

**A STATUS ASSESSMENT OF THE EASTERN SUBSPECIES OF BEWICK'S  
WREN (*THRYOMANES BEWICKII BEWICKII* AND *THRYOMANES BEWICKII*  
*ALTUS*)**

Geographical Area Covered in the United States of America: Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, Washington, D.C., West Virginia, Wisconsin

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### Disclaimer

This document is a compilation of biological data and a description of past, present, and likely future threats to the easternmost two subspecies of Bewick's Wren, *Thryomanes bewickii bewickii* and *Thryomanes bewickii altus*. It does not represent a decision by the U.S. Fish and Wildlife Service on whether these taxa should be designated as candidate taxa for listing as threatened or endangered under the Federal Endangered Species Act. That decision will be made by the Service after reviewing this document; other relevant biological and threat data not included herein; and all relevant laws, regulations, and policies. The result of the decision will be posted on the Service's Region 4 Web site (refer to: <http://southeast.fws.gov/es/candidate.htm>). If designated as candidate taxa, the taxa will subsequently be added to the Service's candidate species list that is periodically published in the Federal Register and posted on the World Wide Web (refer to: <http://endangered.fws.gov/wildlife.html>). Even if these taxa do not warrant candidate status it should benefit from the conservation recommendations that are contained in this document.

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## TABLE OF CONTENTS

The Wren, Its Races, and Ranges	1
Description	1
Races	1
Ranges	4
Validity of <i>altus</i>	11
Life History	13
Nesting season	13
Non-nesting season	15
Food Habits	15
Habitat	16
Conservation Status	22
State Monographs	23
Alabama	24
Arkansas	29
Delaware	30
Florida	31
Georgia	31
Illinois	33
Indiana	34
Iowa	36
Kansas	37

Kentucky	38
Louisiana	39
Maryland and the District of Columbia	40
Michigan	41
Minnesota	42
Mississippi	43
Missouri	43
Nebraska	45
New York, New Jersey, the New England States, and Rhode Island	46
North Carolina	47
Ohio	48
Oklahoma	51
Pennsylvania	52
South Carolina	54
Tennessee	55
Texas	57
Virginia	58
West Virginia	60
Wisconsin	61
States Summary	62
Petition to list <i>altus</i>	63
Published Literature	67
Increasing	68

House Wren Competition	68
Competition with Other Birds and Cowbird Parasitism	74
Habitat Change	75
Weather	76
Unknown	77
Miscellaneous Comments	77
Experts Contacted	81
Specimens Borrowed	83
Population Levels	84
Breeding Populations	84
Wintering Populations	87
Causes of the Population Decline	99
Literature Cited	101

## LIST OF TABLES

Table	Page
1. Historical and present status of Bewick's Wren ( <i>Thryomanes bewickii</i> ) in various states of the eastern United States compiled from state monographs, published literature, and expert comments.	26
2. Trends in Bewick's Wrens populations based on data from Breeding Birds Survey (BBS) routes (1 <sup>st</sup> half=mostly 1967 to 1985, 2 <sup>nd</sup> half= 1986 to 2003, whole period=all 37 years; <u>underlined trends were significant from zero at <math>P \leq 0.05</math></u> ).	85

## LIST OF FIGURES

Figure	Page
1. Number of Eastern Bewick's Wrens on Christmas Bird Counts in the eastern United States and the number of counts recording the species from 1949 to 1996 (Rosenberg 2003).	89
2. Numbers of Bewick's Wrens per party hour detected on Christmas Bird Counts in Georgia from 1939 to 2003.	91
3. Number of Bewick's Wrens per party hour detected on Christmas Bird Counts in Kentucky from 1939 to 2003.	92
4. Numbers of Bewick's Wrens per party hour detected on Christmas Bird Counts in Tennessee from 1939 to 2003.	92
5. Numbers of Bewick's Wrens per party hour detected on Christmas Bird Counts in Alabama from 1939 to 2003.	93
6. Numbers of Bewick's Wrens per party hour detected on Christmas Bird Counts in Missouri from 1939 to 2003.	94
7. Numbers of Bewick's Wrens per party hour detected on Christmas Bird Counts in Arkansas from 1939 to 2003.	95
8. Numbers of Bewick's Wrens per party hour detected on Christmas Bird Counts in Louisiana from 1939 to 2003.	95
9. Numbers of Bewick's Wrens per party hour detected on Christmas Bird Counts in Oklahoma from to 1939 to 2003.	96
10. Numbers of Bewick's Wrens per party hour detected on Christmas Bird Counts in Texas from 1939 to 2003.	97
11. Numbers of Bewick's Wrens per party hour detected on Christmas Bird Counts in New Mexico from 1939 to 2003.	98

## THE WREN, ITS RACES AND RANGES

### Description

Bewick's Wren was newly discovered by John James Audubon on 19 October 1827 near St. Francisville, Louisiana and his rendition of the bird constitutes the type for the species (American Ornithologists' Union 1998, p. 479). Bewick's Wren (*Thryomanes bewickii*) is a small bird measuring approximately 5.25 inches in length from the tip of its beak to the end of its tail. The crown and back are uniformly brown except for white spots near the tips of the lower back feathers, which usually are covered by long brown feathers attached immediately in front and thus are not always visible. The wings and tail are brown marked with darker brown cross bars, the tail having a series of large white marks near and on the tips of especially the outer feathers displayed in tail spreading during flight, or seen when the tail is viewed from below. The throat, upper breast, and flanks are grayish grading to whiter on the belly and turning to brownish on posterior flanks and belly. The under tail coverts are horizontally barred black and white. A bright white line over the eye from the base of the beak to the nape is a conspicuous plumage feature. The tail is longer in proportion to the body than in most wrens and is commonly held tilted upward at an angle to the axis of the body and often is repeatedly switched back and forth. The beak is elongate, thin and sharply pointed, showing the slight downward curvature found in wrens. The beak is mostly dull yellowish, but blackish along the top margin (culmen). Legs and feet are dusky yellowish.

### Races

In considering subspecies taxonomy of Bewick's Wren, the designations were followed that are used in the monograph by Kennedy and White (1997, p. 5-6) matching

the system found in the fifth edition of the "Check-List of North American Birds" (American Ornithologists' Union 1957, p. 411-414) rather than adopt the somewhat different list of races proposed by Phillips (1986, p. 148-155).

Twenty-nine subspecies have been described for Bewick's Wren, most occurring in the western United States and into Mexico (Kennedy and White 1997, p. 5-6). The present report focuses on the two eastern races, the ones that have declined markedly since the mid 1900s. The form *T. b. bewickii* most closely matches the original Audubon plate (Aldrich 1944, p. 306-307) and therefore is designated the nominate taxon. It has a striking reddish or rufescent tinge to the uniform brown of the back coloration. This is the westernmost of the two eastern races existing from the Great Plains to the Appalachian Mountains. The subspecies that occupies the Appalachian region was named *T. b. altus* by Aldrich (1944, p. 307-309) due to its "darker more sooty (less rufescent)" dorsal plumage than *bewickii*. He found no size differences between these two races. It is also important to characterize the still abundant subspecies *T. b. cryptus* immediately to the west of *bewickii* in order to determine the western limit of the latter, which is important to know for management considerations. In size, *cryptus* is larger than the two eastern taxa described above, is a grayish brown above and whiter below, and has a relatively longer tail (Ridgeway 1904, p. 555).

There has been considerable doubt expressed concerning the validity of *altus* as a legitimate taxon differing from *bewickii*. The strongest repudiation emanates from the words of Phillips (1986, p. 151) when after inspecting the specimens that Aldrich (1944, p. 308-309) used to name *altus* Phillips wrote "The type of *altus* described as darker, is indeed dark—in fact filthy, utterly devoid of taxonomic value; the whole type series is

dirty.” Phillips considers *altus* to be a probable synonym of *bewickii* but laments the fact that he has seen too few fall specimens in fresh and clean plumage after the annual molt to be sure. The dirty plumage indictment is echoed by others concerning their collection of Bewick's Wrens. Robert B. Payne, Curator of Birds at the University of Michigan Museum at Ann Arbor, complained that some of the specimens there were so sooty and dirty that they should be subjected to a thorough cleaning. Looking at his series he discovered too much variation and overlap and thus stated “I do not think *altus* differs significantly from nominate *bewickii*.” With reference to the wrens in the collection at the Carnegie Museum of Natural History, Pittsburgh, Robin K. Panza of the Section of Birds, found the same sooty-dirty specimen problem thus precluding reliable subspecies designation. Two suggestions were made: either launder the specimens or collect new birds now that smoke control is in effect. Selander and Johnson (1967, p. 219) declared that due to dusting and industrial soot all specimens of House Sparrows (*Passer domesticus*) and other urban birds must be washed in hot water with detergent, rinsed thoroughly, dried, and then rinsed in an organic solvent to show true plumage colors.

There were two other expert comments on the validity of *altus*. Avian taxonomist Richard C. Banks at the National Museum of Natural History, Smithsonian Institution, communicated that “If it were up to me, I think that I probably would not recommend recognition of the Appalachian race, *altus*, as distinct from other eastern birds, *bewickii*.” Ornithologist Jay M. Sheppard, states that “He would be very dubious of the validity of the *altus* taxon,” and argues that eastern North America originally was almost totally forested thus containing little early successional habitats for Bewick's Wrens until European settlement pattern prevailed in the 1800s and the forests were cleared to

produce agricultural lands (see the habitat section below). This implies time was too short between then and now to permit subspeciation in the Appalachians. The late Robert M. Mengel (1965, p. 349) also had difficulty recognizing *altus* when noting that the difference from *bewickii* was slight if indeed real. Robert B. Payne communicated concerning Mengel's notations on the specimen labels in the University of Michigan Museum collection. The birds from Georgia were identified as *bewickii* even though that is where *altus* should exist (see range below). Most of the birds in West Virginia and neighboring states were named *altus* by Mengel but usually in quotes or with a question mark.

### **Ranges**

Combining the descriptions in several monographs (Bent 1948, p. 180-183, American Ornithologist' Union 1957, p. 411-412, Kennedy and White 1997, p. 3-4, Phillips 1986, p. 151, Pyle 1997, p. 364, American Ornithologists' Union 1998, p. 479) and simplifying somewhat, the combined breeding range of the two eastern subspecies of Bewick's Wren once occupied a region in the eastern United States extending northward to southeastern Nebraska and adjacent Kansas, southern Iowa and Wisconsin, northern Illinois and southern Michigan, southern Ontario, northern Ohio, central Pennsylvania and southeastern New York. From this northern limit breeding birds occurred southward to northwestern Arkansas through eastern Oklahoma, to eastern Texas. The southern edge extended eastward from Oklahoma and Texas to the central parts of Mississippi, Alabama, Georgia and South Carolina, but was not reported nesting in Louisiana (Lowery 1974, p. 461) or southern Arkansas (James and Neal 1986, p. 259-260). In the Atlantic states the eastern edge of the breeding range ended where the Appalachian

Mountain landscape terminated. The species was rare or absent on the Piedmont and Coastal Plain physiographies east of the mountains in the east coast states in its range from New York and New Jersey to central Georgia. The western limit to the breeding range of the eastern subspecies *bewickii* extended to the eastern parts of Kansas, northwestern Arkansas and eastern Oklahoma, northeastern Texas across to northwestern Mississippi, being absent in Louisiana. Bewick's Wrens are presently rare or absent in much of the range described above, a phenomenon first exhibited by a shrinking southward from its northern limit but soon accompanied by a rapid decline throughout the range and especially in the lowlands and mountains east of the Mississippi River. The magnitude of this shrinkage is apparent in *The Birds of North America* monograph on Bewick's Wren (Kennedy and White 1997, p.1) that shows only four tiny areas of present occurrence in its former eastern range east of the Mississippi River.

The *altus* race inhabited the easternmost part of the overall breeding season range described above, primarily in the Appalachians, with *bewickii* occurring in the lowlands from there westward to the eastern limit at the Great Plains. Therefore, where ever the Appalachian topography occurs the northern, eastern, and southern limits of *altus* would coincide with the description given above. It is important, then, to delineate the longitudinal area to the west of the Appalachians where *altus* meets *bewickii*. Aldrich (1944, p. 308) specifies this zone, which is as follows: a north to south line connecting central western Pennsylvania, with central through southwestern Ohio, extending to southeastern Kentucky and east central Tennessee ending in the northwestern part of Alabama. [Note: Aldrich (1944, p. 308) did not include Ontario, Canada, in the range of *altus*, but Bartgis (1986, mimeograph, no page numbers) and Kennedy and White (1997,

p. 4) did. For the purpose of the present manuscript Ontario is omitted from the *altus* range because the site of occurrence is Point Pelee, which is in the *bewickii* lowlands far west of the mountains.]

The winter ranges (Aldrich 1944, p. 308, American Ornithologists' Union 1957, p. 3) of both subspecies show a small shift southward in the north and a comparable shift southward into near Gulf Coastal environs south of the breeding range in the Gulf states. The vast majority of birds in between these two extremes are apparently permanent residents. The migrants into the coastal zone spread laterally to over winter across Louisiana with some *altus* reaching northeastern Texas in the *bewickii* zone (Aldrich 1944, p. 309). Oberholser (1974, p. 634) indicated that only the *cryptus* subspecies occurred in eastern Texas in the breeding season but *bewickii* over wintered there, neither taxa present in summer in the part of the state adjacent to Louisiana.

If the eastern forms of Bewick's Wren qualify for special treatment and are then subject to management considerations, it is important to know exactly where the ranges of the populations of concern end to the west. This would require identifying the western limit of *bewickii* where it meets *cryptus*. Where *bewickii* meets *altus* is also of importance. Therefore, over 200 specimens from 11 museums were inspected from critical localities, all three subspecies represented. A fundamental problem in the evaluation of these specimens concerns the fact that most of the wrens were collected in fall and winter, only a very few in the breeding season. This possible difficulty is mitigated by Bewick's Wren being mostly non-migratory. (Note: most of the literature examined referred to the race *cryptus* in occurrence at the western edge of the range of *bewickii*. More recently Phillips (1986, p. 151-152) repeated in Pyle (1997, p. 364)

described a new form *pulichi* occupying this western position with *cryptus* displaced further west. Very few of the specimens examined for this report were labeled *pulichi* rather than the earlier *cryptus*. Since the task at hand is to only delineate the western limit of *bewickii* that remains the main mission. Naming the race to the west of *bewickii* is not of primary importance. Therefore, the use of *cryptus* serves as a surrogate for *pulichi* where appropriate.).

To provide more specific range details, Bewick's Wrens are summer residents through the eastern third of Kansas and westward along the southern tier of counties (Thompson and Ely 1989, p. 298-299, Busby and Zimmerman 2001, 298-299). Johnston (1960, p. 42, 1965, p. 39) finds that the birds in northeastern Kansas are the form *bewickii*, and the ones in southern Kansas are *cryptus*. Mark Robbins (pers. comm.) reports that in the University of Kansas collection the birds across Missouri are the reddish *bewickii* type. There were no specimens for extreme eastern Kansas, but the ones between east-central and central Kansas are intermediate between *bewickii* and *cryptus* indicating intergradation between the two subspecies. Therefore, the western edge of the *bewickii* range would predictably be eastern Kansas, an area from which there are no specimens. Presence of *bewickii* in Missouri is corroborated by two specimens with very sooty blackened breasts in the American Museum of Natural History, but they still are recognizable as *bewickii* (AMNH 230060). (Museum acronyms are given in a later section titled "Miscellaneous Comments" in the subsection "Specimens Borrowed".) The birds in the Flint Hills Uplands in eastern Kansas and adjacent Oklahoma are definitely brown not red backed and therefore are not *bewickii* in the Manhattan, Kansas, and

Bartlesville, Oklahoma, regions (J. Zimmerman, pers. comm., for Kansas and D. L. Reinking, pers. comm., for Oklahoma).

Progressing southward to Arkansas, there are four *bewickii* from northwestern Arkansas: two specimens from the collection at the University of Arkansas Collections (UA 85-1639, UA 85-1641), one specimen from the Field Museum of Natural History in Chicago (FMNH 49,577), and one from the National Museum of Natural History (NMNH 228582). The American Museum of Natural History collection contains one specimen of *cryptus* (AMNH 374766), which was collected at Winslow in western Arkansas. Moving westward to adjacent Oklahoma, in the collections of the University of Oklahoma plus those of Cornell University, there are a total of eight specimens from various localities (e.g. Broken Bow, Grove, Muskogee) in eastern Oklahoma. Four are *bewickii* (e.g. UO 3238, CU 12,882) and four are *cryptus* (e.g. UO 705). Two specimens (NMNH 298675, 365733) from the Tulsa area were identified as intergrades between *bewickii* and *cryptus*. At this latitude, the contact zone between the two subspecies obviously occurs within the eastern counties of Oklahoma and western counties of Arkansas near the western edges of both the Ozark Plateaus and Ouachita Mountains.

Moving still further southward into Texas and Louisiana, Bewick's Wren apparently does not nest in Louisiana, but does nest in Texas. Oberholser (1974, p. 633) shows that it is the form *cryptus* that nests and winters in eastern Texas, *bewickii* being uncommon and only present in winter, neither taxa is found in summer in the extreme part of eastern Texas. Louisiana then is out of consideration except for over wintering migrants. In the present study *bewickii* specimens from the eastern half of Texas were examined including five in the collection of Stephen F. Austin State University (e.g. SFA 2452) plus another

(NMNH 184703). Specimens of *bewickii* were found from as far west as Huntsville (SHS 753 and 789) and Hempstead (NMNH 195825, 195826, 195827, 195828) and Killeen (LSUMNS 14849). These were primarily winter, spring and fall records, not in the nesting season. The numerous specimens from central Texas, including around Austin, were *cryptus* agreeing with Oberholser (1974, p. 633).

There is a photographed *bewickii* at a nest northeast of Dallas a little further west than Huntsville, which is described in the Miscellaneous Comments section of this report, the entry attributed to Matt White and Cliff Shackelford. This finding, despite Oberholser's contention, behooves further investigation of the northeastern part of Texas for inclusion in the breeding range of *bewickii*. This possibility is enhanced by its nesting in nearby southeastern Oklahoma, and by the fact that the early description of the *bewickii* range included eastern Texas (e.g. American Ornithologists' Union 1957).

There are a number of specimens identified as *bewickii* and a number identified as *altus* from Louisiana (LSUMNS, NMNH), all fall or winter records. This confirms that Bewick's Wren does not nest in Louisiana but migrates there to over winter, both eastern races participating.

Based on the information presented, the breeding ranges of *bewickii* and *cryptus* meet in a longitudinal axis extending from eastern Kansas through eastern Oklahoma and adjacent western Arkansas. The birds recognized in eastern Texas are of a western subspecies, the species does not nest in Louisiana, so the western edge of the breeding range of *bewickii* continues again in central western Mississippi extending eastward from there.

Documenting the demarcation in geographical ranges based on specimens of *bewickii* versus *altus* is difficult and uncertain, confused by dirty specimens. Recognizing this constraint, there were three specimens from the Carnegie Museum of Natural History collected in Beaver County, Pennsylvania, that had darker backs than *bewickii* and thus matched *altus* (e.g. CMNH 2292). Another *altus* from the same museum was from Huntington County, Pennsylvania, and another was collected in Athens, Georgia. However, there were four specimens in the group marked *altus* that despite the grimy film were obviously *bewickii*; two from Athens and two from Pennsylvania (Beaver and Fulton counties), all within the purported range of *altus*. There are two specimens labeled *altus* in the Cleveland Museum of Natural History (CMNH) that were collected respectively at Portsmouth and Amsterdam, Ohio. (Robert B. Payne, University of Michigan Museum, explained that subspecies designations on museum labels, unless initialed by an expert, are commonly assigned based on collection localities within geographical ranges, and not by specimen diagnosis. Robin K. Panza at the Carnegie Museum of Natural History agrees.)

In the University of Michigan collection six skins from central Texas were *cryptus*, and eight from the Midwest (Kentucky, Ohio, Indiana, and Michigan) were *bewickii* (e.g. UM 211,846 from Kentucky). There are also three examples of *bewickii* in Georgia in fall and winter where *altus* should be a resident bird (UM nos. 160,862, 160,859, 160,873). One specimen from Kentucky in the Michigan collection, plus others in scattered museum collections, were the ones over which Mengel (1965, p. 349) equivocated in wondering about the existence of the *altus* race (see previous section). There are two winter specimens from Louisiana in the Cornell University Museum (CU

22346, 22347), and one in the American Museum of Natural History (AMNH 54810 no date), a very dirty specimen, all three labeled *altus*, but obviously are *bewickii*.

In conclusion, the situation concerning the juxtaposition of the ranges of *bewickii* and *altus* is complicated by the sprinkling of *bewickii* through the accepted *altus* range, by misidentified specimens, and by the sooty patina covering eastern specimens casting doubts on the validity of the *altus* subspecies. In fact, the validity of *altus* being a separate race from *bewickii* is very doubtful (see section titled Validity of *altus* that follows.)

Finally, it must be emphasized again that the process of defining the breeding ranges of the two eastern subspecies of Bewick's Wren is blurred by the striking scarcity of specimens taken during the bird's nesting season. It is worth noting too that intergrades between *bewickii* and *cryptus* were identified where the ranges of the two taxa meet in both Kansas and Oklahoma.

### **Validity of *altus***

In our opinion, the *altus* (Aldrich 1944, p. 307) subspecies of Bewick's Wren is not distinct from the nominate race *bewickii*. We reach this conclusion based on several lines of evidence and despite having described the geographical range of *altus* in the previous section. Even though museum curators commonly assign subspecies designations to specimens based on geographical location rather than on morphological diagnosis (see Ranges section above), most of the *altus* specimens we saw were named and initialed by John Aldrich the describer of the subspecies (Aldrich 1944, p. 307).

We laid a long series of specimens of both subspecies next to each other under bright light, first birds from the National Museum of Natural History, and then another series of each from the Louisiana State University Museum of Natural Science. There were 33 *bewickii* and 34 *altus* in the series from the National Museum, fewer of each in the series from Louisiana State. We noted some variation in the shade of the dorsum within each subspecies, but no consistent difference in the dorsal color of *altus* compared to *bewickii*. The feathers on the backs of both forms seemed identical including some lighter and darker ones within both races. The expected more rufescent feathers on the back in *bewickii* compared to the darker, more sooty dorsum of *altus* described by Aldrich (1944, p. 307-309) was not discernable to either of us.

We investigated this further by conducting an identification test where one of us would randomly pick two skins both initialed by Aldrich, one labeled *bewickii*, the other *altus*. They were laid side by side dorsal side up under bright light. The other person who had not watched the setup would then identify the *bewickii* specimen of the pair. Each of us did this ten times with ten different pairs of specimens. We tried to correctly identify the *bewickii* specimens by looking for a more rufescent coloration in the dorsal feathers of the paired birds. We failed miserably in making this discrimination. Our combined score out of twenty test episodes was 11 correct choices, 9 incorrect choices. Thus using the sign test (Siegel 1956, p. 68-75), we did not reject the null hypothesis indicating our inability to identify the two taxa ( $N=20$ ,  $x=9$ ,  $p=0.412$ ,  $\alpha=0.05$ ). One of us was especially poor at making the proper identification registering only four correct choices, 6 incorrect. The other one did better, 7 right, 3 wrong, but even this ratio is non-discriminatory ( $N=10$ ,  $x=3$ ,  $p=0.172$ ,  $\alpha=0.05$ ).

The existence of a sooty patina covering wren specimens collected in the northeast in the soft coal burning era has been mentioned elsewhere in this document (see Races section above). Two of these dirty specimens were collected at Beaver, Pennsylvania, one in April labeled *altus* (CM 2292), the other in August labeled *bewickii* (CM 31473). After wiping the dorsum of the *altus* bird with ethyl ether, its back feathers were brighter than the *bewickii* specimen. We did not wipe the *bewickii* specimen. Because so many of the wrens were soiled, this could be a confounding factor in showing true colors.

These findings make the true existence of the *altus* taxon separable from *bewickii* very doubtful. They support the professional opinions of Robert Payne, Richard Banks, and Jay Sheppard expressed elsewhere in this document (Races section) in which they doubt that *altus* is valid. They also lend support to the problems described by Mengel (1965, p. 349) in accepting the validity of *altus*.

### **LIFE HISTORY**

The biology of Bewick's Wren is detailed in the The Birds of North America account (Kennedy and White 1997, p. 8-9, 13-18). What follows in this section are the main points in the life history of the species summarized from the Kennedy and White (1997, p.8-9, 13-18) document. For emphasis, description of the bird's habitat is addressed in a separate habitat section in this report, which is of special importance in this status assessment.

#### **Nesting Season**

Bewick's Wren is an early nester, with pair formation and nest building occurring from February to April in the east. Male birds are highly territorial announcing their territories with persistent vocalizations. There is much variation in this song per

individual wren. Courtship, mating, nesting, and feeding and raising young occur in the breeding territories, which are small in size, less than half an acre in the east. Males court females with side to side turning, tail spreading exposing the white tips of the tail, and mate feeding. This species is mainly monogamous during each nesting event, but mate changing can occur during subsequent nesting attempts in the same nesting season.

Nest building is performed from February to April, egg laying from March to April, and hatching occurs from March to April. The species commonly nests a second time within a single breeding season. The nest is placed in an outstanding variety of places: in natural tree cavities, on shelves in sheds, in crevices and building nooks, discarded containers, or any odd place that provides a semi-enclosure, usually about six feet off of the ground. Both sexes cooperate in building a cup-shaped nest that rests on the platform base of a cavity or a partial cavity. The bulk of the nest consists of coarse sticks and leaves, with the cup lining being formed by finer plant down, hair, and feathers. The lining also commonly includes a snake skin or cellophane wrapper.

Egg laying commences right after the nest is completed, one egg laid per day until a clutch size of five or six eggs is completed. Egg size is small, approximately 16 mm long and 13 mm wide. The ground color of the eggs is white with reddish brown to purplish spots that are concentrated around the larger end of the eggs. The female does the incubating beginning when the last eggs are laid. The incubation period lasts from 14 to 16 days until egg hatching occurs.

Young are naked at hatching with scattered tufts of down and eyes closed. By the twelfth day, the nestlings are full sized, and they are fully feathered by the fourteenth to sixteenth days. At this time they leave the nest, flying well at the onset. Both parents

feed the young in the nest and continue to feed them for about two weeks after departure from the nest.

### **Non-nesting Season**

Most Bewick's Wrens are permanent residents so they remain where they nested through the rest of the year in their territories, except in the non-breeding season the sexes split and maintain separate territories through the winter. Nevertheless, the northernmost populations migrate southward from late September to early November to join resident birds, and some individuals migrate south of the normal breeding range to over winter in nearby Gulf coastal regions. Spring migration northward is initiated early in late February and into March.

Molting of feathers commences after nesting in late summer and continues into fall spanning August through October. This is the annual molt in which all body and flight feathers are replaced. There is no spring molt where some body feathers might be replaced.

### **Food Habits**

When foraging Bewick's Wrens move around actively, hopping energetically from branch to branch in low shrubbery and small trees. Constantly poking and probing here and there with the beak, it frequently probes bark crevices. Sometimes it probes leaf litter on the ground.

Diet consists mainly of insects, both adult and larvae, but even fruits and seeds are consumed in small amounts. The nestlings are fed mostly caterpillars but also numerous spiders and grasshoppers.

## HABITAT

The various statewide treatises on birds are replete with descriptions of habitats occupied by Bewick's Wrens. A few examples follow. In Arkansas it is found "around houses, sheds and unkempt piles of junk or tangles of vegetation in clearings in lightly developed parts of towns and rural areas" (James and Neal 1986, p. 259). In West Virginia "the favorite habitat is the open space around farmyards or on abandoned farmsteads" (Hall 1983, p. 92). Hall continues: "the nests are usually in the outbuildings of such farms, and it seems as if the more junk in the form of old rusting farm machinery, old automobile bodies, piles of fence wire, etc., there is in the farmyard, the more likely there will be a Bewick's Wren nesting there." In Missouri the bird is "most common around abandoned farm equipment, sheds, etc., and in open, brushy areas at the edge of woods" (Robbins and Easterla 1992, p. 240); and in another monograph on birds in Missouri, Bewick's Wren is described as an inhabitant of "upland shrub habitats and woodland edges....especially detectable around rural houses and brushy fencerows" (Jacobs and Wilson 1997, p. 214). Common themes in these descriptions and all the others is the emphasis on early succession habitats, which are quite shrubby and overgrown often incorporating unkempt fencerows and nearby forest edge and situated in suburban environments and farm barnyards. Also with conspicuous uniformity, the presence of woodpiles and various items of discarded junk and trash is mentioned in most of the habitat accounts.

These habitat descriptions are quite different from the habitats of the western populations of Bewick's Wren where clearings in woodland savannah (e.g. the Cross Timbers of the Great Plains), open riparian woodlands crossing prairie, and shrub

chaparral are favored locations far from human habitation. Chuck Hunter (pers. comm.) contends that there was some Bewick's Wren habitat in the pre-settlement east in the form of scattered glades, barrens and balds. This would be particularly true in the mountains. Hunter continues by explaining that these favored eastern sites were destroyed during the massive conversion of feral lands to agricultural lands in the east during the 1800s, followed by extensive farm abandonment and early successional growth in the 1900s forming an abundance of "new" Bewick's Wren habitat and thus producing the bird's over abundance. He thinks that so called "clean farming" and the tidying up of suburbia since then has diminished the amount of wren habitat, thus the bird's decline. Small isolated habitat patches are usually ecological sinks anyway (Pulliam 1988, p. 652-661), thus producing diminishing survival potential over time leading to the progressive population reductions described in the Populations section of this report.

The issue of the need for junk refrigerators, stoves, automobiles, and the like in Bewick's Wren territories is enigmatic because such items were not present in pre-settlement times. The best explanation for this feature is that it signals neglect, in other words, a household yard that does not receive much care and thus is overgrown with shrubby vegetation, which is to the wren's liking. Woodpiles are popular features in Bewick's Wren habitat and in a way jumbled overgrown junk and trash may become surrogate woodpiles in the foraging realm of the wren.

Douglas Zollner (pers. comm.) has presented very interesting observations on Bewick's Wren habitat obtained from a series of study areas extending from central Arkansas to the Cross Timbers in central Oklahoma. In central Arkansas the bird

occurred in frequently burned post oak savanna on sandstone substrate. The sites were very grassy with many oak sprouts. Further west in the Ouachita Mountains of Arkansas, the species was found on burned over novaculite glades, which were also very grassy and shrubby with many sumacs and a sparse oak overstory. Bewick's Wrens were absent on glades that showed no evidence of having been burned. Even so, it is rare in the Ouachitas and does not occupy the rocky dwarf forest ridges where the Rufous-crowned Sparrow (*Aimophila ruficeps*) is sometimes found. Bewick's Wren becomes common in the Cross Timbers of central Oklahoma where a western subspecies abounds.

Zollner concludes by suggesting that the decrease in eastern Bewick's Wrens is due to forest overgrowth becoming too dense due to a lack of burning. The House Wren was also absent from the same areas suggesting that competition was not a factor in the disappearance of Bewick's Wren.

If habitat restoration practices are to be considered for Bewick's Wrens, there is a model for this discovered in the late 1980s (Robinson 1989, p. 1-3). Robinson (1989, p. 2) found near Dover in western Tennessee that forest clear cut operations where slash piles of limbs and branches remained quickly attracted large numbers of Bewick's Wrens.

In order to properly evaluate the past versus present status of Bewick's Wren in the eastern United States, it is important to know whether there was Bewick's Wren habitat there prior to European settlement. If appropriate habitat was present this would suggest that the wren existed there far into the past, certainly much prior to the early literature dates shown in Table 1. Therefore, if habitat change is an important factor in the recent

population decline, it might be the cause of a sudden tragic end to a viable population that had existed throughout antiquity.

Much has been written on the nature of presettlement habitat in the eastern United States and the overall conclusions are that indeed there were abundant open areas and shrubby-scrub type vegetation present before the European pioneers arrived (Nuzzo 1986, p. 6-36, Delcourt and Delcourt 1997, p. 1012-1014, Hamel and Buckner 1998, p. 312-313, Buckner and Turrill 1999, p. 329-336, 342-343, Litvaitis 1993, p. 866-867, 870-871, Litvaitis et al. 1999, p. 101, Hunter et al. 2001, p. 440-441, Lorimer 2001, p. 425-439, Davis et al. 2002, p.1,4). These authors emphasize the widespread existence of original natural open habitats and associated forest edge and shrublands right up to the east coast, particularly prairie patches, scrublands and savannahs, glades, barrens, balds, bogs, tree fall gaps, beaver meadows, and lands grazed by large mammals. The forested land too was an ever changing landscape replete with openings due to wildfires (lightning), windstorms and floods. The catastrophic effects of earthquakes can be added to the list (Shugart 2004, p. 70-76). The pre-Columbian inhabitants too were a major factor in creating and maintaining open areas through the use of fire to manage areas for hunting, agriculture, and their settlements thus creating woodland savannahs, open agricultural lands, spaces for settlements, as well as maintaining grassland and other early successional habitats (Williams 1989, p. 32-40, Frost 1998, p. 70, 77-79, Lorimer 2001, p. 425-439). Thus, there is ample evidence for expecting that considerable Bewick's Wren habitat was present in presettlement times. However, there are no supporting avifaunal records from that period, and essentially none on a broad basis, until the late 1800s (Table 1).

Overall habitat conditions changed considerably with the arrival of the European settlers. The pattern of change is best documented for New England (Litvaitis 1993, p. 866-867, 870-871) outside Bewick's Wren range, but the same sequence of change occurred throughout forested regions of eastern United States (Smith et al. 2004, p. 1, 3, Flinn and Vellend 2005, p. 244). Forest removal was gradual through the 1700s, but proceeded at a very rapid pace in the 1880s when agricultural activities peaked. Also the eastern grasslands were converted to agriculture by the 1800s (Askins 2001, p. 407-408, Hunter et al. 2001, p. 452-453, Davis et al. 2002, p. 1). This agricultural fervor would have removed wren shrub-scrub habitat too, which may explain why Audubon did not find Bewick's Wren at Cincinnati in the early 1800s but discovered this new species later in Louisiana. Litvaitis (1993, p. 866-867, 870-871) finds that farm abandonment and the movement of agriculture westward by the end of the 1800s produced ragged early successional habitats on abandoned farmland to the east. Lorimer (2001, p. 425-439) amplifies this by noting that by the late 1800s early successional forests covered 55-60% of most eastern states, habitats produced by "logging, wildfires, fuelwood cutting, and farm abandonment." These activities produced the kind of habitats favored by early successional bird species including Bewick's Wren, and these species would have flourished (Litvaitis 1993, p. 866-867, 870-871, Litvaitis et al. 1999, p. 101). By the mid 1900s, when Bewick's Wren began to crash, these early succession habitats were maturing to forest ecosystems and the land was becoming reforested again to the disadvantage of the early succession birds. This cycle of habitat change could explain the current downward trend in Bewick's Wrens. In the parts of the Midwest where abandoned croplands were replaced by pristine pastures, this would further increase the

loss of shrublands. The present existence of scattered small unkempt junk-shrubland yards in the east could have accentuated the downward spiral in Bewick's Wren by functioning as isolated population sinks (Pulliam 1988, p. 652-661). Based on the foregoing scenario, habitat considerations and especially recent habitat loss should be considered as one of the possible reasons, perhaps the most important one, for the recent population decline in eastern Bewick's Wrens.

The view that forest clearing in the east was not sufficient to allow open country birds to extend eastward until the 1800s is supported by (Mayfield 1965, p. 13, 25) and Lowther (1993, p. 3) in tracing the eastward movement from the Great Plains exhibited by the Brown-headed Cowbird (*Molothrus ater*) during the same period. Jay Sheppard (pers. comm.) notes that Audubon discovered the wren in Louisiana, whereas he lived and worked in Cincinnati and Louisville for a considerable time before that and did not find it there. Therefore, Bewick's Wren probably was absent from the Ohio Valley in the early 1800s.

Steyermark (1959, p. 1, 2, 23, 127) is the only dissenting voice concerning the structure of the original eastern forests. He was convinced that the dense Ozark forest of today was just as dense when the pioneers arrived. This is a region where Bewick's Wren is thriving better currently than anywhere else in its eastern range (Table 1 and p. , this monograph). This abundance evidently is made possible by the many prairie patches, bedrock open glades and balds of various types with associated shrubby edge habitats that are distributed across the Ozarks, and were there in the past (Nelson 1987, p. 65-71, 74, 83-89, 104, 107, 111, Nigh and Schroeder 2002, p. 20-21). Other authors also disagree with Steyermark's view. Beilmann and Brenner (1951, p. 261-265) cite

evidence from early explorers and settlers that vast prairies and savanna type forests dominated the Ozarks, easily traversed by horse and buggy. They find this condition persisted into the 1800s, confirmed by Nelson (1987, p. 65-71, 74, 83-89, 104, 107, 111) and Nigh and Schroeder (2002, p. 20-21). Frequent fires at the hands of Native Americans shaped these past ecosystems in a land now clothed in immature forests (Batek et al. 1999, p. 410, Beilmann and Brenner 1951, p. 269-270). Nevertheless, Nelson (1987, p. 65-71, 74, 83-89, 104, 107, 111) and Nigh and Schroeder (2002, p. 20-21) show that many of the openings in the Ozark forest persist creating the conditions that make it the region where Bewick's Wren seems to be thriving the best in the east. Nelson (1997, p. 79) used early survey records to determine that the early Ozark forests consisted of an open woodland landscape.

### CONSERVATION STATUS

Bewick's Wrens, in common with all other migratory birds in North America, are protected by the Federal Migratory Bird Treaty Act against exploitation. Many of the states, for example Arkansas, have similar statewide regulations that afford the same protection within the states. The Natural Heritage Commission and related agencies in the states of North Carolina, Pennsylvania, Ohio, Maryland, Virginia, West Virginia, Tennessee, Arkansas, Alabama, and Mississippi have produced lists of avian species at risk. These lists show that globally Bewick's Wren is ranked as secure because as a whole this species is widespread and abundant. However, the Appalachian subspecies of Bewick's Wren (*T.b. altus*) is ranked globally as an imperiled subspecies but with a questionable taxonomic status. Even though this subspecies has occurred historically in Pennsylvania, it is now considered extirpated from the state. Virginia, West Virginia,

Alabama, and Maryland have ranked it as extremely rare and critically imperiled. Ohio and North Carolina have placed this subspecies on the state endangered species lists. A more detailed portrayal of the status (S) ranks for the eastern states provided by the state natural heritage commissions is as follows (as shown on the Natureserve website, <http://www.natureserve.org/visitlocal>): Missouri and Kentucky S3—vulnerable; Iowa, Arkansas, Mississippi S2—imperiled; Illinois, Indiana, Ohio, West Virginia, Virginia, Tennessee, Alabama, South Carolina S1—critically imperiled; Wisconsin, Ontario, Pennsylvania, North Carolina SX—presumed extirpated.

In addition various conservation organizations have issued lists of avian species of concern that commonly name the two eastern subspecies of Bewick's Wren. These lists include: most of the eastern subdivisions included in the Partners in Flight program such as the Ozark-Ouachita, Piedmont, Southern Blue Ridge, and Appalachian Mountains subdivisions as well as the Central Hardwoods Bird Conservation Area Priority Bird Species List. Bewick's Wren is also listed under High Continental Priority on the following lists: American Bird Conservancy Green List, Arkansas Birds of Conservation Interest List, National Audubon Society Watchlist, and the USFWS Birds of Conservation Concern List (USFWS=U.S. Fish & Wildlife Service).

#### STATE MONOGRAPHS

This section of the report on the status assessment of Bewick's Wren is a review of statements concerning the species in statewide monographs for the eastern states that are in the bird's range. We also report on the status of the House Wren (*Troglodytes aedon*) in these states because it is often suggested that House Wrens expanding southward caused the decline in Bewick's Wrens (see below). The overall summary of the past and

present status of Bewick's Wrens in each eastern state is presented in Table 1. Review of the separate studies of the wren appearing in the peer reviewed journals and other publications are the substance of the following section titled "Published Literature."

### **Alabama**

In 1892, editor F. W. McCormack wrote in *The Leighton News* (northwestern Alabama) that Bewick's Wren was a common year around wren becoming the "true House Wren" (Vol. 2, No. 25, newspaper).

According to Howell (1924, p. 332, 1928, p. 332), Bewick's Wren was a breeding summer resident in northern Alabama in the late 1920s. However, it was never as abundant as the Carolina Wren. It occurred in the state in moderate numbers during winter statewide (Howell 1924, p. 332, 1928, p. 332). He also noted that the House Wren was only a migrant and winter resident in the state at the time (Howell 1928, p. 334). Imhof (1962, p. 388, 1976, p. 294) stated that prior to 1960, Bewick's Wren was uncommon to fairly common in most of Alabama except the coastal region, and since 1960 it had shown a sharp decline in numbers (Imhof et al. 1976, p. 294). By the 1970s, the date of the second edition (Imhof et al. 1976, p. 294), it was only a rare local breeder in the Tennessee Valley and was rare in winter over much of the state. Imhof (1962, p. 385-386, 1976, p. 292) found the House Wren did not nest in Alabama but was an uncommon winter resident in northern Alabama and a fairly common to common winter resident southward to the Gulf Coast.

Haggerty et al. (2004, p. 171) notes that there have been no breeding season records in Alabama for Bewick's Wren since 1976. In Volume 3 of the same publication (Mirarchi et al. 2004, p. 114), these authors suggest that Bewick's Wren was absent from the east prior to European settlement after which forests were fragmented creating suitable habitat for the wren especially between the early 19<sup>th</sup> and 20<sup>th</sup> centuries when the bird became abundant. They (Mirarchi et al. 2004, p. 114) speculated that this increase occurred in Alabama despite the lack of actual records, and did note that the retraction of the breeding range in northern Alabama occurred in the 1920s with a dramatic decrease on breeding bird survey routes from 1979 to 1990. The decline was not attributed to habitat change because the rural Alabama setting had remained essentially unchanged. They noted (p. 115) the decline coincided with the expansion of the House Wren's range into Alabama, but they also stated that the House Wren has never become a consistent breeder in the state. The last confirmed breeding record of Bewick's Wren in Alabama was a report by Greg Jackson of adult birds with young at Newburg, Franklin County, in 1974 (Thomas Haggerty, pers. comm.)

No Bewick's Wrens were recorded in any atlas plot in the recent Alabama Breeding Bird Atlas (Haggerty 2009). The same source shows the House Wren now breeding in Alabama in the northern half of the state.

**Table 1. Historical and present status of Bewick's Wren (*Thryomanes bewickii bewickii* and *T.b. altus*) in various states of the eastern United States compiled from state monographs, published literature, and expert comments.**

State	Distribution		Earlier Status		Recent Status	
	Part of state		Early Reports	Abundance	Final Reports*	Abundance
Alabama	Inland		Late 1800s	Common	1974	Rare
Arkansas	West & North		1911	Common	2003	Very rare
Delaware	Entire		1964	Very rare	1966	Very rare
Florida	Panhandle		1925	Uncommon	1992	Absent
Georgia	Mountains		1945	Fairly common	2004	Rare
Illinois	South		Before 1900	Common	Early 1990s	Absent
Indiana	South		Before 1900	Common	After 1950s	Very rare
Iowa	South		Early 1900s	Rare	Late 1990s	Rare
Kansas	South & East		Late 1800s	Occasional	2000	Present?
Kentucky	Entire		Early 1950s	Common	2001	Rare

\* refers to either the time of last reported record or time of latest published record(s).

Table 1. (continued)

State	Distribution		Earlier Status		Recent Status	
	Part of state	Abundance	Early Reports	Abundance	Final Reports*	Abundance
Louisiana	Entire	Uncommon	1930s	Uncommon	1974	Rare
Maryland & D. C.	West	Common	1940s	Common	Late 1990s	Rare
Michigan	South	Rare	Late 1800s	Rare	After 1970	Absent
Minnesota	Entire	Rare	1930s	Rare	After 1980s	Casual
Mississippi	Entire	Fairly common	1936	Fairly common	Late 1990s	Rare
Missouri	Ozarks	Very common	Late 1800s	Very common	Early 1990s	Uncommon
Nebraska	Entire	Uncommon	Late 1800s	Uncommon	After 1980s	Casual
Northeast	Entire	Accidental	Late 1800s	Accidental	Late 1970s	Accidental
North Carolina	Mountains	Common	Before 1900	Common	1980s	Rare
Ohio	South	Common	Before 1900	Common	Late 1990s	Accidental
Oklahoma	East	Common	1920s	Common	1990s	Rare
Pennsylvania	South	Abundant	Late 1800s	Abundant	1989	Absent

\* refers to either the time of last reported record or time of latest published record(s).

Table 1. (concluded)

State	Distribution		Earlier Status		Recent Status	
	Part of state	Part of state	Early Reports	Abundance	Final Reports*	Abundance
South Carolina	Central & NW	Central & NW	Late 1800s	Uncommon	After 1950s	Absent
Tennessee	Entire	Entire	Early 1930s	Common	2004	Rare
Texas	East	East	No information	No information	2003	Rare
Virginia	West	West	Late 1800s	Common	1989	Rare
West Virginia	West	West	Late 1800s	Abundant	1980	Absent
Wisconsin	South	South	1916	Uncommon	Early 1990s	Rare

\* refers to either the time of last reported record or time of latest published record(s).

## Arkansas

Howell (1911, p. 86) found that Bewick's Wren was restricted primarily to the hills of western and northern Arkansas. He wrote that at the time Bewick's Wren was the "characteristic house wren" of Arkansas instead of the common House Wren of the eastern United States. Nevertheless, Howell noted that Bewick's Wren was much less commonly found in Arkansas than the Carolina Wren, and he stated that Bewick's Wren occurred in the lowland areas of Arkansas only as a migrant in those early days.

Wheeler (1924, p. 156) showed the breeding range of Bewick's Wrens in Arkansas confined to the northwestern and north central parts of the state primarily covering the Ozarks and most of the Arkansas River Valley. Except for one mid-May report in extreme northwestern Arkansas, the House Wren was not known to be present in the state during the nesting season in the 1920s.

Baerg (1931, p. 110) found Bewick's Wrens to be common in summer and uncommon in winter across the northern part of the state. It was present only in southern Arkansas during winter. In his 1951 edition (Baerg 1951, p. 112), he added central Arkansas to the summer range where the wren occurs year around being more common in summer than winter. In both editions, Baerg described the House Wren as only a common migrant and a rare winter resident (1931, p. 109, 1951, p. 112).

By the time of the contribution by James and Neal (1986, p. 259), the situation for Bewick's Wren was as follows. By the late 1980s, this wren was considered "rare and infrequently reported" in the Ozarks and the Arkansas River Valley where it was once a common breeder. At this time, Bewick's Wren wintered primarily in the lowland areas of the state as well as in the Arkansas River Valley, and it was an uncommon migrant in all

regions of the state. This wren has markedly declined in numbers in Arkansas in recent years, and there were only sparse records of them occurring on Arkansas Breeding Bird Surveys from 1967 to 1977. The surveys where the bird was present were primarily from Sebastian County in the Arkansas River Valley as well as from the Ozark Plateaus region of the state. According to files maintained by the Arkansas Audubon Society, Bewick's Wren still nests in small numbers with some regularity in Jefferson County where several nests have been found since 1968 (James and Neal 1986, p. 260). The progressive increase in the human population of Arkansas has led to "fewer neglected sheds and junky open lots with tangles of vegetation" that recently has been the preferred nesting habitat of this wren species (James and Neal 1986, p. 260). It is the change from the preferred natural habitat of early successional shrubs and brush to this surrogate habitat that has been implicated in the decline of the Bewick's Wren in Arkansas (p. 260).

Recently in the summer of 2003 at Harrison, Arkansas, a pair of the "red-backed" *bewickii* form of Bewick's Wren was reported to Bill Holimon (pers. comm.) by Dwight Steward. Holimon visited the site and saw the birds too. The Arkansas Breeding Bird Atlas is still under construction online. However, a preliminary inspection of the results shows there were 14 breeding season occurrences of Bewick's Wrens from 1994 through 2004 primarily in the Ozark region of northwestern Arkansas. Of these 14, there were 3 confirmed nestings.

### **Delaware**

Bewick's Wren is considered casual in Delaware. There have been a mere three records of its occurrence in the state, each having occurred consecutively from 1964 to 1966 (Hess 2000, p. 392). The House Wren is a common breeder in some parts of the

state from late April to late July. It is more common north of the Chesapeake and Delaware Canal than in other parts of the state (Hess 2000, p. 393).

### **Florida**

With regard to Florida, the earlier monographs on the birds of the state described Bewick's Wren as an uncommon bird that occurred primarily in the northwestern part of the state during winter. However, it was common in some places (Bailey 1925, p. 137, Howell 1932, p. 350, Sprunt 1954, p. 332, Stevenson 1960, p. 103). Since then it has declined sharply in its stronghold in the Florida Panhandle where it is now rare to absent in winter (Robertson and Woolfenden 1992, p. 111, Stevenson and Anderson 1994, p. 479-480). Stevenson and Anderson (1994, p. 480) added that it had become rare statewide by 1950 and has been nearly extirpated in Florida. Kale (1990, p. 170) showed it as a winter resident but does not mention abundance. The latest state record of Bewick's Wren was from the Apalachicola National Forest in Leon County where it was seen from November 26, 1990, to January 6, 1991 (Stevenson and Anderson 1994, p. 480). According to these authors the House Wren was and still is a common winter resident throughout the state (Stevenson and Anderson 1994, p. 481).

No mention was made of House Wrens or Bewick's Wrens as breeding birds in the state of Florida in the breeding bird atlases of this state (Biggs and Kale 1991, Kale et al. 1992).

### **Georgia**

Greene (1945, p. 53) stated that Bewick's Wren was a permanent resident in the Appalachian Valley and mountains of Georgia during the mid-1900s. He also noted that this species was a fairly common winter resident in the Piedmont region and was

uncommon on the coastal plain in winter. During this time, House Wrens bred only in the highest mountains of northeastern Georgia but were common winter residents throughout the state. Burleigh (1958, p. 428-429) found that *Thryomanes bewickii bewickii* was a rare winter resident in the northern part of the state with only four records reported statewide. All four records were from the 1930s and 1940s. He also stated that *Thryomanes bewickii altus* was a fairly common summer resident in the mountain counties and a fairly common winter resident throughout the remainder of the state (Burleigh 1958, p. 429). Burleigh (1958, p. 425) also commented that the House Wren did not nest south of Virginia and Kentucky prior to the 1920s. Since that time its range has been expanding southward reaching North Carolina, Tennessee, and northern South Carolina (Burleigh 1958, p. 425). Three nests found in Atlanta in 1950 were the first breeding records for the state (Burleigh 1958, p. 423). Since then, the instances of nesting House Wrens has increased the most in the Piedmont region where Bewick's Wren is rare or absent as a breeder. Burleigh (1958, p. 423) noted that the House Wren is an uncommon transient and winter resident over most of Georgia. There is not more recent information on the status of *altus* in Georgia since Burleigh's 1958 comments, and Aldrich (1944, p. 309) did not examine a specimen of *altus* from Georgia.

According to both Chuck Hunter and Pierre Howard (pers. comm.), the last breeding record in Georgia, which was reported by Sandy Pangle, was at Chickamauga Battlefield Military Park in the northwestern part of the state. Pangle observed two adults and two immature birds on July 24, 2004. This was the first occurrence of Bewick's Wren in nesting season since this wren was sighted by Sandy Pangle in the Beaverdale area northeast of Dalton, Georgia, in June 1975.

## Illinois

Both Ridgway (1889, p. 92) and Cory (1909, p. 686-687) found that Bewick's Wrens nested commonly in southern Illinois. Ridgway further commented that they far outnumbered the House Wren there (p. 92). He further stated that Bewick's Wren nested around barnyards while House Wrens occupied orchards (p. 92). Brawn (pers. comm.) says that Bewick's Wren no longer occurs in southern Illinois. House Wrens were rare in southern Illinois and were more common northward (Ridgway 1889, p. 95). By the 1940s and 1950s, Bewick's Wrens had undergone a definite decline, and they were considered to be rare migrants and summer residents in the state by the late 1990s as well as very rare winter residents (Robinson 1996, p. 221). By the late 1990s, House Wrens were common summer residents in all counties except Union, Alexander, Pulaski, Massac, Pope, and Hardin where this wren species is uncommon but on the increase (Robinson 1996, p. 222).

Graber and Graber (1963, p. 426) summarized the results of their strip censuses of bird populations in Illinois habitats in 1957 and 1958 and compared their results to those published by Forbes and Gross who conducted similar censuses in 1907 and 1909. Among many other habitats covered, each study compiled four censuses over more than 350 acres of shrubby fallow fields. In southern Illinois, Bewick's Wrens were found in all four censuses in the summers of 1907 and 1909 but none were encountered there in 1957 and 1958. No Bewick's Wrens were found north of southern Illinois on any censuses in either time period.

There are four publications on birds of the Chicago area. Woodruff (1907, p. 183) reported one Bewick's Wren nest there. Beecher (1942, p. 36-37) did not find Bewick's

Wrens in the nesting season of 1937 in the habitats of his 482 acre study area near Chicago. Ford (1956, p. 64) found the bird to be a rare summer resident near Chicago. Two of the nesting reports he described were submitted by James D. Watson, then a budding ornithologist from Chicago, the person who later was co-discoverer of the structure of the DNA molecule. Mlodinow (1984, p. 151) stresses the rareness of the wren around Chicago and even notes a decline by saying "there are several old nesting records but only one recent nesting record."

In the online Illinois Breeding Bird Atlas (Kleen 1998, p. 1-16), Bewick's Wrens were found sporadically throughout the state, found in only five atlas blocks from 1986 to 1991. Breeding was confirmed in only four of the five atlas blocks, which are located in the following counties: Adams, Macon, Wabash, and Johnson. All four of these counties are located in the central, west central and southern portions of Illinois. Evidence of probable breeding was found in the remaining atlas block, which is in southwestern Illinois in St. Clair County. House Wrens were found as confirmed breeding birds on numerous atlas blocks in almost every county of Illinois from 1986 to 1991. In *North American Birds*, the last reported sighting of Bewick's Wren during the breeding season was on June 12, 2002, in Brown, Illinois (Brock 2002, p. 444).

### **Indiana**

Prior to the 1900s, Butler (1898, p. 1117) described the Bewick's Wren as a common summer resident throughout most of southern Indiana from the lower Wabash Valley north to Knox County, being much rarer in winter (Keller 1986, p. 155). By the mid-1940s, Bewick's Wren was considered "not plentiful" in Indiana (Brooks 1945, p. 50). It had become a very rare summer resident by the late 1980s and was still casual in winter

(Keller 1986, p. 155). Keller added (p. 156) that Bewick's Wren had decreased in abundance since Butler's survey and that this species was believed to be dominated by the House Wren, which was a common summer resident in much of the state except in the extreme northwestern and southern counties. Whitaker and Gammon (1988, p.56) and Mumford and Keller (1984, p. 223) noted the rapid disappearance in Bewick's Wrens in Indiana beginning in the 1950s.

In the *Atlas of Breeding Birds of Indiana*, the authors stated that there have only been three nesting records in the state since 1960 (Castrale et al. 1998, p. 360). They also mentioned (p. 360) that the wren has never been listed for any Indiana breeding bird atlas block even though single birds were reported on Summer Bird Counts until mid-June in Hamilton County in 1986 and in Jackson County in 1990. These authors commented that Bewick's Wren is currently listed as an endangered species in the state of Indiana (Castrale et al. 1998, p. 360). In direct contrast, atlas block surveys showed that the House Wren was present in the northern and central parts of the state while being less frequently found in blocks in south central Indiana (Castrale et al. 1998, p. 208). Population trends based on 38 Breeding Bird Survey routes in the state showed an increase in House Wrens of 2.6% per year from 1966 to 1990 (Castrale et al. 1998, p. 208).

Brock (2006, website only) found that after increasing northward in Indiana from the late 1800s to the late 1950s, Bewick's Wren declined rapidly after that and became very rare across state by the early 2000s.

## Iowa

In the early 1900s, Bewick's Wren was considered to be rare and locally distributed in Iowa (Anderson 1907, p. 368), and the House Wren was noted to be an abundant summer resident in all parts of the state (p. 369). Dinsmore et al. (1984, p. 227) stated that Bewick's Wren had been declining in Iowa since the 1960s. During the 1960s Bewick's Wren was only reported ten times in the state, and there were only six records in Iowa from the 1970s (Dinsmore et al. 1984, p. 227-228). During the 1980s it was a casual summer resident in southern and eastern Iowa occurring in thickets, brush piles, and fencerows around farms and in residential areas as well as scrubby woodlands with dense undergrowth (Dinsmore et al. 1984, p. 227). These authors also noted that the southeastern part of the state had the highest abundance and that the only nesting records were from southern Iowa (Dinsmore et al. 1984, p. 227-228). House Wrens were abundant summer residents, having been found on all Breeding Bird Survey routes throughout the state (Dinsmore et al. 198, p. 228).

Kent and Dinsmore (1996, p. 259) stated that records of Bewick's Wrens have been scattered in every decade with only a few birds seen each year, primarily in southeastern Iowa. They also commented that presently it is considered a rare summer resident in the southeastern part of the state (Kent and Dinsmore 1996, p. 259). They noted that the House Wren is an abundant summer resident (Kent and Dinsmore 1996, p. 260).

In the *Iowa Breeding Bird Atlas*, it was noted that by the late 1990s evidence of possible breeding by Bewick's Wren was obtained on only three atlas blocks in the state (Jackson et al. 1996, p. 268). These authors also commented (p. 268-269) that there had been only 6 records of Bewick's Wrens in the 1970s, 13 records from the 1980s, and 7

records from the 1990s. They added (p. 268) that while Bewick's Wren has never been common in the state or as common as other wren species, limited historical data suggests they were more abundant in the past than they are today. They predicted that the bird will probably never become abundant in Iowa. According to these same authors, the House Wren has a uniform distribution in all wren habitat types across the state and ranks in the top ten most commonly reported species on Breeding Bird Survey routes each year (Jackson et al. 1996, p. 270). In *North American Birds*, the last breeding season record of Bewick's Wren in Iowa was in Lee, Iowa, on June 15, 2002 (Brock 2002, p. 444).

### **Kansas**

Bewick's Wren was a visitor and an occasional resident to southern and eastern Kansas in the late 1800s (Goss 1886, p. 57), but essentially a very rare summer resident in the state (Goss 1891, p. 610). Bunker (1913, p. 157) only names southwestern subspecies occurring in the state, and Graber and Graber (1951, p.160) also only consider southwestern Kansas where the eastern subspecies is absent. The form *bewickii* was reported to be accidental in eastern Kansas (Long 1940, p. 448). By the 1960s, Bewick's Wren had become a common resident in southern and eastern parts of Kansas but was uncommon to rare in the northwestern part of the state (Johnston 1965, p. 39). The House Wren was a common summer resident in Kansas (Goss 1891, p. 612, Johnston 1960, p. 42, 1965, p. 39, Tordoff 1956, p. 338).

According to the *Kansas Breeding Bird Atlas* by Busby and Zimmerman (2001, p. 298-299) as well as *Birds in Kansas* by Thompson and Ely (1989, p. 298-299), Bewick's Wrens were still breeding birds in much of southern and eastern Kansas especially abundant in the Red Hills and Flint Hills regions through the 20<sup>th</sup> century. The Flint Hills

are where Mark Robbins (pers. comm., see Ranges section) noted that Kansas specimens were intermediate between reddish-backed *bewickii* in Missouri and duller *cryptus* type birds in central and western Kansas. The Red Hills are far enough west to have pure *cryptus*. Tordoff (1956, p. 338) and Johnston (1960, p. 42, 1965, p. 39) state that the form *bewickii* occurred only in northeastern Kansas where according to Busby and Zimmerman (2001, p. 299) there were no recently confirmed records of breeding.

### **Kentucky**

A spring and summer expedition to Kentucky by Smithsonian Institution personnel noted occurrences of Bewick's Wrens at scattered locations (Wetmore 1940, p. 529, 549). It was reported fairly common to common at most locations from west to east across the state (Gordon 1942, p. 23). While doing field studies in Kentucky during the late 1940s and early 1950s, Mengel (1965, p. 347) found Bewick's Wren was a common summer resident throughout the state and was rare in winter. In *The Kentucky Breeding Bird Atlas*, Palmer-Ball (1996, p. 180) stated that House Wrens did not begin nesting in Kentucky until the 1910s and 1920s. By the 1950s, they nested throughout central Kentucky (Palmer-Ball 1996, p. 180). However, Bewick's Wren had undergone a dramatic decline becoming rare or absent in its distribution by the 1990s (Palmer-Ball 1996, p. 178). Before the 1960s, it overwintered in the state but later it rarely did (p. 178). Palmer-Ball (1996, p. 178) also commented that Breeding Bird Surveys show Bewick's Wren has had a declining population over the past 25 years, and from 1966 to the 1980s it had declined 7% per year. Its population in Kentucky appears to have stabilized during the 1990s. House Wrens are mostly breeders in north central Kentucky and appear to be expanding their range westward (Palmer-Ball 1996, p. 180). The

decline of the Bewick's Wren is not well understood but some have suggested severe winter weather or competition with the House Wren as possible factors responsible for its decline in Kentucky (Palmer-Ball 1996, p. 178).

In a monograph dated 1973 (Barbour et al. 1973, p. 57) Bewick's Wren still was found to be common in summer throughout Kentucky, rare or uncommon in winter. In the same period House Wrens were common only in the northern part of the state in summer and rare southward (p. 56).

In *North American Birds*, the most recent breeding season records of Bewick's Wren are from Taylor County, Kentucky, on June 9, 2002, and Washington County, Kentucky, on June 20, 2002 (Brock 2002, p. 444). There was also one confirmed nesting record in which a pair of Bewick's Wrens successfully raised young during the breeding season of 2002 in Scott County, Kentucky (Brock 2002, p. 444), no dates provided.

### **Louisiana**

In Louisiana Bewick's Wren is mainly an uncommon winter resident (Arthur 1931, p. 436, Oberholser 1938, p. 440, Lowery 1974, p. 461). Arthur (1931, p. 436) found that it nests in the northern, central, and southeastern parts of the state, and Oberholser (1938, p. 440) states that it may be a rare nester in northwestern Louisiana. In his most recent volume, Lowery (1974, p. 461) did not mention nesting. House Wrens in Louisiana are described by these authors as being a common winter resident in the southern part of the state as well as a common migrant, but no mention of nesting was made (Arthur 1931, p. 432, Oberholser 1938, p. 438, Lowery 1974, p. 460).

No mention was made of either Bewick's Wren or House Wren in the *Louisiana Breeding Bird Atlas* (Wiedenfeld and Swan 2000).

### **Maryland and the District of Columbia**

During the late 1940s, Hampe and Kolb (1947, p. 43) stated that *T.b. altus* was a summer resident in western Maryland and that it was rare in the eastern part of the state. They also noted (p. 43) that the Baltimore-Washington, D.C., area specifically had no definite breeding records and that no records existed for the Eastern Shore. At the time, House Wrens were considered very common summer residents (Hampe and Kolb 1947, p. 42).

According to Stewart and Robbins (1958, p. 233), Bewick's Wren was a fairly common breeder in the western part of the Ridge and Valley section of the state east to the Indian Springs area of Maryland and uncommon both in the Allegheny Mountains and the eastern part of the Ridge and Valley sections of the state. These birds were casual breeders in the Piedmont region and were found nesting near Cooksville, Maryland, in Howard County in 1949 and at Millers, Maryland, in Carroll County in 1954. Stewart and Robbins (1958, p. 231) further noted that the House Wren was common in all sections of the state as a breeding bird and was uncommon in winter in Worcester County, rare in winter in Somerset, Wicomico, Dorchester, and St. Mary's counties, and casual in winter elsewhere across the state.

The field list compiled by Iliff et al. (1996, p. 35) shows Bewick's Wrens nesting formerly in only the western Maryland counties (counties Garrett through Baltimore) and since the 1970s the species has rarely has been reported nesting anywhere. The bird's habitat is described as consisting of "gardens, orchards, farmyards, wood margins, hedgerows, and scrub."

In the *Atlas of breeding birds of Maryland and the District of Columbia*, Robbins and Blom (1996, p. 270) showed that declines in the Bewick's Wren populations of Maryland and the District of Columbia became evident in the 1960s. They also noted that this decline coincided with the population explosion of the House Wren in these areas. By the late 1990s, Bewick's Wren had disappeared in most places it had once occurred as a breeding bird and was now considered a rarity (Robbins and Blom 1996, p. 270). This wren species had only been confirmed as a breeding bird on one atlas block in the area. These authors also cited cold weather in recent years as a factor in the rapid decline of Bewick's Wren (Robbins and Blom 1996, p. 270-271).

The pages of the journal *Maryland Bird Life* is replete with Bewick Wren reports over the years documenting its occurrence in the early years and absence in later years, essentially gone since the 1960s and 1970s. To cite examples, there was even a record for the eastern shore in 1948 (Robbins 1948, p. 20), it was reported to be regular in summer in Frederick County in 1954 (Worthley 1954, p. 48), and a nest with eggs was found in Allegany County in 1958 (Fletcher 1959, p. 11).

### **Michigan**

Bewick's Wren is described as a rare summer resident in the southern part of the state (Cook 1893, p. 122, Barrows 1912, p. 670, Van Tyne 1938, p. 28, Wood 1951, p. 319) especially in the southwestern counties (Zimmerman and Van Tyne 1959, p. 39). By 1983, it was scarce in the state and is not currently known to breed in Michigan (Payne 1983, p. 41). Barrows (1912, p. 671) stated that the House Wren was not replacing the Bewick's Wren and said the latter was actually expanding its range in the late 1880s. This phenomenon ended in the early 1900s (Barrows 1912, p. 671).

In *The Atlas of Breeding Birds of Michigan*, it was stated that Bewick's Wren was first seen in Michigan in 1879 (Brewer et al. 1991, p. 542), and Bewick's Wrens were first reported nesting in the state in 1894 (Granlund et al. 1994, p. 208). From the late 1800s to 1970, this wren species was a rare and irregular summer resident in the southern third of the state (Brewer et al. 1991, p. 542, Granlund et al. 1994, p. 208). Beginning in 1970, Bewick's Wren was essentially absent from the state, and only three records have been reported there since 1970 at the time of publication (Brewer et al. 1991, p. 542, Granlund et al. 1994, p. 208). According to the authors of both monographs, the decline of Bewick's Wren from the Great Lakes region southward is due to severe winters that occurred in 1957 and the late 1970s as well as because of competition with the House Wren. They also noted that House Wrens have been common summer residents throughout most of the state since the late 1800s and that they have been found on nearly 3, 000 atlas blocks with 33% of those atlas blocks having confirmed breeding evidence (Brewer et al. 1991, p. 334). In *North American Birds*, a Bewick's Wren was reported on June 16, 2001, in Saginaw, Michigan, which was the first reported sighting of it in the state since 1993 (Svingen 2001, p. 437).

### **Minnesota**

Bewick's Wren was considered a rare bird in Minnesota during the 1930s with only a few birds having been recorded in some of the southeastern counties of the state (Roberts 1932, p. 95). Roberts also noted that House Wrens were abundant summer residents throughout the state in the 1930s (p. 89). By the late 1980s, Janssen (1987, p. 226) stated Bewick's Wrens were a casual migrant and visitor during summer in the state. He also discovered that it was more widespread than originally described by Roberts (Janssen

1987, p. 226-227) citing a number of records from south central, southeastern, and eastern Minnesota. Janssen (1987, p. 227) described the House Wren as a regular migrant and summer resident that is widely distributed and numerous in the state.

### **Mississippi**

Coffey (1936, mimeograph, p. 5) noted that Bewick's Wren was an uncommon to fairly common permanent resident in Mississippi. He also stated that the House Wren was an uncommon transient and a very rare winter resident in northern Mississippi during the mid-1930s. In southern sections of the state, the House Wren was considered an uncommon to fairly common winter resident during this same time period (Coffey 1936, mimeograph, p. 5). Burleigh (1944, p. 417) found that Bewick's Wren was a fairly common winter resident on the Mississippi Gulf Coast during the mid-1940s. By the late 1980s, it was the rarest wren on the coast of Mississippi. Only six coastal records have been published since 1974 (Toups and Jackson 1987, p. 102). By the late 1990s, Bewick's Wren was an uncommon winter resident throughout the state and a locally rare summer resident breeding only in the northern counties and was considered rare in the Delta region of Mississippi (Turcotte and Watts 1999, p. 323). During the late 1990s, the House Wren was a fairly common winter resident in southern Mississippi and an irregular winter visitor in the northern parts of the state (Turcotte and Watts 1999, p. 323).

### **Missouri**

In the late 1800s and early 1900s Bewick's Wren was very common in the Ozark border region of southern Missouri (Widmann 1907, p. 248). Every farmstead had a nesting pair and so did every block in town. However, it was rare in northern Missouri.

As a summering bird, it reached the northern border extending into adjacent parts of Iowa and Illinois. Bennitt (1932, p. 47) also noted that Bewick's Wren was common throughout the state but not common in the northwestern portion. Widmann (1907, p. 248) noted that the House Wren dislodged Bewick's Wren when they occurred together. The House Wren occurred all over the state as a nesting bird except southern Missouri including the Ozarks where it was only a migrant (Widmann 1907, p. 249, Bennitt 1932, p. 47).

Most Bewick's Wrens wintered south of Missouri in Widmann's time and only rarely stayed in Missouri, being noted as far north as St. Louis County. By the time of Robbins and Easterla's book (1992, p. 240) on birds in Missouri, Bewick's Wren was declared to be uncommon in summer in the Ozarks and Ozark border region and rare elsewhere to the north. Bewick's Wren was also rare in winter in southern Missouri (Robbins and Easterla 1992, p. 240).

Robbins and Easterla (1992, p. 240, 242) wrote that the House Wren now nests all over Missouri, but that the Bewick's Wren is still the more common of the two in rural areas of the Ozarks. They found from the Missouri Breeding Bird Surveys that Bewick's Wren populations peaked in the late 1960s, dropped sharply in the early 1970s, and have stabilized at one to two birds per survey route ever since.

They also noted (Robbins and Easterla 1992, p. 240) that the House Wren has been implicated in the decline of Bewick's Wren, but they speculated there may be other contributing factors such as brush clearing in general, particularly around farmsteads. They also mentioned that cowbird parasitism may be involved.

The *Missouri Breeding Bird Atlas* compiled from 1986 to 1992 by Jacobs and Wilson (1997, p. 214-215) shows that Bewick's Wrens occur in summer in the southern half of the state with the exception of the southeastern corner. They stated that the species has been declining at a rate of 6.1% per year from 1967 to 1989 as documented by the results of the Breeding Bird Surveys in Missouri. The authors were uncertain of the reason for the declining population, but they suggested that it may be due to the progressive disappearance of early successional habitats through the 20<sup>th</sup> century or due to competition with the House Wren, which seemingly has expanded its breeding range southward in Missouri since the 1960s. Inspection of the atlas maps in the atlas publication showed strikingly that Bewick's Wrens are more common in the southern half of Missouri in summer than House Wrens, and the House Wren is the more common of the two wrens in the northern half of the state.

### **Nebraska**

There are only scattered records of *Thyromanes bewickii bewickii* in Nebraska from the late 1800s to 1970 (Sharpe et al. 2001, p. 313). Rapp and Rapp (1958, p. 20) stated that *T. b. bewickii* was uncommon in summer in the southeastern part of the state. House Wrens were common in summer in eastern Nebraska (Rapp and Rapp 1958, p. 20). Sharpe et al. (2001, p. 313) stated that Bewick's Wren has been reported only as a spring migrant in the state since 1980 and that this wren species has never been a regular breeding bird in Iowa. It should also be noted that Kennedy and White (1997, p. 1) did not include Nebraska on the distribution map for Bewick's Wren nor was there any mention of the existing Nebraska records for this species (p. 2-3). In the *Nebraska Breeding Bird Atlas*, Mollhoff (2001, p. 141) noted that the House Wren is an abundant

breeding bird with a widespread distribution in Nebraska but makes no mention of Bewick's Wren.

### **New York, New Jersey, the New England States, and Rhode Island**

Bewick's Wren has always been considered an accidental visitor to the New England states (Forbush 1925, p. 339). Only six birds have been recorded in New Jersey from the late 1800s through 1977 (Leck 1984, p. 127). There is only one confirmed New York breeding record documented in 1974 as well as two state records of nonbreeding birds in the state, which occurred in 1930 and 1953 (Bull 1974, p. 417, Levine 1998, p. 418-419). Griscom and Snyder (1955, p. 259) noted that only a few inadequately confirmed sight records existed from the Connecticut Valley and Berkshire County in Massachusetts. Rhode Island had only one record of this wren (Bull 1974, p. 417). Zeranski and Baptist (1990, p. 277) mentioned an additional sight record of Bewick's Wren in 1932 at South Windsor, Connecticut, that lacked sufficient documentation. Maine and New Hampshire have one record each that were both from the late 1800s (Forbush 1925, p. 339). Historically, House Wrens were considered uncommon to locally common summer residents in Maine, New Hampshire, and Vermont and locally common summer residents in Massachusetts, Rhode Island, and Connecticut, being most common in the latter (Forbush 1925, p. 341). It was also a common summer resident throughout New Jersey (Stone 1937, p. 743).

The breeding bird atlases of Vermont, Rhode Island, and Connecticut (Laughlin and Kibbe 1985, p. 224, Enser 1992, p. 121, Bevier 1994, p. 252, respectively) stated that the House Wren is a common and widespread breeder throughout each of these three states. The Bewick's Wren is not mentioned as a breeding species in any of these three atlases.

In the *Atlas of Breeding Birds in Maine, 1978-1983*, Adamus (1987, p. 168) did not list Bewick's Wren as a breeding species, but he noted that the House Wren is detected primarily on atlas blocks in the southern and western portions of the state. Foss (1994, p. 200) stated in the *Atlas of Breeding Birds in New Hampshire* that the House Wren is not common in central New Hampshire but that it was found to be most widely distributed south of the White Mountains. Foss does not include Bewick's Wren as a breeding bird of New Hampshire. In the *Massachusetts Breeding Bird Atlas*, Petersen and Meservey (2003, p. 270) commented that House Wrens are common and widespread during the breeding season in all parts of the state except Cape Cod and Martha's Vineyard where they are uncommon to rare. Petersen and Meservey (2003, p. 270) also stated that House Wrens increased after 1917 from being rare to being common today. During the years the atlas was compiled House Wrens occurred on 69% of the atlas blocks (Petersen and Meservey 2003, p. 271). These authors did not include Bewick's Wren as a breeding species of

Massachusetts. *The Atlas of Breeding Birds in New York State* (Andrle and Carroll 1988) made no mention of Bewick's Wren as a breeding bird. The authors of this atlas (p. 302) stated that House Wrens were widely distributed and were only absent in some parts of the Adirondacks.

### **North Carolina**

During the 1940s, Bewick's Wrens were summer residents in the Appalachian Mountains and migrants or scarce winter residents in the remainder of North Carolina (Pearson et al. 1942, p.257, 1959, p. 269). At that time, the House Wren, which had been formerly known as only a transient in North Carolina, was a common summer resident in

the state (Pearson et al. 1942, p. 253 and 1959, p. 266). The House Wren population began to increase in North Carolina in 1922. By the 1980s, Bewick's Wren, the bird that once had been a common summer resident and one of the most common town birds in the Appalachian Mountain region of North Carolina, was now uncommon to rare or absent (Potter et al. 1980, p. 262). These authors also noted that the decline of Bewick's Wren began in the 1930s about the time House Sparrows and European Starlings invaded the state. House Wrens are also common winter residents in eastern North Carolina becoming uncommon to rare going westward through North Carolina (Potter et al. 1980, p. 260).

In the Blue Ridge Mountains Bewick's wrens were once common in summer at all elevations, found in brushy areas: hedgerows, shrub lands, open forests (Simpson 1992, p. 297). Then it declined markedly beginning as early as the 1930s extending through the 1980s. By the early 1990s it was extremely rare in the area with the only summer record occurring at Grayson Highlands State Park (Simpson 1992, p. 297). House Wrens in the Blue Ridge Mountains are fairly common residents up to 5500 ft. elevation from mid April to October, and rare in occurrence up to 6000 ft. (Simpson 1992, p. 297).

## **Ohio**

Prior to the 1900s, Bewick's Wren was virtually unknown in Ohio with only a few having been reported there. By the early 1900s, it had begun to make its appearance in some parts of Ohio and was reported to be on the increase in southern and central Ohio, especially in the Valley of the Scioto River (Dawson and Jones 1903, p. 262). According to Reverend W. F. Henninger, Bewick's Wren had replaced the House Wren in southern and central Ohio and was "the wren of Southern Ohio" in the early 1900s (Dawson and

Jones 1903, p. 263). Peterjohn (1989, p. 142) stated that House Wrens were common only in the northern counties during the early 1900s. Dawson and Jones (1903, p. 265) also noted that Bewick's Wren had expanded its range as far north as Columbus, Ohio, by the early 1900s.

Kemsies and Randle (1953, p. 36) found that *T. b. altus* was undergoing a range expansion northward in Ohio and that it was more common in southwestern Ohio by the 1950s than it had been in the late 1800s. These authors also commented that it was a regular summer resident during the 1950s and that they were certain that every specimen collected in southwestern Ohio belonged to this race of Bewick's Wren (Kemsies and Randle 1953, p. 36). They also mentioned that the House Wren was a common spring and fall migrant as well as a very common summer resident in the southwestern part of Ohio during the 1950s (p. 35). Williams (1950, p. 106) noted that the Appalachian subspecies of Bewick's Wren (*T. b. altus*) was a rare migrant and a rare summer resident in the Cleveland, Ohio, area at this time, and Borror (1950, p. 23) corroborated Williams' conclusion. He also mentioned that only five records of it exist from this region of the state before the 1950s. Bewick's Wrens were considered uncommon in Ohio by 1968 (Trautman and Trautman 1968, p. 286).

Thomson (1983, p. 215) found that Bewick's Wrens once nested in 61 counties in Ohio. By the time of his monograph in 1983, the species was seemingly absent from many of these counties, especially the northern ones.

In the *Ohio Breeding Bird Atlas*, (Peterjohn and Rice 1991, p. 224) as well as in two other monographs (Peterjohn 1989, p. 141, Peterjohn 2001, p. 372-373), it was noted that Bewick's Wren was first found in Ohio in 1879 and thereafter populations expanded

rapidly in the early 1900s peaking between 1925 and 1940 when birds nested regularly in all counties of Ohio north to Mercer, Shelby, Logan, Union, Morrow, Knox, Wayne, Stark and Columbiana Counties. Only a few were reported from northern counties in Ohio during these years. In summer they were "fairly common to very common along the unglaciated plateau north to Muskingum, Noble, and Washington counties," but they were uncommon to rare at other points along this plateau as well as in most southern and central counties Peterjohn (1989, p. 141, Peterjohn 2001, p. 373) and Peterjohn and Rice (1991, p. 224). It is further noted that Bewick's Wren populations of Ohio began to decline in the 1940s and then suffered a dramatic decline beginning in the 1950s, adding that except for a few isolated pairs still reported each year through 1970, most Bewick's Wrens had disappeared in Ohio by the early to mid-1960s. By the late 1980s, Bewick's Wrens were considered to be "accidental to casual summer residents in the southern counties and strictly accidental elsewhere."

With respect to the House Wren, Peterjohn (1989, p. 142, Peterjohn 2001, p. 375) found that it declined briefly in the early 1900s in central and southern Ohio. By the late 1980s, House Wrens were fairly common to abundant in almost all counties in Ohio. He suggested that their population in Ohio was possibly the primary reason for the disappearance of Bewick's Wren there, and added that wherever the territories of these two wren species overlapped there were always conflicts that usually ended with the exodus of Bewick's Wren from the areas of conflict. However, Peterjohn also noted that other factors had to be responsible for the decline of Bewick's Wren because they had even disappeared from areas in Ohio where the House Wren was not present (Peterjohn 1989, p. 142, Peterjohn 2001, p. 374).

**Oklahoma**

In the 1920s, Nice and Morse (1924, p. 93-94) suggested that *Thryomanes bewickii bewickii* was a resident of northeastern Oklahoma but not found in southeastern Oklahoma and that other subspecies occurred in western Oklahoma. At this time, the House Wren was a rare transient in various parts of the state. After more thorough coverage of the state into the 1960s, Sutton (1967, p. 408) able to recognize that Bewick's Wren was a resident throughout Oklahoma being more common in summer than in winter. However, he stated that he was not convinced the subspecies *bewickii* bred in Oklahoma. At the time, Sutton (1977, p. 52) also noted that the House Wren was a transient and summer resident that bred in north central and northwestern Oklahoma where it competed for nesting sites with Bewick's Wren. By the 1980s, both wrens were permanent residents and common throughout the state (Wood and Schnell 1984, p. 120). However, by the 1990s, Bewick's Wren was an uncommon migrant and rare summer resident in northeastern Oklahoma where it preferred shrubby thickets and yards. At this time, there were still no nesting records for the southeastern part of the state. Baumgartner and Baumgartner (1958, p. 271-272) found that the House Wren was an uncommon and local breeder in the northern and central parts of the state as well as a rare winter resident, and Bewick's Wren was a permanent resident.

In the *Oklahoma Breeding Bird Atlas*, Reinking (2004, p. 318) states that most Bewick's Wrens found in Oklahoma appear to belong to the western subspecies of Bewick's Wren but that some birds from the Ozark region may belong to the eastern form. He also noted that the eastern birds seem to winter in extreme southeastern Oklahoma. Even though the eastern subspecies is currently declining in the Ozark region and eastern Oklahoma, there has not been a contraction in its range in the state (Reinking

2004, p. 319). According to Reinking (2004, p. 319), the atlas surveys demonstrated a dramatic reduction in the species' frequency of occurrence in the Ozark and Ouachita Mountains where the habitat is dominated by the mature forest habitat this wren species tends to avoid.

### **Pennsylvania**

Bewick's Wrens were first reported in Pennsylvania in the late 1800s when it was rare in summer in the south central and southeastern parts of the state, absent in the northern section, and fairly frequent in the southern counties of the state (Warren 1890, p. 309). During the 1940s, Todd and Sutton (1940, p. 418) noted that Bewick's Wren was fairly common in the south central counties of Pennsylvania. He described its range as being continuous through Franklin, Fulton, and Bedford counties northward across Huntington county down into southern Centre County. Bewick's Wren was considered a breeder in the ridge and valley sections of the state during this time. It also inhabited southwestern counties where it ranged as far east as Chestnut Ridge and northward to Mercer County (Todd and Sutton 1940, p. 418). Todd and Sutton (1940, p. 418) also noted Bewick's Wren was most abundant in Greene County preferring knotholes in fallen trees in the woods or open fields, woodpecker cavities, or dense brush piles. He commented that few House Wrens were found west of the Allegheny Mountains at this time despite the fact that they were extremely abundant along the eastern seaboard.

By the 1960s, Bewick's Wren was an uncommon to rare transient over much of the state and a breeding summer resident in the central, southwestern, and south central counties. It was also a winter visitor in almost all parts of the state except the northwestern and northeastern counties (Poole 1964, p. 49).

Wood (1967, p. 74-75) stated that this species was having difficulty maintaining a population in the state due to competition with the House Wren, which is a common breeder there. Gill (1985, p. 305) noted that Bewick's Wren was once common in southwestern Pennsylvania but that it had disappeared by the mid-1980s. Gill (1985, p. 306) cited the House Wren as the reason Bewick's Wren had vanished from southwestern Pennsylvania. McWilliams and Brauning (2000, p. 314-315) noted that Bewick's Wren was found nesting in many parts of the state during the late 1800s and early 1900s but that it became more and more uncommon in the state during the latter part of the 1900s having only been reported once as a nesting bird in the late 1970s. They also found there have been no winter records or records of the bird east of the mountains since 1960 nor have there been any reports of it in the western part of the state since 1977. It was further stated that the bird is now considered extirpated from Pennsylvania. They mentioned that the House Wren was a common breeder statewide and emphasize competition with the expanding House Wren population as a possible reason for the decline of Bewick's Wren in the state (McWilliams and Brauning 2000, p. 315-316).

In the *Atlas of Breeding Birds in Pennsylvania*, Brauning (1992, p. 435) stated that Bewick's Wren was first reported breeding in Pennsylvania in 1843. By the end of the 1800s, it was nesting frequently in southwestern Pennsylvania but rarely in the eastern part of the state. He mentioned that this wren eventually extended its breeding range from Greene County east to Adams County on the southern border, north to Mercer County, and irregularly north to Perry and Lycoming counties. Its population expanded until the 1940s when it began to decline rapidly (p. 23, 437). It was last reported on an atlas plot in 1989 in Franklin County. House Wrens were observed in 92% of the atlas blocks, and

these birds are the most widespread and abundant of the five wren species that breed in Pennsylvania (Brauning 1992, p. 252-253). Brauning (1992, p. 252) also noted that House Wrens are more abundant on Breeding Bird Survey routes in Pennsylvania than in any state in the eastern part of the United States.

### **South Carolina**

Bewick's Wrens were recorded nesting in South Carolina by the early 1800s (Wayne 1910, p. 183, who cited Audubon, 1834-1835 p. 121). During the late 1940s, *Thryomanes bewickii bewickii* was a casual winter visitor that had only been recorded in the coastal region of South Carolina, and *T. b. altus* was then an uncommon permanent resident in the central and northwestern parts of South Carolina where it bred (Sprunt and Chamberlain 1949, p. 390). The *altus* race was also a rare winter resident across the rest of the state. During this period, the House Wren was an uncommon winter resident having only been recorded along the South Carolina coast. By the early 1980s, Bewick's Wren was uncommon to rare or absent as a breeding bird in the Appalachian Mountains of South Carolina, and House Wrens were common winter residents in eastern South Carolina becoming uncommon or rare going westward through South Carolina (Potter et al. 1980, p. 260, 262). There have been no records of breeding for Bewick's Wrens in South Carolina since the 1950s (Post and Gauthreaux 1989, p. 44). Post and Gauthreaux (1989, p. 44) also stated that the dramatic decline of Bewick's Wrens in the Southeast correlates with the appearance of House Sparrows and European Starlings in the state.

In the online South Carolina breeding bird atlas (Boyle 2003), which was compiled from 1988 to 1995, Bewick's Wren is not listed as a breeding species, and the House Wren was confirmed in only some of the atlas blocks of the northwestern counties of the

state. However, this particular atlas was not complete as large portions of the state had not been covered adequately including parts of the interior. Most of the coverage was in the coastal zone, which is not the typical habitat for either wren species.

### **Tennessee**

In the early 1930s, Bewick's Wren was considered a common summer resident throughout Tennessee and a fairly common winter resident in western and central Tennessee, but very rare in winter in eastern Tennessee (Ganier 1933, p. 27). It was still fairly common in eastern Tennessee up until the 1940s (Coffey 1942, p. 6), and by the mid-1960s, Bewick's Wren was still considered a permanent resident of the state (Parmer 1965, p. 21). However, Parmer noted that this species had become progressively uncommon over the years and was rare in winter. Ganier (1933, p. 27) stated that the House Wren was a rare transient over much of the state in the early 1930s. Stupka (1963, p. 115) described Bewick's Wren as "very uncommon" in the Great Smoky Mountains National Park, being more frequent at lower elevations. The House Wren was very irregular there (p.112). An expedition from the Smithsonian Institution in spring and summer of 1937 noted occurrences of Bewick's Wrens in Tennessee (Wetmore 1939, p. 175, 212).

Robinson (1990, p. 159) found that Bewick's Wren had become a rare permanent resident now a threatened species in Tennessee. He said it was formerly much more numerous in the eastern and western parts of the state but was rarely found in those parts of the state by the 1990s. He further noted that the decline in its population began in the early 1940s with a sharp decline being shown by Breeding Bird Survey data from 1966 to 1987 across the entire state. Robinson admitted that the actual cause of the decline was

unknown, but he speculated that it was either due to severe winters in the 1940s and 1950s or the effect of an increasing House Wren population and the subsequent competition between the two wren species. Robinson also said that the House Wren was a regular, fairly common migrant and a rare winter resident and summer resident, especially in eastern Tennessee.

In the *Atlas of breeding birds of Tennessee*, Nicholson (1997, p. 233) stated that Bewick's Wren was first reported in the state in Roane County in 1885. During the late 1800s Bewick's Wren was a local bird that was present in almost every county in the state. By the 1930s, it was fairly common in the western part of the state, common in central Tennessee, and fairly common in eastern Tennessee. He noted that a decline in the Bewick's Wren population of Tennessee became evident in the early 1940s, and by the late 1940s it was rare in northeastern Tennessee. By 1965 it had almost disappeared from areas in Nashville, Tennessee, which it had formerly occupied. Nicholson (1997, p. 233) also commented that between 1966 and 1994, there was a significant decrease of 22% yearly of Bewick's Wrens on Tennessee Breeding Bird Survey routes. This bird is now listed as threatened in the state, and Nicholson (1997, p. 232-233) currently describes Bewick's Wren as a rare permanent resident that is less common in winter than any other season. He suggested several possible reasons for its decline in the state: loss of habitat, severe winters, and competition with the House Wren, explaining that competition with the House Wren cannot be the only factor responsible for the decline of Bewick's Wren because the latter's decline was well underway in most of the state before the House Wren's expansion of its breeding range into Tennessee. Also, he noted the

House Wren has not become established in some areas of Tennessee where Bewick's Wrens are no longer found.

The atlas found House Wrens to be common nesters in northeastern Tennessee and fairly common in the Knoxville area as well as the north central part of the state (Nicholson 1997, p. 235). Few birds were found on atlas blocks in the western and southern parts of the state, and Nicholson comments that the range expansion of the House Wren in the state of Tennessee appears to have slowed down or stopped altogether. It is a fairly common migrant and rare winter resident in Tennessee.

### **Texas**

Bewick's Wren has always been common and still is in Texas, especially in the western half of the state. Unfortunately, the plight of the eastern populations has not been emphasized historically. However, Oberholser (1974, p. 633-634) says the race *cryptus* occurs throughout eastern Texas extending westward to the Trans Picos region where it meets the *eremophilus* subspecies. Symbols on his range map show the absence of summer records of *cryptus* in northeastern and east central Texas, but it has bred in the extreme southeastern part of the state. The records of *cryptus* in this blank eastern zone in summer were all in winter or migratory seasons. The form *bewickii* is uncommon in Texas and only present in eastern Texas in winter (Oberholser 1974, p. 634). There was only one record of *altus* (Oberholser 1974, p. 634). It occurred in northeastern Texas in winter.

Oberholser (1974, p. 630) found the House Wren to be fairly common over most of Texas with the exception of the Pan Handle and north central regions, where it is rare. The map shows only a few summer records and those are from the north and far west.

Pulich and Pulich (1988, p. 252) found that Bewick's Wren was fairly common to common throughout north central Texas where it is seen year round in many counties. However, there were few records when he wrote in the 1980s in the eastern counties from May to July. He also noted that the wren's numbers tend to remain fairly constant throughout the year. House Wrens were fairly common to common transients as well as rare to fairly common winter residents in the north central part of the state where 24 counties have recorded their occurrence (Pulich and Pulich 1988, p. 253).

White (2002, p. 85) described Bewick's Wren as an uncommon migrant and winter resident in a variety of brushy areas in the Blackland Prairie and Post Oak Savannah areas of northeastern Texas as well as a rare and very local bird in heavily wooded areas of this section of the state. He also stated (p. 86) that House Wrens are fairly common to common transients in the north central part of the state and fairly common migrants and uncommon winter residents in the northeastern section of the state.

According to Sexton (2001, p. 457) in *North American Birds*, two eastern Bewick's Wrens were seen in Harrison, Texas, (northeastern Texas) from June 23, 2001 to July 4, 2001.

## **Virginia**

In the late 1800s, Bewick's Wrens were not common residents of Virginia even though several nests were found along the James River in small apple trees from 1891 to 1894 and also were found nesting in western Virginia nesting at altitudes of up to 4500 feet (Bailey 1913, p. 327-328). During the early 1900s, House Wrens were common summer residents in Virginia (Bailey 1913, p. 328). Murray (1952, p. 78) states that the eggs that Bailey found in apple trees along the James River were those of the Eastern

Bewick's Wren (*Thyromanes bewickii bewickii*), adding that this subspecies of Bewick's Wren was found breeding in coastal southeastern Virginia during the late 1800s but was rare there. He also noted that by 1952 it was no longer on the coast in summer and that there had only been four winter records of it there from the late 1800s to the early 1950s. Murray (1952, p. 78) also commented that *Thyromanes bewickii altus* was found fairly commonly as a summer resident from the Upper Piedmont westward in the state. However, he reported that Bewick's Wrens were being replaced by House Wrens in many places and were becoming uncommon (Murray 1952, p. 78). By the late 1950s, Bewick's Wren was a common summer resident in Rockbridge County (Murray 1957, p. 38). From 1889 to 1950, Bewick's Wrens were regular breeding birds in the Mountain Lake Region (Giles County) of Virginia; however, it has not been observed in this region since 1967 (Johnston 2000, p. 75). As of the year 2000, House Wrens were considered rare birds with no evidence of breeding in the Mountain Lake region of the state (Johnston 2000, p. 75). In the 1970s, Freer (1973, p. 66) noted that even though Bewick's Wrens had formerly been fairly common summer residents, they had become rare in recent years.

The last reports of the wren along the Blue Ridge Parkway in summer, where they had been regular, were five birds in June 1973 at Buck's Elbow Mountain (3000 feet in elevation) (Charles E. Stevens, Jr. pers. comm.). Subsequently, the birds disappeared there. The habitat was woods and pasture. The Bewick's Wrens disappeared in the absence of the House Wren, which never reached this high elevation. David Shoch (pers. comm.) reports 7 records from Virginia later than 1973 spanning from 1985 to 1998 from Highland, Tazewell, Dickinson, and Bath counties.

In the *Breeding Bird Atlas of Virginia: 1985-1989*, Trollinger and Reay (2001, p. 140) state that *Thyromanes bewickii altus* is a state endangered wren species that summers only in a few areas of western Virginia with only one atlas block showing a confirmed breeding record. This atlas showed that the House Wren is a common breeding species statewide but that it is more commonly found breeding west of the Blue Ridge Mountains and in the northern part of the state (Trollinger and Reay 2001, p. 141).

In 2007 a point count survey (932 points) conducted in the Appalachian Plateau, Ridge and Valley, and Blue Ridge physiographic provinces yielded no encounters with Bewick's Wrens (Mike Wilson, pers. comm.)

### **West Virginia**

During the 1920s, Bewick's Wren was abundant west of the Allegheny Mountains in West Virginia replacing the House Wren, which was only common on the summits of the Alleghenies (Johnston 1923, p. 74). By the early 1980s, Bewick's Wren was considered a rare to uncommon summer resident and a rare winter visitor (Hall 1983, p. 92). In summer it was found in moderate numbers with some regularity in the valleys east of the Allegheny Mountains with most records being reported from Pendleton, Grant, Hampshire, and Hardy counties. It also occurred regularly at high elevations in the clearings of spruce forests (Hall 1983, p. 92). Hall also noted that this wren was irregular elsewhere in the state.

In *The West Virginia Breeding Bird Atlas*, Buckelew and Hall (1994, p. 112) stated that Bewick's Wren was only found on 15 Breeding Bird Survey routes from 1966 through 1980 with no birds having been reported since 1980. They also noted that out of

the six atlas blocks where Bewick's Wren was reportedly detected, only 3 records were confirmed breeding (Buckelew and Hall 1994, p. 112). During the 1980s, the House Wren was a common summer resident except at high elevations in the Allegheny Mountains (Buckelew and Hall 1994, p. 113). They also commented (p. 113) that the House Wren invaded the state and rapidly spread during the early 1900s. Because the Bewick's Wren was supposedly unable to compete with the House Wren, the Bewick's Wren population of West Virginia began to decline gradually (p. 112). These authors speculated that while the expansion of the House Wren population might have contributed to the decline of Bewick's Wren in the state, other factors may have played a role in their decline as well since Bewick's Wren has declined in areas of the state where the House Wren is not present in large numbers or is absent (Buckelew and Hall 1994, p. 112).

### **Wisconsin**

In the early 1900s, there was no record of Bewick's Wren having occurred in Wisconsin, and the House Wren was a common migrant in the spring and fall as well as a common summer resident in the state (Cory 1909, p. 686-687). The first sight record of Bewick's Wren was recorded in 1916 (Robbins 1991, p. 420), and the first nesting record was reported in 1921 (Kumlien and Hollister 1951, p. 111). Kumlien and Hollister (1951, p. 111) also commented that Bewick's Wren was a common migrant in eastern Wisconsin but rarely bred anywhere north of the southern border of the state. By the early 1990s, Bewick's Wren was considered a rare migrant in the southern part of the state as well as a rare summer resident in the southwestern counties of Wisconsin (Robbins 1991, p. 420). There are two specimens in the University of Wisconsin

Zoological Museum collected in Madison, Wisconsin, during migration (29 March 1949 and 17 April 1953 respectively). Robbins (1991, p. 420) also found that Adams County was the northeastern most limit of its expanding range. He also stated that since 1970, no summer or fall reports have been recorded anywhere in the state, and that there have only been four spring reports since 1976 (Robbins 1991, p. 421). The last known breeding record was from Trempealeau County in 1975, and the last individual sighting record was from an unknown location in the state in 1982 (Au pers. comm.). In 1989, this species was added to the Wisconsin endangered species list. Prior to 1919, the House Wren was only a migrant, and since then it has become the most common nester in Wisconsin, especially along the floodplain of the Mississippi River with the highest summer concentrations being in the southwestern part of the state.

In the online Wisconsin Breeding Bird Atlas (Davis 2003), which was compiled from 1995 to 2000, there is no mention made of Bewick's Wren as a breeding bird. However, the House Wren is a common and abundant breeder throughout the state which was reported on atlas blocks in every county of Wisconsin as a confirmed breeding species.

### **States Summary**

Avifaunal monographs for the eastern states first began to appear in the late 1800s. These initial publications documented the widespread presence of Bewick's Wrens in high numbers across the eastern part of its range. This ample population either remained stable or actually increased into the early to mid 1900s. However, near the mid 1900s populations began to drop everywhere in the east until the bird was rare or absent in most of its eastern range. In some eastern states this decline began before the mid 1900s, in most it began to occur right at mid century, and in other states it happened right after mid century, but everywhere in the east the

drop in numbers was conspicuous. The decline was particularly precipitous in the Appalachian region occupied by the subspecies *altus*, the easternmost Bewick's Wren race, where it decreased to extinction or near extinction, but the race *bewickii* to the west was also dramatically affected.

Authors of state monographs often commented on reasons for the Bewick's Wren's progressive decline in the last part of the 1900s. Paramount of these was the postulated inferior capacity of Bewick's Wrens to compete with House Wrens, a species that expanded its range southward into Bewick's Wren's range through the mid to late 1900s in the eastern states. Some authors noted, however, that Bewick's Wrens began to decline in certain areas before the House Wren arrived, and also Bewick's Wrens disappeared in some areas that have never been reached by House Wrens.

Other explanations proposed for the reduction in Bewick's Wren numbers were: disappearance of the shrubby habitat required, severe weather during periods in the last half of the 1900s, and pesticide use.

#### **PETITION TO LIST *altus***

In 1986 the Maryland Natural Heritage Program petitioned the U.S. Fish and Wildlife Service to list the Appalachian population of Bewick's Wren as endangered, which would pertain to the race *Thryomanes bewickii altus* (1986, no page numbers). In 1988 the Service responded saying the action requested was warranted but could not be implemented because of other priorities. The petition covered in great detail the status of the wren in the Appalachian states, ones that are also covered in the present document. Many of the same references were used in both reports, but the Petition covered material in some local publications that were not scrutinized for the present document.

Because the Petition treats the wren taxon that is the most critically at risk, or may already be extinct, a capsule summary of the state by state finding is included here. At the onset in the Petition it was recognized that there were questions concerning the validity of the *altus* race. Therefore, the petition addressed the status of the Appalachian population of Bewick's Wren and not the *altus* taxon per se.

It was found that prior to the second World War, Bewick's Wrens were common to abundant in 12 eastern Appalachian states in a region stretching from Pennsylvania and Ohio southward into Alabama and Georgia. Then near the mid 1900s there was a precipitous drop in numbers everywhere. By the first half of the 1980s, less than 20 pairs were noted in total from Maryland, Virginia, and West Virginia combined. Seemingly the species had nearly disappeared in Appalachia.

The petition addressed the matter concerning why Bewick's Wren declined so dramatically but was indecisive in reaching definite conclusions. Competition with the House Wren (*Troglodytes aedon*) is the prime suspect because the Midwestern race *T. a. baldwini* invaded southward into the southeastern states being vacated by Bewick's Wren. The march southward was consummated during the 1910s through the 1930s in the Carolinas and Tennessee, in the mountains of Virginia and West Virginia into Georgia in 1950, and after the mid 1900s, it occupied the mountains of Virginia and West Virginia. The aggressiveness of the House Wren is well documented and conflicts between House and Bewick's Wrens are noted in literature citations. However, it was also noted that Bewick's Wrens formerly persisted in southern Ohio where the House Wren always has resided, that Bewick's Wren declined in high elevation domains where the House Wren never occurred, and in some places Bewick's Wrens dropped in

abundance before the House Wren arrived. So the matter with the House Wren is not clear.

Other possible causes lacking definite concrete evidence were mentioned in the Petition but were not emphasized. These agents included: competition with Carolina Wrens, House Sparrows, European Starlings, and even Song Sparrows, plus the effect of severe weather in winter and the use of pesticides. The one consideration that was not mentioned in the Petition was the possibility of habitat change adversely affecting Bewick's Wren in its Appalachian range. The state by state summaries of Bewick's Wren trends follow:

Alabama – common in mountainous northern Alabama in the early part of the 20<sup>th</sup> century and even some records from the Piedmont. By the 1950s it was uncommon in the Appalachians and rare in the Piedmont.

Georgia – the common wren nesting in the Appalachians and its valleys into the 1950s but rare there by the 1970s and absent there in summer in the 1980s.

Kentucky – *altus* was common in summer in the Cumberland Plateau and Mountains to the early 1960s. The taxon *bewickii* decreased sharply from 1967 to 1977, declining to almost none since the 1970s. No information on when *altus* showed a drop in its population, but it had disappeared in summer from eastern Kentucky by the early 1980s.

Maryland – reputed common in parts of western Maryland in the 1880s and thereafter a fairly common nester in the mountains. Subsequently, it became rare in the 1970s with only a few scattered records in the 1980s.

New York – one nest was found in the Catskill Mountains.

North Carolina – one of the most abundant birds in the western part of the state in the 19<sup>th</sup> century. This condition persisted into the early 20<sup>th</sup> century, but by the 1930s the wren had become scarce and remained so until after 1971 when the species disappeared as a breeding bird.

Ohio – present in the southern third of the state in the 1800s and increased markedly thereafter to become abundant in the 1930s. It then declined to uncommon in the 1960s, and it was absent from the state after 1980.

Pennsylvania – rare breeder in parts of the state in the late 19<sup>th</sup> century, more frequent in the southwest then northward. It was still rare in the 1920s, but fairly common by the 1930s in the Ridge and Valley regions. The bird disappeared in part of the state by 1940 and was essentially gone from the Ridge and Valley precincts by 1950.

South Carolina – first found in the state in the late 1890s, by the 1940s it was uncommon but present in summer in both the mountainous and the Piedmont physiographic divisions of the state. It has become so rare since 1960 that the bird was listed as “threatened” in the state, and by 1980 it was categorized as rare or absent in South Carolina.

Tennessee – earliest records of the Appalachian population in eastern Tennessee in summer dates to the late 1800s. It was scattered in distribution but nevertheless found in all counties investigated. By the early 1940s it was fairly common in eastern Tennessee but declined in numbers through the 1940s and 1950s plunging to rare status. By the 1980s, except for one record in 1986, it was essentially gone from the state.

Virginia – as in the other states, Bewick's Wren was first detected in Virginia in the late 1800s when it was not common but widespread. By the mid-20<sup>th</sup> century, it was

abundantly present in summer in the Blue Ridge region and to the west where the bird was described variously as uncommon, fairly common, common and abundant. The population declined thereafter to a condition of rare and threatened in the 1970s.

West Virginia – the wren was abundant to common in summer throughout the state until the 1950s, but dropped in numbers everywhere by the 1960s. In the 1970s none were found in areas where the bird had been common in the past. There were still very few scattered summer records in the 1980s.

### **PUBLISHED LITERATURE**

This section covers the published peer reviewed literature pertaining to the eastern taxa of Bewick's Wren (*Thryomanes bewickii bewickii* and *T. b. altus*) that is found in professional journals and also includes the gray literature. In this case, the gray literature refers to local bird journals, special reports issued by federal and state agencies and various conservations organizations, special symposia proceedings, websites, and even personal communications.

These sources of information concerning Bewick's Wren provide some evidence that this bird species was increasing but much more indication that it is decreasing. For example, Hamel (1992, p. 227) in describing this decline and even current absence in its eastern range, emphasizes that the taxon *altus* is listed federally as a Category C1 species, and that the bird is named as either threatened or of concern in seven southeastern states and three eastern national forests. Those noting a decreasing population proposed several possible explanations, which include: 1) competition with House Wrens, 2) competition with other bird species, 3) habitat change, 4) severe weather, and 5) reason

not known. Starting with evidence for an increasing range, these items will be treated in the order mentioned.

### **Increasing**

When Bent wrote in 1948 (p.176), he said that Bewick's Wrens were extending northward in the states at the northern edge of its range, as well as in Ohio and Indiana. He found this movement was most striking in late 1800s and early 1900s, but still was progressing into new areas in the 1940s. This situation is corroborated by Dawson and Jones (1903, p. 262) and Peterjohn (1989, p. 141) for Ohio where Bewick's Wrens peaked in abundance between 1925 and 1940. Pough (1946, p. 100) echoed this northward expansion view and further observed that in the process Bewick's Wrens were replacing House Wrens. Pough attributed the phenomenon to warming winters that possibly allowed permanent resident Bewick's Wrens to survive northern winter climates (p. 101).

### **House Wren Competition**

By far the preponderance of the published literature implicates the role of the House Wren in the decline of Bewick's Wrens. Most of these views are reached by inference noting that the disappearance of Bewick's Wrens more or less coincided with the southern expansion of the House Wren range. For example, in North Carolina, Bewick's Wrens were common to abundant in the mountainous region of the state before the 1900s (Simpson 1978, p. 25). By the 1930s, it had declined there to a mere two breeding records. Simpson acknowledged that the House Wren expansion was commonly speculated to be associated with Bewick's Wren's decline, but he also cites evidence (Burleigh, pers. comm.) indicating that Bewick's Wrens had declined significantly before

the House Wren reached the area as a breeding species, and the House Wren has always been uncommon at the high elevations where Bewick's Wren once was so abundant. Hall (1983, p. 92) also found areas in which Bewick's Wrens declined where House Wrens were not numerous. Odum and Johnston (1951, p. 357-358) document the occurrence of the first nesting House Wren in Georgia in 1950, and speculates that this may ultimately negatively impact Bewick's Wrens there.

Bewick's Wren once was quite common in the Appalachian Mountains of Maryland (Thomas et al. 2002, <http://www.dnr.state.md.us/wildlife/bewick.asp>) and presently is near extirpation if not so already. The authors mention the same process of decline everywhere east of the Mississippi River. They name a number of possible reasons for this decrease in numbers including disease, severe winters, and loss of winter habitat. They note that loss of breeding season habitat is seemingly not a factor because shrubby thickets still abound while stressing that the House Wren, also seeking the same habitat, has prospered there. However, competition with the House Wren is emphasized too because beginning in the 1930s House Wrens began displacing Bewick's Wrens. Also, adverse competition with other species in mentioned such as with the Song Sparrow, House Sparrow, European Starling, and Carolina Wren.

The situation is similar in West Virginia where Bewick's Wren was the only common wren species from the late 1880s to the 1940s thereafter declining precipitously to a state in which it been replaced by House Wrens (Brooks 1934, p. 244, Brooks 1973, p. 15, Smith 1980, p. 77-78). The definitive dissertation on the life history of Bewick's Wren (Bibbee 1947, p. 1- 270) was the result of studying the bird in the 1940s around Athens, Mercer County, West Virginia. By 1975 the species was absent from the area and the

House Wren was common (Smith 1980, p. 78). Smith speculated that “the tidying up of Athens” by 1975 removed Bewick's Wren's habitat (p. 78). Bibbee (1947, p. 212) found that House Wrens first arrived in the Athens area in the late 1920s using nest boxes positioned by school children. Nevertheless, Ron Canterbury (pers. comm.) reports the banding of a Bewick's Wren at Athens in January 2000 while reporting that there have been only three recent records of it there and that the species is virtually extirpated in West Virginia.

In southwestern Pennsylvania, Bewick's Wren was abundant in the early 1900s but by 1923, it was rare to absent in areas of former abundance (Christy 1924, p. 12-13). During the same period, the House Wren reached the area in 1912 and by 1923 it was abundant there occupying former Bewick's Wren habitat. Brauning (pers. comm.) reported in 2004 that Bewick's Wren no longer occurred anywhere in Pennsylvania.

The recurring theme is the same in Kentucky and Tennessee. In Kentucky near Louisville, Bewick's Wren (*bewickii* race) was common before the 1920s. The House Wren invaded in the 1920s and became progressively more common into the 1950s (Monroe 1955, p. 41). The Bewick's Wren population declined rapidly as House Wrens increased until there were only a few Bewick's Wrens still nesting around Louisville in the 1950s. Additionally, Monroe (1978, p. 22) reports that Bewick's Wrens decreased by 75% between 1967 and 1977 statewide in Kentucky. Again, the House Wren influx coincided with the decline in Bewick's Wrens. In adjoining Tennessee, at Nashville, Bewick's Wrens were common nesting birds in the 1930s and 1940s (Laskey 1966, p. 4). She adds that House Wrens were sporadic beginning in 1957 and throughout the mid-1960s, but in 1965 they suddenly were rather common (p. 5). Nesting Bewick's Wrens

were commonest there in the 1930s and 1940s and became very uncommon through the 1950s to the extent that none remained in the 1960s (p. 4-6). Thus Bewick's Wren declined (1950s) when the House Wren was barely arriving (late 1950s to mid-1960s) and before the major influx of House Wren (1965) (p. 4-6). Therefore, Laskey attributed the disappearance of Bewick's Wren to progressive habitat urbanization of the neighborhood (more details later) (p. 4-6). She never noticed any adverse interactions between Bewick's, House and Carolina Wrens, although once a Bewick's Wren ousted a Carolina Wren from a nest box (p.4-6).

Newman (1961, p. 84-86) noted that by the 1960s Bewick's Wrens had become rare in northern Ohio and even was uncommon in central Ohio. He described an aggressive conflict between territorial House and Bewick's Wrens.

Despite the southward movement of the House Wren, nevertheless, Bewick's Wren successfully moved northward into the range of the House Wren in the last decade of the 1800s and the first decade of the 1900s (Bent 1948, p. 176). This suggests there was little conflict between these two wren species.

Although the material above documents on inverse relationship between populations of Bewick's and House Wrens, there is little concrete evidence concerning the mechanisms that allow House Wrens to displace Bewick's Wrens when House Wrens extend into Bewick's Wrens range. There have been some extensive studies and cursory observations relating to this matter. For example, Root (1969, p. 125) found the literature very weak and circumstantial concerning territorial antagonism between Bewick's and House Wrens and emphasized this by noting that the two wren species were not included in the opus by Orions and Willson (1964) describing interspecific territoriality in birds.

In Oregon, where western subspecies occur, Kroodsma (1973) studied territoriality in Bewick's and House Wrens. Even though the territories of the two species broadly overlapped, only twice were aggressive interspecific interactions observed (p. 341- 342). It was further noted that Bewick's Wrens' territories were much larger than those of House Wrens, and the House Wren occupied more open habitat than the Bewick's Wren's shrubbier environment (p. 343). The breeding cycle of the two species coincided, except only the House Wren was commonly double brooded (p. 343-344).

Others in the eastern states have observed intense direct conflicts between Bewick's and House Wrens (Roads 1929, p. 103, Tyler and Lyle 1947, p. 29) where their territories did not overlap (Roads 1929, p.103) and where the Bewick's Wren gives way to the House Wren (Sutton 1930, p. 13). Verner and Purcell (1999, p. 226) in California found the territories of the two wrens broadly overlapped, with Bewick's Wren territories being much larger. Pough (1946, p. 100) states that the territories of the two species do not overlap.

An interesting finding by Kroodsma (1973, p. 347) was that two House Wrens mimicked Bewick's Wrens and Bewick's Wrens exhibited countersinging with the neighboring House Wrens. This practice by House Wrens could potentially be a mechanism for preventing Bewick's Wrens from occupying areas where indeed Bewick's Wrens were absent. This could be the process by which House Wrens displace Bewick's Wrens, but Thomas (1943, p. 192-193) heard a Bewick's Wren sing both its song as well as that of the House Wren. In fact, the songs of Bewick's Wrens are exceedingly variable geographically (Kroodsma 1985, p. 143-146).

There have been two experimental approaches that document the direct adverse impact of House Wrens on other species. Kennedy and White (1996, p. 282) in Kansas erected 102 wren nest boxes in riparian forest and shrubland habitats. Many of these were adopted by both Bewick's and House Wrens. Bewick's Wren's nest failures were monitored showing 81% of these failures were due to House Wren depredations (pecking and removing eggs and nestlings or even piling sticks atop the nest) (p. 282). Renesting attempts by Bewick's Wrens also were negatively impacted by House Wrens (p. 282). Furthermore, they positioned unoccupied nest boxes with introduced eggs from the House Sparrow (*Passer domesticus*) near occupied nest boxes of the two wren species. Only the House Wren removed eggs from the introduced nest boxes, but they did so only during unmated and pre-laying periods (p. 282).

In another experimental approach (Belles-Isles and Picman 1986, p. 190), nests of six avian species with either eggs or nestlings were moved close to House Wren nests. Eighty-four percent of the territorial House Wrens, including both male and female birds, depredated these target nests by pecking eggs and nestlings, removing eggs and nestlings, and using the nest material for their own nests (p. 192). Again only unmated territorial male and pre-laying female House Wrens participated in this aggressive activity (p. 192). Hughes (1929, p. 25) in Illinois watched a House Wren remove both nestlings and nesting material from a nest box occupied by Bewick's Wrens.

In Ohio, Roads (1925, p. 92) observed House Wrens negatively impacting nesting Bewick's Wrens. The House Wrens were new arrivals in an area where Bewick's Wrens had been nesting for at least 28 years.

In a controlled field experiment in an oak-pine woodland in California, it was found that blocking natural tree cavities had a large negative effect on Bewick's Wrens but no effect on House Wrens (Waters et al. 1990, p.242). Apparently House Wrens are adept at finding new cavities in an environment in which they are scarce, which would be an advantage for House Wrens in areas of sympatry.

### **Competition with Other Birds and Cowbird Parasitism**

The alleged adverse effect of the House Wren on Bewick's Wrens has been discussed in detail in a previous section. Other avian species have been implicated as well.

Simpson (1978, p. 26) notes that in North Carolina's mountains the decline of Bewick's Wren coincided more with the arrival of the introduced House Sparrow and European Starling than with the later arrival of the House Wren. In West Virginia, Sutton (1930, p. 15) thought that Carolina Wrens not House Wrens were responsible for ousting Bewick's Wrens from the area. However, Laskey (1946, p. 39-40) describes a case where a Bewick's Wren usurped the nest of a Carolina Wren.

No details are given, but competition with Song Sparrows is also mentioned as another avian species that could have caused difficulty for Bewick's Wren (Bartgis 1986, mimeograph, no page numbers). Gorton (1977, p. 701) found that Song Sparrows and Bewick's Wrens responded to each other's songs.

When recording Bewick's Wren's songs on 10 June 1976 on Dan's Rock and Townhill in western Maryland, Eugene S. Morton (pers. comm.) heard a Carolina Wren singing at a much lower elevation so he started playing the Carolina Wren's song. He knew that Carolina Wrens never occurred as high as where he was recording Bewick's Wren. Nevertheless, the Carolina Wren from below gradually came uphill to where the

Bewick's Wrens were nesting. Quickly the Carolina Wren attacked a Bewick's Wren repeatedly. The Bewick's Wren put up no fight but simply flew out of sight. Morton therefore speculates that the demise of Bewick's Wrens in some areas could be because of increased Carolina Wren populations due to better winter survival of resident Carolina Wrens resulting from use of bird feeding stations in winter. This observation contrasts with the findings of Bibbee (1947, p. 211-212), who found in a population of Carolina and Bewick's Wrens nesting in a common area where no conflicts were noted.

Evidence for adverse effects of nest parasitism by the Brown-headed Cowbird is not pervasive (Friedmann 1929, p. 254-255, Friedmann 1971, p. 243, Friedmann et al. 1977, p. 17). These publications show very few cases of parasitism by cowbirds leading Friedmann (1971, p. 243) to conclude "that Bewick's Wren is an infrequent host choice." Particularly the eastern form (*T. bewickii*) of Bewick's Wren historically would have been to the east of the range of the Brown-headed Cowbird (Mayfield 1965, p. 25). The authors report no incidence of Bewick's Wren parasitism by the Bronzed Cowbird.

### **Habitat Change**

Some authors describing the decreasing population of Bewick's Wren have attributed the phenomenon to habitat change, usually implicating the removal of thickets from the environment. Laskey (1966, p. 4-6) in her Nashville, Tennessee, neighborhood noticed that the bird was common in the 1930s and 1940s, became uncommon in the 1950s, and was absent in the early 1960s. She comments that the Bewick's Wren had already dropped sharply in number in the 1950s before the House Wren had reached the area. Noting this, and also never finding adverse interactions between the two wren species, she named habitat change as the major factor contributing to Bewick's Wren's demise.

She documented this change in detail describing the effects of progressive urbanization and crowding of residential houses through the decades replacing trees, shrubs, thickets, wood piles, and brush piles, which are all microhabitats sought by Bewick's Wrens. This suburbanization effect is echoed on a grander scale by Byrd and Johnson (1991, p. 520). Ehrlich et al. (1992, p. 135) notes the devastating effect of the general loss of small farms, woodlots, and outbuildings. Loss of winter habitat also has been suggested (Thomas et al. 2002, <http://www.dnr.state.md.us/wildlife/bewick.asp>). James (1974, p. 120) incriminates the tidying of unkempt farmyards in the Arkansas Ozarks resulting in widespread loss of hedgerows, shrublands, and farmyard clutter.

Robinson (1989, p. 2) found a sizeable summer population of Bewick's Wrens occurring in clear-cut slash piles near Dover, Tennessee, in a state where the wren had become a rare and threatened species (Robinson 1990, p. 159). The wren population was greatly reduced where resprouting vegetation was invading the slash piles.

### **Weather**

There have been some suggestions that severe winter weather could have played a role in the population decline of Bewick's Wren. Analysis of results of the Breeding Bird Survey from 1965 to 1979 (Robbins 1986, p. 63) showed a sharp decline in numbers of Bewick's Wrens in the eastern and central parts of its range. The authors contend that it was "another species adversely affected by severe weather" in the regions concerned. This too is a hypothesis mentioned by Thomas et al. (2002, <http://www.dnr.state.md.us/wildlife/bewick.asp>). On the contrary, Pough (1946, p. 100-101) says warming winters in the east prior to the mid-1900s possibly allowed the northward expansion of Bewick's Wren's range that was occurring during that period.

### Unknown

It should be emphasized that most of the authors named above stated in their discourses that the actual cause of the disappearance of Bewick's Wrens was not definitely known, but they then described some possible but not fully substantiated factors. Therefore, the feeling that the reason is not known should be given consideration along with the various proposed mechanisms producing the decline.

Tanner (1988, p. 85) feels strongly that the reason for the Bewick's Wren's decline is really unknown and cites Hendron (1956, p. 30) and Laskey (1966, p. 5-6) in supporting the idea that the House Wren was not implicated.

### MISCELLANEOUS COMMENTS

A notice was placed in the April 2004 issue of the Ornithological Newsletter requesting information on Bewick's Wrens. There were very few replies. Most of these are included below, and some were used as personal comments items in other parts of the text. Also below are some responses from individuals that were contacted directly independently of the Newsletter. The Newsletter message was as follows:

**INFORMATION NEEDED ON STATUS OF BEWICK'S WREN--The US Fish and Wildlife Service wants to know if the eastern forms of Bewick's Wren (*Thryomanes bewickii bewickii* and *T. b. altus*) warrant consideration for listing as threatened in the southeastern USA. I've been asked to investigate the matter. Please send me information you have on the bird's present and past abundance in your part of its range stretching from eastern Nebraska, Oklahoma and Texas to the eastern coastal states. I am especially interested in the present abundance of subspecies *altus* which occurs in the Appalachian region from central Pennsylvania and eastern Ohio to northern Alabama including eastern parts of Kentucky and Tennessee and western parts of the eastern coastal states. The range west of there belongs to the form *bewickii*. I also solicit opinions on the taxonomy of the species, particularly thoughts concerning the validity of the *altus* race. Send information to DOUGLAS JAMES, Department of Biological Sciences, University of Arkansas, Fayetteville, Arkansas 72701 (PH: 479-575-6364, FX: 479-575-4010, EM: djames@uark.edu).**

Responses to the Newsletter posting and other sources were as follows:

**Leakhena Au**, U.S. Fish and Wildlife Service, Green Bay Field Office, 2661 Scott

Tower Drive, New Franken, WI 54229, <leakhena\_au@fws.gov>, (phone: 920-866-1734) sent information about Wisconsin where Bewick's Wren is now considered extirpated within the state. She stated that the last breeding record for this wren was from Trempealeau County in 1975. She also noted that the last recorded individual sighting was at an unknown location in the state in 1982.

**Dr. Noel J. Cutright**, We Energies (A231), 333 W. Everett, Milwaukee WI 53203,

<Noel.Cutright@we-energies.com>, (phone: 414-221-2179) sent information about Wisconsin where Bewick's Wren once was a nesting bird but now is only accidental in occurrence. There was a report in 1981 and 1982 and one in 1990 and 1991 and none since through 2003.

**Thomas M. Haggerty**, Department of Biology, University of Northern Alabama,

Florence, AL 35632, <tmhaggerty@una.edu>, (phone: 256-765-4432) found a pair of Bewick's Wrens at an abandoned dairy farm outside Nolensville, Tennessee, Williamson County, on 23 July 1996.

**William Holiman**, Grants Coordinator/Zoologist, Arkansas Natural Heritage

Commission, 1500 Tower Bldg., 323 Center St., Little Rock, AR 72201, <BillH@arkansasheritage.org>, (phone: 501-325-9763) found a pair of obviously red-backed (*bewickii*) Bewick's Wrens, which were seen several times over two weeks in summer 2003 at Harrison, Arkansas.

**Pierre Howard**, Institute of Ecology, University of Georgia, Athens, Georgia 30602,

<h\_pierre@bellsouth.net>, (phone: 706-542-2968) reports on the discovery of

Bewick's Wrens and fledglings by Sandy Pangle in May 2004 at Chickamauga National Battlefield Military Park in northwestern Georgia. The habitat was mixed hardwood-pine with open patches and woodpiles. The most previous report of the species in Georgia was a photograph in 1990 on the Dalton, Georgia, Christmas Bird Count. Howard reports that the bird within the described range of *altus* did not appear to have rusty tones dorsally.

**E. Dale Kennedy**, Chair Biology Department, Albion College, Albion, Michigan 49224, <dkennedy@albion.edu>, (phone: 517-629-0297) reports that Dr. Gary Ritchison and graduate students were studying Bewick's Wrens in Kentucky and Tennessee in 2001 and 2002.

**Rick Knight**, 804 N. Hills Dr., Johnson City, TN 3760, <RKnight@preferred.com> described the situation in northeastern Tennessee where Bewick's Wrens were formerly fairly common in summer, rarer in winter, being found mostly in the lowlands (1200-200 feet elevation) but up to 4000 feet. The bird was scarce by 1960. The last record in that region was 30 October 1975 in Johnson City.

**Michael Roedel**, State Ornithologist, Tennessee Wildlife Resources Agency, P.O. Box 40747, Nashville, Tennessee 37204, 615-781-6653, <michael.roedel@state.tn.us> reported several sightings of Bewick's Wrens in 2004 in Tennessee: (1) Two were seen in Knoxville, Tennessee, on May 6, 2004, (2) One was seen at Percy Priest Lake Area in Rutherford County on May 8, 2004, and (3) One was seen at Lebanon, Tennessee, Wilson County, on May 8, 2004, and (4) One was seen in Nashville, Tennessee, on May 9, 2004.

**Charles E. Stevens, Jr.**, 615 Preston Place, Charlottesville, VA, 22903, (phone: 434-293-8658) described in detail the last Bewick's Wrens reported in Virginia, which was in 1973 at 3000 feet elevation along the Blue Ridge Parkway in Albemarle County. Five birds were seen at Bucks Elbow Mountain on 24 June 1973, and one bird on 28 December 1973 at Pasture Fence Mountain. Before 1973 the bird was more numerous but very local in the Blue Ridge Mountains of Virginia. An important aspect of Mr. Steven's remarks centers on the absence of the House Wren at high Blue Ridge elevations. House Wrens were not there when Bewick's Wrens disappeared, nor are House Wrens there now.

**Bill Whan**, 223 E. Tulane Rd., Columbus, OH 43202, <billwhan@columbus.rr.com> , (phone: 614-262-3595) reported on conditions in Ohio. Bewick's Wrens were common in Ohio at the beginning of the 1900s moving northward to breed regularly in the southern two-thirds of the state. The population peaked in the 1940s, declining rapidly thereafter. Since the 1980s, there have been fewer than ten reports, all in the southern part of the state. The last pair was seen on 2 April 1998.

**Matt White**, 882 Hwy. 50, Campbell, TX, 75422, <mwhite@parisjc.edu >, (phone: 903-862-3397) and **Cliff Shackelford**, 714 Shiny rock Drive, Austin, TX, 78748, <cliff.shackelford@tpwd.state.tx.us>, (phone: 512-912-7045) photographed a red-backed Bewick's Wren (*bewickii*) at its nest near Lane, Hunt County, Texas, (just northeast of Dallas) on 16 May 2003.

**Experts Contacted**

Other people that were contacted about Bewick's Wren were as follows: (museum personnel who helped and their museums are named in the Ranges section above):

**Dr. Richard C. Banks**

USGS Patuxent Wildlife Research Center  
Smithsonian Institution  
P.O. Box 37012  
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Room 378 MRC 111  
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**Daniel Brauning**

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Department of Animal Biology, and Director, Program in Ecology  
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**Samuel Droege**

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**William C. Hunter**  
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**Dr. Eugene S. Morton**  
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**Dr. Robert Payne**  
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**Dan Reinking**  
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**Mark Robbins**  
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**Jay Sheppard**

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**David Shoch**

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**Douglas Zollner**

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Little Rock, AR 72205  
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**Specimens Borrowed**

The following museum and contact personnel are hereby acknowledged for making specimens available or for providing specimen information: American Museum of Natural History (AMNH)—George Barrowclough and Peter Capainolo; Carnegie Museum of Natural History (CM)—Bradley C. Livezey and Robin K. Panza; Cleveland

Museum of Natural History (CMNH); Cornell University Museum of Vertebrates (CU)—John W. Fitzpatrick and Charles M. Dardia; Field Museum of Natural History (FMNH)—Peter E. Lowther and David Willard; Louisiana State University Museum of Natural Science (LSUMNS); National Museum of Natural History, Smithsonian Institution (NMNH)—Richard C. Banks and Roger Clapp; Sam Houston State Natural History Collection (SHS)—Diane L. H. Neudorf; Sam Noble Oklahoma Museum of Natural History (UO)—Gary D. Schnell and Amanda C. Person; Stephen F. Austin State University Vertebrate Collection (SFA)—D. Brent Burt; University of Arkansas Collections (UA)—Nancy G. McCartney; University of Kansas Museum of Natural History (UK)—Mark B. Robbins; University of Michigan Museum of Zoology (UM)—Robert B. Payne and Janet Hinshaw.

## POPULATION LEVELS

### Breeding Populations

The catastrophic drop in breeding season populations of Bewick's Wrens across its eastern range is thoroughly documented in the results of the Breeding Bird Survey (Sauer et al. 2008, <http://www.mbr-pwrc.usgs.gov/bbs/>, revised annually). Note that the overall trends for the 37 years from 1967 to 2003 were strongly negative (Table 2) in the regions occupied by the *bewickii* and *altus* subspecies. These negative trends represent the percent annual decrease in numbers. The average decrease for the whole period in the eastern range was over 15% (Table 2). The formula for calculating the percentage change in a population over a given number of years is  $[(t/100)+1]^y - 1$  (100), where  $t$  is the trend or percent change per year and  $y$  is the number of years in question (Droege

pers. comm.). In the case of Bewick's Wren, the average  $t$  across all regions was -15.9 (Table 2), and the

**Table 2. Population trends in Bewick's Wrens based on data from Breeding Birds Survey (BBS) routes (1<sup>st</sup> half=mostly 1967 to 1985, 2<sup>nd</sup> half= 1986 to 2003, whole period=all 37 years; underlined trends were significant from zero at  $P \leq 0.05$ ).**

Region <sup>1</sup>	Trend (no. of routes)		
	1 <sup>st</sup> Half	2 <sup>nd</sup> Half	Whole period
<b><i>T. b. bewickii</i> and <i>altus</i> range</b>			
Upper Coastal Plain	-9.3 (12)	(0) <sup>2</sup>	<u>-16.3 (14)</u>
Blue Ridge Mountains	<u>-32.7 (2)</u>	(0)	-33.2 (2)
Ridge and Valley	<u>-20.3 (9)</u>	(0)	<u>-26.6 (9)</u>
Ohio Hills	<u>-19.6 (6)</u>	(0)	<u>-32.9 (6)</u>
Cumberland Plateau	-11.8 (2)	(0)	-15.8 (2)
Lexington Plains	<u>-10.7 (8)</u>	-11.3 (5)	<u>-12.1 (8)</u>
Till Plains	75.1 (2) <sup>3</sup>	(0)	7.7 (2)
Highland Rim	<u>-12.4 (28)</u>	-4.1 (3)	<u>-11.0 (29)</u>
Ozark-Ouachita Plateau	-5.8 (19)	-3.1 (24)	-3.2 (31)
<b>Average</b>	<b>-15.3</b>	<b>-6.2</b>	<b>-15.9</b>
<b><i>T.b. cryptus</i> range</b>			
East Texas Prairie	-0.7	0.0	-1.4 (18)
Staked Plains	(0)	18.6 (6)	<u>10.6 (7)</u>
Edward's Plateau	-3.5 (16)	1.48 (23)	-1.1 (25)
Osage Plains	<u>-5.9 (21)</u>	0.5 (38)	0.7 (39)
<b>Average</b>	<b>-3.4</b>	<b>5.1</b>	<b>2.2</b>

<sup>1</sup> The various BBS strata

<sup>2</sup> No routes had Bewick's Wrens

<sup>3</sup> This outlier was omitted from the evaluation

number of years was 37. Solving the equation using these two values produces a result showing that the overall wren population would have decreased by 99.8% in the period of concern. This means that with respect to being detected on Breeding Bird Survey routes in the east, Bewick's Wrens have virtually disappeared. The regions are arranged in Table 2 with the easternmost ones at the top and the more western areas at the bottom (except the Upper Coastal Plain extends in a mainly near coastal band from New Jersey to eastern Texas, leapfrogging the Mississippi Alluvial Plain). Notice that all these regions had data for the wren in the early years 1967 to 1985, but no wrens were found in most of them in the later years 1986 to 2004. The ones that still retained some birds in later years were the westernmost regions where the *bewickii* race occurs. The eastern regions that would include *altus* totally lost wren populations earlier than to the west. This indicates that the severe decline of the eastern forms of Bewick's Wren transpired during the 19 years 1967 to 1985. The average trend across all regions for these years was -15.3 (Table 2). Solving the above equation by entering  $t=-15.3$  and  $y=19$  years shows that the wren population decreased by 95% from 1967 to 1985. This supports the above conclusion that the more precipitous drop in numbers happened in the earlier years prior to the mid-1980s.

Most of the trends for regions were statistically significant, some were not. The binomial test (Siegel 1956, p. 36-42) can be employed to determine whether the overall trends are significant. For the whole period (Table 2) there were nine trends ( $N=9$ ) produced in the eastern regions. All were negative except one ( $x=1$ ). Using  $N=9$  and  $x=1$  in the binomial table produces a  $p$  value of 0.020 thus indicating that the overall trend for the 37 years was indeed significantly negative. For the 19 years of the early period  $N=8$ ,  $x=0$  (omitting the obvious outlier) producing  $p=0.004$ , again significantly negative overall.

It should be emphasized that the Breeding Bird Survey is a scattered sampling approach showing near disappearance of the wren. More thorough searches probably would have found a few more birds remaining.

For a comparison with the eastern races the bottom part of Table 2 shows trends for regions just to the west in the range of *T.b. cryptus*. As is generally believed, the trends for *cryptus* do indeed document healthier population levels there than in the east. The average annual percent population change (Table 2) over the whole survey period was 2.2% ( $t=2.2$  and  $y=37$  in the above formula). The solution equaled 123.7% population increase over the same period when the easternmost subspecies crashed. There were not always increasing populations in the west. In the early years 1967-1985 the overall population of *cryptus* actually decreased by 48.2% ( $t=-3.4$ ,  $y=19$  in Table 1), then rebounded by 144.8% in the later years 1986-2003 ( $t=5.1$ ,  $y=18$ ).

It was not feasible to produce the same analysis on a state by state basis because among the 27 states named in Table 1 only four had detections on the Breeding Bird Survey from 1966 to 2006 : Kentucky, Missouri, Oklahoma, and Tennessee. Of these states only two trends were statistically significant, Missouri and Tennessee. Both of these trends were steeply negative -8.4 and -19.9, respectively.

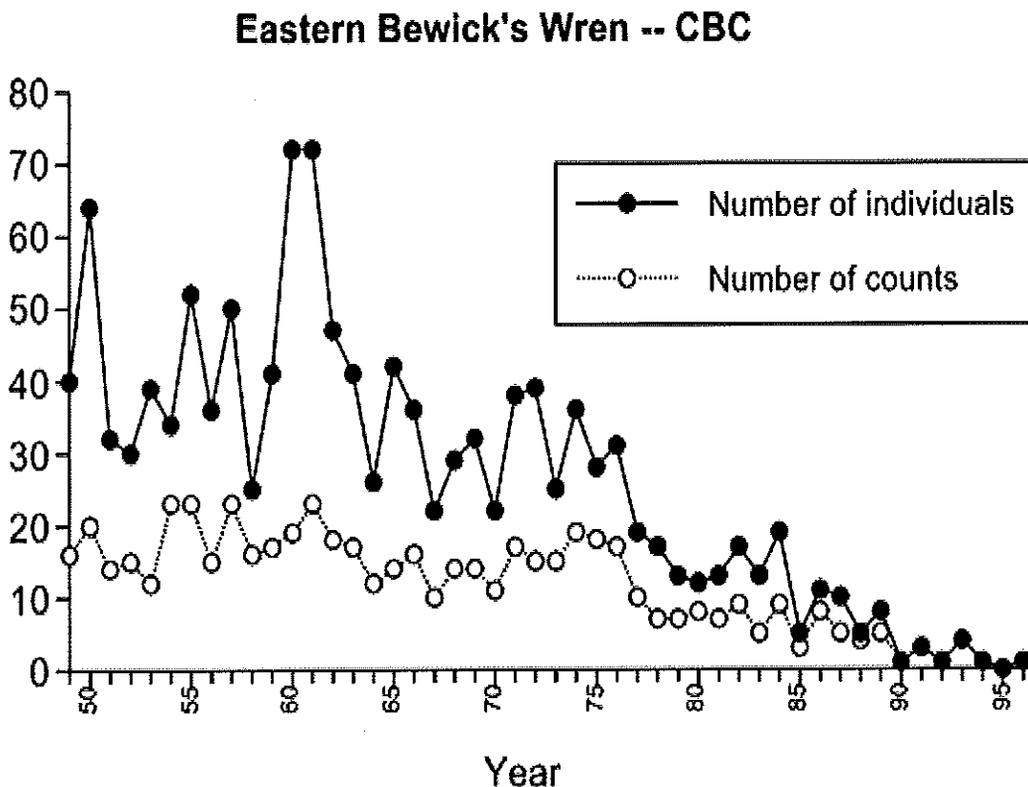
### Wintering Populations

The overall conclusion in this section, based on Christmas Bird Count trends for the states for which there were adequate data across the years, is that Bewick's Wrens have declined in numbers in winter. This drop in numbers, which occurred in the 1950s in Georgia, Arkansas, Louisiana, and Oklahoma (see Figures on pages that follow), was documented in the 1960s in Alabama, in the 1970s in Kentucky and Missouri, and in the 1990s in Tennessee (see Figures). Adding the information from the states in which there were only scattered Christmas Bird Count

data, the winter decline occurred in the 1950s in West Virginia and in the 1960s in Virginia, South Carolina, North Carolina, and Ohio. The overall conclusion emphasizes the fact that populations of Bewick's Wrens have decreased significantly in winter in the eastern part of its range, the decline occurring primarily in the 1950s or 1960s depending on the location.

Over much of the eastern range of Bewick's Wren, races *bewickii* and *altus*, it is a permanent resident. However, summer residents in the northern part of this eastern distribution do migrate southward for the winter joining year around resident populations. The Christmas Bird counts compiled in cooperation between the National Audubon Society and the Laboratory of Ornithology at Cornell University provides an indication of fluctuations in these overwintering populations (Rosenberg 2003, <http://www.birdsource.org/features/bewr/index.html>). Rosenberg (2003) has compiled the overall results from Christmas Bird Counts in the range of *bewickii* and *altus* showing how many Bewick's Wrens were found on all these counts and how many counts recorded the wren in the east during the years 1949 to 1996 (Figure 1). As Rosenberg (2003, <http://www.birdsource.org/features/bewr/index.html>) notes, the bird was seen fairly regularly on eastern counts from at least 1949 through the mid-1970s, with 30 or more individuals found each year at roughly 20 different sites. Beginning in 1977, the eastern population began to crash, and it essentially never has recovered (Figure 1). He highlights this by remarking that "even in places like Nashville, Tennessee, where 5 to 10 Bewick's Wrens were found on counts in early years this number dropped during the same period, and none could be found there after 1984."

**Figure 1. Number of Eastern Bewick's Wrens on Christmas Bird Counts in the eastern United States and the number of counts recording the species from 1949 to 1996 (Rosenberg 2003).**

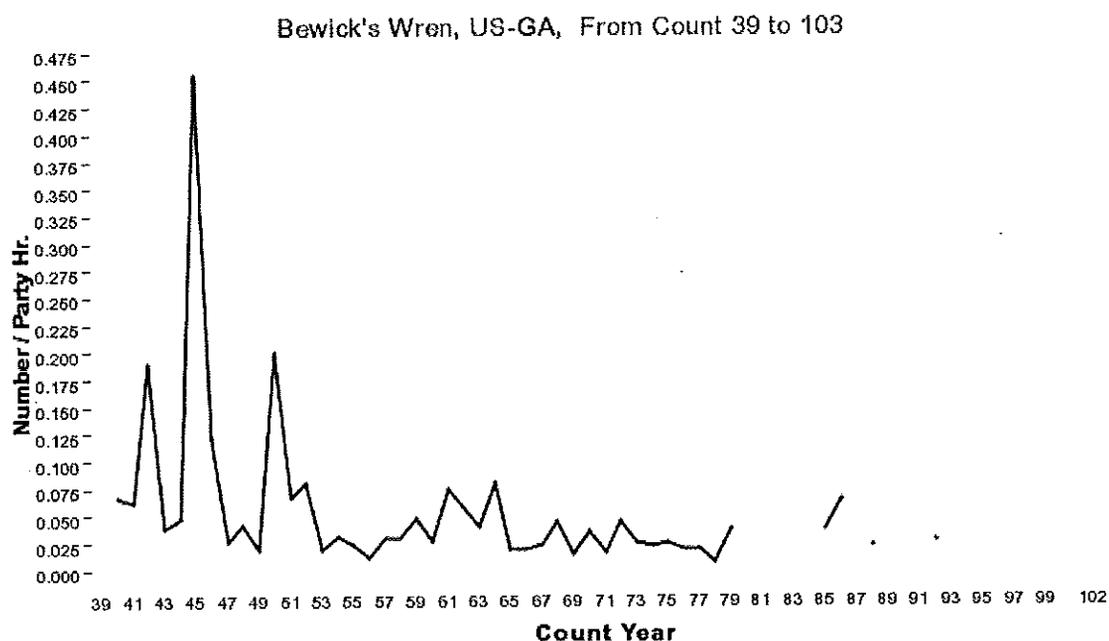


Notice in Figure 1 that the same trend is exhibited by the total number of birds found each winter and by the total number of counts each year in which the wren was encountered. From 1990 to 1996, the number seems to fluctuate from year to year between 1 to 4 birds, usually only 2, once only 1, on one or two counts. This represents a tremendous decline from former years, and in winter mirrors the comparable decline in summer documented by Breeding Bird Survey results described above. In summary, Bewick's Wrens in the east have virtually disappeared using both population measures.

Results similar to those above are shown by compiling statewide average numbers of Bewick's Wrens per party hour over the years, totaling across all Christmas Bird Counts in the respective states (Figures 2 to 11). The states included are only those for which the wren has been detected more or less consistently over successive winters. In some of the states few to none were found in the 1980s and 1990s. This situation reflects the drop in numbers compiled across all Christmas counts described above (Figure 1).

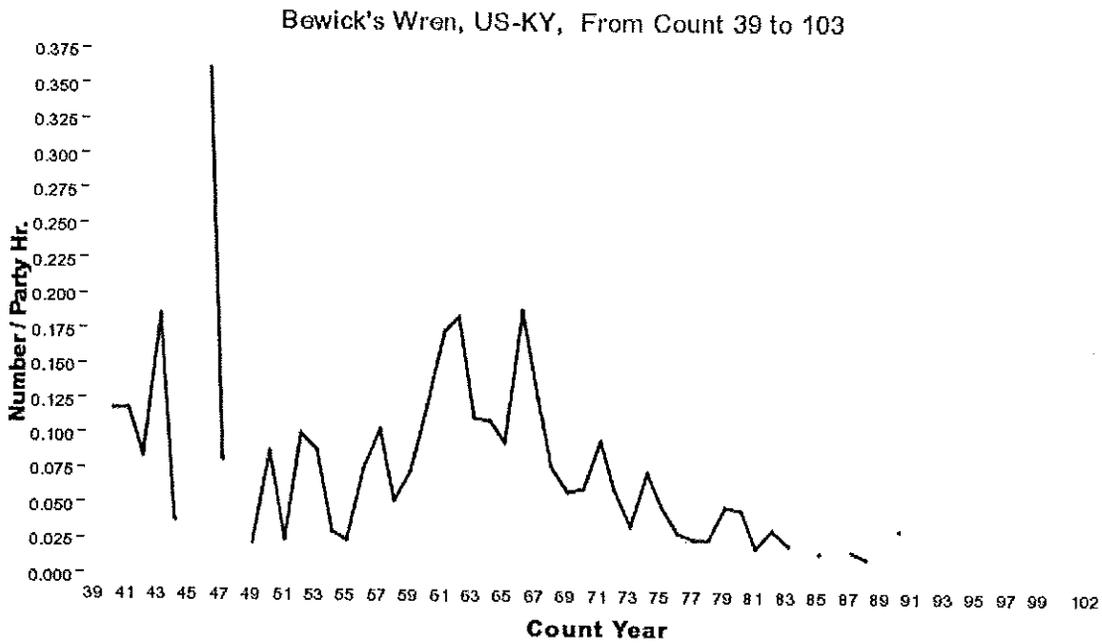
On a state by state basis, starting with Georgia (Figure 2), the numbers of wintering Bewick's Wrens there show a considerable variation from year to year. This phenomenon will be conspicuous with all the states, making it necessary to visually interpolate across the variation to discern overall trends. In Georgia the higher numbers of wrens per party hour, with interspersed low points, characterize the earlier years into the mid 1960s followed by lower levels through the 1970s. In the 1980s through 2003 the bird was absent from counts during most years (**Note: the count years on the abscissa in the figures refer to two successive years because Christmas Bird Counts are scheduled from late December to early January each time. Thus, for example, Count Year 41 would cover the counts made in the end of December 1940 and beginning of January 1941, Count Year 67 means 1966-1967, Count Year 102 equals 2001-2002. These counts actually extend to 103, or 2002-2003. Except for the far right only odd numbered count years are printed on the abscissa.**)

**Figure 2. Numbers of Bewick's Wrens per party hour detected during Christmas Bird Counts in Georgia from 1939 to 2003.**

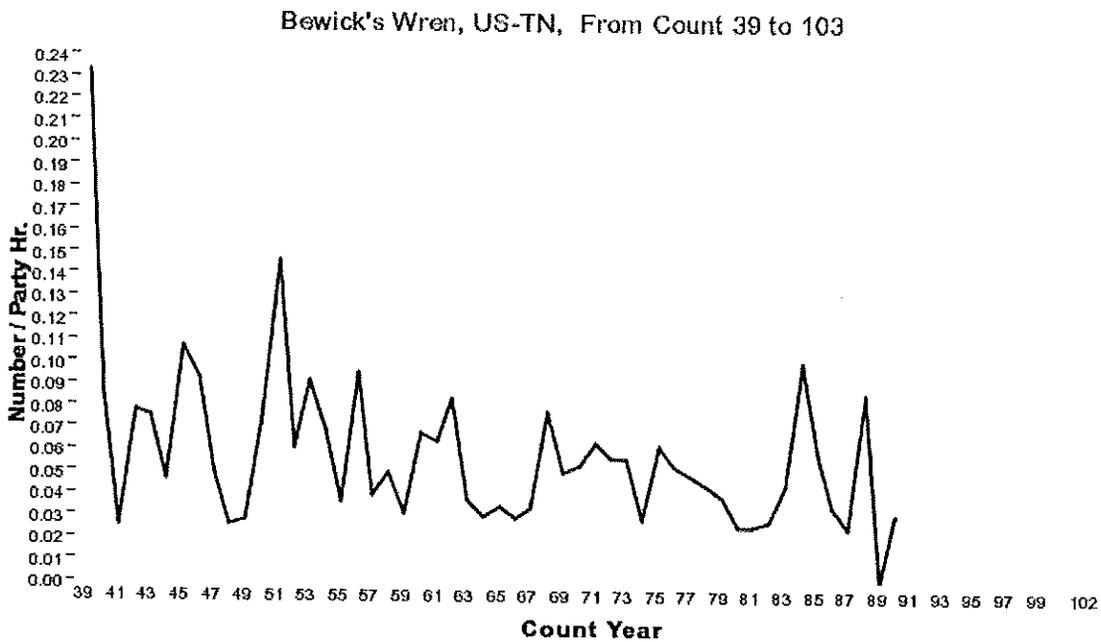


The situation in Kentucky (Figure 3) is similar to Georgia, showing a drop in relative numbers through the 1970s and birds not found some years in the 1980s, absent most years in the 1990s to 2003. The historically healthy population in Tennessee is obvious in Figure 4 where numbers remained rather steady until 1990-1991 when no Bewick's Wrens were recorded thereafter.

**Figure 3. Number of Bewick's Wrens per party hour detected during Christmas Bird Counts in Kentucky from 1939 to 2003.**

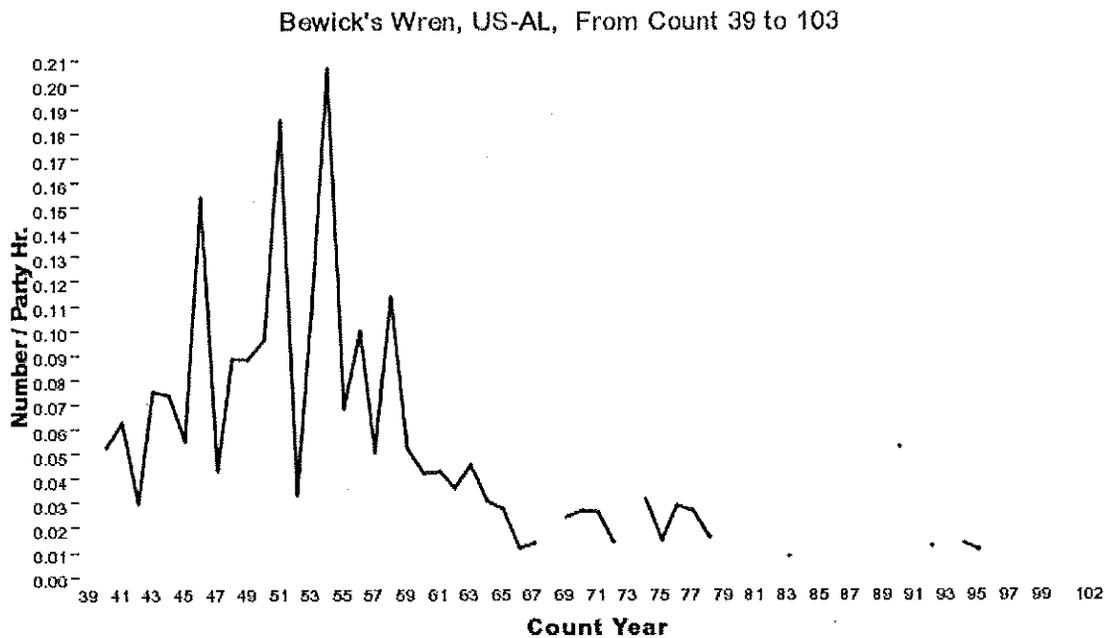


**Figure 4. Numbers of Bewick's Wrens per party hour detected during Christmas Bird Counts in Tennessee from 1939 to 2003.**



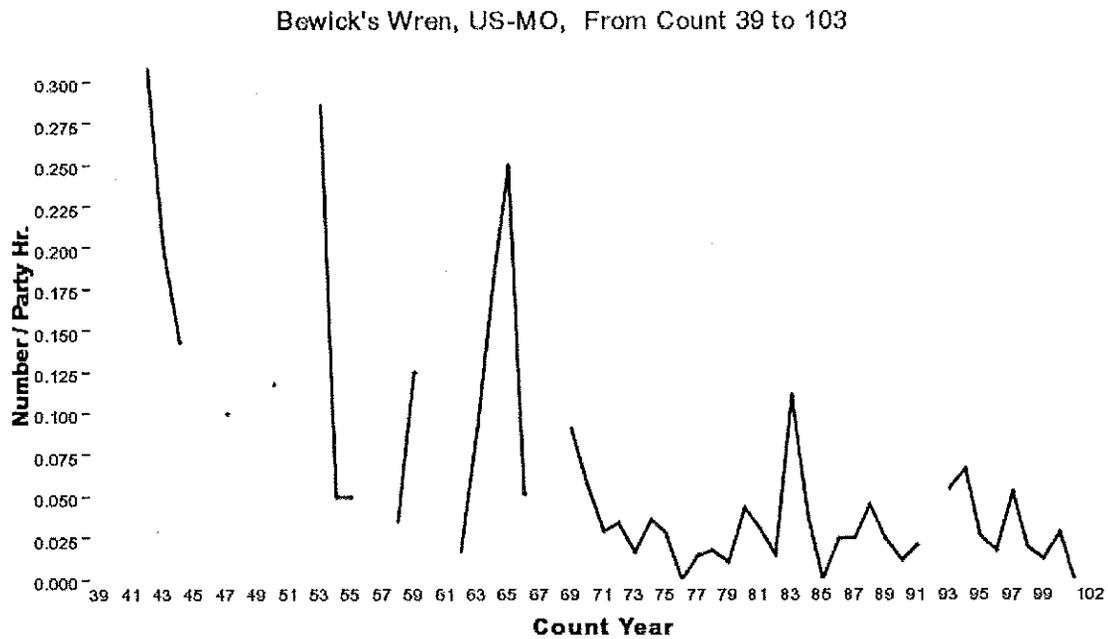
The wintering wrens in Alabama (Figure 5) show relatively high numbers compared to the previous states, at least in the earlier years, reflecting the influx of birds migrating from the north to overwinter. But there was a steep drop in numbers in the 1960s, perhaps even earlier than elsewhere. Detections began to be sporadic even in the 1970s and in the 1980s, 1990s, to 2003 most years no birds were found.

**Figure 5. Numbers of Bewick's Wrens per party hour detected during Christmas Bird Counts in Alabama from 1939 to 2003.**



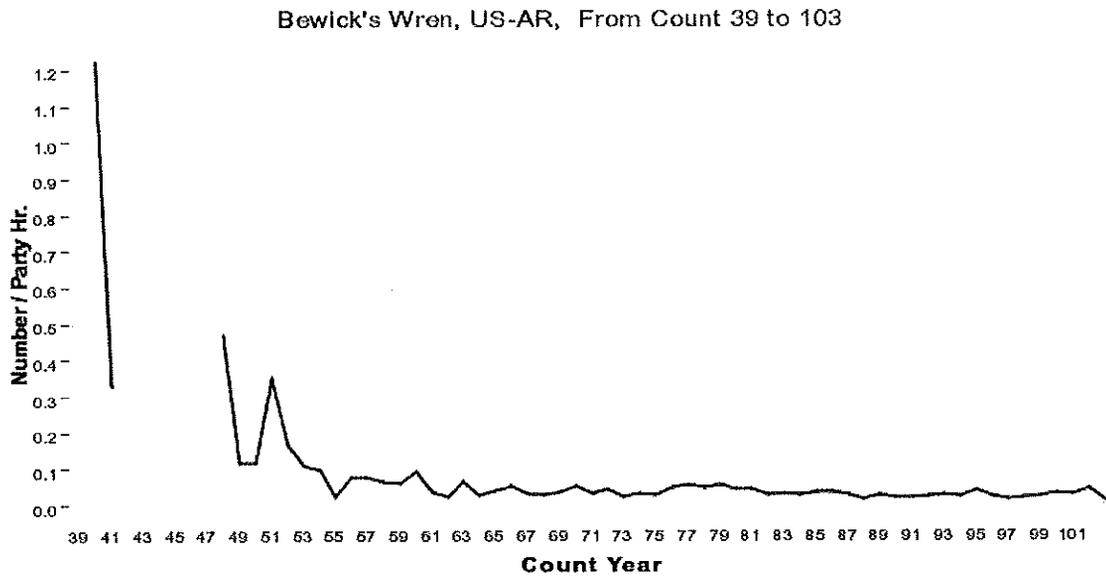
In Missouri (Figure 6) the record is spotty throughout with major fluctuations and unexplained gaps, but the overall trend is the same: larger numbers earlier, fewer later through the 1970s and beyond, but still exhibiting a noteworthy presence through the 1990s in keeping with what is shown from 1986-1992 in the Missouri Breeding Bird Atlas (Jacobs and Wilson 1997, p. 215).

**Figure 6. Numbers of Bewick's Wrens per party hour detected during Christmas Bird Counts in Missouri from 1939 to 2003.**

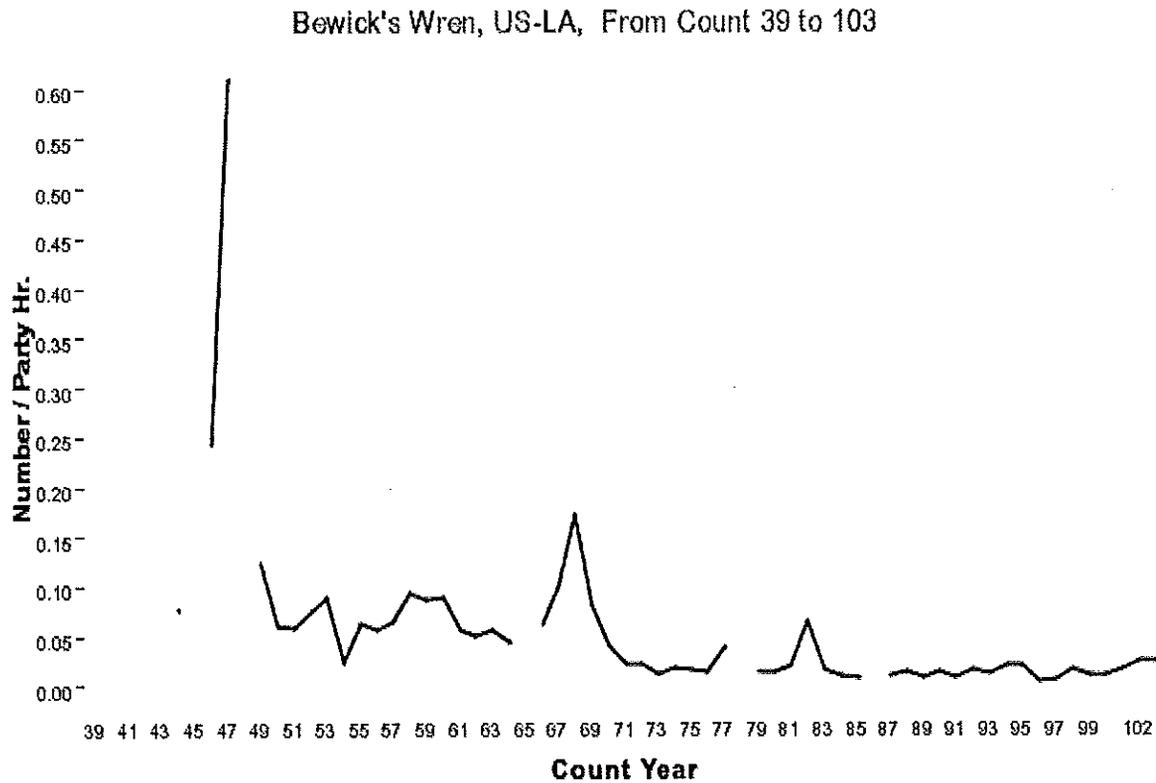


In Arkansas (Figure 7) the population decreased to the 1960s and has remained low in winter ever since. Louisiana (Figure 8) to the south is similar except for some fairly high numbers in the 1960s (ordinate scales differ in these states). Both states show very low numbers of Bewick's Wrens in recent winters, but consistent from year to year and still present in the 21<sup>st</sup> century.

**Figure 7. Numbers of Bewick's Wrens per party hour detected during Christmas Bird Counts in Arkansas from 1939 to 2003.**

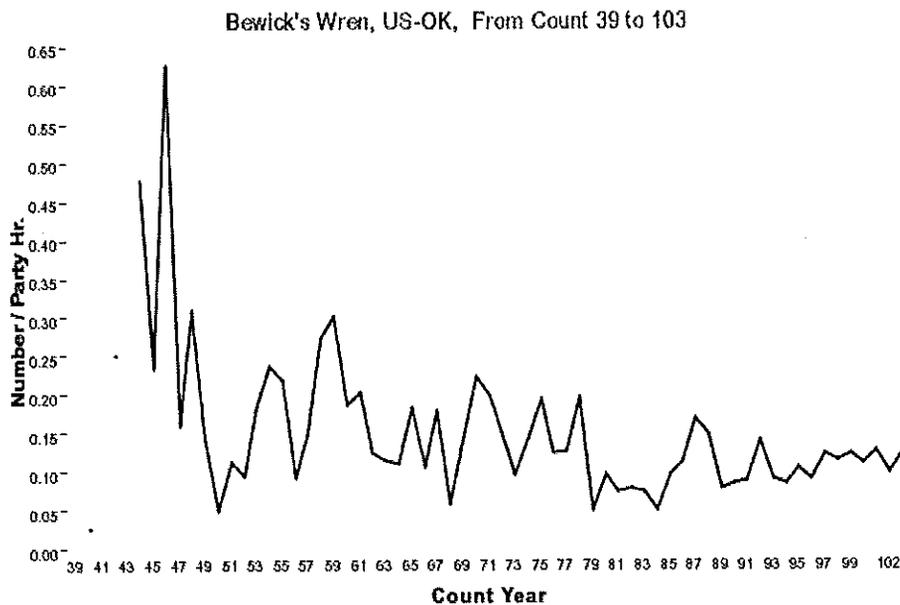


**Figure 8. Numbers of Bewick's Wrens per party hour detected during Christmas Bird Counts in Louisiana from 1939 to 2003.**

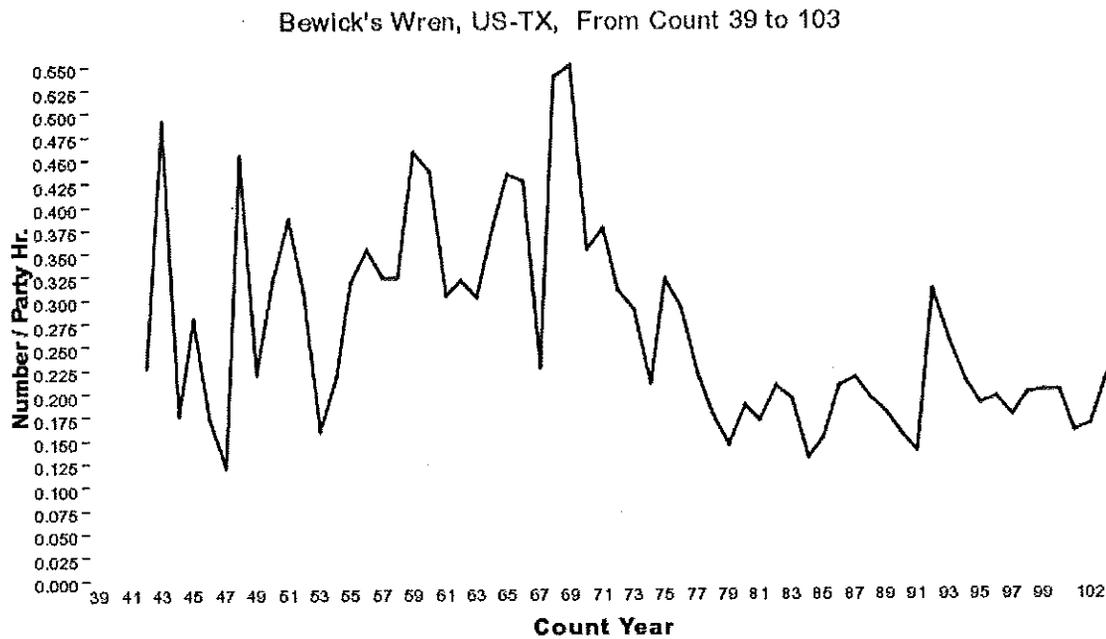


Oklahoma (Figure 9) and Texas (Figure 10) overlap the critical geographical area that includes *bewickii* in the east and *cryptus* in the west, the later supposedly being in good condition population-wise. Both states show higher populations at the beginning and lower numbers to the present, but nevertheless still rather healthy populations currently. The decline may be due to more Christmas Bird Counts in the eastern parts of both states where more people live, and where the declining *bewickii* taxon overwinters. In fact an attempt was made to compile wren population information separately for the eastern parts of these two states, but there were too few Christmas Bird Counts there that found any Bewick's Wrens. The data from the counts that did find the bird (e.g. Tulsa, Oklahoma, and Nacogdoches, Texas) were so low in number of birds (less than 0.1 per 10 party hours) and so irregular from year to year as to defy interpretation.

**Figure 9. Numbers of Bewick's Wrens per party hour detected during Christmas Bird Counts in Oklahoma from to 1939 to 2003.**



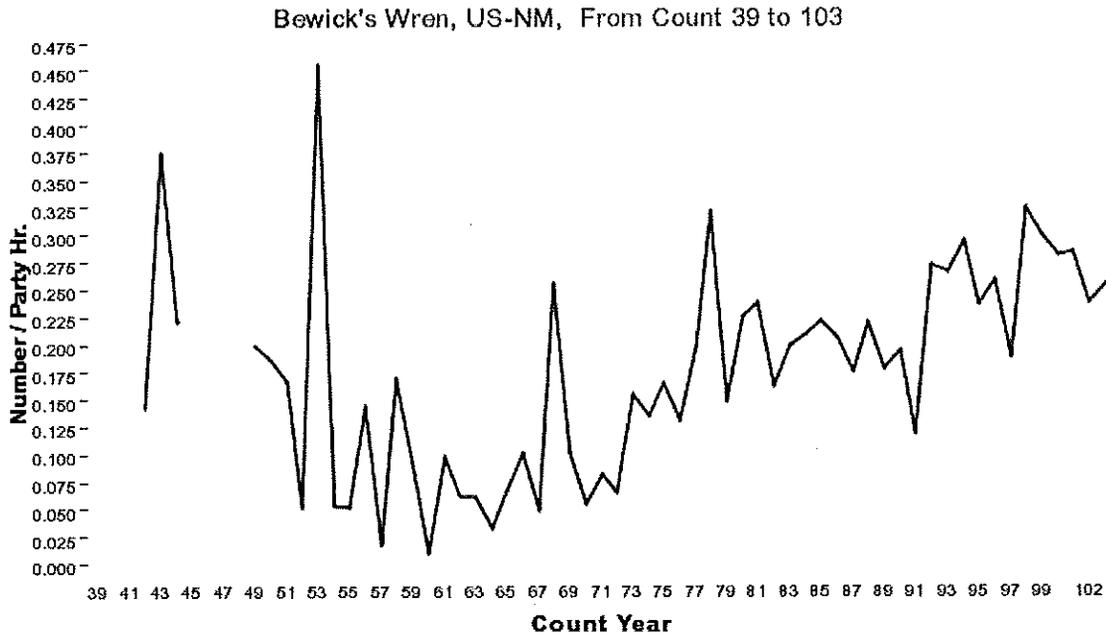
**Figure 10. Numbers of Bewick's Wrens per party hour detected during Christmas Bird Counts in Texas from 1939 to 2003.**



New Mexico (Figure 11) is added as a comparison since only the western *cryptus* race occurs there. This population is not thought to be threatened, and the figure confirms this. Surprisingly, however, numbers were very high in the 1940s and early 1950s followed by a big decrease in the mid 1950s and has been steadily increasing ever since to its present high population level. This illustrates the fact that even populations of Bewick's Wrens that are not at risk can exhibit trends in changing abundance over time in winter.

**(Note: It should be noticed that the scales on the ordinate differ somewhat from state to state in the figures, but after the decline in numbers in all states except Oklahoma, Texas, and New Mexico, populations settle at around 0.025 to 0.050 birds per party hours. It is the peak number between states that vary the most in the figures. In Oklahoma, Texas, and New Mexico populations generally stay above 0.050 birds per party hour, but did dip that low in New Mexico.)**

**Figure 11. Numbers of Bewick's Wrens per party hour detected during Christmas Bird Counts in New Mexico from 1939 to 2003.**



Other states for which there are Bewick's Wrens on Christmas Bird Counts had just too few and scattered occurrences in the counts since the 1940s to produce substantial information (Virginia, North Carolina, South Carolina, West Virginia, Ohio, Illinois and Mississippi). In North and South Carolina data from five scattered years in each state when the wren was found in the 64 year period, and 12 years in Virginia, show a rough trend of high numbers in the 1950s, low in the 1970s. The same pattern is shown in West Virginia based on 14 years of scattered data, except higher numbers in the 1940s, lower in the 1950s and thereafter. In Ohio, there were 12 years when Bewick's Wrens were found, 11 of which were from 1961 to 1962, only one in the 1980s, showing that the bird virtually disappeared in the 1960s and thereafter. In neighboring Illinois, based on 17 years of wren presence, there is a gradual trend downward from the 1950s through the 1990s, but with an isolated peak in abundance at 0.250 birds per party hour on the 1971-72 count. In Mississippi there were many more Christmas Birds Counts represented but the curve is perfectly flat from the 1940s to the 1996-97 count, except for a huge

number of wrens (around 9.6 birds per party hour) on the 1995-96 count. The information from the 7 years for Maryland and 6 years for Indiana show no discernable trends.

### CAUSES OF THE POPULATION DECLINE

The state by state and other literature reviewed in this report mentioned several hypotheses that have been proposed concerning the dramatic decline of the two eastern subspecies of Bewick's Wren, *Thryomanes bewickii bewickii* and *Thryomanes bewickii altus*. Destruction of suitable habitat, such as brush clearing, or the reverse, allowing forest regeneration in once cleared areas, have both been cited by many authors as possible reasons for the decline of these two wren subspecies despite the fact that some appropriate habitat still remains. The use of pesticides such as DDT has also been implicated; however, declines were noted in some areas before the widespread use of DDT and other pesticides. Another hypothesis is that severe winters in the late 1950s and late 1970s played a role in the decline of these birds. However, declines were evident in many areas across the eastern United States before the severe winters in the late 1950s. In addition to these ideas, cowbird parasitism on Bewick's Wren has been proposed as a possible cause of the decline of this bird, but cowbird parasitism was shown to be minimal. Competition with other bird species such as House Sparrows, Song Sparrows, Carolina Wrens, European Starlings, and House Wrens was cited as the culprit responsible for the population declines noted in the two wren subspecies even though there was no solid evidence to support these claims. However, Gorton (1977, p. 701) showed in Washington state that Bewick's Wrens reacted to Song Sparrow song playbacks and vice versa. Lastly, several authors thought the cause of the decline was unknown or that it might not be due to only one factor but instead to several factors.

The most commonly cited cause of decline was competition with the House Wren whose range expansion occurred simultaneously with the population decline of Bewick's Wren in some areas of the eastern United States. However, many authors commented that the House Wren could not possibly be the only factor playing a role in the demise of eastern subspecies of Bewick's Wren because Bewick's Wren also decreased in areas not inhabited by House Wrens. In addition, in some states such as Tennessee, Bewick's Wren had already started to decline prior to the range expansion of the House Wren into those states. Many authors also mention that Bewick's Wrens and House Wrens live in harmony in the western United States and that no population declines have been noted in western subspecies of Bewick's Wren.

The role of loss of Bewick's Wren habitat in the east deserves special consideration. As documented in the Habitat section of this treatise, the eastern states possessed extensive open Bewick's Wren type habitats in pre-settlement and early settlement times. Intensive farming in this area from the late 1700s through much of the 1800s destroyed the shrubby aspects sought by Bewick's Wrens, only to have it return due to farm abandonment in the east resulting from the westward movement of agriculture in the late 1800s into the 1900s. This recovery of the shrub-scrub environment definitely helped Bewick's Wrens and easily explains the success of the species in the east in the late 1800s into the first half of the 1900s. This favorable period ended by the mid 1900s when forest growth overrode early successional stages to the disadvantage of Bewick's Wren. Also many Midwestern farms converted to pastures producing the same effect. What mainly remains in the east for the wren now are scattered isolated small patches of unkempt farm yards, not an ideal situation.

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