

Originally distributed throughout the Sierra Madre Occidental in Mexico, this bird, the largest woodpecker in the world, has suffered from the widespread and almost total destruction of its specialized open pine-forest habitat. Although previously not uncommon, it has not been recorded with certainty since 1958 and may well already be extinct.

**DISTRIBUTION** Historically the Imperial Woodpecker, the largest member of its family in the world, was found throughout the Sierra Madre Occidental of Mexico in Sonora, Chihuahua, Durango, Nayarit, Zacatecas (possibly) and northern Jalisco, with more isolated populations in western Jalisco and northern Michoacán. Localities are arranged from north to south, with coordinates taken from OG (1956a).

**Sonora** The Imperial Woodpecker has been recorded from the north-eastern part of the state, where the Sierra Madre Occidental of western Chihuahua extends across the border into Sonora, north of 29°N. The species was first recorded in this area in 1886, when it was found in the pine-forests of the “Sierra Madre de Sonora” within 80 km of the Arizona border (Ridgway 1887c). This is the most northerly record of the species and presumably refers to the most northern part of the sierra around which the río Bavispe flows (i.e. El Tigre), and Marshall (1957) recorded holes “probably made by this woodpecker” in forest on the Sierra Huachinera (30°16'N 108°45'W). Van Rossem (1945) recorded the Sierra de Nácori – apparently referring to the mountains just south of Tres Ríos, which Marshall (1957) placed at roughly 29°50'N 108°45'W – as a locality for the species, but gave no further details, although it probably referred to two birds seen at 1,920 m, c.45-50 km from Nácori, in late 1890 (Lumholtz 1903). Allen (1893) recorded that specimens were taken on the río Bavispe (near the headwaters: van Rossem 1945) during December 1890. Other records include a female (in USNM) taken in the “Sierra Madre de Sonora” (date unknown); and west of Casas Grandes (29°29'N 109°35'W in westernmost Chihuahua) on the summit of the Sierra Madre de Sonora, where a male and female (in LACM) were collected in 1906 (see below). In 1941, the species was “easily found” along the Sonora–Chihuahua “line” (Tanner 1942; see below). An unconfirmed sighting in 1975 by a rancher, who had previously collected a bird and taken a photograph (both lost in a fire at SBMNH), was followed up by the suggestion that the species should be searched for in the mountains between Madera (westernmost Chihuahua), and the headwaters of the río Yaqui in Sonora (Plimpton 1977).

**Chihuahua** This species has been recorded from a number of scattered localities in the Sierra Madre Occidental of western Chihuahua. From north to south, it has been found along the Sonora–Chihuahua border, where in 1941 it was “easily found” in pine-forests between 2,285-2,745 m on the Chihuahua side (Tanner 1942), localities in this area including Pacheco (30°06'N 108°21'W), where a specimen (in USNM) was taken in March 1902, with a pair and a juvenile (in FMNH) collected in July 1909. An abandoned Imperial Woodpecker nest, taken over by Thick-billed Parrots *Rhynchopsitta pachyrhyncha*, was found in 1905 at “Colonia Pacheco” (= Pacheco, and c.15 km north of Colonia García: Goldman 1951) (Thayer 1906). The records from west of Casas Grandes (on the Chihuahua side of the border) appear to be from Sonora (see above), as they were apparently made on the “summit of the Sierra Madre de Sonora”, but travelling west from Casas Grandes high mountains are reached before the border is crossed, so it is impossible to attribute these records to a particular state. Other localities along the border include: three specimens (one female is in AMNH) taken near “Ranchería de los Apachos” at 2,020 m in January 1891 (Allen 1893, Lumholtz 1903), this locality being described as near the río Gavilán with its origin “probably near Chuhuichupa” (29°38'N 108°22'W) (Lumholtz 1903, Marshall 1957), but obviously near the border, as the AMNH specimen has two labels, one with “N. Sonora”, the other with “Chihuahua” (see Marshall 1957); near Colonia García (29°59'N 108°20'W), where two males and three females (in USNM) were collected in July 1899, a male and female (in ANSP) in July 1902, a male and two females (in USNM and MCZ) in April 1903, and a male, female and immature (in ROM) during 1903, plus a male and female (in USNM) collected respectively c.8 km and c.25 km west of Colonia García in February 1904; Chuhuichupa (29°38'N 108°22'W), where two males and two females (in AMNH) were taken in January 1892 (see also Allen 1893), with a male and three females (in MCZ) in September 1905; Catalaria (Candelaria) Peak (c.15 km west of Chuhuichupa), where a male (in SDNHM) was collected (date unknown); Babicora (29°30'N 108°01'W), where three males and a female (in FMNH) were taken in June 1902; and in the region of the Sonora–Chihuahua line west of Babicora, where birds were seen around 1940 (K. Simmons *in litt.* to J. T. Tanner 1941 *per* N. Tanner *in litt.* 1991). Further south in the state, the Imperial Woodpecker has been recorded c.80 km west of Terrazas (28°57'N

106°16'W), where 17 were shot in the course of a few months, the area apparently being “much frequented by the species” (Smith 1908); Pinos Altos (from the map in Lumholtz 1903 this is Pinos Redondados at 28°15'N 108°17'W, and not the same as the locality mentioned by Marshall 1957: see Remarks 2 under Eared Quetzal *Euptilotis neoxenus*), where a male and female (in MCZ) were taken in July 1888; Yahuirachic (28°35'N 108°09'W), where a bird was seen sometime prior to 1961 (A. S. Leopold *in litt.* to J. T. Tanner 1961 *per* N. Tanner *in litt.* 1991), and whence come other unconfirmed reports (Plimpton 1977); and Temochic (27°51'N 107°02'W), where a male (in MCZ) was collected in May 1884 (see Remarks 1). In the vicinity of Temochic, unconfirmed local reports come from Tutuaca, Cebadilla, Pitoreal and Pescados. There is also a rumour of some Mexican biology students reportedly discovering several pairs near Barranca del Cobre in October 1973 (Plimpton 1977), presumably close to where a bird was seen sometime prior to 1961 (B. Villa *in litt.* to J. T. Tanner 1961 *per* N. Tanner *in litt.* 1991). Bennett and Zingg (1935) had old unconfirmed reports from the area around Samachique (27°17'N 107°28'W), although the population was extinct there by the time of their inquiries. In the south of the state, records come from: Laguna Juanota (26°30'N 106°29'W), where a male (in MLZ) was taken at 2,745 m in July 1937; mountains west of Parral (Bergtold 1906), i.e. presumably modern-day Hidalgo del Parral; halfway between Santa Rosa (26°00'N 107°00'W) and Llano Grande (untraced), where one was seen sometime prior to 1962 (C. Pennington *in litt.* to J. T. Tanner 1962 *per* N. Tanner *in litt.* 1991); and “Imperial valley”, which is untraced but apparently on the east side of Monte Mohinora (26°06'N 107°04'W) west of Guadalupe y Calvo, where a male (in MLZ) was collected at 3,050 m in May 1937 (see Miller *et al.* 1957), and whence come unconfirmed reports in 1961 (A. Gardner *in litt.* to J. T. Tanner 1961 *per* N. Tanner *in litt.* 1991). Untraced localities in Chihuahua include “Black Cañon”, where a male and female (in YPM) were collected in February 1910, and “Mound valley”, where two males and five females (in MCZ and CM) were taken in September 1905, a male (in AMNH) in December 1919, and three females (in AMNH) in December 1921.

*Durango* The Imperial Woodpecker is noted from the western and southern parts of the state, the localities involved being as follows: San Miguel de los Cruces (130 km west-north-west of Durango), with unconfirmed reports (Tanner 1964); río Verde crossing (24°15'N 105°00'W), with unconfirmed reports of a bird in 1961 (A. Gardner *in litt.* to J. T. Tanner 1961 *per* N. Tanner *in litt.* 1991); 200 km west of Durango “at the summit of the sierras”, where two females (in AMNH and ROM) were taken at 2,775 m in February 1904; Coyotes (either 24°15'N 104°42'W, or 23°49'N 105°20'W), where a male and two females (in FMNH) were collected in August and September 1904; El Salto, where a male and three females (in USNM) were collected in July 1898; near La Ciudad, where several specimens (male and female taken in January 1882, and a male and female taken in February by the same collector; all in BMNH) were collected (Salvin and Godman 1888-1904); Nievero (Neviero in Miller *et al.* 1957, both untraced but c.6 km west of La Ciudad), where a male and female (in MLZ and LSUMZ) were taken in March 1938; Chavarría (Chavaria in Lumholtz 1903: 23°38'N 105°36'W, and apparently in the immediate vicinity of La Ciudad), where a flock of six was seen in February 1891 (Lumholtz 1903); Pueblo Nuevo (south of El Salto), whence come reports of birds in 1960 (R. Baker *in litt.* to J. T. Tanner 1961 *per* N. Tanner *in litt.* 1991); Rancho Las Margaritas (untraced but apparently 43 km south and 27 km west of Vicente Guerrero at 23°45'N 103°59'W), whence come unconfirmed reports of the species in June 1957 (Fleming and Baker 1963); 46 km south by 31 km west of Vicente Guerrero, where in July 1957 at 2,680 m a nest-hole apparently excavated by the species was found to contain the nest of a Thick-billed Parrot (Baker 1958: see Ecology); Los Cebollos (south of Durango), unconfirmed reports suggesting that the species was present here until 1961 (A. Gardner *in litt.* to J. T. Tanner 1961 *per* N. Tanner *in litt.* 1991); 80 km south of Durango, where a male and female (in MLZ and MNHUK) were taken at 2,440 m in July 1947, with unconfirmed reports coming from the vicinity of “La Guacamayita” (untraced, but also 80 km south of Durango), locals recording the species up to five years prior to 1962 (Tanner 1964); 100 km south of Durango, where a pair was found in 1954, one noted in 1956 and a dead one seen in 1958 (Tanner 1964, Plimpton 1977); near Los Charcos (untraced but 130 km south of Durango), where two old nest-holes were seen at c.2,800 m in June 1962, unconfirmed reports suggesting that the species was present until three years before this date (Tanner 1964). Other reports suggest that the species was present in the northern part of the Sierra de los Huicholes in June 1962 (Tanner 1964), further specimens coming from “Sierra de Durango” (male in SDMNH, date unknown), and the “Durango mountains” (a male in LACM taken in 1912).

*Nayarit* There appears to be only one record of this bird from Nayarit, represented by a male (in

MLZ) taken 16 km north-west of Santa Teresa (22°28'N 104°44'W) at 1,675 m during June 1941. The distribution map given by Tanner (1964) implies that there is an unconfirmed record of the bird from 1961-1962 south-east of the known locality.

*Zacatecas* The available evidence is inconclusive: Salvin and Godman (1888-1904) suggested that Richardson, “in the Sierra de Valparaíso, in the state of Jalisco, saw a specimen and shot at it”, Nelson (1898) mentioned that “Richardson took others in the Sierra de Valparaíso in northern Zacatecas”, and both Tanner (1942) and Miller *et al.* (1957) subsequently included Zacatecas within the range of the species. On the CETN (1976) map of the area, however, the Sierra Valparaíso is situated at c.22°40'N 103°45'W in northernmost Jalisco and south-western Zacatecas: the precise locality and state where Richardson recorded the species is therefore unknown.

*Jalisco* Records of this species from the Sierra de Valparaíso may possibly be from this state (see immediately above). Nelson (1898) recorded the species from near Bolaños (21°41'N 103°47'W) and also suggested that this is the type-locality (see Remarks 2). Lumholtz (1903) mentioned having seen the species as far south as the southernmost point which the Sierra Madre del Norte reaches in the state of Jalisco, north of the río de Santiago. South and west of this river, specimens come from near Mascota (20°32'N 104°49'W) in the Sierra de Juanacatlán, where a female and two juvenile males (in AMNH) were taken in May 1892, with a female in December of the same year. Nelson (1898) described specimens taken by A. C. Buller as coming from (c.240 km) south of Bolaños in the Sierra Juanacatlán, western Jalisco, presumably referring to the specimens that Buller collected at Mascota in 1892, despite the fact that this is c.175 km south-west of Bolaños (calculated from the coordinates). Nelson (1898) also visited this locality (240 km south of Bolaños) in the spring of 1897, recording the scalp of a bird taken a few months previously, and noting unconfirmed reports of the bird in the surrounding mountains.

*Michoacán* The Imperial Woodpecker has been recorded from just one small area of north-central Michoacán, the most southerly point in the species's distribution. At Pátzcuaro (19°31'N 101°36'W), one bird was killed “a few miles away” in the summer of 1892 (Nelson 1898), this probably referring to a juvenile female (in USNM and labelled “Pátzcuaro”) taken in July 1892. In the autumn of the same year, a pair was seen and a male collected at 2,135 m near Nahuatzen (19°42'N 101°50'W), and at a camp to the west of the village five were seen (and all collected), with 5-6 more found in the hills “a mile or so away” (Nelson 1898). Three males, three females and two others (in USNM) were collected at or near Nahuatzen during October 1892, and on the return trip to Pátzcuaro, near the original site, a party of 8-10 were seen (Nelson 1898). In the Nahuatzen district this species's range appears to have been restricted to the rather narrow belt along the top of the main central ridge of the Sierra Madre which lies above 2,135 m (Nelson 1898).

**POPULATION** The last confirmed record of the Imperial Woodpecker was from Durango in 1958, although there are plausible but unconfirmed records throughout the early 1970s, with nothing having been recorded about the species since 1977. It has been variously described as “greatly reduced in numbers and in danger of extinction” (Miller *et al.* 1957), “virtually extirpated from its native pine-forests in the Sierra Madre Occidental” (Leopold 1959), and “on the brink of extinction if not already extinct” (Short 1982). It was not historically a rare species within its preferred habitat, occurring at a calculated density of 6 birds per 80 km<sup>2</sup>, with a group of even 8-10 birds having been recorded (Tanner 1964).

*Sonora* In 1886, the Imperial Woodpecker was found to be common in the pine-forests of the Sierra Madre de Sonora, within 80 km of the Arizona border (Ridgway 1887c). However, the record of a male and female (in LACM) collected in the “Sierra Madre de Sonora”, west of Casas Grandes (westernmost Chihuahua) in 1906 appears to be the last positive record from this state (Miller *et al.* 1957 suggested that there had not been a record since 1902), although the species was easily found along the border on the Chihuahua side in 1941 (Tanner 1942; see below) and an unconfirmed sighting in 1975 may also be from this state (see Distribution).

*Chihuahua* In the north, almost all records come from between 1892 and 1909 (see Distribution), although in 1941 the species was found easily but was not common across the border from Sonora (Tanner 1942). Further south, c.80 km west of Terrazas, 17 were shot within a few months, this area being “much frequented by the species” (Smith 1908). Even in 1890-1891, Lumholtz (1903) concluded that the bird could be seen in only the remoter parts, but that it was on the point of being exterminated by the Tarahumara and Mexicans. Bergtold (1906) considered it common (in 1903-1904) in the mountains west of Parral. More recent unconfirmed records are from Yahuirachic, 8-14 years prior to 1977; Tutuaca, with

reports of “many” in the vicinity during the early 1970s, and one reportedly seen 8 km away in 1977; Cebadilla, 6-8 years prior to 1977, and Pitoreal, where six were reported by woodcutters in 1977 (Plimpton 1977). An interesting rumour of several pairs discovered in the mountains near the Barranca del Cobre in October 1973 is also unconfirmed (Plimpton 1977). A significant population obviously existed at “Mound valley” (see Distribution). There is no information about the population further south in the state.

*Durango* Fleming and Baker (1963), along with local residents, considered this species rare and elusive in the state. Unconfirmed reports from west of San Miguel de los Cruces indicated that a population died out during the 15 years before 1962 (Tanner 1964). Good numbers appear to have existed in the La Ciudad–Nievero–Chavarría area (see Distribution). In the area south and west of General Vicente Guerrero in 1957, locals (at Rancho Las Margaritas) indicated that (in 1957) birds were only occasionally seen (usually two but sometimes four), being widely spaced with no more than a pair in any one of the large canyons, and indeed in a valley nearby, two birds were reported in June 1957, several trees showing fresh evidence of feeding, and one felled tree having cavities (one of these presumably containing the two young reported taken in that month): residents agreed that the species was less abundant in 1957 than previously, mentioning that a pair in the canyon where La China lumber camp was built in 1956 disappeared soon afterwards (Fleming and Baker 1963). In the south of the state, residents around a new lumber camp in 1953 claimed that 12 individuals were shot in a year (Tanner 1964). In the region 80-130 km south of Durango city, natives who knew the bird agreed (in 1962) that it was once common but no longer present, suggesting that it was last seen around 1957-1959, although other unconfirmed reports indicated that it was still present in the northern part of the Sierra de los Huicholes in June 1962 (Tanner 1964; see Distribution).

*Nayarit* The only confirmed record refers to a single bird (see Distribution).

*Jalisco* All records for this state are from the late nineteenth century, the species apparently still being found sparingly in the mountains surrounding Mascota in 1897 (Nelson 1898).

*Michoacán* In the Pátzcuaro–Nahuatzen district during the summer and autumn of 1892 a group of 8-10 was reported, along with two smaller groups of five or six birds (Nelson 1898). At this same time, the local Indians mentioned other places where they were common, one local leading an observer to a view-point overlooking a great expanse of forested country, and pointing out a number of park-like openings where the birds could assuredly be seen; two nests were found in the area the following year (Nelson 1898). Tanner (1964) calculated the density in this area at c.1 pair per 25 km<sup>2</sup> (or probably more accurately as 6 birds per 80 km<sup>2</sup>). There are no records of the bird during the twentieth century, Lea and Edwards (1950) in the Pátzcuaro region during 1947 concluding that the species “is undoubtedly completely absent at present from this section of its former range”, the extensive pine-forest between Nahuatzen and Pátzcuaro that existed in the 1890s already having been destroyed.

**ECOLOGY** Miller *et al.* (1957) asserted that the species was found in mountains from 1,525-3,050 m, but almost all records come from between 1,920 and 3,050 m, and contrary to Tanner (1964) there does not appear to be any significant altitudinal variation between the northern and southern populations (see Distribution). The record from Nayarit (see Distribution), at 1,675 m, is the only one from lower than 1,900 m, and as the specimen was taken in June, it may represent a non-breeding or post-breeding wanderer. The Imperial Woodpecker's preferred habitat can generally be described as open forest consisting of large pines (trees commonly 15-20 m to the lowest limb) with many dead trees intermixed, and broken by grassy park-like areas (Nelson 1898, Tanner 1964). In the north-west of the range, one area for the species (around Casas Grandes between 2,100-2,700 m) is intersected by many ravines and sparsely covered by tall pines (Bergtold 1906), the mountains generally forested with *Pinus montezumae* (Tanner 1942); but in southern Durango, Tanner (1964) found that the dominant tree species (in an area once inhabited by the species) were *P. durangensis*, *P. lutea*, *P. ayacahuite* and *P. montezumae*, the largest pines being found at the higher elevations. Locals in Durango mentioned that the species preferred stands of “yellow” pines with numerous dead but still standing pines intermixed (Fleming and Baker 1963).

In Jalisco, it was found that the undulating mountain summits were forested with several species of pine, oak and madroño (*Arbutus* spp.), park-like basins scattered throughout the area (Nelson 1898). In Michoacán, where the bird's population density was calculated at c.1 pair per 25 km<sup>2</sup>, the area was described as upland volcanic country, overgrown with open pine-forest in which grassy parks opened “here and there” (Nelson 1898). A hill which provided a view across this area revealed a succession of pine-covered hills (like a rolling and irregular tableland), broken in places by the dull yellow openings of

the grassy parks: here, Imperial Woodpeckers were only found where the forest was almost entirely made up of *Pinus montezumae*, and were not seen to alight on any other tree (Nelson 1898). In the Pátzcuaro district, a pair of birds was seen on a dead pine on the border of an Indian cornfield; although the woodpecker generally roamed through the thin parts of the forest or about the borders of grassy parks, it was also partial to dead trees around partly cleared fields (Nelson 1898).

During February 1891, Lumholtz (1903) noted a group of six birds, concluding that except in this “pairing” season the birds are not seen in such numbers and are normally found in pairs (a conclusion reinforced by an independent observation given by Tanner 1942). However, the six birds may have been a family group from previous seasons (see below), Nelson (1898) recording parties (see Population) during one October, and concluding that the birds remain in family groups during the autumn and winter. Tanner (1964) suggested that as the species produced 1-2 young a year (see below), the flocks of 5-10 birds may have represented young birds from previous breeding seasons, or possibly a chance encounter between two families. In autumn 1892, Nelson (1898) noted a party of five birds that persistently returned to the same roost area each evening, calling from there each dawn and then flying off to a feeding ground amongst the dead pines on an adjacent park-like flat. At that time of year, the birds showed strong local attachments although in the middle of the day the group roamed throughout the open forest (Nelson 1898). Roost-site fidelity was also recorded by Tanner (1942). In western Jalisco, locals claimed that the species was present every summer, but led a more wandering life during the winter (Nelson 1898). In Durango during the winter, birds apparently moved to lower areas in the barrancas when snow fell in the higher country (Fleming and Baker 1963). Also in this area, birds were noted as flying high and often long distances from one side of a steep barranca to another, rarely staying long in one place (Fleming and Baker 1963), although Lumholtz (1903) reported that one of the species's peculiarities was that they “feed on one tree for as long as a fortnight at a time, at last causing the decayed tree to fall”.

Imperial Woodpeckers foraged almost exclusively by scaling bark from dead pine trees, and have been observed feeding on partly decayed prostrate trunks and knocking large chunks of outer bark from standing trees (Tanner 1964, Short 1982). The birds fed in this way in order to find large insect larvae (e.g. Cerambycid larvae) (Fleming and Baker 1963, Tanner 1964).

Nest-holes were excavated in dead pine trees, holes having been found c.20 m up in the main trunk, the only tree species recorded being *P. montezumae* (Baker 1958, Fleming and Baker 1963). A local “meat hunter” suggested that the bird may excavate holes in dead oaks or in the dead branches of living oaks (Fleming and Baker 1963), which appears to be the only reference to the species using a broadleaf species and may well involve a misidentification of the bird (see Remarks 3). Breeding has been recorded during February–June: in Michoacán, two eggs were taken in February, a nest with newly hatched young was found on 1 March 1893 (the young flew in April) (Nelson 1898), two young were found in a cavity (in Durango) in June (Fleming and Baker 1963), and juveniles have been collected in May (in AMNH) in Jalisco, and July (in FMNH) in Chihuahua, Short (1982) suggesting that immature birds are known (in Jalisco and Chihuahua) from April to September (birds in the nest in June would still be recognizably immature until September or October: L. L. Short *in litt.* 1991).

**THREATS** A number of factors have brought about the elimination of this species in the Sierra Madre Occidental, but they can all be summarized as either (initially) hunting pressures or (more recently, and with far greater consequences) habitat destruction and modification. As early as 1890-1891, Lumholtz (1903) observed that in Chihuahua the Imperial Woodpecker was on the point of being exterminated because (a) the Tarahumara Indians (who at this time ranged throughout the Sierra Madre in Chihuahua) considered the young of the species such a delicacy that they did not hesitate to cut down even large trees in order to get at the nests, and (b) local Mexicans shot them because their plumage was thought to have medicinal properties. Bennett and Zingg (1935) studied the same tribe during the 1930s, the Indians then claiming that they had no knowledge of the species and that it had been wiped out by the Mexicans. Observations in Durango convinced Tanner (1964) that shooting was the main cause of the species's elimination, the locals being dependent on hunting for meat, and indeed the last confirmed record was ironically of a dead bird being carried by a local in southern Durango in 1958 (see Population).

Other examples of the exploitation of this species are the collection of 17 within a few months in Chihuahua on the pretext that the bills had a commercial value (Smith 1908), and the occasional sale of caged birds as pets in the markets of Ciudad Durango (Fleming and Baker 1963), but the collection of over 120 scientific specimens (from museums mentioned in Distribution) is unlikely to have had a significant

impact. Two young that were presumably taken from one of the nest-holes noted in a tree felled in June (Fleming and Baker 1963) were obviously sufficiently sought-after (by locals) to warrant the felling of the nest-tree (see below).

The real cause of the hunting problem seems to stem from the expansion of lumber operations into remote parts of the sierra, which brought people into the forest: small ranches were set up, and areas opened up for settlement (Tanner 1964). Residents in a number of areas where lumber operations had started (operations were apparently set up in earnest during the early 1950s) indicated that the Imperial Woodpecker disappeared within a few years (e.g. La China and La Guacamayita; see Population). Although the residents reported this decline, they either gave no reason for it, or blamed it on logging, felling of dead pines or the fact that the birds were shy (contrary to all reliable reports of the bird: Tanner 1964) and “disappear” when man is present (Fleming and Baker 1963). The fact that the species disappeared so rapidly after settlement suggests the influence of hunting rather than habitat modification (e.g. in southern Durango, 12 birds were killed within a year around a new lumber camp: Tanner 1964), although it could also have simply been due to human disturbance.

In Michoacán, there are no records of birds killed by locals, the extinction here being caused by the almost total removal by 1947 of the extensive virgin pine-forests between Nahuatzen and Pátzcuaro (Lea and Edwards 1950). This is the only area where total deforestation (rather than modification) is deemed to be the cause of the species's disappearance, although the widespread felling of trees also used by Military Macaw *Ara militaris* (and Thick-billed Parrot) in Durango (with the intention of obtaining young to sell for pets) may have had a detrimental effect upon the availability of the species's food and nest-trees (Tanner 1964).

In the early 1960s the logging of the Sierra Madre Occidental pine-forests was highly selective and relatively light: many areas still had extensive stands of virgin forest, and logged areas still contained many large pines, enough of which were dead (or would die from natural causes) to supply adequate food (Tanner 1964). It was then believed that if the prevailing policies of selective cutting continued, suitable habitat should remain, and the main problem would be hunting for food. However, it now appears that dead pines are specifically extracted for pulp, and government restrictions only prevent living pines with a breast-height diameter less than 40-50 cm from being felled (see relevant section under Thick-billed Parrot). The relatively recent but widespread modification of primary forest, even in the remotest areas of the species's range, has inevitably (and substantially) reduced the chances of the woodpecker's survival, and if the bird is (or becomes) extinct, this will be the overriding cause of its final destruction.

**MEASURES TAKEN** Tancítaro and Barranca del Cobre National Parks are both within the range of this woodpecker, although there are no confirmed records from either (see Distribution). There appear to be no protected areas covering localities where this species is known to have occurred, and although the game laws apparently “protect” the bird, they are totally unenforceable (Tanner 1964). There has also been no effort to prevent further pine-forest modification in any areas suitable for the species within the Sierra Madre.

**MEASURES PROPOSED** Tanner (1964) suggested that the presence of the Imperial Woodpecker in an area of Sierra Madre pine-forest might well be a suitable criterion for the establishment of a national park, although clearly before any such initiative can be implemented, a viable population must first be found. A number of specific searches have been undertaken during and since the 1960s (e.g. Plimpton 1977, A. G. Navarro and A. T. Peterson *in litt.* 1991, L. L. Short *in litt.* 1991), although these have to a large extent concentrated on regions from which the most recent reports came, and are therefore the areas where the species has perhaps been persecuted the most. There are three general areas that appear to be most likely still to harbour individuals of this species: (1) in the north, the area around the Sonora–Chihuahua border where the bird was found easily in 1941, and was probably seen in 1975 (see Distribution); (2) the main part of the Sierra Madre Occidental in northern Durango, north and west of Santiago Papasquiaro, where the species has never been recorded but which is in the middle of its range and appears to be less densely populated than other areas (it appears to be a greatly neglected area in terms of biological investigation); (3) the southern part of the Sierra de los Huicholes, north of the río Grande de Santiago in northern Jalisco (and Nayarit), which also appears to be less densely populated and ornithologically unexplored in recent years. If a remote and as yet relatively unsettled area can be found, this species may well be present in small numbers which would then enable a conservation plan for its survival to be initiated. Obviously,

however, with each passing year the prospects of success recede, and it is time that a major international expedition was formed to survey these and other regions exhaustively; with the loss of the closely related Ivory-billed Woodpecker *Campephilus principalis* (see relevant account) to contemplate, the conservation and ornithological communities of North America and indeed the “developed” world would do well at least to avoid posterity's imminent judgement that the planet's largest and most spectacular woodpecker disappeared in a climate of indifference and inertia. The need to preserve several extensive areas of intact forest in this species's range is indicated in the equivalent section under Thick-billed Parrot and Eared Quetzal, species which would also benefit from study in any major new initiative in the Sierra Madre Occidental.

**REMARKS** (1) Van Rossem (1934) cited a specimen from MCZ collected by McLeod in May 1884 but gave “no locality”; however, inspection of apparently this specimen in 1987 revealed “Temochi” (presumably Temochic) on the label. (2) The type-specimen (one of 5-6) was taken from “that little-explored district of California which borders the territory of Mexico” (*Proc. Zool. Soc. London* 1832: 139-140); Salvin and Godman (1888-1904) suggested that the specimens were taken by Floresi, who apparently collected in the mountains near Bolaños, Jalisco; from this, Nelson (1898) concluded that the type locality was Bolaños. (3) Sclater and Salvin (1866) were the first to recognize the identification “problem” that this large black-and-white woodpecker presented, even a specimen described as this species (Sclater and Salvin 1859) proving on further inspection to be an example of the Pale-billed Woodpecker *Campephilus guatemalensis*. Plimpton (1977) reported that some of the unconfirmed records of the species that he heard of probably referred to Lineated Woodpeckers *Dryocopus lineatus*, and the fact that Tanner (1964) found that the Imperial Woodpecker's common local name (“pitoreal” [*sic*]) was also used for the Pale-billed Woodpecker shows that care needs to be taken with records from locals.