes are probably too small to permit entry by starlings. Hairy Woodpeckers may nest in heavily forested areas less frequented by starlings (D. Paulson, pers. comm.). Even flickers have not been much affected by starlings, and this could be for several reasons. First, woodpeckers excavate new nests if displaced from theirs by starlings. Troetschler (1976) documented this in Acorn Woodpeckers in California. She found that the Acorn Woodpecker population was not affected by the presence of starlings, and attributed this to the woodpeckers' longer and more flexible breeding season. Second, if woodpeckers nested earlier or later in the year than starlings, they could avoid competing directly with them for nest sites. Woodpeckers, like other resident hole-nesters, often nest early in the year, although breeding appears to overlap substantially among these four species in Washington (Larrison and Sonnenberg 1968). Third, conclusions reached from CBC data should be considered tentative until we know what proportions of both starling and flicker populations in Seattle are resident.

Another hypothesis to explain the woodpeckers' continued reproductive success after starling invasion is that the starlings are not competing for nest sites. One of the reasons for starlings' successful invasion into new territories is their adaptability. They nest in a wide variety of cavities, for example in streetlight poles and the corner of attics. In a residential area such nest sites are often abundant, probably much more so than tree cavities. One reason for the success of starlings may be their use of these urban resources for which little competition exists rather than the scarcer woodpecker holes for which other cavity-nesters compete. Starlings are well adapted to living closely with humans, and their spread across several continents is directly linked to the spread of agriculture. If a reduction of native cavity-nesting birds is occurring in this country, perhaps it is due to urbanization rather than competition with starlings. Studies examining the effect of starlings on other birds must take this into consideration.

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INTERIOR SONG SPARROW IN WESTERN WASHINGTON

Dennis R. Paulson
Slater Museum of Natural History
University of Puget Sound, Tacoma, Washington 98416

While examining specimens in the University of Washington Burke Museum, I found a Song Sparrow (*Melospiza melodia*) of an interior subspecies (*M. m. juddi*) that has not been recorded from the Pacific states to my knowledge. The sparrow had been caught in a mousetrap on 27 February 1978 at the Montlake Fill, Seattle, King County, Washington.

The specimen, UWBM 32610, is a male (testes 2 x 1.5 mm) weighing 22.2 grams and considered "very fat" by the preparator. It was presumably in good health until it encountered the trap. It conforms very well to the plumage characteristics of a series of winter specimens of *juddi* from Kansas in the Slater Museum.

The race *juddi* breeds east of the Rocky Mountains, from northeastern British Columbia east to northern Ontario and south through Alberta and eastern Montana to northern Nebraska, then east to southern Minnesota and southwestern Ontario. Its normal wintering range is from southeastern Montana and southern Minnesota south to western and southern Texas and east through the southeastern states to southwestern Virginia and central Florida (American Ornithologists' Union, 1957). Behle and Perry (1975) list *juddi* as a migrant in Utah, with no further details, and Monson and Phillips (1981) list two records of the subspecies from Arizona.

If seen in the field in western Washington, *juddi* would be easily distinguishable from resident (*M. m. morphna*) or migrant (*M. m. rufina* or other large, dark subspecies from Alaska) Song Sparrows by its smaller size and greater contrast. The brown areas of *juddi* are medium brown as in a White-crowned Sparrow (*Zonotrichia leucophrys*), the ground color of the underparts white and the back and breast stripes dark brown to blackish. Two subspecies breeding to the east of *juddi* are *euphonia* and *melodia*, both of which have browner, less contrasty stripes than *juddi*. These three subspecies are all smaller than the common Washington forms.

The subspecies breeding east of the Cascades (*M. m. merrilli*) and the one breeding to the north of it in British Columbia (*M. m. inexpectata*), both of which appear to be common winter residents in the eastern part of the state, are more contrasty below than the coastal *morphna* because of their whiter underparts but much less contrasty than *juddi*, with brown rather than blackish stripes on the upperparts and finer, paler breast markings.

Washington Birds 2: 42-43, 1992

I regularly see Song Sparrows west of the Cascades in winter that are a bit more contrasty than the resident *morphna*, and these may be migrant individuals of *inexpectata* or *merrilli*.

There is still confusion about the subspecific identity of breeding Song Sparrow populations in the Columbia Basin. Jewett et al. (1953) assigned these birds to *M. m. fisherella*, apparently surrounded on the north, west, and east by populations of *merrilli*, whereas the AOU Check-list (American Ornithologists' Union, 1957) listed *merrilli* throughout eastern Washington and *fisherella* breeding north only to eastern Oregon. To me, the Song Sparrows of the Columbia Basin do look different from those breeding on the east side of the Cascades, but the question remains whether this contrast is between *merrilli* and *morphna* or *fisherella* and *merrilli*.

Individual birds that can be identified to subspecies (that is, to a breeding population with known distribution) in migration or on their wintering grounds are of considerable value in determining the migration patterns of birds. With the replacement of the shotgun by binoculars, the de-emphasis of museum ornithology, and the virtual lack of bird-banding stations in the Pacific Northwest, at present we are largely ignoring this way of discerning such patterns.

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AN UNUSUAL SIDESLOPE NEST LOCATION FOR DARK-EYED JUNCO

John H. Michael, Jr.
Washington Department of Fisheries
P. O. Box 43154, Olympia, Washington 98504

Harrison (1979) described the Dark-eyed Junco (*Junco hyemalis*) as a ground-nesting species, although the nest description for the "Gray-headed" subspecies (*J. h. caniceps*) specifically mentions that nests are sometimes found in a cavity in a roadside bank. Normally, junco nests are constructed on the ground, often well hidden by some overhanging vegetation. Other sites, including trees, are used on occasion.

On 13 July 1990 I found an "Oregon" Dark-eyed Junco (*J. h. oreganus*) nest in an unusual situation. The nest was located in an uphill sideslope cut of the Chiwawa Loop Road (Township 27N, Range 18E, Section 32), in Chelan County, Washington. The approximate elevation was 600 m.

The nest was situated in a hole in the ground created by the effects of slope slippage. The entire nest had a canopy of soil. On steep slopes, particularly on open cuts or in rapidly eroding areas, portions of the slope "slip" downhill. The bottom of the slope rotates out and the upper portions tear away and then slide down. Because the entire cut was only about 1 m high, some structural integrity was maintained, allowing the tear in the top of the slide to stabilize. The slope apparently had been stable for at least a few years, as grasses and a low shrub were growing around the cavity, providing screening and holding the soil in place.

This nest probably was better protected than a similar site on level ground. A nest constructed on or in a steep slope will be more difficult for a terrestrial predator to find. Locating the nest underground will provide overhead protection from predators and rain. Snakes are potential predators on junco nestlings and eggs (Gumbart and Sullivan 1990), and several species of nest-predatory snakes should occur in this area (Nussbaum et al. 1983).

The stabilization of vertical or near-vertical cuts may enhance them as nest sites for a number of bird species, in particular those such as Pacific-slope Flycatcher (*Empidonax difficilis*) and Townsend's Solitaire (*Myadestes townsendi*) that typically nest in sideslopes. Road work or other projects that disturb this habitat—which may be limited—should not be conducted until either the absence of nests has been confirmed or the nesting season is completed.

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Manuscript received 17 January 1991

Dark-eyed Junco nest and nestlings. Sullivan Creek, Washington, July 10, 1976 (Dennis Paulson).

BOOK REVIEW

Root, T. 1988. Atlas of wintering North American birds. Univ. Chicago Press, Chicago.

I bought this ambitious atlas some time back, reacted to it, and put it aside. Recent receipt of several more flyers about it indicates the publisher hasn't given up and promotes a few comments.

Computer-mapping the early winter distribution and abundance of birds via Christmas bird count (CBC) data seems like a worthy and useful project. In addition, the book has received some good reviews. So my judgment has to be that Washington's CBCs, geography, and birds do not measure up to qualify for the book's treatment.

For one thing, we didn't have enough, or representative enough, CBCs in the state—we misled the computer. During the data-base years used (1963-1972), the only years for which computerized data were available, there were few Washington counts (5 West, 5 East in 1972), essentially all in lowlands and/or urban situations. Parenthetically, by 1988 there were 20 West and 8 East, again only a handful not lowland or urban. This totals too few counts in too few habitats.

One result of the atlas is an impression similar to one I had on opening the new *Catalog of Washington Seabird Colonies* by Speich and Wahl (Fish & Wildlife Serv. and Minerals Management Serv., Biol. Rep. 88[6], MMS 89-0054, 1989). Hot off the press, but the latest data are from 1982(!). It should still be useful, but thank Reaganomics for the publication delay. The main problem is that the state's Common Murre nesting population has been only about 10% of the catalog total for the last several years.

Further, our birds are perverse. Of 508 species occurring relatively regularly on North American CBCs, my quick count comes up with about 220 recorded in Washington. However, only about 140 of these are included in the maps apparently judged acceptable. About 54 additional species (Appendix B) have maps with "problems," and about 27 species are "not suitable" for mapping.

This might not seem so bad except that many of the birds that I, at least, am interested in are ones with "problems." These include problems like occurring in too few CBCs, being rare, nomadic, irruptive, gregarious, or with "bad peaks." The "problem" or "not suitable" species are not exotics, but include Common Loon, Western Grebe, Pelagic Cormorant, wigeon (Eurasian too rare, American too gregarious), accipiters (Sharp-shinned and Cooper's too widespread or rare, but Harris' turns out to be "suitable"), and on through the list to American Robin and European Starling (both gregarious). A conclusion from this is that no provision was made for a

human being to intervene and adjust outlandish computer analysis results due to sample size and all the typical problems with field data, especially CBC data (look at the variation in Bellingham's counts of Western Grebes, with factors like wind speed, for example).

The indication is that many birds don't cooperate or fit into a given computer program. Does this say anything about the program? It looks as if you devise a treatment that works for part of the data, add a new graphics technique, and go for it. There are, of course, a number of species mapped with confidence, including Fox, Song, and crowned sparrows and juncos.

A few specific examples of problems: Barn Owl was too rare (seen on 292 CBCs but on only two did abundance make it to the qualifying 0.2 birds/party hour), so its map was unsuitable. Northern Saw-whet Owl was "rare" so its map was unsuitable, but text states anyway that the species' highest recorded abundances were in the Columbia Basin (!) and southern Iowa. Remember, in 1972 there were 5 CBCs in all of western Washington! Do these owl accounts say anything about owl distribution or simply illustrate that CBCs don't do very well at finding owls? Of course, this is what obviously makes some types of species "unsuitable."

Brown Creeper has one of the "most complex" abundance patterns among wintering North American birds. In addition to where you'd expect it to be common, "it also appears to be common in the grasslands, but closer examination indicates the creeper is frequenting galeria forests along river valleys." I'm unclear how the "closer examination" is accomplished—maybe calling up someone in the grasslands area and asking? Borrow an atlas and read the rest of this species account; you may agree that this is a case of attempting to draw too much from the data available.

Winter Wren was "inordinately abundant" from San Francisco into northern Canada and Alaska but lack of CBCs in southwestern BC (?) makes the map confusing and thus unsuitable. Gee whiz, if Winter Wrens don't measure up, I don't know what the world is coming to.

Finally, in spite of a lot of explanation by people who really know CBCs, birds, and computer mapping, I don't like the maps. Though it looks exciting to be able to create three-dimensional "mountains" of birds based on fairly complicated density calculations, smoothing and so on, I would much prefer scaled, light-to-dark type two-dimensional maps showing distribution and abundance. *American Birds* had some neat maps a few years ago done this way from CBC data; the Great Blue Heron map there was vastly clearer and more meaningful than the map in this atlas.

The recent Breeding Bird Survey report maps (see Robbins, C. S., D. Bystrak, and P. H. Geissler, 1986, *The Breeding Bird Survey: its first fifteen years*, 1965-1979, U. S. Fish and Wildl. Serv. Resource Publ. 157, Washington, D.C.) use the same technique—old-fashioned but certainly

achievable by computer—with similarly better results. I am not enough of a computer-graphics fan to appreciate the atlas maps (two per species). Another point is that I would have hoped that a new mapping technique would have meant finer detail and mapping by habitat or vegetation type. The maps here don't satisfy me on those accounts; there is no way mountain ranges or anything else get in the way of plotting distribution. Though mapping North America (actually the conterminous U. S. and southern Canada) means gross scale representation on a state level, more realistic maps can be drawn, as shown by the Breeding Bird Survey maps.

Perhaps the uneven, unrepresentative CBC coverage (even with 1550 in 1988!) means, however, that winter distribution from CBC data cannot be well mapped at all. Maybe simple, scaled black dots, without interpolation (by computer, anyway) in between, would be about the best one could do.

Even if you like the way the maps look, the year span of the data (Barred Owls hadn't yet made it to Washington), the state's extreme ecological variation, and the mapping technique practically drop Washington species out of meaningful mapping (Bushtits appear to occur east almost to the Columbia River, and that's considered a "suitable" map). There are so many qualifications admitted, and a lot more apparent on the Washington state level, that I feel the atlas has real problems for our state.

Perhaps in the East, where geography is less varied and the CBC data base 1963-1972 was from longer established counts, the maps are much more acceptable. Perhaps if the title and thrust of the atlas were something like "An attempt to computer-map winter bird distribution using CBC data," implying an experimental effort, I might feel differently, but it wouldn't have sold. You might want to wait for the movie; for the book—for Washington—I wasted my money.

Terence R. Wahl, 3041 Eldridge, Bellingham, Washington 98225

WASHINGTON BIRDS

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Editor: Dennis Paulson, Slater Museum of Natural History, University of Puget Sound, Tacoma, Washington 98416

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The purpose of WASHINGTON BIRDS is to publish information on birds of Washington state and the Pacific Northwest. Papers of general interest independent of geographic region will also be considered. Subject matter may include but is not limited to geographic and ecological distribution, seasonal status and migration, breeding biology and general natural history, conservation, identification, faunal lists, site guides, field techniques, and reports on current research. Conciseness is encouraged.

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CONTENTS

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WASHINGTON BIRDS 2
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