THE WHISTLING WARBLER OF ST. VINCENT, WEST INDIES

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The endemic Whistling Warbler (*Catharopeza bishopi*) inhabits humid hill and mountain forests on tropical St. Vincent island in the Lesser Antilles. It was discovered in 1877 on Soufrière volcano by F. A. Ober and was first described by Lawrence (1879a) from Ober's specimens. Comments on its status, habits, and relationships have been made by Lawrence (1879a, b), Lister (1880), Sclater (1880), Ridgway (1902), Clark (1905), Bond (1928, 1950, 1956, 1959, 1967, 1971, 1972, 1974), Griscom and Sprunt (1957), Greenway (1967), Kepler and Parkes (1972), Lack et al. (1973), and Devas (n.d.). They have given principally local assessments of the warbler's distribution and abundance and comparatively little information on its biology.

Our investigation from 29 April to 31 May 1973 was primarily concerned with an evaluation of the warbler's status in relation to preservation and future survival. A brief report on these aspects and on the status of two other endemic island species has been submitted to the International Council for Bird Preservation, which supported the research. We also were able to devote part of our time to studying *Catharopeza*'s habitat, behavior, and ecology. Concentration on our primary objective plus difficulties in travel about the island and in observation of the warbler did not permit extensive accumulation of quantitative behavioral data. Nevertheless, we think that the material here contributes new information about this little-known species.

We spent 24 days in the field, mostly occupied with attempts to find and observe the warbler and to determine its distribution and abundance in various sectors on the periphery and in the interior of the island's central hill and mountain chain. Four days were spent on Soufrière volcano, six days in the Bonhomme Mountains and headwaters of the Colonarie River, one to two days each in the upper Buccament, Cumberland, Richmond, Colonarie, and Grand Sable river valley areas, and the rest of the time in various other places in the mountains.

ST. VINCENT: PHYSICAL CHARACTER, FOREST TYPES

St. Vincent is an essentially hilly and mountainous island in the Windward Island chain 330 km north of Trinidad and 165 km west of Barbados. It is 28.5 km long, 17.4 km wide, and has an area of about 345 km^2. A rugged central mountain spine, comprised of very complex terrain of peaks, ridges, ravines, gorges, and valleys, extends north to south, with spur ridges extending on all sides toward the coast. These ridges extend farther and higher on the leeward than on the windward (east) side where they merge into more extensive hilly lowlands with some nearly level areas. Soufrière (1234 m), the highest mountain, is partly isolated from the rest of the chain to the south, which is dominated by five major peaks (fig. 1). The island's Pleistocene and Recent volcanic structure is evidenced by its andesitic and basaltic agglomerate rocks and lava flows (Watson et al. 1958). Volcanos range from old extinct peaks in the south, through recently extinct ones in the Richmond Peak-Mt. Brisbane complex, to the recently active Soufrière, whose recorded eruptions have had a markedly adverse effect on flora and fauna, including the Whistling Warbler, in the northern part of the island.

Annual precipitation ranges from 1500 mm near the coast to about 3800 mm in the central mountains. Although yearly rainfall varies considerably, essentially no dry season occurs at higher elevations. In response to this abundant moisture the central hills and mountains, except the upper slopes of Soufrière, support a luxuriant growth of forest which Beard (1949) described and classified as rain forest, palm brake, and elfin woodland. Rain forest occurs chiefly between about 300 and 500 m elevation in valleys and on slopes and crests of low ridges largely on the periphery of the mountain chain; palm brake occurs mainly above 500 m mostly on steep, exposed windward and less frequently leeward slopes (figs. 2, 3); and elfin woodland is found on summit slopes, ridges and peaks. A variable secondary

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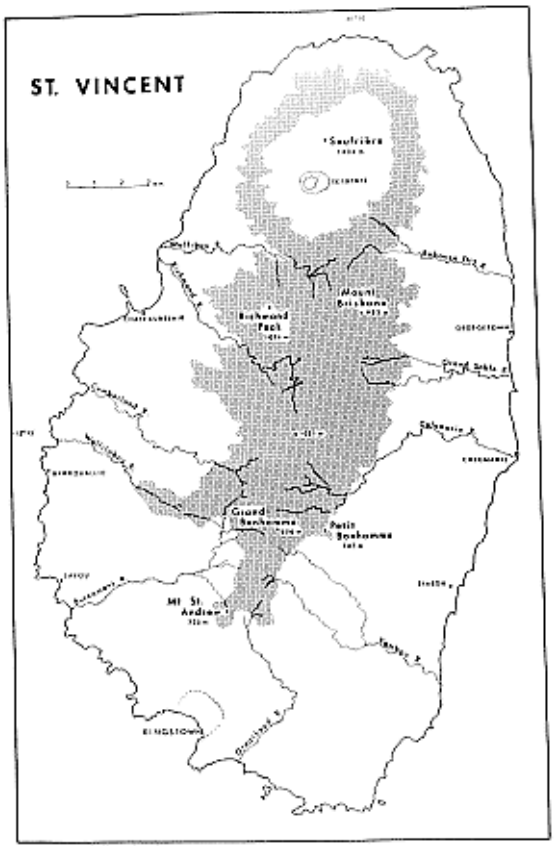

humid forest, including scrub, grows principally at lower elevations in the central chain where human disturbance has taken place and in rain forest and palm brake on steep slopes and ridges where storm damage has occurred or loose unstable subsoil exists. It contains chiefly species of the rain forest and palm brake with scattered tree ferns but few palms. Secondary forest has also colonized Soufrière (fig. 4) up to about 600 m, where it changes to very low forest and then to shrubs, ferns, grasses, and herbaceous plants up to the summit. The island outside the central hills and mountains is extensively cultivated, and only small sections of drier, mostly secondary forest exist.

HABITAT, DISTRIBUTION, AND ABUNDANCE

The Whistling Warbler inhabits all three types of humid forest as well as secondary forest on

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FIGURE 1. The island of St. Vincent in the West Indies showing approximate range of the Whistling Warbler (*Catharopeza bishopi*). The hiatus on Soufrière is due to habitat destruction by vulcanism in 1902–3.

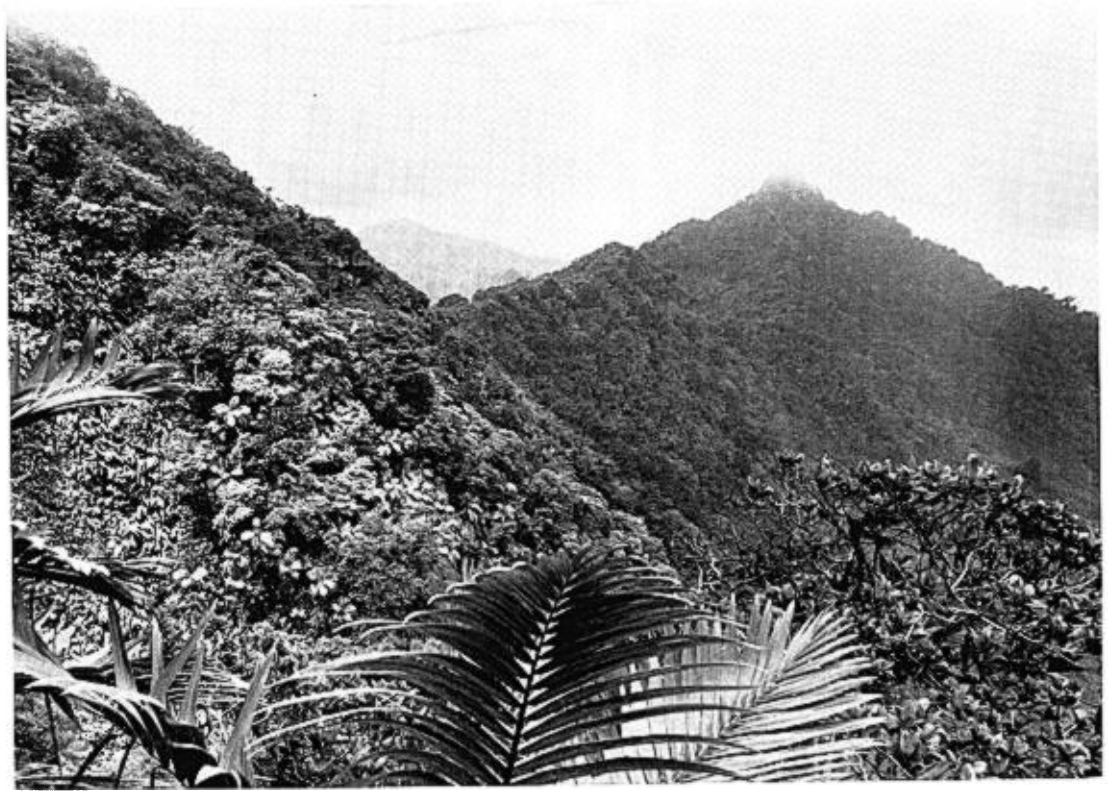

FIGURE 2. General view of Whistling Warbler habitat at 700 m in the palm brake zone of the Bonhomme Mountains. Palms (*Euterpe* sp.) are common on the slope at left, and ferns form a dense carpet in a large open swath that may be the result of storm damage or unstable soil.

FIGURE 3. Interior of palm brake in the headwater area (500 m) of the Colonarie River showing understory and dense ground cover frequented by Whistling Warblers.

Soufrière and in other places in the mountain chain. It frequents the complex of steep-sided ravines, gorges, sloping interstream sections, and valleys that occur in much of the central hill and mountain area's dissected terrain.

Since its discovery, the Whistling Warbler's range has been diminished at least 50% by vulcanism and deforestation. The species is slowly reoccupying its former range on Soufrière as forests regenerate. Based on our contacts with *Catharopeza*, ground study of vegetation types and distribution, air survey, and reports of the bird by local persons and other ornithologists, we calculate an approximate range for the warbler of about 90 km^2 (fig. 1). The species appears to be generally distributed through much of its range. We saw it, and others have reported it recently on Soufrière, in the headwaters of the Grand Sable, Colonarie, Buccament, Cumberland, and Richmond rivers, in the Bonhomme Mountains, and southwest of Mt. St. Andrew.

The Whistling Warbler normally occurs from about 300 m above sea level to the highest elevation where humid forest exists (1074 m on Richmond Peak). We found it near the peak of Grand Bonhomme (970 m). Prior to the 1902 eruption the warbler ranged at least as high as the crater on Soufrière (915 m), but now it

FIGURE 4. Whistling Warblers foraged through the undergrowth and sang from various heights in this secondary humid forest at 380 m in a ravine on the windward slope of Soufrière. This variably structured forest has regenerated on slopes devastated by volcanic eruption.

ranges from 300 to 600 m or slightly higher. Its distribution appears more irregular there than elsewhere owing to differential regeneration of forest. In a few places the warbler descends into humid forest below 300 m, and it has been reported twice well outside the central mountains, in the botanic garden of Kingstown (Bond 1972) and near Peruvian Vale on the windward coast (J. Dick, pers. comm.).

Since its discovery, the Whistling Warbler has been classified from very rare to common in different parts of St. Vincent. We found it generally to be fairly common, and judge that distribution and abundance are partly dependent on the occurrence of ravines, gorges, and valleys. The species is less numerous at higher elevations where such features are fewer and precipitous slopes exist.

An accurate calculation of the Whistling Warbler's present total population on St. Vincent was not possible because of the nature of our study and the time available. Owing to difficulties inherent in assessing numbers of such a small species and to the rugged terrain and dense vegetation of its habitat, such an assessment may not be feasible. Our sample counts of singing males in palm brake and secondary forest on the slopes of the Bonhomme Mountains, in palm brake in the headwaters of the Colonarie River, and in secondary forest on the southeast slope of Soufrière revealed an average of about nine singing males per km^2. Assuming these to represent breeding pairs, and taking into consideration the complex terrain, available habitat, and decrease in abundance with altitude, we projected a probable maximum population of less than 1500 breeding individuals for the island. This is admittedly a very rough estimate, and we cannot speculate how much less it actually may be.

BEHAVIOR AND ECOLOGY

MOVEMENTS, FORAGING AND FOOD

Whistling Warblers are difficult to observe and especially to follow in the dense herbaceous ground vegetation and understory of palm brake, secondary forest and elfin woodland. They spend most of their time from ground level to about 4 m; in at least 90% of our observations they were in this range. When they ascend higher, they may reach 15 m above ground in rain forest and secondary forest and lesser heights in lower types of vegetation. We saw the warblers on the ground only a few times and, though it is likely that they are on or close to it much of the time, we could not ascertain the proportion because dense vegetation and decaying plant debris conceal them

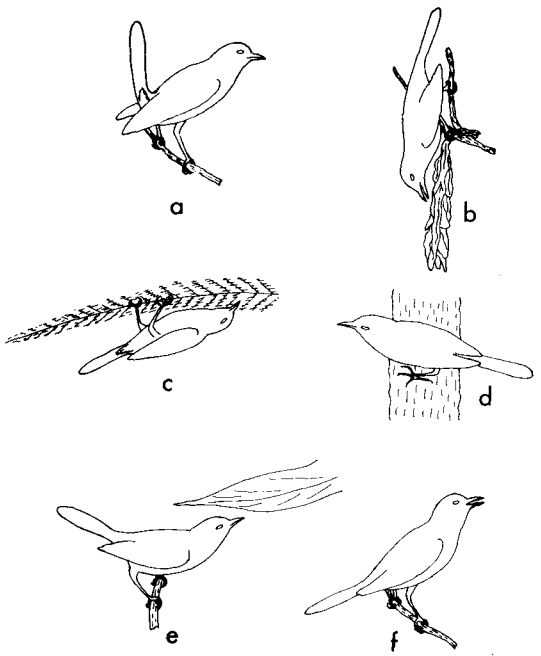

FIGURE 5. Characteristic perching and foraging positions of the Whistling Warbler: a) "cocked tail" perching; b) vertical feeding; c) inverted feeding; d) horizontal on tree trunk; e) peering for food; f) singing.

and in many places effectively eliminate open ground. In the Colonarie River headwater area we saw them foraging about boulders and large rocks along streams, but not as often as Lister (1880) mentioned. Frequently it was possible to follow them only by sound, their loud vocalizations being the sole indication of their whereabouts.

While feeding on woody and herbaceous plants, Whistling Warblers move fairly actively but rather more slowly and deliberately than, for example, the American Redstart (*Setophaga ruticilla*). They hop from branch to branch and along slanting and horizontal limbs, exploring bark and leaves. Figure 5 shows the "cocked tail" perching posture and five others they assume in foraging and vocalizing. In the typical "cocked tail" position the warbler holds its tail about 75–85° above the horizontal. Frequently, but at varying intervals depending on its position, the bird flicks its tail in a rapid up-down movement through an arc of 20–30° so that the tail often reaches the vertical. During this movement, the tail normally is not fanned, and the wings are flicked (extended) outward and downward slightly from the body. Both adult and immature-plumaged birds usually perch and move about with the tail "cocked" except when using feeding postures (fig. 5) with which tail posi-

tion varies. On three occasions we saw an adult perch for 5 to 20 sec without any tail or wing movement, the tail held below horizontal, almost in line with the body. A young bird about three-quarters grown moved its tail up-down only very slightly with an almost imperceptible, simultaneous wing-flick.

Whistling Warblers often hang vertically downward in feeding, especially when exploring dead leaves, for example, *Cecropia*, caught in tree branches. They also hang inverted in the manner of a Bananaquit (*Coereba flaveola*) to investigate the ventral surfaces of leaves or tree fern fronds. We watched an immature-plumaged bird in the Bonhomme Mountains successively hang vertically and inverted for about two minutes at the tip of a tree fern frond. Twice we saw an individual with body held almost horizontal alight for a few seconds on the side of a tree trunk. A warbler frequently will stretch horizontally and cock its head to one side to peer under a leaf. We observed an immature-plumaged bird flutter in the air three times for one or two second intervals at tips of tree fern fronds. Once we saw a warbler fly in pursuit of a flying insect, and another leapt into the air to pick something from the ventral surface of a palm leaf above it. An adult wiped its bill rapidly once on each side of a small limb, and another caught a green worm about 15 mm long and beat it several times on a branch before swallowing it. We saw an immature-plumaged bird with a fairly large winged insect, and two other birds captured what appeared to be small white larvae.

Stomachs of adults and immatures were packed with the remains of many insects. Recognizable stomach contents of an adult male secured on 27 May included specimens of Hymenoptera: Formicidae; Plecoptera: Pteronarcidae; Coleoptera: Curculionidae and at least two other families; Orthoptera: various saltatorial appendages. It is surprising that no dipterous insects were included. Lister (1880) found a small "newt" in the stomach of one individual. Possibly this was a lizard because newts have not been found on the island.

BREEDING

Bond (1928) noted the report of a St. Vincent resident that the Whistling Warbler places its cup-shaped nest low in trees or bushes, lays two spotted eggs, and nests later in the season ("about July") than other birds on the island. The species actually breeds considerably earlier, at least by mid or late April. Bond (pers. comm.) saw parents with young out of the nest in early June and in late May we observed fledglings from a few days to a week out of the nest. However, we found no nests during our study and know of no ornithologist who has. On 21 May in the Bonhomme Mountains an adult with two or three fine fibers in its bill flew up to a palm (*Euterpe* sp.), and another carried similar material into dense ground vegetation, but we found nothing. On 18 May on Soufrière an immature-plumaged individual carried a small dead leaf and a twig or rootlet to a clump of bamboo and palms on the steep side of a ravine, and an adult came at least twice and looked down at this spot, but again we found nothing.

INTRA- AND INTERSPECIFIC RELATIONSHIPS

A young bird was feeding slowly and methodically through dense heliconias and shrubs in palm brake understory on 21 May. It repeatedly gave characteristic call notes described below. This short-tailed bird showed the fluffy plumage and downy-tipped crown feathers of immaturity. It seemed independent of its parents, and we did not see it being fed. On 24 May, also in the Bonhomme area, two smaller stub-tailed fledglings gave similar calls and fluttered their wings when fed by adults. In all areas where we found Whistling Warblers we noted fully grown immature-plumaged individuals which were probably young of the previous year. They retain this plumage into the second year. Sometimes these immatures appeared to accompany adult-plumaged birds. As in the American Redstart, they probably breed in this plumage, although we have no evidence of it.

The only intraspecific interaction that we noted was on 30 May in the Grand Sable area when an immature-plumaged warbler briefly chased another in similar plumage. The absence of intraspecific activity may be due to the species' low density and relatively infrequent contact between individuals. Also, we rarely saw more than one individual at a time and only for brief periods. Much of our observation was in the latter part of the breeding season when young were either fledged or nearly so, and territorial behavior was probably low or had ceased. Also, this was not the season for flocking, when interspecific activity may be more likely to occur.

The warbler is the only small, insectivorous species normally found in forest above 300 m that habitually feeds and spends a major portion of its time on and near the ground. This circumstance not only lessens the chances of contact with other species, but also probably

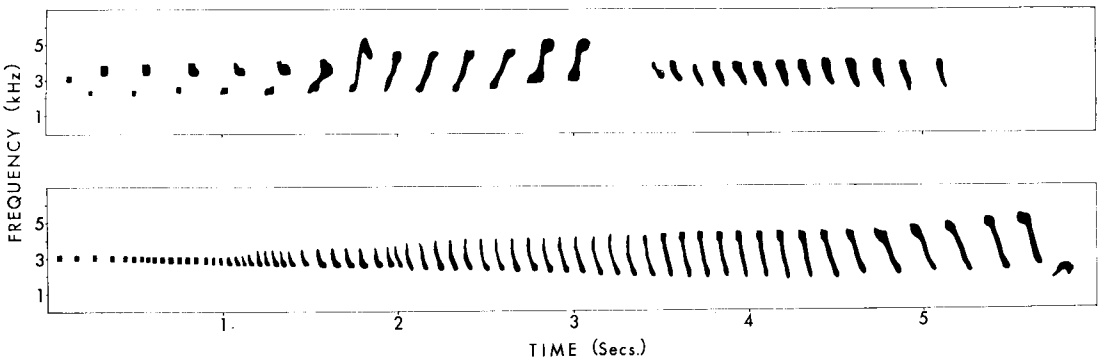

FIGURE 6. Tracings from audiospectrograms of Whistling Warbler songs. Lower: commonest type; upper: three-part type showing first two parts (see text).

minimizes competition with them for food. Possibly the abundant anoles in the lower levels of the humid forest influence the availability of insect food for *Catharopeza*. Insect life did not seem very abundant at ground and low levels in warbler habitat. Recent studies in tropical forest tend to support this finding (Elton 1975).

Considering the few potential mammalian and reptilian predators and their relatively low abundance on the island, predation by them probably is not a major factor influencing the warbler population. The Broad-winged Hawk (*Buteo platypterus*) is fairly common and may occasionally prey on *Catharopeza*, though on St. Vincent this hawk subsists largely on mole crickets (Clark 1904). The Glossy Cowbird (*Molothrus bonariensis*) is apparently rather rare on St. Vincent, so brood parasitism on the warbler is probably slight.

VOCALIZATIONS

Whistling Warblers sang frequently during our study. We recorded them at 7 ips with a Uher Report L tape recorder and Uher M514 microphone. We analyzed the songs and calls on a Kay-Electric Sona-Graph 6061B at wide bandwidth. One of the commonest songs consists of a loud, clear, rather low-pitched (2–5 kHz) series of rapidly whistled notes that are initially unslurred, then downward slurred. The notes increase in volume and pitch interval and the series ends with a noticeable rise in pitch on several less rapid, slurred notes and a final short, lower-pitched, slurred note (fig. 6). Another song (fig. 6) is three-parted. The first part consists of a series of couplets, the first note of each low-pitched and phasing into a series of upward slurred notes of increasing volume. The second part consists of an even-pitched crescendo-diminuendo series of short downward slurred notes, and the third of a series in crescendo similar to but shorter than the commoner song described above (fig. 6). This song type is often uttered in response to another individual singing the common type, and occasionally there is partial overlap, with two birds singing both song types simultaneously in an apparent duet. The several variants of both these song types differ in length, pattern, number and type of notes, pitch, volume, and tempo.

Length of the commonest song varies from about 4–6 sec (N = 15), and intervals between them are variable and normally rather long. The three-part song lasts from about 8–10 sec (N = 8). It is sung less often than the other type and at much longer intervals. Both of these songs are lower-pitched and longer than songs of most other North American warblers. A Whistling Warbler singing the commonest song type on Soufrière in early morning did so at about 2–4 min intervals, which gradually lengthened to about 7–9 min intervals by midday. It continued singing well into the afternoon except during periods of heavy rain. We recorded singing late in the afternoon and also in dense clouds which envelop the mountains almost daily above about 700 m.

The warbler's usual call note is a soft, short, rather low-pitched, downward slurred *tchurk*. Recently fledged young, some being fed by parents, uttered a similar but higher-pitched call note interspersed with series of sharp, loud, rapidly repeated, downward slurred, fairly high-pitched (3–6 kHz) notes.

We followed songs to immature-plumaged individuals but did not see an immature singing. We watched an adult sing from a branch 6 m up in a small tree. It perched (fig. 5) and sang the initial notes of the commonest song type with the bill closed or nearly so, then gradually opened the bill as the song increased in volume and ended. The gape was pale yellowish-white.

TAXONOMIC RELATIONSHIPS

The Whistling Warbler was referred by Lawrence (1879a) to the genus *Leucopeza*. Sclater (1880) later named it *Catharopeza* on the basis of its shorter and broader bill, slight bristles on the rictus, shorter tail, and rather shorter and stouter tarsi. Ridgway (1902:619) emphasized its distinctness from *Leucopeza* and retained the name *Catharopeza* but stated that "It is nearly related to *Dendroica*, from which it differs chiefly in the relatively shorter tail, and perhaps should not be separated from that genus." Since then the genus has remained *Catharopeza* in most references, its relationships, however, being the subject of some discussion. Kepler and Parkes (1972) transferred it to *Dendroica*. Bond (1972) concurred with this initially but later (1974) considered it inadvisable at the present time, citing the warbler's distinctive habits of tail cocking and ground foraging unlike other West Indian species. We have no major new findings but can clarify a few points.

In examining a number of specimens of *C. bishopi* we found a suggestion of the concealed white "superciliary" that Kepler and Parkes (1972) mentioned only as doubtful in one specimen. In addition, the proximal half of the lower mandible of adult *C. bishopi* in life is medium brown medially, unlike that of *D. angelae* and contrary to Kepler and Parkes' description of it from dried specimens as entirely black. Although the commonest song of *C. bishopi* resembles that of *D. angelae* in its crescendo and disconnected terminal notes, as Kepler and Parkes stated, this song and particularly the second type differ so markedly in quality, pitch, pitch range, tempo, note structure, and total length from the song of *D. angelae* that no sound basis exists for their assertion that the songs of the two species have a remarkably similar pattern.

Considering the information now on hand regarding *C. bishopi* and the other apparently related West Indian warblers, as well as the morphological diversity of forms presently included in *Dendroica*, some evidence tends to support its placement in that genus. *C. bishopi*, however, is a distinctive species differing to varying degrees from all forms in the genus *Dendroica* in proportions, color pattern, song, habit of tail cocking, and color of the immature plumage. Therefore, we tentatively retain the genus *Catharopeza*.

SURVIVAL AND CONSERVATION

The total present population of the Whistling Warbler seems to be large enough and supported by habitat of sufficient extent to insure survival for an indefinite period. A recurrence of major vulcanism similar to that of 1902–3 would have a markedly adverse effect on the population, but this activity would have to be considerably more extensive to threaten the species' existence. The removal of humid forests above 300 m in the central hill and mountain area is the critical factor that now affects the bird's numbers and that could be decisive in the short-term.

Government efforts to protect forests and vital watersheds in the central mountains and hills are partially effective, but human population and agricultural pressures continue to make inroads to higher elevations at various points on the periphery. Stronger and more effective measures are required to preserve forests above 300 m elevation. An inviolate reserve for water, soil, forest, and wildlife protection, extending from and including Soufrière south to Mt. St. Andrew, should be officially proclaimed and strictly enforced. Also, the St. Vincent Birds and Fish Ordinance, a good law for which some inprovements have been proposed by local officials, must be effectively enforced, to protect not only the Whistling Warbler but also the unique St. Vincent Parrot (*Amazona guildingii*), the uncommon Rufous-throated Solitaire (*Myadestes genibarbis*), and other valuable elements of the island's native flora and fauna. These are difficult tasks, and we sincerely hope that the St. Vincent government and its concerned citizens will accomplish them and conserve the natural environment of their beautiful island.

SUMMARY

Results are given from a study of the status, biology, and ecology of the indigenous Whistling Warbler (*Catharopeza bishopi*) on St. Vincent island in the West Indies. The species inhabits rain and elfin forest, palm brake and secondary humid forest above 300 m in a range of about 90 km^2 through a central hill and mountain chain. After considerable range reduction from vulcanism in 1902–3, the warbler is now regaining habitat as revegetation occurs, but it is losing it elsewhere as forests are removed under population and agricultural pressure. It is estimated that fewer than 1500 breeding individuals exist.

Catharopeza mostly forages on the ground and at low levels. Several of its movements are described including its characteristic "cocked tail" position and action. Its food is briefly discussed. No nest was found. Recently fledged young were being fed by parents.

Young retain immature plumage into their second year, sing, and probably breed. Low density and lateness in the breeding season may account for little intraspecific behavior noted. Interspecific competition for food, and interaction with other small resident insectivores probably are minimized by occupation of different feeding levels. No predation was detected; it probably is minimal owing to low variety and numbers of potential predators. The species' vocalizations are described and illustrated.

The warbler's taxonomic history and relationships are discussed briefly. Although some evidence appears to support its placement in *Dendroica*, it possesses some exceptional characteristics, and therefore *Catharopeza* is retained.

The Whistling Warbler's survival depends primarily on the retention of sufficient habitat for it to maintain a viable population. Enough habitat remains to insure the species' survival indefinitely, but severe and widespread vulcanism or continued forest removal could jeopardize its status. Establishment and strict protection of a reserve in the central mountain chain are essential to protect the warbler and other valuable species and to insure the integrity and health of the island's natural environment.

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