A WINTER POPULATION STUDY OF THE WESTERN WINTER WREN

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DURING an assignment to the upland game research station maintained by the Oregon Cooperative Wildlife Research Unit, we had an opportunity to study of the resident bird life. The Western Winter Wren (*Troglodytes troglodytes pacificus*) was selected for an intensive study because relatively little was known about the life history of the subspecies. The study was begun with a census on November 13, 1952, and concluded by one on February 16, 1953. The main objectives were to determine the normal daily range of the species in winter, to discover roosting sites, to determine population densities, and to record unusual behavior. We wish to express our appreciation to Mr. Arthur S. Einarsen, Unit Leader, and Dr. Robert M. Storm, Assistant Professor of Zoology at Oregon State College, for their review of the manuscript and helpful criticism.

Very little work has been done on the winter habits of the Western Winter Wren. A search of the literature revealed nothing about the daily range in winter, but Armstrong (1953) in his discussion of the St. Kilda Wren (*Troglodytes troglodytes hirtensis*) mentions breeding territories between 17,000 and 30,000 square yards in size. Assuming that the ranges are circular, the radius would be about 75 to 100 yards. He quotes Heath as suggesting that an Alaska Wren's (*T. t. alascensis*) territory extends for a quarter of a mile along the coast. No other references to the subject were discovered.

Little information on roosting during the winter season is available. Ehinger (1925) describes an instance of community roosting in a bird box in Washington during severe weather when thirty-one wrens roosted in one box and others tried to get in but found no room. They began to gather at sunset and for half an hour played about the bird box. "Singly and in groups they would dash up to the cabin wall, cling there a moment, then with a flying leap change their position to one a little nearer to the bird box. This was continued until they could spring upon the roof of the box, from which they dropped to the little platform and entered. After a moment they would usually fly out again and circle around, only to repeat the aforesaid maneuver and finally disappear silently through the tiny opening into their lodging house." Bent (1948) quotes Forbush as saying that the bodies of these Winter Wrens are occasionally found beneath lumber piles, and he mentions one that had taken up quarters in a knot-hole in a barn, but he does not state that it roosted there. Laidlaw Williams

(1947) gives a detailed account of the roosting habits of four or five that roosted close together, about 12 feet above the ground, on a limb of a Monterey pine close under an accumulation of dead needles. He quotes the *Handbook of British Birds* as saying that individuals of the British race usually roost singly but sometimes as many as ten have been recorded roosting regularly in a cocoanut shell, and thirty or more in one group of House Martins' (*Delichon urbica*) nests.

The winter section of *Audubon Field Notes*, the main source of published winter population studies, does not record any studies made in the Western Winter Wren's habitat. Quay (1947) reports a study that mentioned the eastern form as occurring in the southern pine region and as common in deciduous woods in the south, but he gives no density figures.

The study area was located on Eliza Island, one of the San Juan Islands, in Whatcom County, Washington, and was restricted to the 56-acre elevated and forested eastern portion of the island. The island is about six miles from the city of Bellingham and has a total area of 158 acres.

The area is clothed with a stand of Douglas fir (*Pseudotsuga taxifolia*), grand fir (*Abies grandis*), and western red cedar (*Thuja occidentalis*), that also contains a mixture of red alder (*Alnus rubra*), dwarf maple (*Acer douglasii*), big-leaf maple (*Acer macrophyllum*), and willow (*Salix* sp.). The stand is predominantly middle-aged and of medium but not uniform density. Scattered individuals of madrone (*Arbutus menziesii*) and yew (*Taxus brevifolia*) occur through the area, and the hardwoods are distributed over most of it. Clumps of big-leaf maple occur and form an open grove in one place.

No well-defined understory is present, and young reproduction is thin or lacking. A variety of shrubs and herbs is present and is characterized by nearly pure stands of single species. The principal ones are salal (*Gaultheria* sp.), nettle (*Urtica* sp.), sow-thistle (*Sonchus* sp.), blackberry (*Rubus* sp.), snowberry (*Symphoricarpos albus*), sword fern (*Polystichum munitum*), Oregon grape (*Berberis* sp.), and ocean spray (*Holodiscus discolor*) in approximately that order of abundance. Shrub growth is heaviest where the overstory is least dense and where the younger age classes predominate. It is also particularly heavy along the seaward east bank. A few scattered openings of small size are present, and most of the forest floor is fairly open with little downed timber.

The study area is relatively flat and is bordered on three sides by steep banks extending down to the beaches. On the other side are open, gently rolling cultivated areas. Elevation extends from sea level to 60 feet.

To facilitate censusing, a grid was laid out using a hand compass and a cord two chains (132 feet) long. Lines were run north-south and east-west, and all corners were marked with identifying cards stapled to trees or stakes. The north-south lines were lettered while the east-west ones were numbered, giving an easy location for records on the area. The two-chain grid gave 0.4-acre quadrats, permitting accurate plotting of sight records and serving as a basis for vegetation analysis.

The census was carried out by slowly cruising along the grid lines, plotting all wrens seen or heard nearby enough to be located accurately. A dog was used on several occasions to aid in obtaining a complete count. Counts were not made on days of high wind because the noise and motion materially increased the difficulty of finding the wrens. The area was naturally broken into three parts that could be censused independently with little danger of duplication even though the areas formed a continuous tract.

Three separate methods were used in attempting to determine an individual's range: following an individual wren, inspection of plotted locations of wrens from censuses for repeats in an area, and marking of individual wrens. Marked wrens were subsequently followed by direct observation, or they were simply recorded on the overlays of the study area and their range determined by noting the distance between locations where they were seen on diferent days. By permitting positive identification of individuals, marking contributed to the accuracy of range determination by both methods.

Unsuccessful attempts were made to trap wrens for marking. A figure-4 trigger was used as a perch in a hardware cloth box trap, both by using blind sets and by utilizing dripping water as a lure, but the attempts were unsuccessful. Use of a butterfly net showed some possibilities, but the method was not used because of the difficulty in handling the net in brush.

Wrens were effectively marked with a paint-tipped dart propelled through a blowgun made from a three-foot length of one-inch pipe. The dart was a four-inch cedar sliver with a cotton wrap of sufficient diameter at the rear to fit the pipe snugly. A forward wrap was pulled over the tip as a pad which could be dipped in the brightly colored airplane dope used for marking. The dart was shot at the wrens from distances varying from five to fifteen feet.

Three methods were used to study roosting habits. Reliance was primarily on direct observation. Wrens were followed and closely watched from late afternoon until they had gone to roost or until darkness precluded further observations. Some possible roost sites (holes and cracks in snags and decayed portions of standing trees)

were kept under constant surveillance from late afternoon until after dark. Inspection of these roosting sites was also made after dark by climbing and checking with the aid of a flashlight.

Counts were made from November 13, 1952, until the last count on February 16, 1953, a total of 18 counts of the various sub-units of the study area. The results follow.

North Point		*Central Woods*		*South Point*	
Date	*Number*	*Date*	*Number*	*Date*	*Number*
November 13	16	December 31	10	December 2	16
December 31	10	January 5	22	December 14	13
January 2	14	January 12	10	December 31	14
January 12	13	February 16	16	January 5	14
January 16	11			January 14	10
January 24	19			January 16	8
February 11	17			February 9	7
Average	14.3		14.5		11.7
Estimated number present	18		20		14

The averages of the counts are thought to be low because it was generally found that the wrens were so hard to see that the chance for errors of omission were much greater than for those of duplication; but the highest figures for the censuses are not taken either because at the time they seemed to include duplications. Altogether, then, we have a total average census of 40 wrens and, from our experience in the field, good evidence of 52 as the wintering population on the 56 acres of the study area. This seemed to be a rather high density, so four other islands were censused to determine whether they had similar wren populations. In censusing these islands the two observers made an effort to keep one chain (66 ft.) apart so that the area traversed could be computed in acres. This was not accomplished because the dense undergrowth made it impossible to maintain anywhere near a uniform distance apart while getting accurate counts of the wrens in the included area. Thus the figures are of those wrens seen or heard and are merely indicative of relative abundance.

Two census strips were run on Vendovi Island, the first through an alder bottom where red alder was the dominant in a mixture of Douglas fir, western red cedar, and grand fir. The understory consisted of a dense growth of salal, dwarf maple, currant (*Ribes sanguineum*), blackberry, snowberry, and ocean spray. The second strip ran over the 330 foot-high center of the island and down to the north

shore. Here the vegetation was dominated by scrub madrone and alder with a few scattered old-growth Douglas firs. Moss blanketed the ground, and snowberry, ocean spray, salal, and Oregon grape grew thickly. Only two wrens were seen or heard in the two hours of the census, a distance of about 1400 yards. This would indicate a much lower density than exists on Eliza where one could expect to see from ten to twenty wrens in a similar census.

The census of Point Frances was along the terminal moraine that makes up the southern rim of the island, then back across the middle. The vegetation was that of a cut-over rain forest of western red cedar, western hemlock (*Tsuga heterophylla*), big-leaved maple, and red alder. The ground was covered with slashings and windfalls. Elderberry, blackberry, snowberry, and sword fern were the dominant ground cover with some salal mixed in. The central part of the island is a low swamp that was flooded at the time of our visit. On this island a total of eleven wrens was seen in three hours and two-and-a-half miles of walking. This might be nearer to the density of the main study area than it appears, as the conditions were very poor for censusing or even walking.

Lummi Island was censused by running a strip up from Inati Bay on the east side to the crest and then by following roads around the north portion back to the starting point. The first eight-tenths mile, that from the bay to the 1700-foot ridge, started through an alder bottom and passed through thick cut-over fir on steep slopes. Madrone, ocean spray, salal, and snowberry were the most common shrubs. Only one wren was seen, and it was in a small patch of scrub fir near the ridge-top. This population is very low, even compared to the density found on Vendovi Island. Five more wrens were seen during the rest of an eight-mile hike, mostly under a tall tree canopy, but the count has little significance because the observers were traveling too rapidly to make a good count.

Sinclair Island, the last island that was censused, produced the highest wren densities. The swampy area in its northwest quarter was cruised on February 5. This was a deep swamp of western red cedar, grand and Douglas firs, and scattered big-leaved maple. Sword ferns, currant, salal, ocean spray, and snowberry were the shrub dominants. All fallen timber as well as the ground and the lower portions of standing trees was draped in a thick coat of mosses. Fifteen wrens were seen in four hours and as many miles. This appeared to be the best habitat visited.

In determining the daily range of the wrens to see if they tended to stay in one area for the winter, it was at first thought that plotting

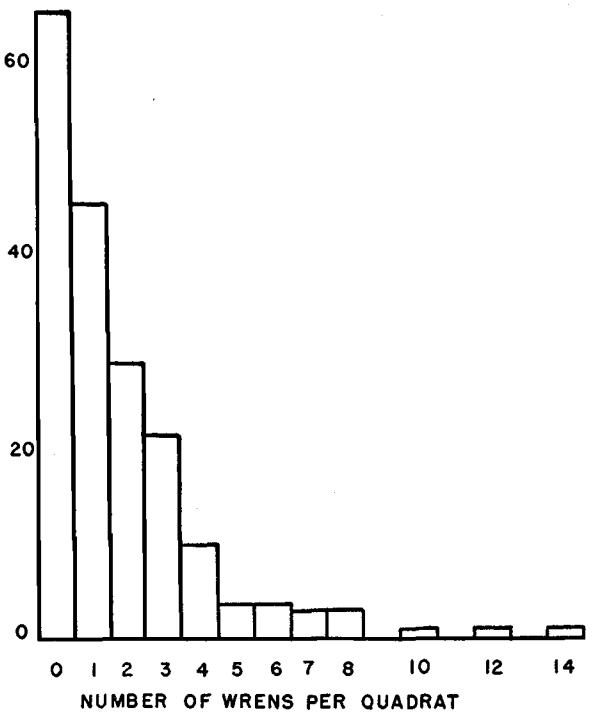

FIGURE 1. Number of wrens seen per quadrat plotted against the number of quadrats.

censused individuals would be of considerable value, but because most of the wrens were not individually recognizable, this plotting method was unsatisfactory. It did, however, show that there were preferred areas where occurrence records tended to be grouped. Wrens were recorded from only 120 of the 180 quadrats and parts thereof included in the study area. Roughly two-thirds of these records were from less than one-third of the area, showing a trend toward localization. Figure 1 shows graphically the way the occurrence records were distributed among the quadrats. A possible source of error in these figures is the chance that the proportion of fractional quadrats in one-half of the fraction might be greater than that in the other half. This factor was not carefully tested, but general inspection of the maps of the area indicated that it was not serious.

The ground and tree cover on each quadrat was mapped to see if the wrens had any preferences. There was no apparent relationship between the vegetation on the ground and wren distribution, for the birds occurred with equal frequency in everything from dense stands

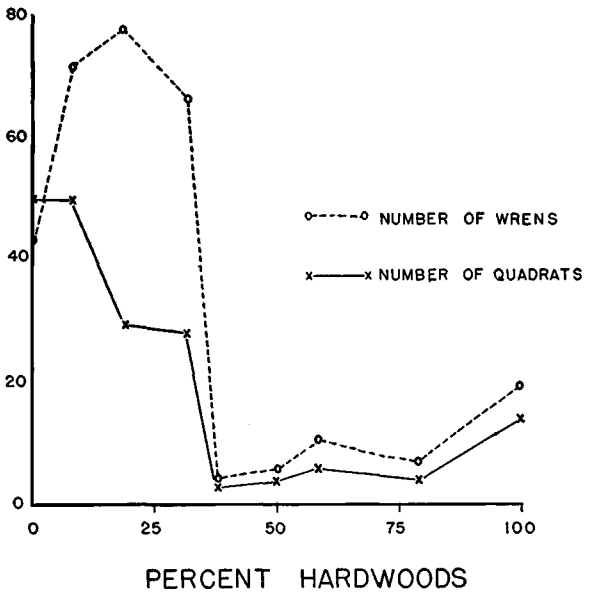

FIGURE 2. Number of wrens observed in quadrats containing given percentages of hardwoods.

of orchard grass to the barren litter typically found under conifer stands. Only areas of very dense salal seemed to lack wrens. Wren distribution was related neither to tree species nor to age classes, but there seemed to be some correlation with the amount of hardwoods in the stand. Maximum wren density was found in areas containing between 10 and 40 per cent hardwoods. (See Figure 2.) In this respect, it is interesting to note that the best habitat visited, the swamp on Sinclair Island, had hardwoods mixed in with the conifers, and that Quay (1947) found the wrens common in hardwoods but absent or accidental in pines.

Another method by which range was determined was by following both marked and unmarked wrens as long as they could be kept under observation. One period of one-half hour, two of one hour, one of one and one-half hours, one of two hours, and many lesser periods were spent this way. Birds were not followed for longer periods, because they were so quiet and secretive that it was very difficult to keep track of a single bird, even at the very close approach allowed by the wrens. Of twenty-one wrens followed, not one went more than 175 feet without doubling back. One that was chased to see how far it would go started out northeast but doubled back within 80

feet then went about 160 feet southwest before turning again to end up no more than 20 feet from the starting point. Occasionally wrens were seen to travel farther, especially those that were active in the adjoining cultivated fields, and they may do so in going to roost, but all our observations point to a daily range of less than 200 feet.

To substantiate observations made by following birds, four were marked with airplane dope and plotted on a map each time that they were seen. All were seen at least once again, and the farthest any moved was one that traveled about 80 yards in seven days. All the others were seen within twenty yards of the marking point. On numerous trips, careful search was made for marked individuals, but none was seen although they were found in their accustomed spots at later dates. By the end of the census period the paint had probably worn off, which would explain their not being seen at this time.

Many attempts to follow wrens to their roosts in the evening failed, but they did indicate that the birds were active on the ground until late in the evening. Then they seemed suddenly to flit up into the trees and to disappear. On January 14, two wrens were watched moving over the forest floor at 4:30 P.M. (P.S.T.). They hopped onto a fallen branch and sat together. One tried to mount the other but fell off. The birds seemed to reverse roles several times. Finally they flew to the ground and were joined by three more. The whole group flew up to a hole about 20 feet above the ground in a maple. In a moment all flew to the base of a nearby maple clump where they apparently fed before fluttering up the trunk of a dead stub and disappearing into one of the numerous woodpecker holes in it. This was at 4:50 and sunset was between 4:39 and 4:45, however, it was a dark evening and the birds were barely visible against the sky as they entered the stub.

On January 16, the roost tree was again watched. At 4:43 the first wren flew into the tree, followed by about ten more at 4:50. At 5:00 the last one disappeared into one of the holes. Sunset was at 4:45. No wrens were seen at this tree on January 17 or 19, but on January 22 one flew into the tree and moved actively around the roost hole at 5:00, but it was not definitely seen to enter. On January 24 a single wren appeared at the hole, but it is not certain that it roosted there.

The attempt to find roosting wrens by climbing trees at night and examining possible roost holes yielded nothing.

Weather seemed to have little influence on the activities of the wrens because they normally lived in the very sheltered layer next to

the ground. There were no periods of cold weather or snow during the study, so food was abundant and available to the birds all winter. In all the time that the wrens were under observation, only once was one seen to go into a tree during the day. That one inspected a hole in a limb for five minutes at noon on the cloudy day of January 8. All the rest of the time the birds stayed low until evening when they went to roost.

Most of the feeding time was spent in holes under stumps, under logs, in old brush piles, and under fallen twigs and branches where the birds were exceedingly hard to locate. Often they would permit us to approach within five or ten feet, and on several occasions let us stand on the log under which they were feeding without paying us the slightest attention. The ordinary method of feeding was to travel along keeping a sharp look-out for prey, but once one was seen to stamp its feet and vibrate its wings and tail very rapidly, beating the feet and wings against the ground cover. The wren stayed in a small area for several minutes as it vibrated and turned around and around picking up the insects that tried to escape. This behavior was seen on December 31, but we never saw it again although we watched carefully for it.

Only two basic call notes were used by the birds. One, a sharp "chip," was used much like an ordinary flocking note when given occasionally; when repeated several times in rapid succession, it served as a scolding note or indicated excitement. The only time a definite response to this call was noted was when a pair was seen traveling together. When they were separated for any length of time, one would give the "chip" and the other would answer. The other basic note was a rolling "br-r-reeeee," very rapidly rolled and repeated several times on a single pitch. The first time it was noted, on November 13, it immediately attracted two other wrens. It seemed to be used as a scolding note.

SUMMARY

In winter, the normal daily range of a Western Winter Wren appears to average less than two hundred feet in diameter; longer flights may be made to the roost site. The only roost that was found was in an old woodpecker hole about thirty feet up in a big-leaved maple. The birds went to roost at dusk and did not use the same roost during the entire period. The population of Winter Wrens on Eliza Island was determined to be about 52 birds on 56 acres of suitable habitat, a density of 93 per 100 acres. Check censuses of nearby islands indicated that other areas probably have similar densities. Attempts

to correlate ground cover with density failed, but some correlation was shown between the amount of hardwoods and wren density, the optimum lying between ten and forty per cent hardwoods. A tall overstory appears to be essential for maximum densities.

LITERATURE CITED

ARMSTRONG, E. A. 1953. The history, behavior, and breeding biology of the St. Kilda Wren. Auk, **70**: 127–150.

BENT, A. C. 1948. Life histories of North American nuthatches, wrens, thrashers, and their allies. U. S. Natl. Mus. Bull. 195.

EHINGER, C. E. 1925. A Winter Wren's lodging house. Murrelet, **6**: 37–39.

QUAY, T. L. 1947. Winter birds of upland plant communities. Auk, **64**: 382–388.

WILLIAMS, L. 1947. A Winter Wren roost. Condor, **49**: 124.

415 N. Court St., Crown Point, Indiana, and Department of Conservation, Fernow Hall, Cornell University, Ithaca, New York, June 5, 1954.