

(b) Includes one or more mirrors which together provide, at the driver's eye location, a view of:

(1) For the mirror system on the right side of the bus, the entire top surface of cylinder N in Figure 2, and that area of the ground which extends rearward from cylinder N to a point not less than 60.93 meters (200 feet) from the mirror surface.

(2) For the mirror system on the left side of the bus, the entire top surface of cylinder M in Figure 2, and that area of the ground which extends rearward from cylinder M to a point not less than 60.93 meters (200 feet) from the mirror surface.

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Issued on: March 20, 1995.

Ricardo Martinez,

Administrator.

[FR Doc. 95-7348 Filed 3-24-95; 8:45 am]

BILLING CODE 4910-59-P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

Endangered and Threatened Wildlife and Plants; Notice of Determination To Retain the Threatened Status for the Coastal California Gnatcatcher Under the Endangered Species Act

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of determination.

SUMMARY: The Fish and Wildlife Service (Service), announces a determination affirming its earlier conclusion (March 30, 1993; 58 FR 16742) that the coastal California gnatcatcher (*Polioptila californica californica*), a small, insectivorous songbird, is a distinct subspecies and, thus, meets the definition of a "species" pursuant to the Endangered Species Act of 1973, as amended (Act). In addition, the Service affirms its earlier conclusion (58 FR 16742) that the southern limit of this subspecies extends to about 30° north latitude near the vicinity of El Rosario, Baja California, Mexico. Based on these determinations, the Service concludes that its March 30, 1993, decision that the coastal California gnatcatcher is a threatened species was correct. Federal protection for the coastal California gnatcatcher is thus continued.

EFFECTIVE DATE: March 23, 1995.

ADDRESSES: The complete administrative records and files for this determination and all related rule promulgations and notices are available for inspection, by appointment, during

normal business hours at the Fish and Wildlife Service Carlsbad Field Office, 2730 Loker Avenue West, Carlsbad, California 92008.

FOR FURTHER INFORMATION CONTACT: Mr. Gail C. Kobetich, Field Supervisor, at the above address (telephone 619/431-9440).

SUPPLEMENTARY INFORMATION:

Background

The coastal California gnatcatcher (*Polioptila californica californica*), a subspecies of the California gnatcatcher, is a small, long-tailed member of the thrush family Muscicapidae. The subspecies is restricted to California and Baja California, Mexico, and is an obligate resident of coastal sage scrub, which is one of the most depleted habitat types in the United States (58 FR 16742). The plumage color of the species is dark blue-gray above and grayish-white below. The tail is mostly black above and below. This subspecies is distinguished from the other subspecies by its darker body plumage, less extensive white on tail feathers (rectrices 5 and 6), and longer tail (Atwood 1991). The male has a distinctive black cap that is absent during the winter. Both sexes have a distinctive white eye-ring. Vocalizations of this species include a call consisting of a rising and falling series of three kitten-like mew notes (National Geographic Society 1983).

The California gnatcatcher was originally described as a distinct species (*Polioptila californica*) by Brewster (1881) based on specimens collected by Stephens in 1878. Later taxonomic treatments (e.g., Coues 1903 and Chapman 1903) reflected Brewster's (1881) conclusions. Grinnell (1926), however, later concluded that the species was a form of the black-tailed gnatcatcher (*Polioptila melanura*), which inhabits the Sonoran and Chihuahuan Deserts of the southwestern United States and northwestern Mexico. Subsequent scientific publications (American Ornithologists' Union 1931, Grinnell and Miller 1944, Friedmann 1957, American Ornithologists' Union 1957) adhered to the species limits as defined by Grinnell (1926). Three subspecies of the black-tailed gnatcatcher were recognized for southwestern California and western Baja California, Mexico: *P. m. californica* (ranging from Los Angeles County, California (formerly northward to Ventura County), south to about 30° north latitude in Baja California, Mexico), *P. m. pontilis* (resident in central Baja California), and *P. m. margaritae* (ranging from about 27°

north latitude south to the Cape region of Baja California) (American Ornithologists' Union 1957).

Based on identified differences in ecology and behavior that were elucidated as a result of specimen study and statistical analysis, Atwood (1988) proposed that *Polioptila californica* was specifically distinct from *P. melanura*. This finding was subsequently formally adopted by the American Ornithologists' Union Committee on Classification and Nomenclature (American Ornithologists' Union 1989), thus affirming Brewster's (1881) original taxonomic placement with respect to species. The American Ornithologists' Union 1989 publication did not address subspecies other than to refer the reader to the American Ornithologists' Union 1957 checklist of North American birds.

The coastal California gnatcatcher, *Polioptila californica (=melanura) californica*, has been recognized as a distinct race or subspecies since Grinnell's (1926) publication (e.g., American Ornithologists' Union 1931, Grinnell and Miller 1944, Friedmann 1957, American Ornithologists' Union 1957, Garrett and Dunn 1981, Unitt 1984, Phillips 1991, Atwood 1991). As indicated above, this subspecies occurs from Los Angeles County (and, formerly, Ventura County) south to about 30° north latitude in Baja California, Mexico. Although Atwood (1988) proposed merging *P. californica californica* with a more southerly subspecies of *P. californica*, he later (1991) retracted this conclusion.

On March 30, 1993, the Service published a final rule determining the coastal California gnatcatcher (*Polioptila californica californica*) to be a threatened species (58 FR 16741). In making this determination, the Service relied, in part, on taxonomic studies conducted by Dr. Jonathan Atwood of the Manomet Bird Observatory. As is standard practice in the scientific community, the Service did not request, nor was it offered, the data collected and utilized by Atwood in reaching his conclusions. Instead, the Service cited the conclusions presented by Atwood in a peer reviewed, published scientific article pertaining to the subspecific taxonomy of the California gnatcatcher (Atwood 1991).

The Endangered Species Committee of the Building Industry Association of Southern California and other plaintiffs subsequently filed a suit challenging the listing on several grounds. In a Memorandum Opinion and Order filed in the United States District Court for the District of Columbia on May 2, 1994, the Court vacated the listing determination, holding that the

Secretary of Interior (Secretary) should have made available the underlying data that formed the basis of the Atwood (1988) report in light of the controversy surrounding inconsistent conclusions reached by Atwood in his 1988 and 1991 studies.

Following the Court's decision, Atwood released his data to the Service. These data were, in turn, made available to the public for review and comment on June 2, 1994 (59 FR 28508). By order of June 16, 1994, the Court reinstated threatened status for the coastal California gnatcatcher pending a determination by the Secretary whether the listing should be revised or revoked in light of his review of the subject data and public comments received during public comment periods. This notice constitutes the Service's determination in response to the Court's June 16, 1994, order.

Summary of Comments and Recommendations

A proposed rule to list the gnatcatcher as endangered was published on September 17, 1991 (56 FR 47053). Public comments were solicited and two public hearings were held on the proposed rule. Notification of the hearings was published in the **Federal Register** on February 7, 1992 (57 FR 4747). A legal notice announcing the hearings and inviting general public comment on the proposal was also published on February 7, 1992 in the *Los Angeles Daily News*, *Los Angeles Times*, *Riverside Press-Enterprise*, and the *San Diego Union-Tribune*. Public hearings were conducted in Anaheim, California, on February 25, 1992, and in San Diego, California, on February 27, 1992. A notice of extension and reopening of the comment period for 30 days to obtain additional information on gnatcatcher taxonomy was published on September 22, 1992 (57 FR 43688). On February 11, 1993, the Service published a notice announcing the reopening of the public comment period on the proposed rule for 20 days and the availability of a report prepared by Service taxonomists on the taxonomic validity of *P. c. californica* (58 FR 8032). On March 30, 1993, the Service published a final rule determining the coastal California gnatcatcher to be a threatened species (58 FR 16741). That same day, a proposed special rule pursuant to section 4(d) of the Act was published (58 FR 16758). The final special rule was published on December 10, 1993 (58 FR 65088).

Following the Court's Order of May 2, 1994, and receipt of Atwood's data, the Service announced the availability of these data and the opening of a public

comment period on June 2, 1994 (58 FR 28508). Atwood's data were sent to 15 parties upon request. With the approval of the Court, the public comment period was extended to December 1, 1994 (59 FR 53628), to allow the public additional time to receive and then comment upon the raw data and methodology utilized by Atwood.

During this 6-month public comment period, Dr. William Link and Mr. Grey Pendleton of the National Biological Service, Department of the Interior (Department), conducted a new and independent analysis of Atwood's data (Link and Pendleton *in litt.* 1994). To assure that the Service utilizes the best scientific information available in the implementing the Act, it is policy (59 FR 34270) to seek independent review of the scientific basis for listing and recovery actions. Consistent with this policy, the Service solicited comments on the National Biological Service document and all other public comments received by December 1, 1994, from the general public, including scientists with an expertise in avian taxonomy. A new 30-day public comment period (59 FR 66509) was opened on December 27, 1994, to allow the public to review and comment on these documents. This final comment period closed on January 26, 1995.

A total of 31 comments pertaining to either (1) Atwood's data, methodology, or results, or (2) the taxonomy of the gnatcatcher was received during the final two comment periods. This total includes 21 comments received prior to December 1, 1994, and an additional 10 comments received during the final comment period. Included among the comments were three new, independent analyses of Atwood's data. After a review and consideration of all such comments, five relevant issues have been identified and are discussed below. The five issues encompass all substantive comments pertaining specifically to Atwood's data, analyses, and conclusions regarding the taxonomy and geographic range of the coastal California gnatcatcher.

Issue 1: Several commenters noted that Atwood's apparent discarding of raw data precludes an appropriate analysis of his conclusions. One commenter in particular was disturbed that "Atwood no longer has the raw data used in his original analyses." Another commenter noted that Atwood admitted to discarding computer programs used in the analysis of the data subsequently analyzed and reported in his 1991 publication. Some stated that differences existed between the data sets used in Atwood (1988), Atwood (1991)

and that provided to the Service and the public (Atwood *in litt.* 1994a).

Service Response: Atwood (*in litt.* 1994b) has stated that the measurements provided to the general public following the May 2, 1994, Court Order "represent the total and unmodified data set that formed the basis for my 1988 and 1991 publications on gnatcatcher morphology." Atwood (*in litt.* 1994b) also indicated that only one difference existed between the computer file data set transmitted to the public and the data on the original paper forms that he discarded after entering the data into a computer file, the sex of a single specimen from sample area SI29 was corrected. Atwood (*in litt.* 1994b) further indicated that he verified (in 1985) the data on the computer by comparing it with the hand-written information on the paper forms. The Service concludes that there is no reason to doubt the veracity of Atwood in this regard.

Because data on paper forms cannot readily be subjected to statistical analysis, the data transferred to a computer or computer disk are, in essence, the raw data at issue. The Service, therefore, rejects the contention that Atwood discarded his raw data, thereby precluding reanalysis of the data.

After providing his data, Atwood realized that discrepancies in sample size existed between data reported in his dissertation, his monograph (Atwood 1988), his subspecies paper (Atwood 1991), and data provided to the Service. He noted that for site SI29 there was a discrepancy with respect to one female and one male specimen and concluded that he had corrected the sex for one individual. His dissertation revealed 14 specimens for sites PP28 and MA30, whereas the Service data includes 13 specimens for site PP28 and 15 for site MA30. Atwood believes that this discrepancy was the result of correctly placing one specimen in site MA30 rather than PP28. These two corrections resulted in apparent discrepancies. Atwood was unable to explain an additional discrepancy, in his dissertation he reported 19 female specimens for site SD24, whereas the data provided to the Service indicates 20 female specimens for site SD24; Atwood suggested that a typographical error had occurred.

Atwood discovered numerous discrepancies between the sample sizes for his monograph (Atwood 1988) and the data given to the Service (amounting to 15 more male specimens and 7 fewer female specimens reported in the Service data set). Atwood could not conclusively explain these

discrepancies, but suspected that they were associated with the differing lengths of data set lines that may have caused the SAS program to skip lines or combine lines of data. He suggested that this problem may also have affected his analyses of the data presented in the 1988 monograph. He indicated that because of these potential problems, he felt that it is inappropriate to rely upon the 1988 monograph with respect to subspecific conclusions, although the conclusions with respect to species were unaffected, and are valid. However, programming errors would not have affected the original data set.

Atwood (*in litt.* 1994a,b) has acknowledged that one of the 213 samples in the data set provided to the public was not used in his 1991 study or in his previous, unpublished status review of the gnatcatcher. Atwood (*in litt.* 1994b) believes that the excluded specimen was that designated YP2717, an aberrant specimen (possibly a black-tailed gnatcatcher or interspecies hybrid) collected in 1885. In Atwood's subsequent reanalysis of the original data set, specimen YP2717 was excluded from the data set because it differed from its sample area mean by more than 3 standard deviations (Atwood *in litt.* 1994b).

The sample size discrepancies for all reports, except the 1988 monograph, are very minor, and would not have affected the overall conclusions of the authors. Atwood (1994b) has characterized the analysis of his 1988 monograph as being "seriously flawed" with respect to data processing. The sample size discrepancies between Atwood's other reports, and the 1988 monograph are likely due to these data processing problems, and not the result of changes made to the data set. The Service, therefore, concludes that the data set provided by Atwood to the Service adequately duplicates the data originally written on paper forms.

Issue 2: One commenter noted that two of Atwood's publications (1988 and 1991) were contradictory in that they proposed different geographic ranges for the taxon of California gnatcatchers occurring in the United States. This same commenter suggested that Atwood's (1991) retraction of his original (1988) conclusions pertaining to the subspecies taxonomy of the California gnatcatcher was prompted by his desire to affect the listing of the species.

Service Response: While the record indicates that Atwood believes that the listing of the coastal California gnatcatcher is warranted, the record also indicates that Dr. Atwood's revised conclusion about the subspecific

geographic limits of *Poliophtila californica californica* resulted from his 1991 reanalysis of the data cited in his 1988 monograph. The (1988) monograph had received peer review critical of its findings.

The Service receives dozens of petitions to list or delist species each year. The Act requires the Service to conduct an independent review of each of these petitions, and to make final decisions on the basis of the best scientific data available. The motives of the petitioners, as with commenters, are not relevant to the Service's decisions on these issues.

Issue 3: Several commenters alleged fundamental flaws in the data used by Atwood (1991) in generating his conclusions. In particular, commenters suggested or concluded that the data appeared to be incomplete, or non-random (i.e., "censored"). Several commenters were concerned that the variables were "confounded" (i.e., the effects of two or more factors on a response variable could not be separated) due to the age or condition of certain specimens. These commenters indicated that for the northern sites nearly all specimens were collected prior to 1940, and none of the specimens from the remaining sites were collected prior to 1920. One commenter noted that a potential exists for serious bias in the data due to specimen "foxing" (i.e., browning with age). Another commenter noted, citing relevant published scientific literature, that body size and plumage brilliance and iridescence can reflect variation in specimen condition. Some of these commenters suggested that differences in characters among sites may be the result of the age of the collection, and not the site from which they were collected.

Service Response: On behalf of the Service, the National Biological Service independently conducted a new analysis of Atwood's data (Link and Pendleton *in litt.* 1994). Three additional independent analyses of the data were also submitted during the comment period.

In response to one commenter's concern that the data appeared to be a non-random sample of California gnatcatchers, the National Biological Service (Newton, *in litt.* 1995) replied that although these are valid concerns, they are not proof, as acknowledged by the commenter, that Atwood's data are not representative. One commenting ornithologist who was largely critical of Atwood's (1991) analyses nevertheless concluded that "[t]he data set gathered by Atwood was quite comprehensive and included measurements from a

large number of specimens throughout the range of the species." In the Memorandum Opinion and Order filed May 2, 1994, the Court declared, citing the declaration of this ornithologist, that "it is not disputed that Atwood's means of collecting data were proper."

After noting the possible problem of the age of the specimen being confounded with the collection site, the authors attempted to adjust the data for year or month the data was collected. McDonald *et al.* (*in litt.* 1994) removed specimens collected from May to September and thus avoided problems associated with feather wear. Link and Pendleton (*in litt.* 1994) adjusted several characters for month and year based on the results of regression analyses. Messer (*in litt.* 1994) conducted two of her analyses by limiting the specimens to those collected between 1920 and 1940, and 1980 to 1984. Link and Pendleton (*in litt.* 1994) were cautious and indicated that they may not have removed all of the confounding effects; however, they also indicated that they may have over adjusted the data and removed differences due to sites.

After adjusting the data for year and month of collection, Link and Pendleton (*in litt.* 1994) obtained results similar to the unadjusted data. Messer (*in litt.* 1994) was able to classify the northern birds from the southern birds using specimens collected from 1980 to 1984 correctly in 84 percent of the cases, and using birds collected from 1920 to 1940 in 94 percent of the cases. The results of McDonald *et al.* (*in litt.* 1994) also yielded weak evidence of a break at 30° north latitude, even though they had removed birds collected during certain months of the year. Atwood (*in litt.* 1994b) also had similar results before and after he excluded the variable brightness of breast plumage (a variable that would have changed as a specimen aged) from his analysis.

Given the above considerations and results, the Service finds no justification or cause for concluding that Atwood's data were incomplete, censored, or otherwise inadequate. Further, the Service concludes that the available information does not support the hypothesis that the confounding of variables is responsible for erroneous conclusions regarding perceived breaks in the morphology of the coastal California gnatcatcher. The Service concludes that the analysts took adequate care to remove the possible effects of confounding of age of specimen and collection area.

Issue 4: The Service received four significant analyses and a number of critiques of each of the analyses of Atwood's data. Each commenter

attempted to answer a different question, and consequently, each of the analyses used somewhat different statistical techniques, and drew somewhat different conclusions. Some of the commenters concluded that the clinal nature of the data would argue against subspecies; or that a primary break occurs further south and would argue that if there are subspecies, the boundary line should be drawn further south in Baja California. Others argued that the data are clumped (consistent with a subspecific break); or that the birds north of 30° north latitude are different from the birds south of 30° north latitude. The Service analyzed these reports to draw a conclusion regarding whether the data support Atwood's 1991 conclusions.

Service Response: Several commenters produced new analyses of the data provided by Atwood. Atwood (*in litt.* 1994b) also provided an additional taxonomic analysis of the data. With the exception of Atwood (*in litt.* 1994b), all of the authors (Messer *in litt.* 1994, Link and Pendleton *in litt.* 1994, and McDonald *et al.* *in litt.* 1994) explicitly stated that their expertise is in statistics, and that taxonomic conclusions should be left to taxonomists. The Service has carefully reviewed each of these analyses and critiques to examine the strengths and the weaknesses of each approach. A summary of these analyses follows.

Atwood (*in litt.* 1994b) presented a reanalysis of his data using \log_{10} transformations of 6 variables (bill length, tarsus length, wing length, tail length, length of white spot on a tail feather (retrix 6), and brightness of breast plumage). In one analysis, he excluded the variable "brightness of breast plumage" because Mellink and Rea (1994) found readings inconsistent, even when resampling a single specimen. Atwood used a Tukey-Kramer method to conduct pairwise comparisons of the sample area means. He also conducted a principal components analysis (a method of determining how the data are intercorrelated, and reducing intercorrelated data to a principal component score) of the data and performed a cluster analysis on the first two principal component scores as well as on the original variables. Tail length, tail spot length, and brightness of breast plumage varied significantly among sample areas (all $P < 0.001$), and multiple comparison tests revealed a grouping, or "step," at 30° north latitude. The cluster analyses grouped sites north of 30° north latitude together, and variously grouped sites to the south. Atwood's methods show that regional means may

be clumped, but do not show whether individual birds can be placed correctly into these groups.

Link and Pendleton (*in litt.* 1994) used regression analysis of mean latitudes of Atwood's (1991) nine sample areas against 25 characters. They determined that the data vary along a geographic gradient. Link and Pendleton (*in litt.* 1994) then conducted a series of tests to determine if the characters were representative of gradual change or of groupings. They used multivariate analysis of variance (MANOVA) to place the original 9 sites into the best groupings of 8 sites, 7 sites, 6 sites, 5 sites, 4 sites, 3 sites and 2 sites. Abbott *et al.* (1985), in their book on taxonomic analysis, recommended the use of canonical variate analysis (MANOVAs) for delineation of subspecies, where the data are continuous and the data are preclassified into postulated groups. Akaike's information criterion (AIC) was used by Link and Pendleton (*in litt.* 1994) to determine which grouping best fit the data. Link and Pendleton (*in litt.* 1994) conducted discriminant function analysis to determine if they could correctly classify birds into groups. Hotelling's t^2 test was used to test the significance of the results. Cluster analysis and discriminant coordinates were computed on the individual specimens to see how the data was clumped. Finally, they attempted to adjust the data for time effects (see issue 3 above).

Link and Pendleton (*in litt.* 1994) obtained similar results in each of these tests. They concluded that the changes in the characters are more representative of groupings than of gradual change. They determined that, at least one break occurs north of site 5 (mean latitude of site 5 is 29.5° north latitude) and at least one break occurs south of site 5. The use of MANOVA would reduce the likelihood of Type 1 error (reporting differences that do not exist) that would occur if you looked at each variable separately. The AIC is not prone to overfitting, and can be used to determine the model that best fits the data. The AIC does not have an associated statistical test for significance, and therefore, the groups identified in this manner may not represent actual groupings (Newton *in litt.* 1995). Though Newton (*in litt.* 1995) also indicated that Atwood's (*in litt.* 1994b) cluster analysis would have been more useful if he had used individual specimens rather than group means, Link and Pendleton's (*in litt.* 1994) cluster analysis did use individual specimens and yielded groups similar to their MANOVA results, creating a stronger basis for their conclusions.

Messer (*in litt.* 1994) examined whether the birds north of 30° north latitude can be distinguished from the birds south of 30° north latitude. She used multivariate discriminant analysis to classify birds into northern and southern subgroups with the boundary set at 30° north latitude. Discriminant analysis is used when one is examining a categorical dependent variable (e.g., north or south of 30° north or one of 9 sites) and metric independent variables (e.g., measurements of gnatcatcher characteristics). Discriminant analysis would test whether the means among groups are equal. Using several subsets of the data (e.g., limiting years of collection to remove time effects, or in developing a model with one set of data and another to test the model), Messer (*in litt.* 1994) concluded that one could correctly classify the birds as being from the northern or southern areas with 86 to 92 percent accuracy.

McDonald *et al.* (*in litt.* 1994) conducted their analyses using individual specimens, and estimated the latitude based upon the locality description given by Atwood in his original data set. They removed specimens collected from May through September to avoid data problems due to feather wear and molting, and attempted to adjust some data for year of collection. To examine how the data are intercorrelated, they conducted principal components analysis on size, color, and pattern variables separately. McDonald *et al.* (*in litt.* 1994) conducted Gabriel's sum of squares simultaneous test procedure on the first principal component scores and on the original variables. McDonald *et al.* (*in litt.* 1994) conducted an intervention analysis to look for steps or breaks in the trends in means. In addition, they conducted a discriminant function analysis to determine whether birds could be correctly classified at various latitudes.

The results from the Gabriel's test indicated that there were significant differences in means of the first principal component at 24° north latitude, and that for some of the size variables there was weak evidence for a trend in means at 28° north latitude or 27° north latitude. There was weak evidence for difference in the means at 30.5° north latitude for the first principal component for color variables. The intervention analysis revealed a significant rate of change for 4 of the 16 individual size variables (page 6) at 30° north latitude ($P < 0.10$). The discriminant function analysis revealed that the lowest misclassification rate was at 24° north latitude (4 percent). The misclassification rate at 30° north latitude was 13 percent (a 25 percent

misclassification rate is generally acceptable for many subspecific groups).

McDonald *et al.* (*in litt.* 1994) used principal components analysis (a method to reduce intercorrelated data to a single principal component score) on size, color, and pattern variables separately. This analysis may have been done to group data by measurement type (e.g., units of length, weight, etc.), as is recommended in some statistics books (Newton *in litt.* 1995). Other statistics texts (e.g., Hair *et al.* 1995) apparently do not recommend grouping like measurements. A more exhaustive approach to principal components analysis would have been to do the analysis on all variables simultaneously, then exclude size variables, then pattern variables, and so forth (Newton pers. comm. 1995). In that manner, McDonald *et al.* may have detected additional intercorrelations among gnatcatcher characteristics.

McDonald *et al.* (*in litt.* 1994) presented a stronger case for breaks in characters south of 30° north latitude than they did for characters found at 30° north latitude. Atwood (1991, *in litt.* 1994), and Link and Pendleton (*in litt.* 1994) also found breaks south of 30° north latitude. The evidence of at least one break south of 30° north is supportive of Atwood's (1991) conclusion of an additional subspecific break. McDonald *et al.* (*in litt.* 1994) provided the strongest evidence against Atwood's (1991) conclusions. Nonetheless, they found weak statistical results supporting a break at 30° north latitude (Gabriel's SS-STP and intervention analysis). They also acknowledged that Gabriel's test may not have detected differences in the critical region, where Atwood concluded changes occur, because this test is sensitive to small sample sizes (i.e., an investigator needs a large number of individual records before the test will detect differences). Thus, in this portion of the analysis of McDonald *et al.*, the possibility of a Type 2 error or accepting the null hypothesis when it should be rejected (i.e., believing that there is no break in characters when in fact one does occur) was higher than the possibility of a Type 1 error or rejecting the null hypothesis when it should be accepted (i.e., believing that there is a break in characters, when in fact no break exists).

McDonald *et al.* (*in litt.* 1994) also used "intervention analysis", a procedure normally used when an experimenter intervenes in some way (i.e., provides medical treatment) and wants to evaluate whether changes in behavior or performance are statistically significant (Edgington 1987). McDonald

et al. (*in litt.* 1994) apparently used this approach to see if changes at various latitudes resulted in a sharp step. McDonald *et al.* (*in litt.* 1994) provided limited details of this method, which they modified and "tested using data from the literature." Therefore, the Service was unable to fully evaluate this method, which apparently is not commonly used. Messer (*in litt.* 1995), however, indicated that the technique is a "nonparametric (and thus less powerful) version of linear regression analysis."

McDonald *et al.* (*in litt.* 1994) did find weak statistical evidence for a break in characters at 30° north latitude, and were able to distinguish the birds north and south of this line with a 13 percent error rate. In evaluating their techniques, the Service notes that McDonald *et al.* (*in litt.* 1994) used techniques that were less exhaustive, or that were less well known, or that may have been more likely to result in a Type 2 than in a Type 1 error than techniques used by the other authors. The techniques of McDonald *et al.* (*in litt.* 1994) appeared more likely to accept the null hypothesis (e.g., there is no subspecific break in gnatcatchers at about 30° north latitude). Given the selection of statistical techniques by McDonald *et al.* (*in litt.* 1994), and that Atwood (*in litt.* 1994), Link and Pendleton (*in litt.* 1994), and Messer (*in litt.* 1994) found evidence for a break at 30° north latitude, the Service concludes that the weak statistical evidence of a break at 30° north latitude presented by McDonald *et al.* should be given greater credence.

In summary, the MANOVA conducted by Link and Pendleton (*in litt.* 1994) and cluster analysis conducted by Atwood (*in litt.* 1994) are supportive of groupings of birds rather than a cline. Use of cluster analysis by Link and Pendleton (*in litt.* 1994) on individual specimens provides stronger evidence that groups or "steps" exist in characters. In addition, efforts by McDonald *et al.* (*in litt.* 1994) and Messer (*in litt.* 1994) to determine correct classification rates provide further evidence that gnatcatcher variance along a geographic gradient is more indicative of groupings than of a gradual cline. The misclassification rates at 30° north latitude were well within the range acceptable for subspecies.

Each author utilized different statistical methods to analyze the data and draw conclusions. As a first step, the authors investigated whether they could separate the means among various groupings of the data. Atwood (*in litt.* 1994b) used a Tukey-Kramer multiple

comparison procedure to determine if the means of individual variables among previously selected groups could be separated. Link and Pendleton (*in litt.* 1994) used Hotelling's t^2 on the groupings identified in their MANOVA analysis to determine if the means could be separated. McDonald *et al.* (*in litt.* 1994) used Gabriel's method to determine differences in means at selected latitudes. Each of these approaches was successful in separating means among groups of gnatcatchers.

The investigators next examined whether there might be steps in these changes, or whether one could correctly classify (or place) the birds within these groups. Messer (*in litt.* 1994) conducted a multivariate discriminant analysis and found that the birds could be classified into a groups north and south of 30° north latitude with an error rate of about 10 percent. Link and Pendleton (*in litt.* 1994) conducted a clustering analysis to group individual specimens into clusters and examined the overlap between the clusters and the groupings identified in the MANOVA. McDonald *et al.* (*in litt.* 1994) conducted a discriminant function analysis to identify latitudes that separate the range of the bird into 2 groups with minimal misclassification rates. Each of these approaches showed a break in the characters at 30° north latitude, and was supportive of Atwood's (1991) conclusions.

In a statistically pure sense, these methods are exploratory in nature and were useful in identifying hypotheses that could be tested with respect to the gnatcatcher. To formally test these hypotheses, an investigator would need to make similar measurements on newly gathered gnatcatcher specimens. Issue 5 below discusses the Service's response to this point. However, it is important to understand that statistics are a tool used to assist an investigator in drawing conclusions in that they can help quantify uncertainties with respect to those conclusions (Newton pers. comm. 1995). The investigator still needs to evaluate the practical significance of results, and should not focus exclusively on statistical significance (Abbott *et al.* 1985, Hair *et al.* 1995, Mayr *et al.* 1953). Statistics do not remove or supplant the need to make informed decisions with respect to any data set. Messer (*in litt.* 1994), Link and Pendleton (*in litt.* 1994), and McDonald *et al.* (*in litt.* 1994) all explicitly recognized that taxonomic decisions should be made by taxonomists.

The misclassification rates identified by Messer (*in litt.* 1994) and McDonald *et al.* (*in litt.* 1994), and the overlap in many of the characters show that these

groupings of gnatcatchers are not entirely discrete. Abbott *et al.* (1985) noted that taxonomists expect "variation within species to involve either a continuum or at least some continuity or overlapping between forms." If the groupings of California gnatcatcher were entirely discrete, avian taxonomists likely would have assigned these groupings to separate species. Mayr (1970) defined subspecies as "an aggregate of phenotypically similar populations of a species inhabiting a geographic subdivision of the range of a species and differing taxonomically from other populations of the species." Mayr (1970) concluded that the magnitude of taxonomic difference necessary to appropriately decide when subspecies should be delimited "can be determined only by agreement among working taxonomists."

Grinnell (1926), Phillips (1991), and Atwood (1991) identified 30° north latitude as a boundary between *Polioptila californica* (= *melanura*) subspecies. Recent work suggests that the southern boundary of *P. c. californica* may be further north, near the international boundary between the United States and Mexico (Mellink and Rea 1994). Mellink and Rea (1994) placed the birds between the international border and 30° north latitude in a new subspecies. Atwood identified another subspecific break south of 30° north. McDonald *et al.* (*in litt.* 1994) and Link and Pendleton (*in litt.* 1994) also noted a break south of 30° north latitude, consistent with Atwood's (1991) conclusion of an additional subspecific break. The consensus among working taxonomists supports recognition of *P. c. californica*, albeit its range may be more restricted than that proposed by Atwood (1991). Therefore, the Service concludes that a finding that 30° north latitude as the southern specific boundary of *P. c. californica* is supported by the available scientific evidence. Until additional taxonomic work is published and accepted by the ornithological community, the Service will recognize 30° north latitude as the southern subspecific boundary of *P. c. californica*.

Issue 5: Several commenters stated that analyses of a newly collected independent data sets should be done to clarify gnatcatcher taxonomy or resolve differences of opinion among the various commenters. One commenter urged the Service to "dismiss the subspecies issue for gnatcatchers (pending further study) and focus on the management of U.S. populations." Another commenter concluded that "a rigorous analysis of both morphometric,

reflectance, genetic, and other chemical data are required to address the problem in the clearest possible manner." Other commenters added that the gnatcatcher should not be listed until the perceived taxonomic controversy is resolved.

Service Response: The Service fully endorses and encourages efforts to assess and refine the taxonomic status of all species, including the coastal California gnatcatcher, provided that any collection of specimens associated with such efforts does not result in unacceptable mortality or other impacts. However, in making listing determinations, section 4(b) of the Act requires the Service to make its listing decisions within set timeframes and requires the Service to base its listing decisions on the best scientific and commercial data available at the time of the decision. The Service is not authorized to delay listing decisions until all studies of arguable utility are completed, until scientific debate is exhausted, or until complete consensus occurs. The Service cannot await the "next study," which may or may not occur and which may or may not be affirmed by the scientific community through the appropriate peer review process.

Efforts to conduct further analysis on the taxonomy and subspecific limits of the California gnatcatcher would be costly and time consuming. One could seek additional museum records not analyzed by Atwood, or could collect new specimens. Collecting new specimens could result in unacceptably high mortality. Moreover, collecting new field specimens prior to making a final decision on this issue is not practical. Alternatively, investigators could capture birds in mist nets and obtain these measurements from live individuals, which would then be released. However, additional researchers would be unable to verify the results by visiting a museum and repeating the measurements. As stated above under issue 4, the Service was charged with evaluating whether Atwood's data supported his conclusions, and not with carrying out additional studies to remove any and all controversy surrounding the taxonomy of the *Polioptila californica* subspecies.

Conclusion

The Service has been charged with scrutinizing data and conclusions rendered by Atwood, and determining if his data support his conclusions. The Act provides that the Service must render its determination on the basis of the best scientific and commercial data available. The Service has made a concerted effort to obtain and accurately

assess the best scientific and best commercial information available regarding the taxonomy and range of the coastal California gnatcatcher. As an integral part of this process, the Service's statutory mandates and standard scientific protocol require that we recognize and act in accordance with the concepts, conventions, and practices of the scientific method. To this end, the Service must seek and seriously consider (1) data and analysis published in peer reviewed, scientific journals, (2) the opinions of recognized experts in given scientific disciplines, and (3) the input of the interested public.

In this effort the Service has reviewed the analyses of the data used by Atwood in his 1988 and 1991 papers. The Service finds that the conclusions reached by Atwood (1991) are reasonable, and are generally supported by the additional analyses received.

Under any circumstances that pertain to the taxonomy of North American bird species, the Service actively seeks the publications, input and expert opinion of the American Ornithologists' Union (AOU) and its constituent Committee on Classification and Nomenclature (Committee). The Committee and its publication (*Check-list of North American Birds*) are recognized by the Service, scientists, and scientific organizations throughout the world as authorities on avian taxonomy in North America. Although the AOU has formally published its positions on the taxonomy of the California gnatcatcher and coastal California gnatcatcher (American Ornithologists' Union 1957, American Ornithologists' Union 1989), the Service, nonetheless, made a concerted effort to solicit and receive the recent, unequivocal, expert opinion of the Committee and its members. During a past, prescribed public comment period, the Service received responses from four members of the Committee (including the Committee chair). The Committee members were unanimous in acknowledging that *Polioptila californica californica* is currently accepted as a distinct subspecies and that its southern distributional limit occurs at 30° north latitude.

In addition to independently seeking and reviewing the best scientific information available from expert sources pertaining to the taxonomic status of coastal California gnatcatcher, the Service also repeatedly solicited comments or suggestions from the public, other concerned governmental agencies, the scientific community, industry, and any other party interested in gnatcatcher taxonomy and all other aspects of the listing decision. In

response to these requests for comments, the Service received a wide variety of public comments and opinions, which are discussed earlier in this notice.

The Service has carefully considered all public comments received, separate and independent analyses of Atwood's data, the National Biological Service's (Link and Pendleton *in litt.* 1994) analysis of the data, subsequent review of all technical submittals from the National Biological Service (Newton *in litt.* 1995) and other interested parties, the existing scientific literature, and the information presented in the final listing rule designating the gnatcatcher as threatened (58 FR 16742). As a result, the Service concludes that the taxonomy and geographic limits of the coastal California gnatcatcher are as provided by Grinnell (1926, 1928) van Rossem (1931), American Ornithologists' Union (1931), Grinnell and Miller (1944), Friedmann (1957), American Ornithologists' Union (1957), Paynter (1964), Garrett and Dunn (1981),

Atwood (1991), and Phillips (1991). All of these scientific, peer reviewed, publications present conclusions or affirmations that the gnatcatcher (*Polioptila californica californica*) is restricted to coastal southern California and northwestern Baja California, Mexico, from Los Angeles County (and formerly Ventura County) south to the vicinity of El Rosario at about 30° north latitude.

The Service determines that the coastal California gnatcatcher is a distinct taxon and that its geographic range is that described and considered in the final listing rule for the coastal California gnatcatcher (58 FR 16742). Therefore, the coastal California gnatcatcher shall remain classified as a threatened species for reasons that are stated in the final rule to list the species (58 FR 16742).

References Cited

A complete list of all references cited herein is available upon request from the U.S. Fish and Wildlife Service,

Carlsbad Field Office (see **ADDRESSES** above).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Authority: The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Authors

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Dated: March 22, 1995.

Mollie H. Beattie,

Director, U.S. Fish and Wildlife Service.

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