HABITAT RELATIONSHIPS OF WINTER WRENS IN NORTHERN CALIFORNIA

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The Winter Wren (*Troglodytes troglodytes*) has the most widespread distribution of any wren and is the only member of the Troglodytidae found in Asia, Europe and northern Africa, as well as North America. In Europe, where it is known simply as the Wren, this bird has been well studied (Armstrong 1955). In North America, however, there has been little investigation of Winter Wren ecology.

Despite their cosmopolitan distribution, Winter Wrens in California appear restricted in their habitat selection. Dawson (1925, Vol. 1:680-681) described the Winter Wren as an " . . . inhabitant of rugged stream beds . . . throughout the somber depths of the fir and Redwood forests . . . pine country being altogether too dry." Grinnell (1915: 160) referred to this wren as " . . . a common resident of the humid coast belt . . . sparingly in the northern high Sierra . . . occurs more widely in mid-winter." Beyond such general descriptions, information on the habitat of Winter Wrens in California comes from broad spectrum inventories. Breeding bird censuses published in *American Birds* and elsewhere are currently the only source of Winter Wren habitat data for this region.

In this paper I present data on the habitat relationships of Winter Wrens in northern California. I document the wrens' seasonal habitat selection in the context of forest age and temperature-moisture gradients.

STUDY AREA AND METHODS

I gathered most of the data presented here at the Nature Conservancy's Northern California Coast Range Preserve in Mendocino County. Interior sites where additional, opportunistic observations were made include the King Range Conservation Area and Butte Creek Old Growth Forest Reserve in Humboldt County, The Nature Conservancy's McCloud River Preserve in Shasta County and Yosemite National Park in Mariposa County. Most of the data from coastal areas were collected at the Jughandle State Reserve in Mendocino County. Additional, opportunistic observations were made of coastal Winter Wrens in the city of Arcata and at the Nature Conservancy's Lanphere-Christiansen Dunes Preserve in Humboldt County.

I made censuses of Winter Wrens from 1982 to 1984 at the Coast Range Preserve and Jughandle Creek sites. At these sites wrens were counted along predetermined transects which traversed representative habitats occurring in the region. The transect at the Coast Range Preserve was 4.8 km long; at Jughandle Creek it was 2.8 km long. Censuses were stratified between the fall-winter (late September to early April) and spring-summer (late April to early September) seasons. The Coast Range Preserve transect was censused 24 times during the fall-winter period, and 14 times during spring-summer. The Jughandle Creek transect was censused 14 times during the fall-winter season, and 5 times during the spring-summer.

Habitat types found at the coastal census site are characterized by the following descriptions:

Disturbed Pine Forest: A heavily disturbed habitat dominated by native Bishop Pine (*Pinus muricata*) and introduced Monterey Pine (*P. radiata*). Overall canopy closure of these conifers was less than 30%. Gaps in the canopy were filled with blackberry (*Rubus* sp.) and various introduced grasses.

Sitka Spruce Forest: A dense multi-layered conifer forest consisting of Sitka Spruce (*Picea sitchensis*), Bishop Pine, Grand Fir (*Abies grandis*), Western Hemlock (*Tsuga heterophylla*) and Douglas-fir (*Pseudotsuga menziesii*). Canopy closure for these species approached 100%. An extensive understory was comprised of Cascara (*Rhamnus purshiana*), Labrador Tea (*Ledum glandulosum*), rhododendron (*Azalea macrophyllum*), Oregon Grape (*Mahonia nervosa*), and Red and Blue huckleberry (*Vaccinium parvifolium* and *V. ovatum*).

Riparian: This habitat was restricted to a thin strip along Jughandle Creek and was dominated by Red Alder (*Alnus rubra*) and willows (*Salix* spp.). The understory here consisted of Sword Fern (*Polystichum munitum*) and Yellow Skunk Cabbage (*Lysichitum americanum*).

The inland census site at the Coast Range Preserve was within the mixed evergreen forest zone (Sawyer et al, 1977). The subdivisions of this forest where the census was conducted are characterized by the following descriptions:

Old Growth Forest: Generally north-facing slopes dominated by Douglas-fir and occasionally some Redwood (*Sequoia sempervirens*) trees aged 200 years and older. A well developed middle canopy existed, consisting of Tanoak (*Lithocarpus densiflora*), Canyon Live Oak (*Quercus chrysolepis*) and Madrone (*Arbutus menziesii*). The forest floor was littered with large downed logs; Blue Huckleberry, Oregon Grape and Sword Fern often occurred as a ground cover.

Young Growth Forest: A single layered canopy of hardwoods and conifers usually averaging much less than 200 years in age. Few if any large downed logs.

Meadow: Grassland areas with scattered shrubs, often with human dwellings present.

Riparian Forest: A thin strip of forest along the South Fork of the Eel River dominated by Red Alder and Big Leaf Maple (*Acer macrophyllum*). Sedges (*Carex* spp.) occurred along the waters edge.

Frequency of habitat types along the transects was determined by pacing the distance the transect passed through each habitat type.

RESULTS AND DISCUSSION

To quantify the Winter Wrens' habitat relationships, I initiated a series of censuses in both coastal and inland portions of the northern California Coast Range. A summary of Winter Wren censuses in the coastal habitat matrix is shown in Table 1. No significant shifts in the wrens' habitat preferences from the fall-winter to spring-summer seasons were noted. The spring-summer distribution of Winter Wrens was not significantly different from random. The

fall-winter distribution was not random; there appeared to be a slightly significant tendency for Winter Wrens to occur in the deciduous riparian forest and avoid the dense Sitka Spruce forest.

Overall, Winter Wrens in coastal habitats showed broad habitat preferences. These birds were observed regularly in young managed Redwood forests, urban settings and thickets within the salt spray zone along coastal bluffs.

A summary of the censuses conducted at the inland site are shown in Table 2. The distribution of Winter Wrens during the fall-winter months appeared to be random. In the spring-summer season Winter Wren habitat selection shifted significantly to an almost exclusive occurrence in the old growth forest type.

Table 1. Results of Winter Wren censuses conducted at Jughandle Creek State Reserve. Habitat descriptions are in the text.

HABITAT TYPE	PERCENT HABITAT AVAILABILITY	PERCENT WINTER WREN OCCURRENCE	
		FALL-WINTER	SPRING-SUMMER
Disturbed Pine Forest	53	51	43
Sitka Spruce Forest	33	24	36
Riparian Forest	14	25	21
Chi-square value		8.8	1.5
Significance level		$p<0.05$	$p<0.75$
Total number of observations		99	14

Table 2. Results of Winter Wren censuses conducted at the Northern California Coast Range Preserve. Habitat descriptions are in the text.

HABITAT TYPE	PERCENT HABITAT AVAILABILITY	PERCENT WINTER WREN OCCURRENCE	
		FALL-WINTER	SPRING-SUMMER
Old Growth Forest	55	60	92
Young Growth Forest	32	25	08
Meadow	10	13	0
Riparian Forest	3	2	0
Chi-square value		4.1	15.6
Significance level		$p=0.25$	$p<0.005$
Total number of observations		124	40

Corroborating data can be gathered from two sources. An examination of breeding bird censuses appearing in *American Birds* over the past 15 years revealed 17 censuses conducted in habitats similar to those covered in this study. Eleven of these 17 censuses were done in logged or young-growth mixed evergreen forests and none of these reported Winter Wrens. The remaining six censuses were conducted in old growth or mature Douglas-fir dominated forests; all of these reported breeding Winter Wrens. Also, a 3-year investigation of old growth wildlife habitat relationships in northern California determined a positive correlation between Winter Wren abundance and forest age (Martin Raphael pers. comm.). Winter Wrens appear to select the old growth conifer forests of California's interior Coast Range during the spring-summer months.

Following the wrens along their daily wanderings in summer, I found them more commonly away from creeks during early morning hours or on unseasonably cool days. During mid-day warm temperatures the wrens were almost always within the confines of creek beds with water. These creek bed habitats were more than 5-10° C cooler than surrounding non-old growth areas. Sixty-eight percent of my spring-summer observations of Winter Wrens were along creeks or creek beds; just 30% of my fall-winter observations were in these wetter areas. The Winter Wrens' northern distribution in North America (Robbins et al. 1966) adds further credence to the wrens' selection of cooler-wetter climes.

Selection for cool and moist habitats is just one of several hypotheses which could explain the Winter Wrens' distribution in California. Selection for habitats with higher food resources, less interspecific competition, or a higher density of nest sites are other possible explanations for the Winter Wrens' limited distribution. None of the above hypotheses were tested.

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