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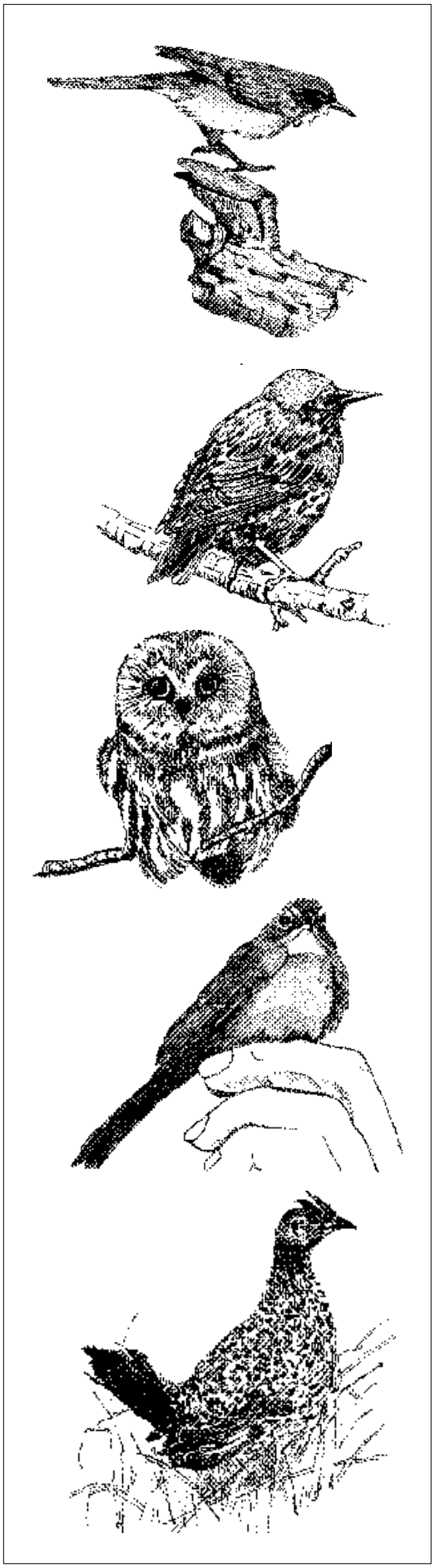

Atlas of the Breeding Birds of Los Alamos County, New Mexico

Pajarito Ornithological Survey

Los Alamos

Los Alamos National Laboratory is operated by the University of California for the United States Department of Energy under contract W-7405-ENG-36.

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Printing coordination by Guadalupe Archuleta, Group IS-9

LA-12206

UC-908
Issued: October 1992

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The detailed information on the distribution of birds in the state is due to John P. Hubbard. Dr. Hubbard's critical review of the atlas increased its precision and accuracy, which I gratefully acknowledge.

We express appreciation to the Los Alamos National Laboratory for the computer resources made available to the Pajarito Ornithological Survey for the data file, which were essential to and an integral part of the atlas project. Al Peaslee most effectively set up and managed the data file so that the atlas developed in real time as the field work proceeded.

The Environmental Management Division of the Los Alamos National Laboratory supported the atlas project from the start, provided the resources for publication, and is the repository for the atlas data file. I wish to thank Teralene Foxx in particular for her continued efforts to get the atlas published.

We offer special appreciation to Alan Kernodle for conducting the weekend atlasing expeditions to the top of Caballo Mountain, his exploration of the high country, and his photography.

Editing of early drafts of the atlas material by Linda Willis, Diane Noveroske, and Sharon Crane aided in making it intelligible. W. Burton Lewis prepared the digitized species base map, and James E. Lewis did the initial design work and provided much aid and comfort in the atlas production.

Finally, I would like to acknowledge the stimulation of Gloria Travis, who shared this and my other bird adventures, and to whom I dedicate this volume.

Foreword

John P. Hubbard
Assistant Chief for Endangered Species

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This study by the Pajarito Ornithological Survey (POS) represents a major landmark in New Mexico ornithology, as it is the first atlas of breeding birds ever completed for a major area of the state. For readers not familiar with the atlas approach, it is the systematic survey of the birds of a prescribed area over several consecutive years to document the avian species that breed there. The gathering and publication of such data are important not only to document the status and distribution of birds of such areas, but also to provide another means for monitoring nature. Many species of breeding birds provide valuable insights about the condition of the environment, which is very valuable knowledge in these times of increasing stresses on the natural world.

Although Los Alamos is the smallest of New Mexico's counties (111 square miles), this survey represented a formidable challenge because of the area's topographic variation (elevations ranging from 5,400 to 10,500 feet above sea level) and often limited access. The POS divided the county into a grid of 60 equal-sized blocks, 1.55 × 1.55 miles on a side and covering 2.4 square miles. Each block was surveyed at least twice during the breeding season (variously midwinter to early autumn) in the 5 years from 1984 through 1988. The findings included an average of 46 species (range 21–68) of breeding birds in each block and a total breeding avifauna for the county of 107 confirmed species and another 5 species that were likely breeders.

The information yielded by this survey and detailed in this atlas provides interesting fare for everyone from the amateur naturalist to the professional biologist. Included are descriptions of the county's habitats, which range from urban and suburban areas to grasslands, shrublands, woodlands, and forests. The species of breeding birds are treated in individual accounts and in several analyses, the latter focusing on both the blocks themselves and the habitats they encompass. Individual accounts contain a summary of the findings from the atlas project, including habitat use, breeding status, and migrational profiles.

The successful completion of an atlas of breeding birds requires a number of important elements, including proper design, resource allocation, execution, and data analysis.

Equally important are good leadership and the assembling of a cadre of competent and dedicated observers. The members of the POS and New Mexico ornithology can be proud of this accomplishment, and they are to be congratulated. Special recognition goes to James R. Travis, whose leadership and other skills have been instrumental in bringing this project to fruition—culminating in a fine publication.

Preface

A breeding bird atlas shows the geographical distribution of the birds that breed in a defined area. A systematic representation of the distribution is best obtained with a grid-based atlas—one in which the region to be investigated is subdivided into a number of equivalently surveyed blocks of equal area. This grid-based atlas provides a detailed look at the geographical distribution of the breeding birds of Los Alamos County. With a grid size that gives fine resolution, full coverage of the entire county, and a large amount of field time in a few years, we have information invaluable for conservation, environmental monitoring and protection, research on the local avifauna, and bird watching. The goal of our project was to obtain data adequate to determine the distribution patterns and habitat relationships of the breeding birds of Los Alamos.

Atlas data are useful in environmental documents because these data provide knowledge of the local species pool and alert researchers about the importance of the environmental features and activities ongoing at a particular site. Furthermore, these data can be used in the effort to conserve species diversity through identifying rare species and fragile habitats that need protection, and to assess the effects of landscape changes on bird populations over time. The atlas provides an unprecedented data base for analysis of species complexes—which species occur together and under what biogeographical conditions. The atlas data can be correlated with similarly systematic representations of ecological variables. The recently developed Geographical Information Systems (GIS) offer a powerful tool for comparison with other grid-based geographical data bases, which include physiographic, geological, demographic, and meteorological, as well as ecological data.

The Los Alamos atlas project benefited greatly from its association with the continental atlasing program overseen by the North American Ornithological Atlas Committee (NORAC). NORAC facilitates breeding bird atlasing in the Americas by providing guidelines for atlasing standards and regular means of communication between the states and provinces involved in atlases (Laughlin 1982, Sutcliffe et al. 1986, and Smith 1990).

The atlas offers visual displays such as graphs and maps, exploratory analyses, and interpretation of the atlas data. For

additional analyses, one should go directly to the atlas data bank, which is shown in abridged form in Appendix A. The complete data are included in the data base of the Laboratory's Biological Resources Evaluation Program. Access to the data is available to researchers through the Environmental Protection Group, EM-8, of the Los Alamos National Laboratory.

The atlas is a valuable resource to the Laboratory for its biological assessment of the land it utilizes. The atlas provides baseline data for topics of particular concern, such as, threatened and endangered species, threatened wetlands and flood plains, and potential species pathways for contaminants to enter the environment. Background information needed for evaluating biodiversity is contained in the atlas. It is a jumping-off point for more research on species complexes and their relationship with the environment. We now have baseline data for monitoring long-term changes and determining the effects of environmental changes on local avifauna.

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List of Atlas Species

Mallard
Turkey Vulture
Sharp-shinned Hawk
Cooper's Hawk
Northern Goshawk
Zone-tailed Hawk
Red-tailed Hawk
American Kestrel
Blue Grouse
Wild Turkey
Gambel's Quail
Spotted Sandpiper
Band-tailed Pigeon
Mourning Dove
Flammulated Owl
Great Horned Owl
Northern Pygmy-Owl
Spotted Owl
Northern Saw-whet Owl
Common Nighthawk
Common Poorwill
White-throated Swift
Black-chinned Hummingbird
Broad-tailed Hummingbird
Lewis' Woodpecker
Acorn Woodpecker
Red-naped Sapsucker
Williamson's Sapsucker
Ladder-backed Woodpecker
Downy Woodpecker
Hairy Woodpecker
Three-toed Woodpecker
Northern Flicker
Olive-sided Flycatcher
Western Wood-Pewee
Hammond's Flycatcher
Dusky Flycatcher
Gray Flycatcher
Cordilleran Flycatcher
Black Phoebe
Say's Phoebe
Ash-throated Flycatcher
Cassin's Kingbird
Violet-green Swallow
Cliff Swallow
Gray Jay
Steller's Jay
Scrub Jay
Pinyon Jay
Clark's Nutcracker
Black-billed Magpie
American Crow
Common Raven
Mountain Chickadee
Plain Titmouse
Bushtit
Red-breasted Nuthatch
White-breasted Nuthatch
Pygmy Nuthatch
Brown Creeper
Rock Wren
Canyon Wren
Bewick's Wren
House Wren
American Dipper
Golden-crowned Kinglet
Ruby-crowned Kinglet
Blue-gray Gnatcatcher
Western Bluebird
Mountain Bluebird
Townsend's Solitaire
Hermit Thrush
American Robin
Northern Mockingbird
European Starling
Solitary Vireo
Warbling Vireo
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Virginia's Warbler
Yellow-rumped Warbler
Black-throated Gray Warbler
Grace's Warbler
MacGillivray's Warbler
Hepatic Tanager
Western Tanager
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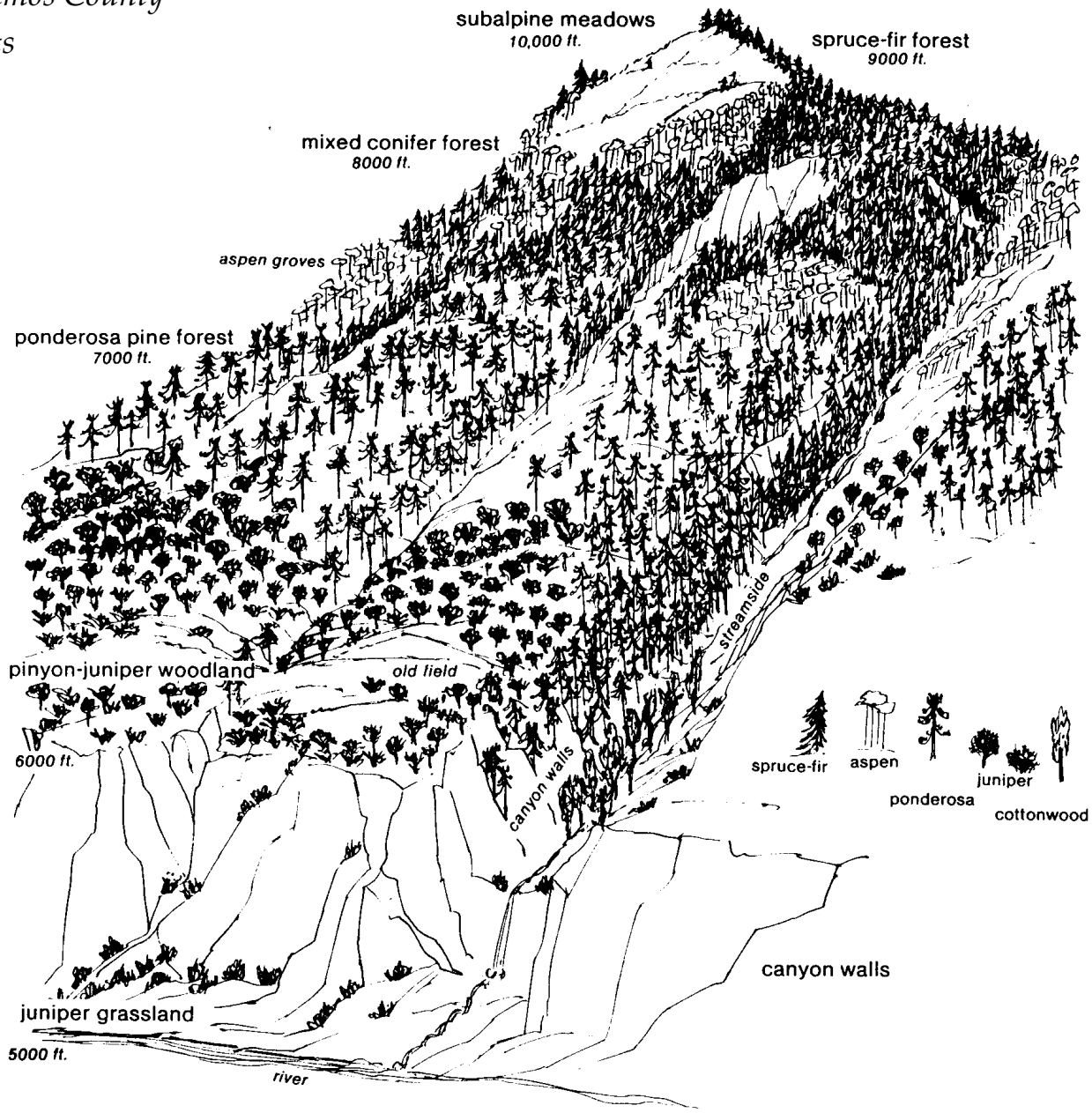
Lazuli Bunting
Indigo Bunting
Green-tailed Towhee
Rufous-sided Towhee
Canyon Towhee
Rufous-crowned Sparrow
Chipping Sparrow
Vesper Sparrow
Lark Sparrow
Song Sparrow
Lincoln's Sparrow
Dark-eyed Junco
Red-winged Blackbird
Western Meadowlark
Brewer's Blackbird
Brown-headed Cowbird
Northern Oriole
Scott's Oriole
Cassin's Finch
House Finch
Red Crossbill
Pine Siskin
Lesser Goldfinch
Evening Grosbeak
House Sparrow

Los Alamos County Habitats



Abstract

This atlas shows the geographic distribution of breeding birds within the county of Los Alamos, New Mexico, based on field surveys from 1984 through 1988. The county was divided into 60 square blocks, each 2.5 kilometers on a side. We attempted to confirm breeding of all the bird species in every block. The atlas maps show the distribution of the 112 species found. Breeding dates and other information on breeding behavior are provided, and species distribution patterns and species-habitat relationships in the county are presented.

Los Alamos and Its Avifauna

In north-central New Mexico, Los Alamos County is located on the eastern slope of the Jemez Mountains between the Valles Caldera to the west and the Rio Grande Valley to the east. The major geological feature of the county is the Pajarito Plateau, which consists of a series of narrow mesas separated by deep, steep-sided canyons that run east by southeast from the mountains to the Rio Grande. Figure 1 shows Los Alamos in New Mexico.

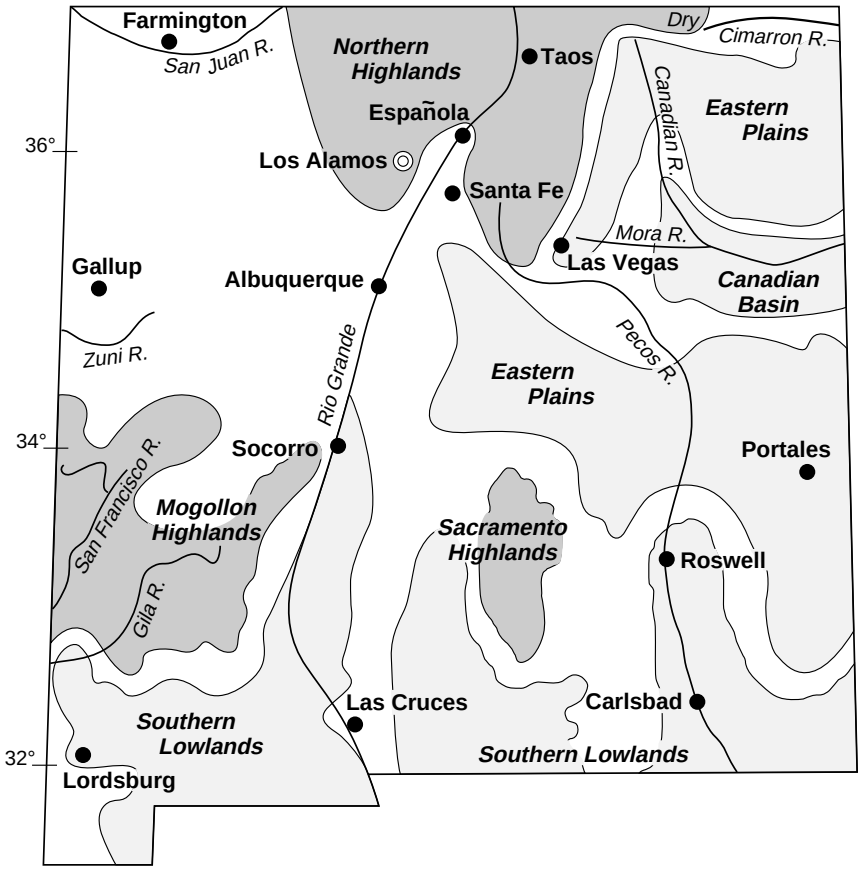


Fig. 1. New Mexico's topographic features.

Over 200 species of birds have been reported in the 144-square-mile area covered by the Los Alamos atlas project, and about half of them are considered to be breeding species. The diversity of bird life is attributable to the geographical location of the county and the diversity of its ecosystems.

Passage migrants move through or fly over Los Alamos each spring and fall. Sandhill Cranes, for example, accompanied by members of the small Idaho experimental flock of Whooping Cranes, follow the Rio Grande, traveling between their wintering grounds in southern New Mexico and their staging areas in the San Luis Valley in southern Colorado. In autumn, hummingbirds and a variety of passerines and hawks follow the mountain ridges as they gradually move south, passing through the mountain meadows as they go. Waterfowl visit Ashley Pond in the center of the town of Los Alamos and forage along the Rio Grande. Wintering flocks of juncos and nomadic fringillids roam the plateau woodlands and frequent residential feeding areas.

Birds common to the southern Rocky Mountain forests and woodlands compose the basic breeding avifauna of Los Alamos. Two-thirds of our nesting species are in this category. Because of the location of Los Alamos at the southern end of the Rocky Mountains and the northern extent of the Rio Grande valley, we can expect to find 11 species of the lower southwestern United States avifauna, which add interesting variety.

Ecosystems in Los Alamos County are diverse, primarily as a result of the 5000-foot elevational gradient that occurs in the 12 miles from the Rio Grande to the mountain ridgetops. The ecosystems vary from the hot, dry, lower canyon bottoms, which meet the Rio Grande at an elevation of 5400 feet, to the spruce/fir forest at 10,500 feet on the peak of Caballo Mountain in the northwestern corner of the county. Abrupt slope changes in many canyons result in differences in the amounts of solar radiation reaching north- and south-facing canyon slopes and local variations in precipitation and temperature, with a consequent diversity of soils, plants, and animals. The interdigitation of canyons and mesas results in many transitional overlaps of plant and animal communities within small areas.

Six major plant communities are found in Los Alamos County, and each of them supports its own avifauna. They are juniper grasslands, piñon/juniper woodland, ponderosa pine forest, mixed conifer forest, spruce/fir forest, and subalpine meadows (Foxx and Tierney 1985). Additional species of birds are attracted by the Rio Grande shoreline, a few cattail marshes, patches of riparian woodland, aspen stands, open fields, cliffs, and residential areas.

The Los Alamos National Laboratory is situated on the Pajarito Plateau in the southern half of the county. It occupies 43 square miles, of which 2.4 square miles are developed. The Laboratory has minimized the clearing of vegetation, and areas around buildings have been left natural wherever possible. Vegetation has been cleared around some of the dynamic testing sites to reduce fire hazard, but most of the activity is on the mesa tops, so the canyons are relatively undisturbed. The Los Alamos townsite occupies 6 square miles north of the Laboratory; the residential areas of White Rock, La Senda, and Pajarito Acres occupy 5 square miles to the southeast. The gardens, plantings, and parkland of these communities provide favorable avian habitat. The outlying areas are covered by the natural vegetation of forests and woodlands. A few roads penetrate the forests, and local areas evince earlier disturbance by fire, lumbering, and agriculture.

The Atlas Project

We chose a block size small enough to provide detailed information relative to the bird and habitat distributions, but large enough so that we could survey all the blocks adequately in 5 years. Block boundaries were defined by superimposing a grid on the 7.5-minute-quadrangle US Geological Service topographic maps that contain Los Alamos County. This grid divides the county into 60 square blocks, each 2.5 kilometers (1.55 miles) on a side. The grid map is shown in Fig. 2. The grid origin is the intersection of the western boundary of the county and a line extended west from the northernmost edge of the county. The blocks have two-digit designators, starting with 1-1 in the northwest corner. The first number is that of the row, the second that of the column. Individual block maps were reproduced from the master and provided to each participant. An example of a block map, the one for the main Laboratory technical area, is shown in Fig. 3. Some of the blocks extend outside the county boundaries. In these cases, the full block was surveyed and the data for the entire block were included in the atlas.

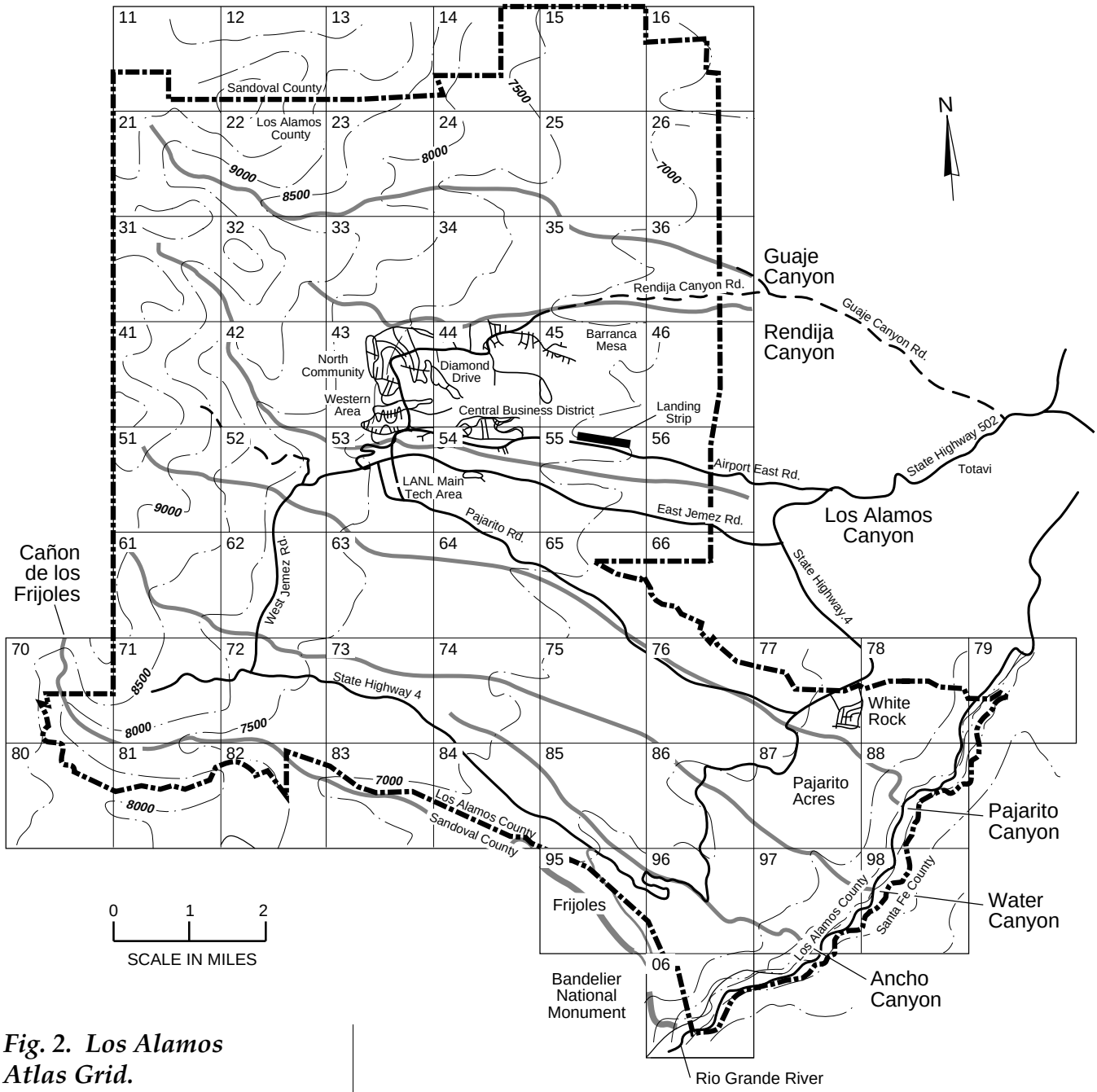
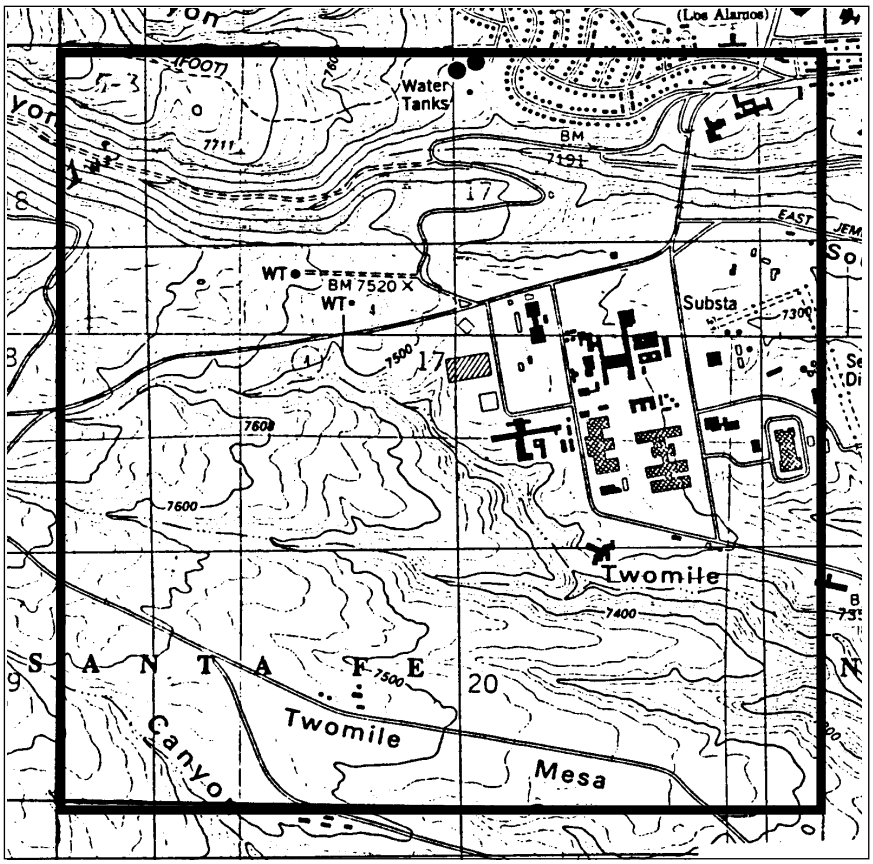


Fig. 2. Los Alamos Atlas Grid.

The breeding criteria used for the Vermont Atlas Project (Laughlin and Kibbe 1985) were adopted with a few small changes for our use. These criteria reflect the certainty of breeding of a species in a block: possible, probable, or confirmed breeding. They are defined in the Codes for Breeding Criteria section.

Fig. 3. Example of a block map (Block 5-3).



To start the atlas project, we selected for intensive study a few blocks that were representative of major ecosystems and were readily accessible. These blocks were assigned to a few individuals for thorough surveying in the first 2 years. Data gathered from them provided the information we needed to evaluate the adequacy of coverage. We based our criterion for adequate coverage on the expected number of species per block, following the precedent of the Vermont Atlas Project. A block was considered to be adequately covered when 75% of the expected species were found and half of these were confirmed. The number of species expected came from our earlier experience with the birds of Los Alamos. For example, if a block had several habitats, we expected to find the species appropriate to those habitats. Thus, a block with both ponderosa pine and piñon/juniper habitats was expected to have species from both of those habitats (54 species in this case). Adequate coverage for such a block would be 40 species recorded with 20 confirmed.

Blocks were surveyed throughout the breeding season, starting at the time of pair formation in late winter and continuing until the adults had finished caring for their fledglings in late summer. In the last 3 years of the project, we concentrated on blocks difficult to access. We set up weekend forays at the height of the breeding season to survey blocks in the Rio Grande gorge, the mountains in the northwest corner, and the interior, restricted-access areas of the Laboratory. Volunteers from nearby Santa Fe and Albuquerque joined us in these group forays.

A computer data file was created to handle the field records. Data, which included species name, block number, habitat, breeding activity, and the date of the activity, were entered on standardized forms. A matrix was drawn from the species-block data. This matrix was the basis for determining the field activity needed for each season and from season to season. The final version is reproduced in Appendix A, Atlas Data section.

Requirements for the atlas fieldworkers were the ability to find and identify the birds, to recognize significant breeding activity, and to locate block boundaries (at times in rugged country with imprecise landmarks). Forty-two people participated substantially in the atlas fieldwork. Four of them provided more than half of the atlas data, each covering six to ten assigned blocks and working in many others. An estimate of the combined time in the field of these four people is 2000 hours.

All atlas data were reviewed for validity; for example, that possible and probable breeding records lay within breeding season limits, and that the birds were found in appropriate habitats. The data set that defines the geographical distribution consists of 2648 breeding records (one record for each species found in each block). Because atlas fieldworkers were asked to report all confirmed breeding observations, the data file includes multiple confirmations for some species in a block. The total number of confirmations, including the multiple ones, is 2307. Of these, 1138 are nest records.

Bias and Limitations

Unequal coverage of blocks is the principal cause of bias in the data. The actual hours spent surveying in the different blocks varied greatly and were directly related to the difficulty of access. The high mountain blocks, accessible only in part by trails, the Rio Grande gorge with its steep tortuous descending footpaths, and some of the blocks within the Laboratory's secured grounds were less well covered than those reached within a few minutes from atlas fieldworkers' homes. Differences in observer ability are another cause of bias, but are less important a cause than time in the field.

Crepuscular and nocturnal species, particularly the small owls, were under-recorded. Exceptional effort was required to locate them, and they were especially difficult to confirm as breeders. We arranged for after-dark searches, and a few people concentrated on just these species, but much more effort would have been required for adequate coverage.

The geographical distribution displayed on the maps is less reliable for some species than others. This results from two causes: relative abundance and difference in detectability. The extremes are species that are scarce and hard to find and observe, on the one hand, and those that are abundant and readily detected on the other. Breeding in the former, such as the Black-throated Gray Warbler, is most likely inadequately represented, whereas that of the latter group, such as the American Robin and Black-headed Grosbeak, is probably described with reasonable accuracy.

The breeding date distributions shown below the maps in the Species Account section are biased as a result of the rigorous forays. Weekend forays were scheduled during the nesting season on dates when we expected the most activity involving adult birds attending their young. Thus, more hours were spent in the field on those days than on others. Although the quantitative data will be skewed toward those dates, the qualitative pattern for each species remains approximately correct.

The geographical distributions in this atlas portray data obtained only during the atlas period. They are incomplete as a matter of necessity. We cannot exclude the occurrence of any species not found within a block with the appropriate habitat if it were given additional coverage, nor can we assume that the species recorded constitute the entire set of species breeding within a block during the survey period.

Habitat Characterization

Although the coarseness of the grid limits the resolution of relationships between habitat and species occurrence, the atlas scale allows the geographical distribution of habitat types specified by the major overstory vegetation to be represented approximately by defined sets of blocks. Habitats delimited this way are the mixed coniferous forest of the mountains, the ponderosa pine forest of the plateau, the piñon/juniper woodland, and the wooded lower canyon bottoms. Other, more limited, habitats can also be so represented: abandoned agricultural fields, cliffs, marshes, residential areas, and the Rio Grande gorge. We used the habitat information from the Los Alamos National Environmental Research Park (NERP) report (US Energy Research and Development Administration undated), particularly from the map of the overstory vegetation of the Los Alamos environs (Fig. 10), Foxx and Tierney (1984), and personal observation in the field. The NERP information was derived from a mosaic of overstory plant community types compiled from color infrared photographs proofed by field observations. Maps showing habitat distribution, Figs. 4 and 5, outline the blocks where substantial areas of these habitats occur. If a habitat was found in at least one-fourth of a block, that block was included in the area designated for the habitat. The values for elevational range given for the habitats in the following descriptions are nominal. The particular elevation at which a specific plant will grow is dependent on sun exposure. For example, mixed conifers are found at lower elevations on north-facing canyon slopes and in shaded canyon bottoms.

The mixed coniferous forest covers the mountain slopes above an elevation of 8000 feet in the western quarter of the county. The major overstory vegetation consists of Engelmann spruce (*Picea englemannii*), Douglas fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), and limber pine (*Pinus flexilis*). As one approaches lower elevations, ponderosa pines (*P. ponderosa*) intrude from below. Much of the forest has an understory of bearberry (*Arctostaphylos uva-ursi*), creeping barberry (*Berberis repens*), and various grasses and forbs. Near the summits of the mountains (9500–10,500 feet) are small, dense stands of Engelmann spruce, white fir, and subalpine fir (*Abies lasiocarpa*) with little understory—a sampling of true spruce/fir forest. Aspen stands are interspersed within the coniferous forest, mostly on old large burns, areas of previous logging or blowdown, and on moist, north slopes at the heads of narrow, shaded canyons. Subalpine meadows, with dominant oatgrass (*Danthonia intermedia*) and brome

grass (*Bromus* spp.), occur at the higher mountain peaks. Twenty-two blocks encompass the mixed coniferous forest habitat (Fig. 4A). Spruce/fir forest is found in seven of these blocks (Fig. 4C-1).

The ponderosa pine forest lies on the Pajarito Plateau between elevations of 7000 and 8000 feet. The primary overstory vegetation is ponderosa pine. Patches of Gambel oak (*Quercus gambelii*) are scattered through the forest and wavy leaf oak (*Q. undulata*) occurs on the cliff edges. The dominant grasses include mountain muhly (*Muhlenbergia montana*), pine dropseed (*Blepharoneuron tricholepis*), and little bluestem (*Andropogon scoparius*). Twenty-six blocks include this habitat (Fig. 4B-1).

The piñon/juniper woodland consists of open and broken stands of piñon pine (*Pinus edulis*) intermixed with the codominant one-seed juniper (*Juniperus monosperma*), scattered alligator juniper (*J. deppeana*) on the dry slopes, and Rocky Mountain juniper (*J. scopulorum*) in the canyons. Among the common grasses found here are blue grama (*Bouteloua gracilis*), galleta (*Hilaria jamesii*), and little bluestem. This habitat occurs from 6200 to 7000 feet elevation in 27 blocks (Fig. 4C-2).

Many blocks contain more than one major plant community. These boundary blocks, which contain substantial areas of two major habitats and regions of habitat intermixture, are inhabited by species from both. Of particular interest are the set of five blocks (1-4, 2-4, 5-2, 6-2, and 7-2) that contain significant samples of both mixed conifer and ponderosa pine habitats, and the set of 21 blocks wherein the ponderosa pine (including the lower canyons) and piñon/juniper communities adjoin (Blocks 1-6, 2-6, 3-5, 3-6, 4-5, 4-6, 5-5, 5-6, 6-4, 6-5, 6-6, 7-4, 7-5, 7-6, 8-4, 8-5, 8-6, 8-7, 9-5, 9-6, and 10-6).

The habitat of the lower canyon bottoms is not defined definitively by major overstory vegetation. It contains mixed conifers (spruce/fir/ponderosa pine) on north-facing slopes, piñon pines on south-facing slopes, some riparian vegetation including narrowleaf cottonwood (*Populus angustifolia*), willows (*Salix spp.*), Western box elder (*Acer negundo*), and open shrub and grassy areas. Eleven blocks contain this habitat (Fig. 4B-2). These blocks also have significant samples of ponderosa pine forest, piñon/juniper woodland, and cliff habitat.

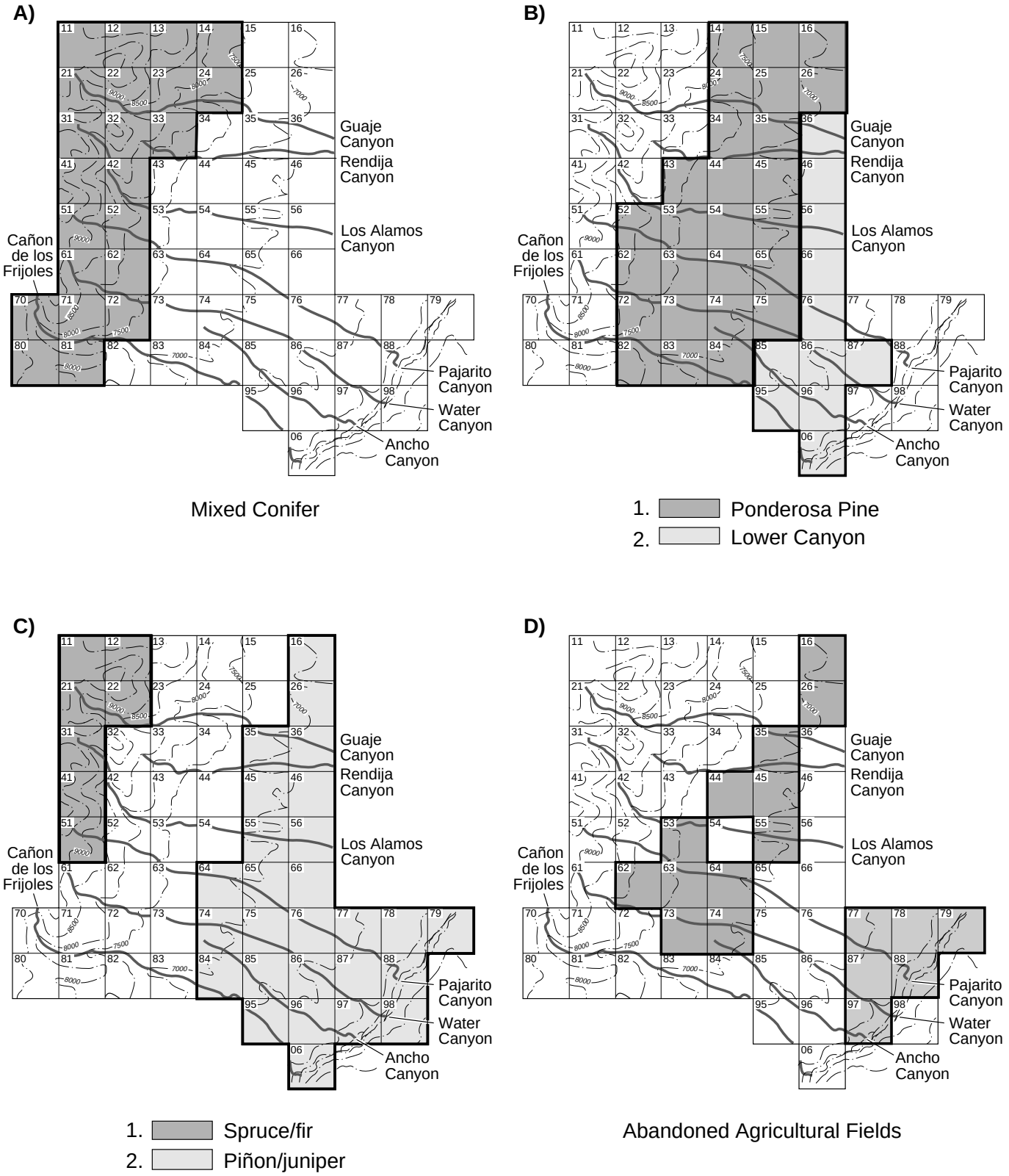


Fig. 4. Habitat Distribution I.

Abandoned agricultural fields are found in cleared areas in the ponderosa and piñon/juniper habitats. Some of the plants typical of these areas are wormwood (*Artemisia carruthii*), false tarragon (*A. dracunculus*), chamisa (*Chrysothamnus nauseosus*), Japanese brome (*Bromus japonicus*), black grama (*Bouteloua eriopoda*), Bermuda grass (*Cynodon dactylon*), trailing fleabane (*Erigeron flagellaris*), and ponymint (*Monarda pectinata*) (Foxx and Hoard 1984). Eighteen blocks contain these grasslands (Fig. 4D).

Steep-walled canyon cliffs and associated rock piles are a specialized habitat utilized almost exclusively by a few species. They are found in 30 blocks (Fig. 5A).

The Rio Grande gorge encompasses the area below an elevation of 6000 feet in the county. Habitats found here are juniper/yucca/cactus grasslands, shoreline, and very local riparian growth, including a few mature Rio Grande cottonwoods (*Populus fremontii*). There are six blocks in the gorge (Fig. 5D-2).

A few marshes, primarily made up of broad-leaved cattails (*Typha latifolia*), have developed where there is impounded water in the canyons. Live marshes were found in nine blocks (Fig. 5B) during the atlas project.

Residential areas contain a variety of habitats: open grassy areas, shrub and tree plantings, gardens, and structures that provide nesting and roosting places. These areas occupy a substantial part of ten blocks (Fig. 5C-1).

The Los Alamos National Laboratory, located in the south-central part of the county, is situated on the Pajarito Plateau, mostly in the ponderosa pine forest, but also extending southeast into piñon/juniper woodland and lower canyon bottoms. Laboratory and industrial buildings and connecting roads disrupt the natural habitat locally, but, enclosed by a security fence, most of the Laboratory area is protected from disturbance from the general public. The Laboratory area is encompassed by ten blocks (Fig. 5D-1).

The Rito de los Frijoles in Bandelier National Monument and the Rio Grande are the only live streams in the county. Water flows at times in several of the other canyons during parts of the year. Riparian habitat occurs locally in these canyons. The mountain streamside habitat includes alder (*Alnus*

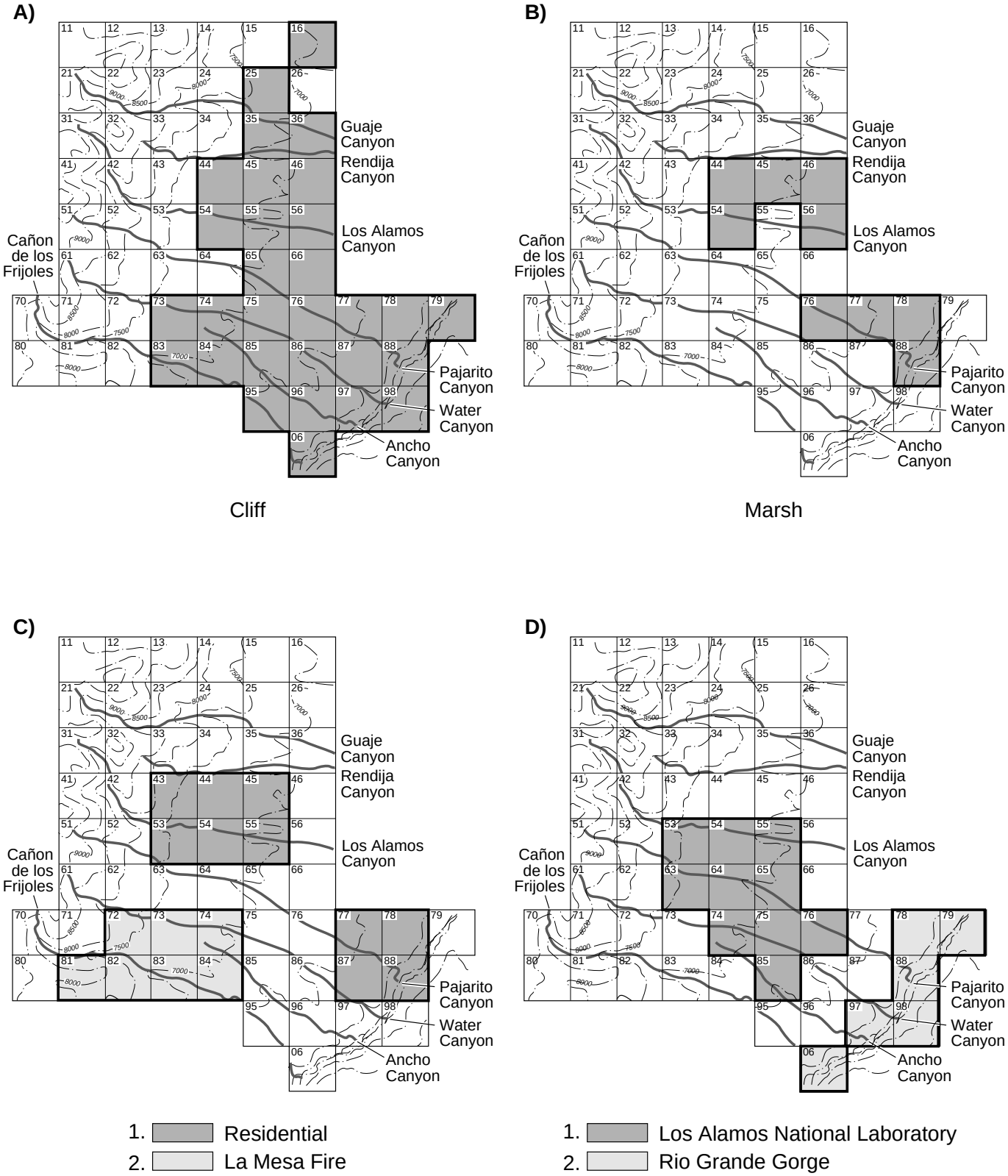


Fig. 5. Habitat Distribution II.

spp.), shrub willow (*Salix* spp.), and Western water-birch (*Betula occidentalis*).

The extent of severe foliar damage (all needles singed or consumed) by the 1977 La Mesa fire (Foxx 1984) is outlined in Fig. 5C-2. Seven blocks were substantially affected.

The Breeding Season in Relation to Altas Fieldwork

Antiphonal hooting in midwinter by the pairs of Great Horned Owls that occupy the major canyons heralds the beginning of the breeding season. Their nests are under way by March. Pairs of the other common large raptor, the Red-tailed Hawk, take to the skies in spectacular courtship flights not long after, and they, like Great Horned Owls, are feeding young in early summer when there is an abundance of prey.

These are among the 39 resident species that spend the year in Los Alamos. Some of them maintain winter foraging territories; others winter in flocks that roam through the forests or attend feeding stations. In late March and early April, resident pairs re-establish their breeding territories, and the wintering woodland flocks break up into pairs. Atlas fieldwork began in earnest when these territorial and courtship activities, evidence of probable breeding, were observed in these resident species.

At the end of April and in early May, preceded by the Say's Phoebe, most of the summering migrant breeders arrive. Shortly after arrival, the males establish breeding territories. Song and visual displays are the means by which they announce their presence and defend their territories. Females, typically for most species, appear a week or two after the males. Listening during the height of the song period—the last 3 weeks in May and the first week in June—reveals the presence of most of our breeding species, and territorial activity indicates probable breeding.

The peak of the breeding season for atlas fieldwork is June and July, when adults are feeding nestlings and fledged young. Song is greatly reduced then, so location of new species is more difficult. But the activity of the parents in gathering, carrying, and feeding food to the young is readily observed. Most atlas confirmations were obtained during this period.

A few species, such as Say's Phoebe and American Robin, are double-brooded. Nestlings of these species, as well as those of the latest breeders, like the Lesser Goldfinch, may be found as late as mid-September.

The nomadic and irruptive species are particularly challenging for atlas projects. Their numbers may vary greatly from year to year. Breeding in a particular locality may be irregular and may occur at different times of the year.

Early in the breeding season, atlas fieldwork is most profitable early in the morning, shortly before and after dawn, because song is greatest then. Later in the season, when the parents are caring for their young, fieldwork is effective all day, but mornings and late afternoons are best.

Each species has its own breeding phenology, and knowledge of this and of each one's particular behavioral patterns is vital for adequate atlas fieldwork. Selected behavioral and song information that is particularly useful for fieldwork in Los Alamos is included in the Species Account section.

The Survey Results

We found breeding evidence for 112 species in Los Alamos during the atlas period. Breeding was confirmed for 107 species and was possible or probable for another 5 species. The geographical distribution for each of these species is mapped in the Species Account section.

Four additional species, reported as probably breeding but not confirmed as breeding species in Los Alamos, are treated in the Additional Species section. There are no previous breeding records in the county for them, and the atlas fieldwork evidence is not conclusive.

Of the atlas breeding birds, 39 are resident species (species present all year); 59 are migratory summer residents; 6 are nomadic species; 6 are resident in nearby areas, but withdraw from Los Alamos after the breeding season; and 2 (Lewis' Woodpecker and American Crow) are present in numbers at other seasons, but summer only occasionally in Los Alamos.

Six species were nearly ubiquitous, occurring in almost all blocks (greater than 92%). These are the Broad-tailed Hummingbird, Northern Flicker, Violet-green Swallow, American

Robin, Western Tanager, and Black-headed Grosbeak. The most abundant species, although not necessarily the most widespread, were most frequently confirmed as breeders in a block. They were also among the most readily detectable. More than 80% of the Say's Phoebe, Pygmy Nuthatch, Western Bluebird, American Robin, and Chipping Sparrow records were confirmations. The species confirmed in the most blocks was the American Robin.

Two species new to Los Alamos, the Rufous-crowned Sparrow and Scott's Oriole, were confirmed as breeding species, but for four species—Golden Eagle, Peregrine Falcon, Prairie Falcon, and Scaled Quail—known from earlier years to have nested in Los Alamos, there was no evidence of breeding.

An average of 44.1 breeding species was found per block and of those, 20.9 (47.2%) were confirmed, 12.3 (28%) were probable, and 10.9 (24.8%) were possible breeders. Block species totals ranged from 64 in Block 4-6 in lower Bayo Canyon, which has a varied habitat including a sizable marsh and had intensive coverage; to 19 in Blocks 1-1, visited twice; and 1-3, visited once, in the northwest corner. Both Blocks 1-1 and 1-3 have little habitat variety.

The number of species found in the different blocks is shown in Fig. 6. Three numbers are given for each block. The number of occurrences (the sum of the possible, probable, and confirmed records) is in the upper center, the score for the block is in the lower left corner, and an estimate of the number actually breeding is in the lower right corner. The score, S, is a measure of breeding likelihood that quantifies the difference in probability of breeding indicated by the three breeding criteria. It is discussed in Appendix B. The weighting formula used is 1, 1/2, and 1/4 for confirmed, probable, and possible breeding, respectively. Thus, a breeding record for a species in a block has a value of 1, 1/2, or 1/4 and the score for a block is the sum of the individual species scores. The estimate of the number actually breeding, N, was calculated from the atlas data as described in Appendix B. Blocks for which S and N are nearly equal are considered to be well surveyed; those in which S is greater than 69% of N are adequately surveyed. Based on this criterion, 15% of the blocks were poorly covered (Blocks 1-1, 1-2, 1-3, 2-1, 2-2, 3-1, 3-6, 8-1, and 9-8).

Fig. 6. Block totals.

	1	2	3	4	5	6	7	8	9
1	19 10*	24 18*	19 13*	35 28 32	44 35 36	50 41 42			
2	32 18 33	33 18 33	31 24 33	38 31 36	45 26 32	42 28 36			
3	27 17 29	32 22 31	36 26 31	30 27 30	48 30 32	43 26 39			
4	39 27 34	39 28 30	45 27 27	56 41 41	63 41 41	64 47 47			
5	31 24 31	47 32 33	54 40 40	61 44 44	62 48 48	61 48 48			
6	37 25 31	47 30 31	38 25 27	51 34 37	56 41 41	56 38 42			
7	34 22 28	38 23 28	44 33 33	48 30 31	43 27 34	48 33 38	45 34 36	38 25 25	51 33 33	52 25 28
8	46 27 33	40 19 29	44 27 37	44 30 37	51 33 35	40 24 35	45 31 32	55 38 38	59 42 42	
9						61 46 46	49 38 39	45 28 30	34 14 29	
10							59 35 39			

*There are insufficent data to estimate N in these blocks.

The number of species per block shows a strong east-west trend—the number decreasing as one goes from lower to higher elevations (right to left in Fig. 6) or from a nominal value of 60 to 20. The blocks with the most species occurrences lie in the east-central region where the lower canyon bottoms are located and in Frijoles Canyon (Blocks 9-5 and 10-6).

With the atlas data we can unfold distributional patterns of the bird species of Los Alamos and determine species-habitat relationships. The distributional patterns are related to avian habitat selection and elevational gradient.

Distributional Patterns

Although few of our species breed solely in a single habitat (as defined by major overstory vegetation), examination of the geographical data shows that groups of species are found in similar sets of habitat types. One of these groups, which includes the Broad-tailed Hummingbird, Northern Flicker, and Violet-green Swallow, consists of ten common, widely spread species found in all three of the major plant

communities. Six additional habitat-related associations are restricted to one or two of the major habitats. The species in these associations are listed in Table I. The data included are the number of blocks in which the species was found, the block frequency (the percentage of the association's blocks occupied by the species), and the score for the species in the association (defined in Appendix B). Each of these associations has its own distribution pattern, with every species in an association sharing the same habitats with nearly alike elevational profiles. One set, typified by the Ash-throated Flycatcher, Scrub Jay, and Plain Titmouse, is restricted almost exclusively to the piñon/juniper woodlands between 6000 and 7150 feet elevation. Another set, the lower forest and woodland association, inhabits the piñon/juniper woodland, the lower canyons, and the ponderosa pine forest between 6000 and 7950 feet elevation. Representative species here are the Mourning Dove, Rufous-sided Towhee, and Lesser Goldfinch. A midforest association consists of species primarily with ponderosa pine affinity that breed from 6900 to 8400 feet elevation. The principal birds of this association are the Pygmy Nuthatch, Solitary Vireo, Virginia's Warbler, and Grace's Warbler. The birds of the higher forests divide into three associations—those that occupy primarily the spruce/fir forest above 8950 feet, such as the Red-breasted Nuthatch and the kinglets; those, primarily birds of the mixed conifer forest, that also breed in the ponderosa forest (from 7100 to 10,000 feet), typified by the Yellow-rumped Warbler and the Dark-eyed Junco; and those that occupy both the mixed conifer and ponderosa pine forests and extend into the wooded lower canyons (from 6900 to 10,000 feet). The Steller's Jay, Mountain Chickadee, White-breasted Nuthatch, and House Wren are representative of the last group.

The species within an association have their own specialized micro-habitat requirements. For example, the Virginia's Warbler breeds in the scrub oak/pine habitat, MacGillivray's Warbler breeds in riparian shrub habitat within the mixed conifer community, and the Hepatic Tanager nests in ponderosa pines found in piñon/juniper habitat. Each of the species breeding in the county has been placed uniquely in one association. There is evidence suggesting that finer subdivision could be made, but the grid size precludes doing this reliably with the atlas data.

Table I. Bird Associations

a. All major habitats (60 blocks; 11 species)

Species	Occurrence (%)		Score
Broad-tailed Hummingbird	59	(98)	37.5
Northern Flicker	59	(98)	45.5
Western Wood-Pewee	53	(88)	38.0
Violet-green Swallow	59	(98)	45.5
Common Raven	50	(83)	37.0
Western Bluebird	48	(80)	45.0
American Robin	57	(95)	49.5
Western Tanager	56	(93)	42.8
Black-headed Grosbeak	55	(92)	43.8
Chipping Sparrow	51	(85)	44.8
Evening Grosbeak	19	(32)	10.3

b. Piñon/juniper woodland, 6000–7150 feet (27 blocks; 21 species)

Species	Occurrence (%)		Score
Zone-tailed Hawk	10	(37)	4.8
Gambel's Quail	2	(7)	1.3
Black-chinned Hummingbird	11	(41)	7.3
Gray Flycatcher	22	(81)	13.8
Say's Phoebe	19	(70)	23.8
Ash-throated Flycatcher	27	(100)	26.5
Cassin's Kingbird	22	(81)	19.8
Scrub Jay	27	(100)	29.0
Pinyon Jay	10	(37)	7.3
Black-billed Magpie	2	(7)	1.3
Plain Titmouse	27	(100)	20.5
Bushtit	22	(81)	13.8
Bewick's Wren	19	(70)	15.3
Blue-gray Gnatcatcher	22	(81)	10.3
Northern Mockingbird	3	(11)	1.5
Hepatic Tanager	18	(67)	13.8
Black-throated Gray Warbler	13	(48)	10.0
Blue Grosbeak	9	(33)	5.8
Canyon Towhee	21	(78)	18.3
Lark Sparrow	13	(48)	10.0
House Finch	25	(93)	22.8

Table I. Bird Associations (cont.)

c. Lower forest and woodland, 6000–7950 feet (43 blocks; 15 species)

Species	Occurrence (%)		Score
Cooper's Hawk	25	(58)	16.8
Red-tailed Hawk	28	(65)	18.0
American Kestrel	31	(72)	22.5
Mourning Dove	39	(91)	25.3
Great Horned Owl	22	(51)	11.8
Spotted Owl	2	(5)	1.3
Common Nighthawk	35	(81)	18.3
Lewis' Woodpecker	4	(9)	4.0
Acorn Woodpecker	14	(33)	11.3
Mountain Bluebird	29	(67)	25.3
Lazuli Bunting	6	(14)	1.5
Rufous-sided Towhee	43	(100)	35.5
Brown-headed Cowbird	40	(93)	16.3
Northern Oriole	4	(9)	1.8
Lesser Goldfinch	38	(88)	29.8

d. Midforest, 6900–8400 feet (47 blocks, 10 species)

Species	Occurrence (%)		Score
Band-tailed Pigeon	7	(15)	2.5
Flammulated Owl	9	(19)	5.8
Northern Saw-whet Owl	1	(2)	1.0
Common Poorwill	20	(43)	9.5
Dusky Flycatcher	14	(30)	7.0
Pygmy Nuthatch	47	(100)	41.8
Solitary Vireo	46	(98)	34.5
Virginia's Warbler	41	(87)	32.3
Grace's Warbler	42	(89)	30.8
Cassin's Finch	10	(21)	5.8

Table I. Bird Associations (cont.)

e. High forests and lower canyons, 6900–10,000 feet (54 blocks; 18 species)

Species	Occurrence (%)		Score
Northern Pygmy-Owl	5	(9)	3.0
Williamson's Sapsucker	28	(52)	19.3
Downy Woodpecker	14	(26)	7.8
Hairy Woodpecker	50	(93)	34.3
Hammond's Flycatcher	37	(69)	27.3
Cordilleran Flycatcher	39	(72)	25.5
Steller's Jay	52	(96)	37.5
Clark's Nutcracker	17	(31)	8.3
Mountain Chickadee	53	(98)	39.0
White-breasted Nuthatch	52	(96)	36.0
Brown Creeper	31	(57)	17.8
House Wren	51	(94)	43.0
Townsend's Solitaire	31	(57)	15.3
Hermit Thrush	45	(83)	25.0
Warbling Vireo	38	(70)	20.5
MacGillivray's Warbler	22	(41)	9.3
Red Crossbill	32	(59)	11.0
Pine Siskin	40	(74)	19.0

f. Mixed conifer and ponderosa pine forests, 7100–10,000 feet (43 blocks; 8 species)

Species	Occurrence (%)		Score
Sharp-shinned Hawk	6	(14)	3.3
Wild Turkey	8	(19)	5.3
Three-toed Woodpecker	3	(7)	2.3
Olive-sided Flycatcher	11	(26)	5.0
Orange-crowned Warbler	18	(42)	11.5
Yellow-rumped Warbler	31	(72)	21.0
Green-tailed Towhee*	14	(33)	8.8
Dark-eyed Junco	36	(84)	27.8

*Limited to mountain meadows and brushy areas in the forests.

Table I. Bird Associations (cont.)

g. Spruce/fir and adjoining mixed conifer forest, 8,950 10,000 feet (17 blocks; 7 species)

Species	Occurrence (%)		Score
Blue Grouse	8	(47)	6.4
Red-naped Sapsucker	6	(35)	4.0
Gray Jay	2	(12)	1.3
Red-breasted Nuthatch	17	(100)	9.8
Golden-crowned Kinglet	10	(59)	5.3
Ruby-crowned Kinglet	14	(82)	7.0
Lincoln's Sparrow*	4	(18)	3.5

*Limited to mountain meadows in the forest.

h. Abandoned agricultural fields (18 blocks; 2 species)

Species	Occurrence (%)		Score
Vesper Sparrow	12	(67)	6.8
Western Meadowlark	9	(50)	4.0

i. Marsh habitat (9 blocks; 2 species)

Species	Occurrence (%)		Score
Song Sparrow	7	(78)	3.3
Red-winged Blackbird	7	(78)	3.5

j. Cliff habitat (30 blocks; 6 species)

Species	Occurrence (%)		Score
Turkey Vulture	10	(33)	4.0
White-throated Swift	23	(77)	16.3
Cliff Swallow	5	(17)	3.0
Rock Wren	26	(87)	18.8
Canyon Wren	27	(90)	15.8
Rufous-crowned Sparrow	5	(17)	3.0

Table I. Bird Associations (cont.)

k. Rio Grande gorge (6 blocks; 8 species)

Species	Occurrence (%)		Score
Mallard	3	(50)	1.8
Spotted Sandpiper	4	(67)	2.0
Ladder-backed Woodpecker	3	(50)	0.8
Black Phoebe	5	(83)	2.0
American Crow	1	(17)	1.0
American Dipper	2	(33)	1.5
Indigo Bunting	3	(50)	0.8
Scott's Oriole	5	(83)	2.3

l. Residential habitat (10 blocks; 3 species)

Species	Occurrence (%)		Score
European Starling	10	(100)	10.0
Brewer's Blackbird	9	(90)	8.5
House Sparrow	10	(100)	13.0

*A few species have scores greater than the number of occurrences for the association. This is a result of habitat spillover into adjacent blocks.

The block data were analyzed in three steps to determine the associations. Single-link cluster analysis starting with the representative species, followed by χ^2 independence test for pair comparisons using the habitat breakdown from the atlas status tables, established reasonably differentiated core species. The associations were filled out and refined by another χ^2 analysis using sets of blocks to sort out the lower canyon effects and elevational data, which cut through the major habitats. The variable used for breeding probability was the species score.

Although the bird associations share the major habitats, they partition them in different ways. This is evident from examination of the number of species in the associations at different elevations. A nominal elevation for each block was obtained in the following way. From the topographical maps, the upper and lower elevations for each block were

determined and their mean value taken as the nominal elevation of the block. The criterion used for the extremes was that approximately 5% of the block would be at higher elevation than the maximum and 5% would be lower than the minimum. The number of species of an association at each of the nominal elevations was plotted against elevation and fitted with a smooth curve. The smoothed elevation profiles for the forest and woodland bird associations of Table I are portrayed in Fig. 7a. The vertical axis is species frequency (the fraction of species found at a given elevation). The fit of the data for the mixed conifer/ponderosa pine association is shown as an example in Fig. 7b. Although there is considerable scatter in the data, the pattern of elevational distribution of the association is clear. The data scatter for the other associations is no greater than that shown here.

Those forest species found throughout the county in all the major habitats (Fig. 7a-1) are fairly uniformly distributed elevationally, dropping off at the lowest elevations where the plant variety declines. Species associations more restricted in habitat occupation have substantially different profiles. The association of the piñon/juniper woodland (Fig. 7a-2) has a monotonically declining profile to a truncation point at

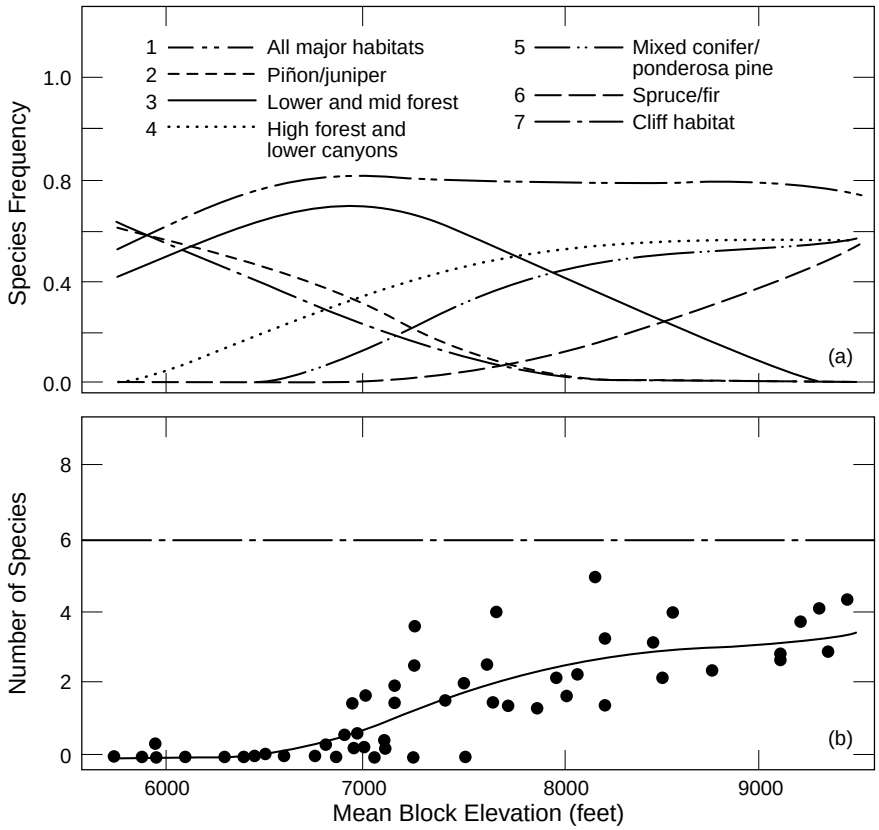


Fig. 7. (a) Bird association elevation profiles (upper); (b) fitted data for mixed conifer/ponderosa pine association (lower).

7590 feet elevation. The lower and midforest association birds are combined in Fig. 7a-3. The combined group contains birds of the ponderosa pine forest that follow the pines into the mixed conifer forest at higher elevations and into the lower canyon bottoms at the lower elevations, and piñon/juniper species that also use ponderosa forest. The peak in the distribution is where the ponderosa pine and piñon/juniper habitats overlap (near 8000 feet).

The three associations of the higher forests have differing range extension to lower elevations: into the lower canyons (Fig. 7a-4), only into ponderosa pine forest (Fig. 7a-5), and limited to only the highest mixed conifer and spruce/fir forests (Fig. 7a-6), and increasing in species frequency with increasing elevation.

Figure 7a-7 shows the elevational profile of the cliff-dwelling species, reflecting the decrease in cliff area at higher elevations.

Elevation Profiles of Individual Species

Comparison of the profiles of individual species shows interesting differences or similarities in the distribution of related species. Several sets of these will be illustrated. To reveal the pattern, since only values of 0, 1/4, 1/2, or 1 are available for a point on the plot, the atlas blocks were grouped according to their elevation. Sorting the nominal elevations revealed clumping of the blocks at eight different elevations, where the difference in the means within a clump was no greater than 200 feet. The resultant elevational grouping is illustrated in Fig. 8, and the elevational range for each group is shown in Fig. 9. Also shown in Fig. 9 is the habitat distribution related to elevational groups.

The four major raptors of the county have profiles that are much the same (Fig. 10). They are concentrated at the lower elevations, decreasing in species frequency by approximately a 25 percentile increment for an increase of 1000 feet elevation in the region above 6700 feet.

Empidonax flycatchers are found throughout the county (Fig. 11). The Gray Flycatcher dominates the lower elevations. The Hammond's and Cordilleran Flycatchers have nearly similar profiles—they peak at the middle elevation of the mixed conifer forest. The profile for the Dusky Flycatcher reflects its opportunistic habitat utilization. It was found in

Fig. 8. Grouping of blocks with equal mean elevation.

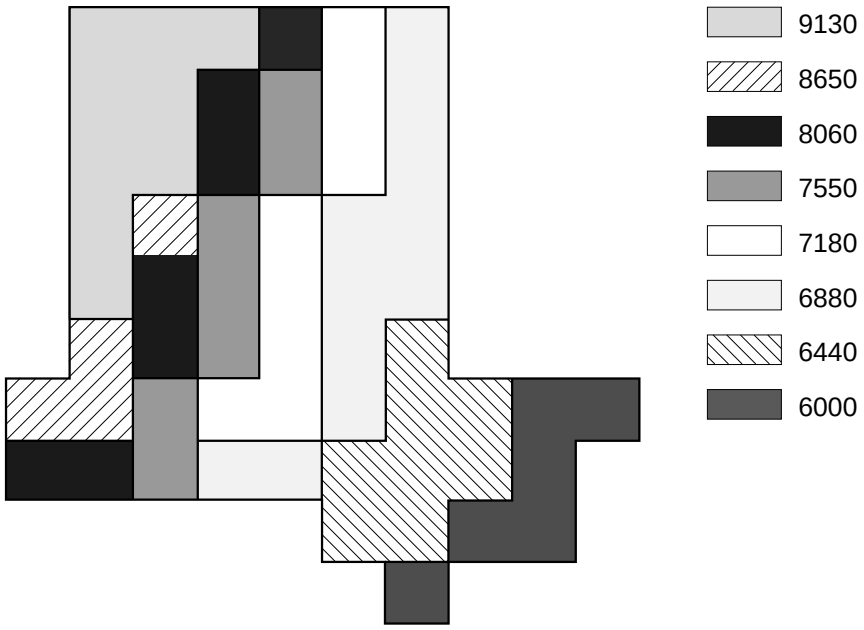


Fig. 9. Elevational range of groups and habitats.

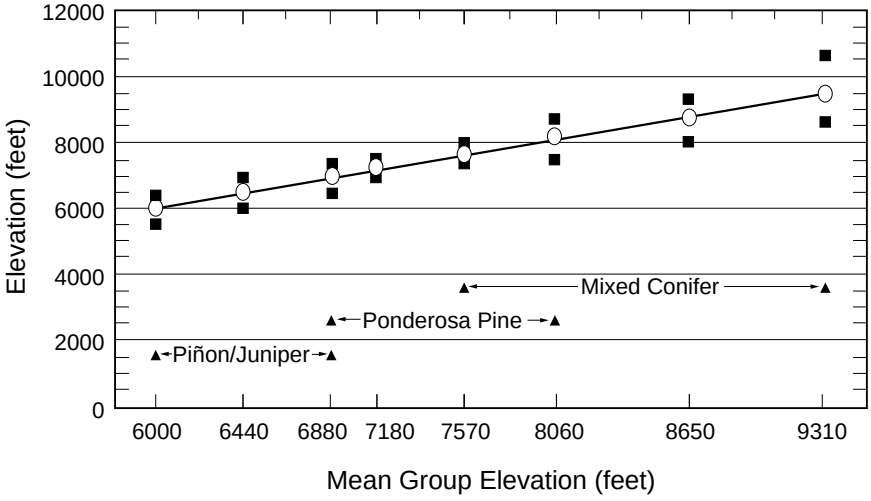


Fig. 10. Raptors.

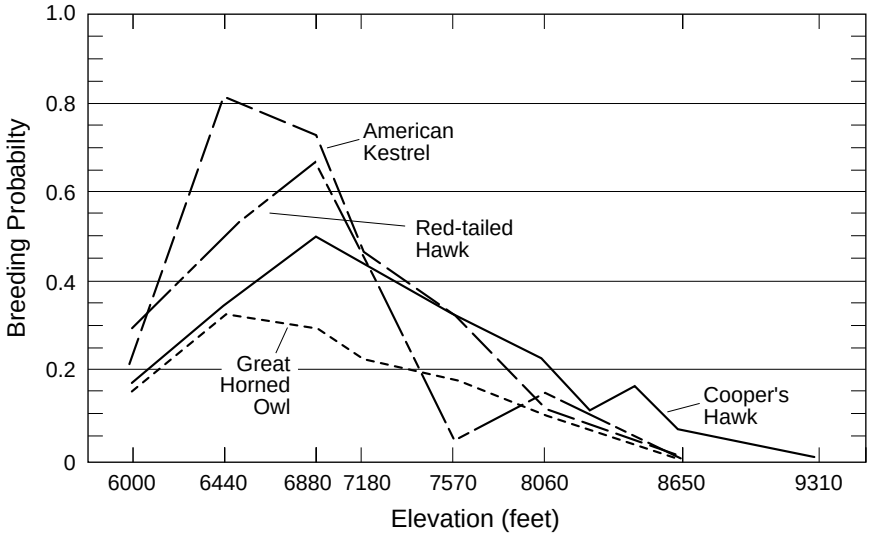
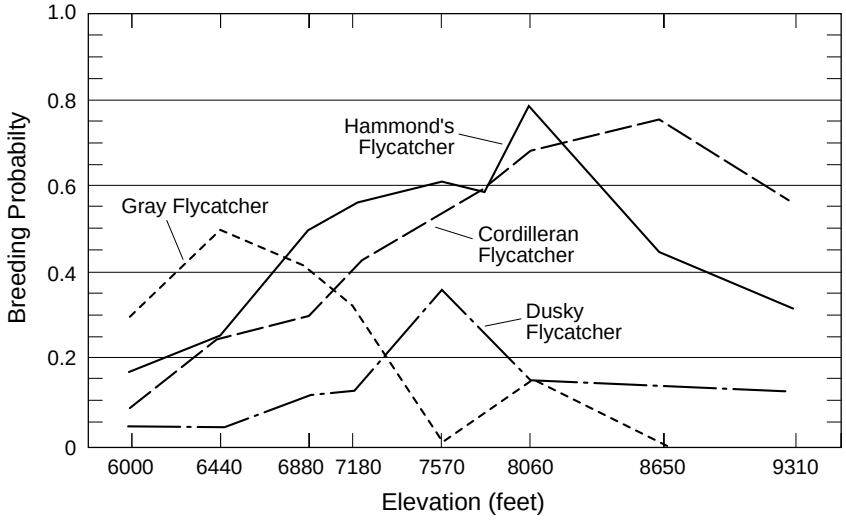


Fig. 11. Empidonaces.



new growth, typically aspen, and in scrub oak understory in open coniferous forest. The greatest Empidonax species density occurred in the mixed conifer community around 8000 feet.

The jays partition the habitat resources of the county (Fig. 12), with considerable overlap. The Scrub Jay is most abundant at the lower elevations, while the Steller's Jay is abundant at higher elevations. The Pinyon Jay is found exclusively in the low piñon/juniper woodland; whereas the Clark's Nutcracker nests in undisturbed canyons at middle elevations.

The three most abundant warblers have specific elevational pattern differences (Fig. 13a). The Virginia's and Grace's Warblers are most common from 6200 to 8200 feet, and the Yellow-rumped Warbler is abundant above 7200 feet. The other high-elevation warbler, the Orange-crowned, has a profile like the Yellow-rumped (Fig. 13b). The Black-throated Gray Warbler is localized in the lower piñon/juniper areas. The profile of MacGillivray's Warbler reflects its predilection for local moist canyons, which are scattered through the county at different elevations.

Although they have similarities in microhabitat preferences, the three towhees occupy different elevational ranges (Fig. 14). The Canyon and Rufous-sided Towhees share the lower areas, but the Canyon Towhee range ends abruptly at 6900 feet, the approximate upper limit of the piñon/juniper woodland, while the Rufous-sided's extends to 8200 feet. The less abundant Green-tailed Towhee is found in the middle and higher elevations.

Fig. 12. Jays.

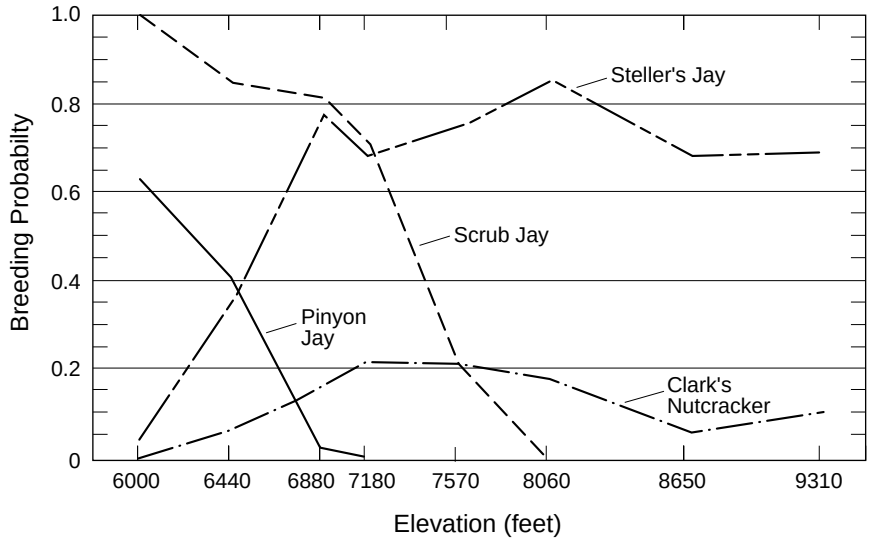


Fig. 13a. Warblers I.

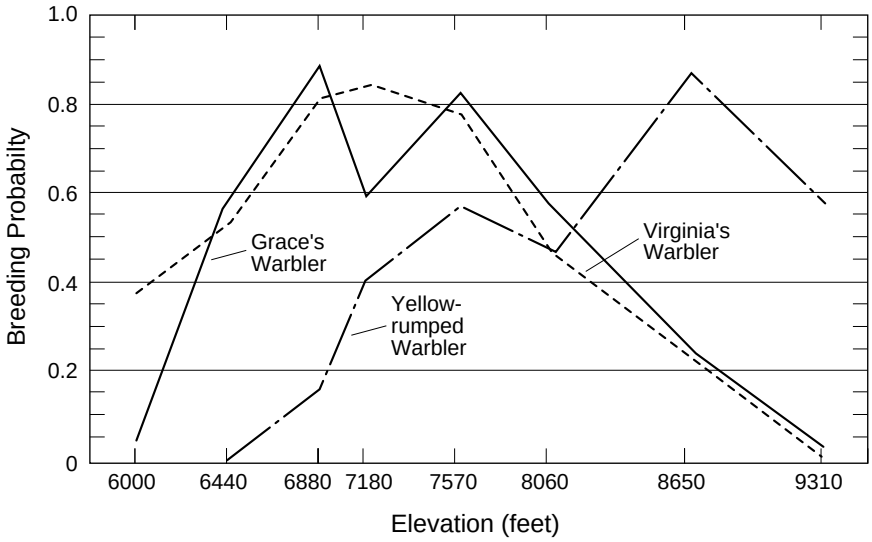


Fig. 13b. Warblers II.

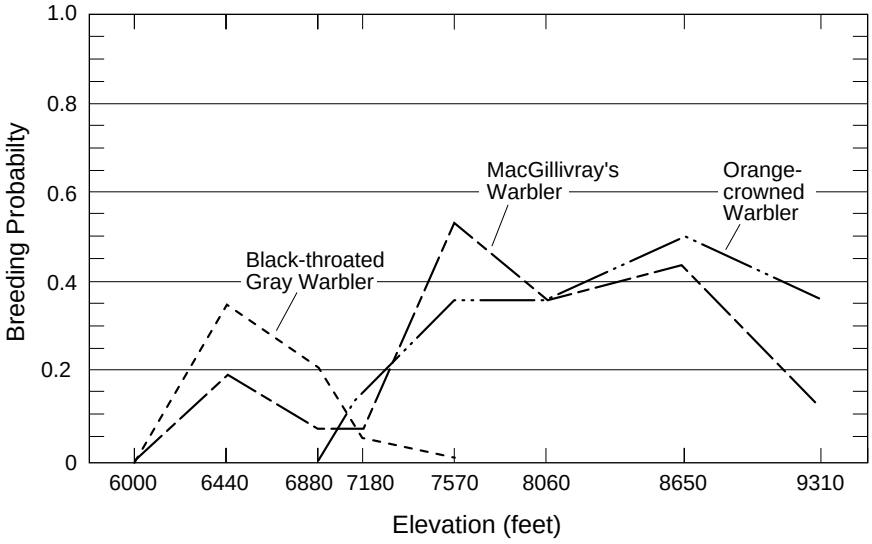
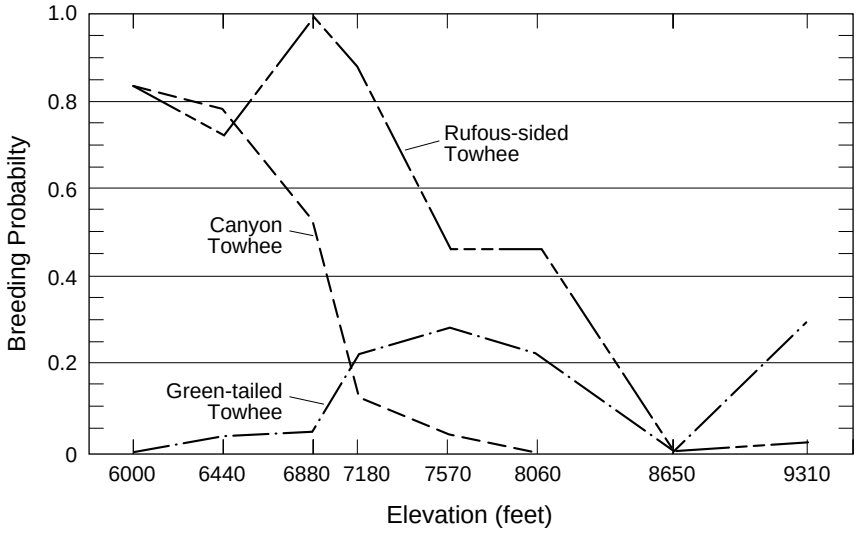
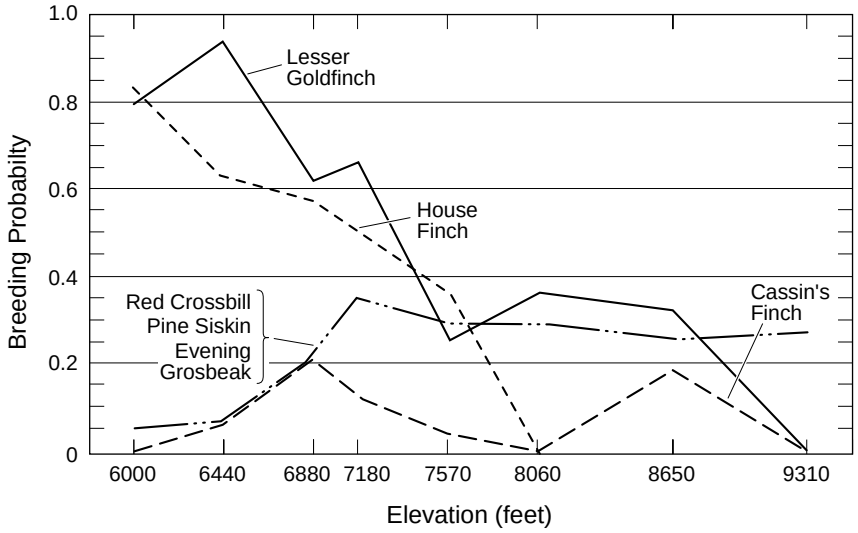


Fig. 14. Towhees.



Finches nest at all elevations but have specific differences in habitat utilization (Fig. 15). The resident House Finch occupies the lower elevations and is abundant in the residential areas. The migratory Lesser Goldfinch is common at lower elevations, but nests in the mountains as well. Three of the nomadic finches (Red Crossbill, Pine Siskin, and Evening Grosbeak) have nearly similar profiles, which are combined in Fig. 15. These birds have a fairly uniform species density in the coniferous forest above 7200 feet. Cassin's Finch, the fourth of the nomadic finches, has rarely been found breeding in Los Alamos. It has a pattern of localized breeding.

Fig. 15. Finches.



Species Richness

The number of species in an area (species richness) is related to the habitat complexity of the area. Each of the plant communities has a different number of bird species. Some of these species are found in several habitats; some are selective, breeding preferably in one habitat, but occasionally breeding elsewhere; and a few are exclusive, breeding solely in one habitat. The species richness for each of the three major plant communities in Los Alamos was determined by tallying all the species found in the blocks containing the community. The result is 38 species in the piñon/juniper community, 57 species in the ponderosa pine community, and 54 species in the mixed conifer community.

Uncertainty in determining species richness arises from the ecological species-area relationship: the number of species increases with increasing area sampled. Some species are common in the habitat and are likely to be found in an area the size of a block; others are rare and may be found in only one or two blocks (or not at all in Los Alamos). To determine the species richness and to examine the effect of area for a major plant community, we tallied the confirmed breeding species found in each of the blocks that contained only that plant community. Species that breed solely in the field, cliff, marsh, residential, or gorge habitats were excluded. Starting with the best surveyed block of the set, we scanned the other blocks, in turn adding additional confirmed species to the cumulative total. Then we searched through the blocks that had an additional, confounding, major plant community for additional species of the target habitat to get the total number of breeding species. The last step was particularly necessary for the piñon/juniper community because the sampling area for "pure" piñon/juniper woodland was only six blocks. Typically, about 70% of the total species for a habitat were found in a block. To obtain the final species number for a community required 6 blocks of piñon/juniper woodland, and 12 blocks each of ponderosa pine and mixed conifer forest, or an equivalent area of 37.5, 75, and 75 square kilometers, respectively, for the three communities.

Species richness for the major plant communities is given in Table II. A summary of the block results, which shows how many species were found in a block for each habitat, is also given in the table. The values of the median for occurrences and confirmed breeders, and the interquartile distance (the range in species that includes the central 50% of the records) are shown. The interquartile distance is analogous to twice

Table II. Species Richness by Habitat (Blocks)

	Piñon/Juniper (27)	Ponderosa Pine (26)	Mixed Conifer (22)
Number of Species	38	57	54
Species/block			
Median for Occurrences	29	40	33
Interquartile distance	5	5	7
Median for Confirmed	16	19	16
Interquartile distance	7	6	5
Percent occurred	76	70	61
Percent confirmed	42	33	30

the standard deviation for a normal distribution. The percentage of the total species found on the average per block is given in the last two lines of the table.

The piñon/juniper habitat, with the lowest species richness is rather uniform in the county; the other two have more habitat complexity. The ponderosa pine community includes patches of aspen and understory scrub oak and local limited areas of riparian shrub; the mixed conifer community has scattered mountain meadows and aspen stands, for example. Generally, additional tree species in a community introduce more species.

The breeding species of the three communities are listed in Table III. The common species, those that occurred in greater than 90% of the habitat blocks, are shown in bold type; the scarce species of the community are italicized. A species is defined as scarce if it occurred in less than 25% of the blocks that contained the habitat.

Species richness for the field, marsh, cliff, and residential area habitats is 2, 2, 6, and 3, respectively. For each of these habitats, all the blocks that contained some of the habitat (identified in Figs. 4 or 5) were used in the analysis.

Table III. Breeding Birds of the Major Plant Communities

Piñon/Juniper	Ponderosa Pine	Mixed Conifer
	Sharp-shinned Hawk	*Sharp-shinned Hawk*
	Cooper's Hawk	*Cooper's Hawk*
	Red-tailed Hawk	
American Kestrel	American Kestrel	Blue Grouse
Gambel's Quail	*Wild Turkey*	Wild Turkey
Mourning Dove	Mourning Dove	
	Flammulated Owl	*Flammulated Owl*
	Northern Saw-whet Owl	*Northern Pygmy-Owl*
Common Nighthawk	Common Nighthawk	
Black-chinned Hummingbird	Common Poorwill	
Broad-tailed Hummingbird	**Broad-tailed Hummingbird**	**Broad-tailed Hummingbird**
	Williamson's Sapsucker	Red-naped Sapsucker
	Lewis' Woodpecker	
	Acorn Woodpecker	
	Downy Woodpecker	Downy Woodpecker
	Hairy Woodpecker	**Hairy Woodpecker**
		Three-toed Woodpecker
Northern Flicker	**Northern Flicker**	Northern Flicker
		Olive-sided Flycatcher
Western Wood-Pewee	**Western Wood-Pewee**	Western Wood-Pewee
Gray Flycatcher	**Hammond's Flycatcher**	Hammond's Flycatcher
Say's Phoebe	Dusky Flycatcher	*Dusky Flycatcher*
	Cordilleran Flycatcher	**Cordilleran Flycatcher**
Ash-throated Flycatcher	Ash-throated Flycatcher	
Cassin's Kingbird	*Cassin's Kingbird*	
Violet-green Swallow	**Violet-green Swallow**	**Violet-green Swallow**
		Gray Jay
	Steller's Jay	**Steller's Jay**
Scrub Jay	Scrub Jay	
Pinyon Jay	Clark's Nutcracker	Clark's Nutcracker
Black-billed Magpie		
Common Raven	**Common Raven**	Common Raven
Plain Titmouse	**Mountain Chickadee**	**Mountain Chickadee**
Bushtit		**Red-breasted Nuthatch**
	White-breasted Nuthatch	**White-breasted Nuthatch**
	Pygmy Nuthatch	Pygmy Nuthatch
Bewick's Wren	Brown Creeper	**Brown Creeper**
House Wren	**House Wren**	**House Wren**
Blue-gray Gnatcatcher		Golden-crowned Kinglet
		Ruby-crowned Kinglet
Western Bluebird	**Western Bluebird**	Western Bluebird
Mountain Bluebird	Mountain Bluebird	*Mountain Bluebird*
	Townsend's Solitaire	Townsend's Solitaire
	Hermit Thrush	**Hermit Thrush**
American Robin	**American Robin**	**American Robin**
Northern Mockingbird	**Solitary Vireo**	Solitary Vireo
	Warbling Vireo	**Warbling Vireo**
Black-throated Gray Warbler		Orange-crowned Warbler
	Virginia's Warbler	Virginia's Warbler
	Yellow-rumped Warbler	**Yellow-rumped Warbler**
	Grace's Warbler	Grace's Warbler
Hepatic Tanager	MacGillivray's Warbler	MacGillivray's Warbler
Western Tanager	**Western Tanager**	**Western Tanager**
Black-headed Grosbeak	**Black-headed Grosbeak**	**Black-headed Grosbeak**
Blue Grosbeak	Green-tailed Towhee	Green-tailed Towhee
Rufous-sided Towhee	**Rufous-sided Towhee**	*Rufous-sided Towhee*
Canyon Towhee		
Chipping Sparrow	**Chipping Sparrow**	Chipping Sparrow
Lark Sparrow		Lincoln's Sparrow
	Dark-eyed Junco	**Dark-eyed Junco**
Brown-headed Cowbird	Brown-headed Cowbird	
	Northern Oriole	
House Finch	Cassin's Finch	
	Red Crossbill	Red Crossbill
	Pine Siskin	**Pine Siskin**
Lesser Goldfinch	Lesser Goldfinch	*Lesser Goldfinch*
	Evening Grosbeak	Evening Grosbeak

The selective species of the three major plant communities in Los Alamos are listed in Table IV. The species of the field, marsh, cliff, and residential habitats listed in Table I are exclusive species in Los Alamos; they nest in no other habitats.

Table IV. Selective Species of the Major Plant Communities

Piñon/Juniper	Ponderosa Pine	Mixed Conifer
Black-chinned Hummingbird	Cooper's Hawk	Blue Grouse
Gray Flycatcher	Common Poorwill	Wild Turkey
Cassin's Kingbird	Acorn Woodpecker	Red-naped Sapsucker
Pinyon Jay	Solitary Vireo	Williamson's Sapsucker
Plain Titmouse	Virginia's Warbler	Olive-sided Flycatcher
Bushtit	Grace's Warbler	Red-breasted Nuthatch
Bewick's Wren	Chipping Sparrow	Golden-crowned Kinglet
Blue-gray Gnatcatcher		Ruby-crowned Kinglet
Blue Grosbeak		Orange-crowned Warbler
Canyon Towhee		

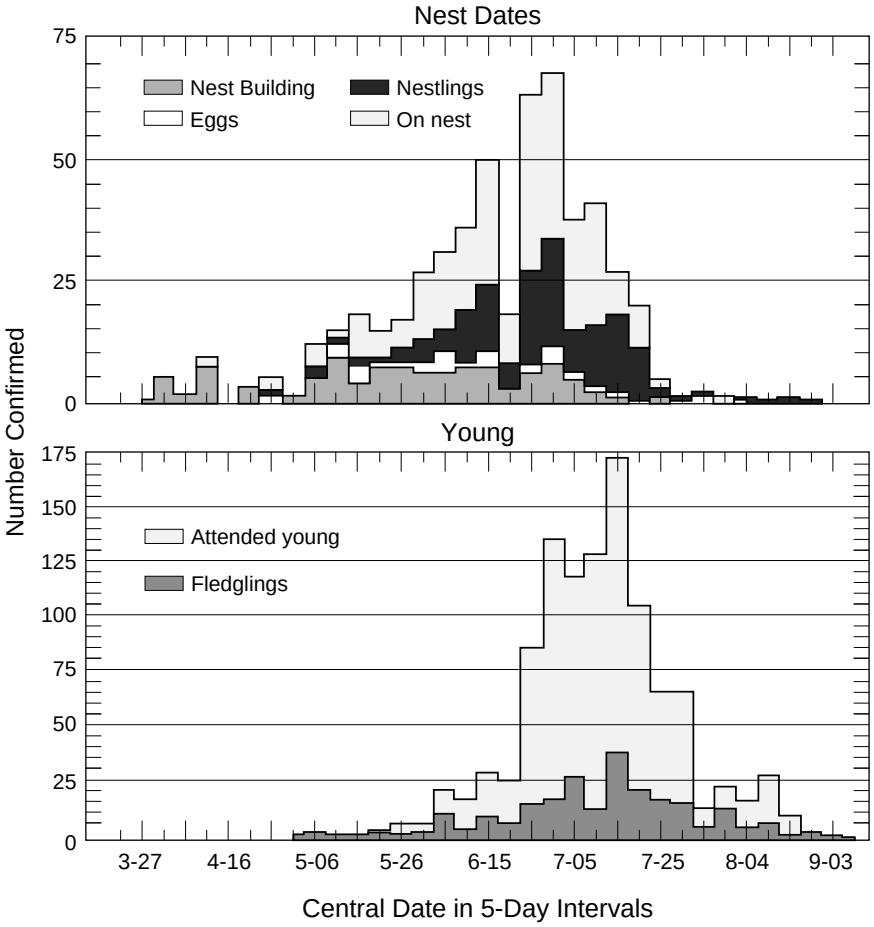
Breeding Dates

Along with geographical data, we collected information on when breeding activities occurred. The histograms in Fig. 16 show the number of confirmed breeding records in 5-day intervals for all species, blocks, and years combined. The upper plot contains the nest records: nest building, nests with eggs, nests with young, and on nest. The designation "on nest" was used for nests with a sitting bird, or to which an adult came and went regularly, but for which the contents (eggs or nestlings) could not be determined. The actual total number of occupied nests is the total of nest building, nests with eggs, nests with young, and on nest records. The lower plot shows attended young and fledgling dates.

Atlas fieldworkers were instructed to report the date of the first noted evidence of breeding; for example, "nest with eggs," for a given nesting, but to include later observations if there were any. Only the earliest date for a block-confirmed breeding record, whether a nest, attended young, or fledgling record, is used in these breeding date tallies.

Dates for confirmed breeding ranged from March 15 (nest building by a Common Raven) to September 28 (a fledgling Canyon Towhee). Reports of attended young and fledglings

Fig. 16. Confirmed breeding dates.



combined accounted for two-thirds of the confirmed breeding records. Sixty percent of the attended young and fledging records fell in the 3-1/2-week period from June 28 to July 22; 60% of the nest records were between June 8 and July 15.

Discussion

Although the geographical distribution of breeding birds in Los Alamos has not been documented until now, we can relate the current status to that of the past from reports in the *New Mexico Ornithological Society Field Notes* (New Mexico Ornithological Society 1962–1989) and unpublished records of local bird watchers, who have kept records from the inception of the Laboratory to the present. Identifiable changes in species occurrence are attributable to manmade habitat modifications and range expansions of a few species. Species diversity has increased some in areas that are now inhabited as a result of the creation of favorable habitat in the residential areas. The Scott's and Northern Orioles have nested, and the Say's Phoebe, Brewer's Blackbird, and House Finch are

widespread. In recent years, several new species have become established; for example, the Black-billed Magpie has moved in from farther north, and the Northern Mockingbird and Blue Grosbeak have moved up from the lower river valleys.

Little if any deleterious effect on species richness has occurred from the presence of the Laboratory or habitation. Comparison of Laboratory and residential blocks with relatively undisturbed blocks having comparable habitat composition shows no measurable difference in species richness or species diversity (as determined by examining species similarity). Because it is in a fenced, restricted area, the Laboratory provides protected nesting and foraging grounds for the raptors.

Disturbance and destruction of limited and fragile wet habitats are the major cause of species reductions. Because of the scarcity of usable permanent ponds and marshes, few waterbirds or marsh-dwelling species breed in the county. The only open water in town, Ashley Pond (Block 5-4), established during the days of the Los Alamos Ranch School, has been a great attraction over the years for transient waterbirds, but possibly no breeding activity has been associated directly with it. In recent years, urban development and cultivation around the pond have discouraged its use by wild waterfowl and the pond adds little to the breeding season.

The Pajarito Acres sewage ponds (Block 8-8), within a few years of their establishment, provided some favorable water and marsh habitat that attracted a variety of visiting waterfowl. Just before they were filled in 1977, there was some evidence of breeding activity there.

The few marshes extant in the county, most of them a result of human activity, are an important habitat resource. They are fragile, threatened, and ephemeral. The marsh in the drainage area below the Bayo Canyon (Block 4-5) sewage treatment plant is the prime example. It has been productive, but has been subject to severe damage by grazing cattle in some summers. Our only nesting marsh birds have been there.

The most valuable acts for protecting species diversity in Los Alamos would be to preserve the few existing marshes and to reclaim the disturbed marshy areas. The Song Sparrow and Red-winged Blackbird nested in only one block, but these species were reported as probable or possible breeders in seven more blocks. The marshy areas in those blocks were inadequately protected or maintained to permit nesting. The Virginia Rail and Sora were reported from the one productive marsh. With sustained protection, we could expect the natural establishment of viable populations of all of these species.

The Rio Grande valley provides habitats that are attractive to a specialized set of species, but because of the changes in water level and the watercourse, which occur with some frequency from year to year, it is an unstable environment. Five species bred along the river during the atlas project, but some species that frequent this habitat elsewhere in northern New Mexico have not established breeding populations here. Flooding of the valley floor from the filling of Cochiti reservoir in 1986 destroyed much of the riparian and shoreline habitat. The result was a significant reduction in species observed along the river in the last 2 years of the survey. Recovery will probably take many years.

An event of important ecological significance to the Los Alamos area was the La Mesa fire of 1977, which burned 30 square miles of forest in Bandelier National Monument, the Santa Fe National Forest, and the southwestern edge of Los Alamos County. Atlas surveying revealed increases in hole-nesting and shrub-dwelling species resulting from the large habitat modification. Censuses by Wauer (Foxx 1984) before and after the fire provide a base for comparison with atlas results. Where relevant, this is done in the individual species accounts.

During the last half of the atlas period, logging operations were carried on in selected tracts of coniferous forest in the western part of the county. The consequences were mixed. The disturbance seriously interfered with surveying, but the maintained logging roads required by the US Forest Service opened up some otherwise inaccessible areas. Except for the proximate effects at the time of logging, there was no discernible effect on bird occurrences during the atlas project, but longer term effects, particularly on raptors, have yet to be determined.

Codes for Breeding Criteria

Observed: An observation of a species believed not to nest in the block because the species is well out of its breeding range or habitat; it is before or after the breeding season; or this is a single observation in an area visited often.

Possible: A species present in the block in the right habitat during the breeding season.

Probable: Species behavior that indicates likely breeding.

1) Presence of a pair. Two birds obviously associating together or engaging in activities together. Just the presence of two birds of the same species in the block is not sufficient evidence.

2) Evidence of established territory.

   a. Territorial song at the same location at least twice, one week or more apart.

   b. Several territorial males singing in the same area at the same time.

   c. Territorial defense where one bird chases another bird, usually male chasing male.

3) Courtship behavior. Mate feeding, displaying; or copulation.

4) Visiting probable nest site (by nuthatches, woodpeckers, swallows, other hole nesters).

5) Nest building by wrens and woodpeckers. Wrens build dummy nests, and woodpeckers drill roosting cavities as well as nest cavities.

6) Agitated behavior or anxiety calls from adult. Suggests likelihood of nearby nest or young.

Confirmed: Species behavior that indicates positive breeding.

1) Nest building (except wrens and woodpeckers).

2) Occupied nest.
   a. Adults entering or leaving a nest site in circumstances indicating an occupied nest.

   b. Adult incubating or brooding.

   c. For hole nesters, when adult enters an appropriate hole and stays inside or leaves after having been inside for some minutes or when the parents trade places in the hole.

3) Nest with eggs.

4) Nest with young seen or heard.

5) Recently fledged young or downy young of precocial species restrained to natal area by limited mobility.

6) Adult attending young.

   a. Carrying food for young (avoid confusion with courtship feeding).

   b. Feeding recently fledged young.

   c. Carrying fecal sac.

7) Injury feigning or distraction display.

8) Used nest or eggshells below nest; only when positive identification is possible.

Species Accounts

The species are arranged in American Ornithologists' Union (AOU) check list order (AOU 1983). The text includes the state and county geographical distributions, seasonal occurrence, habitat preferences, and selected breeding behavior. The first statement gives the breeding range of the species for New Mexico, in most cases taken from the *Revised Checklist of the Birds of New Mexico* by John P. Hubbard (1978). This is followed by a brief description of the Los Alamos distribution as determined by the atlas project.

Habitat preferences and information about breeding behavior were gathered from the ornithological literature as well as from our own observations. The term "local" is used in discussing range and habitat to indicate that the species does not occur in all or most of the suitable appearing areas. The term Los Alamos, by itself, refers to the atlas definition of the Los Alamos County area. The Los Alamos National Laboratory and its grounds are referred to as the Laboratory.

For migratory species, the dates for arrival and departure for the species in the county are given. These dates are median dates (as many dates before as after) from the number of years of observations indicated. These migration data come from the collected Los Alamos records of Les Hawkins, W. Burton Lewis, Patricia Snider, James Travis, and others, as well as from the atlas data file.

The table below the sketch, showing breeding status according to habitat as defined by major overstory vegetation, was obtained from the species map on the preceeding page. The number of blocks occupied by the species in every designated habitat in which it was found is given for each breeding criterion. The habitat designations used are for sets of blocks that contain mostly a single habitat—mixed conifer (17 blocks), ponderosa pine (11 blocks), and piñon/juniper (6 blocks) and those that contain significant areas of more than one habitat—mixed conifer/ponderosa pine (5 blocks) and ponderosa pine/piñon/juniper (21 blocks). A few species were found in blocks neighboring major-habitat boundary blocks into which the habitat extends slightly. These blocks are designated "Adjoining."

Several additional habitat designations are used in the text to identify the location of the breeding populations in the county. "Higher mixed conifer" (17 blocks) excludes those

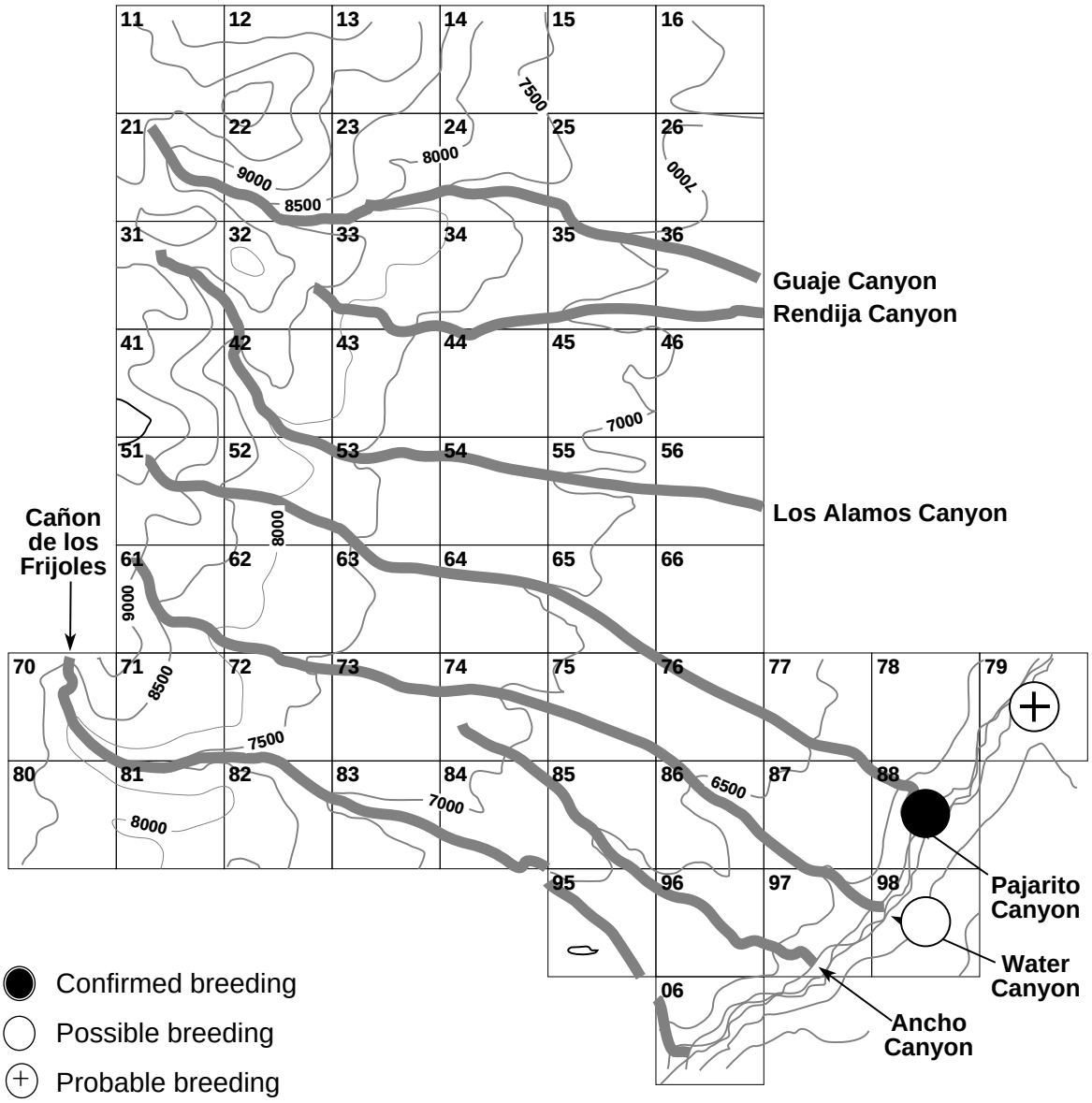
mixed conifer blocks that also contain ponderosa pine forest. "Mesa ponderosa pine" (21 blocks) includes all blocks that contain ponderosa pine forest except those that also contain mixed conifer forest or the lower canyons. "Forested blocks" (54) include all blocks except the six "pure" piñon/juniper blocks in the southeast corner.

On the opposite page, the geographic distribution of each of the Los Alamos breeding birds is displayed on a map of the county with the atlas grid superimposed. Different symbols are used to indicate the degree of certainty of nesting. An open circle, ○, indicates possible breeding, a circled plus sign, ⊕, indicates probable breeding; and a solid circle, ●, indicated confirmed breeding.

The breeding date bar graph at the bottom of the page contains all the dates on which the species was confirmed (excluding used nests), regardless of block, including multiple records in a block. The graph shows the number of records (vertical axis) that fall in each 5-day period indicated on the horizontal axis by the mid-date of the 5 days.

Sonograms of the songs of three Empidonax flycatchers are illustrated in the accounts. A sonogram shows the frequency/time representation of a song. The vertical scale is frequency marked for every 1 kHz. The horizontal scale is time marked for every 0.5 s. The most useful characteristics of a sonogram are duration and pattern. Duration may be for the entire song or the length of its components. Revealed in the pattern are phrasing (separate notes, repetitions, and trills), tempo (steady, slowing, or accelerating), changes in pitch, and quality (clear or harsh, for example). A harsh or buzzy sound appears on a sonogram as a closely packed series of up and down strokes covering a wide frequency range. A sound at constant pitch would be a horizontal line. A click, which is made up of many frequencies, would be a vertical line at one time position.

Mallard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Guaje Canyon
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding

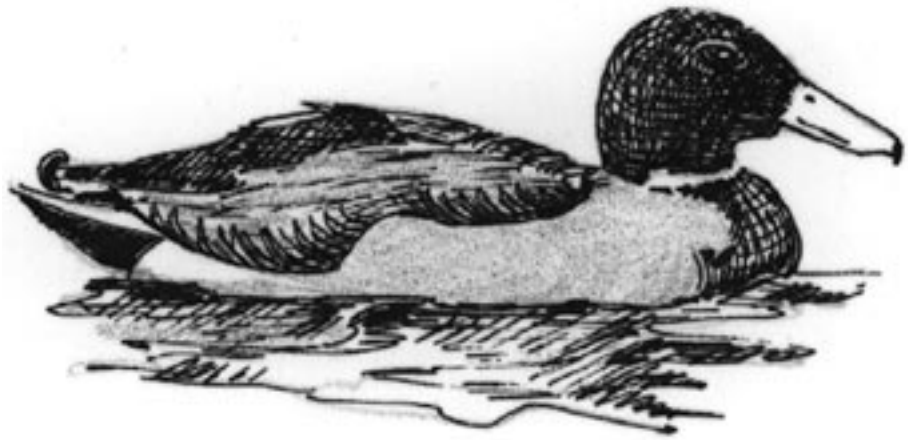
Mallard

Mallard
(Anas platyrhynchos)

Mallards are resident in northeast New Mexico and from the Pecos Valley westward, breeding in wetlands from the lowlands locally up to higher elevations (Hubbard 1978). The breeding season in New Mexico generally extends from late spring through late summer (young are present from May through August) (Hubbard 1977).

During the atlas period, Mallards were found in 50% of the blocks containing riverine habitat. One brood of downy young attended by their mother, found near the eastern bank of the Rio Grande on June 6, 1987, was the only confirmed breeding record. Two pairs were reported along the shoreline in April 1987 and another in May 1988.

Mallards are typical river and pond surface feeding ducks and prefer water that does not exceed 12 to 16 inches in depth—the maximum they can reach when "tipped up" (Pough 1953). Nest building begins a few weeks after pair formation, signalled by persistent quacking of the female. The male at this time defends a small territory, usually within 100 yards of the nest site,



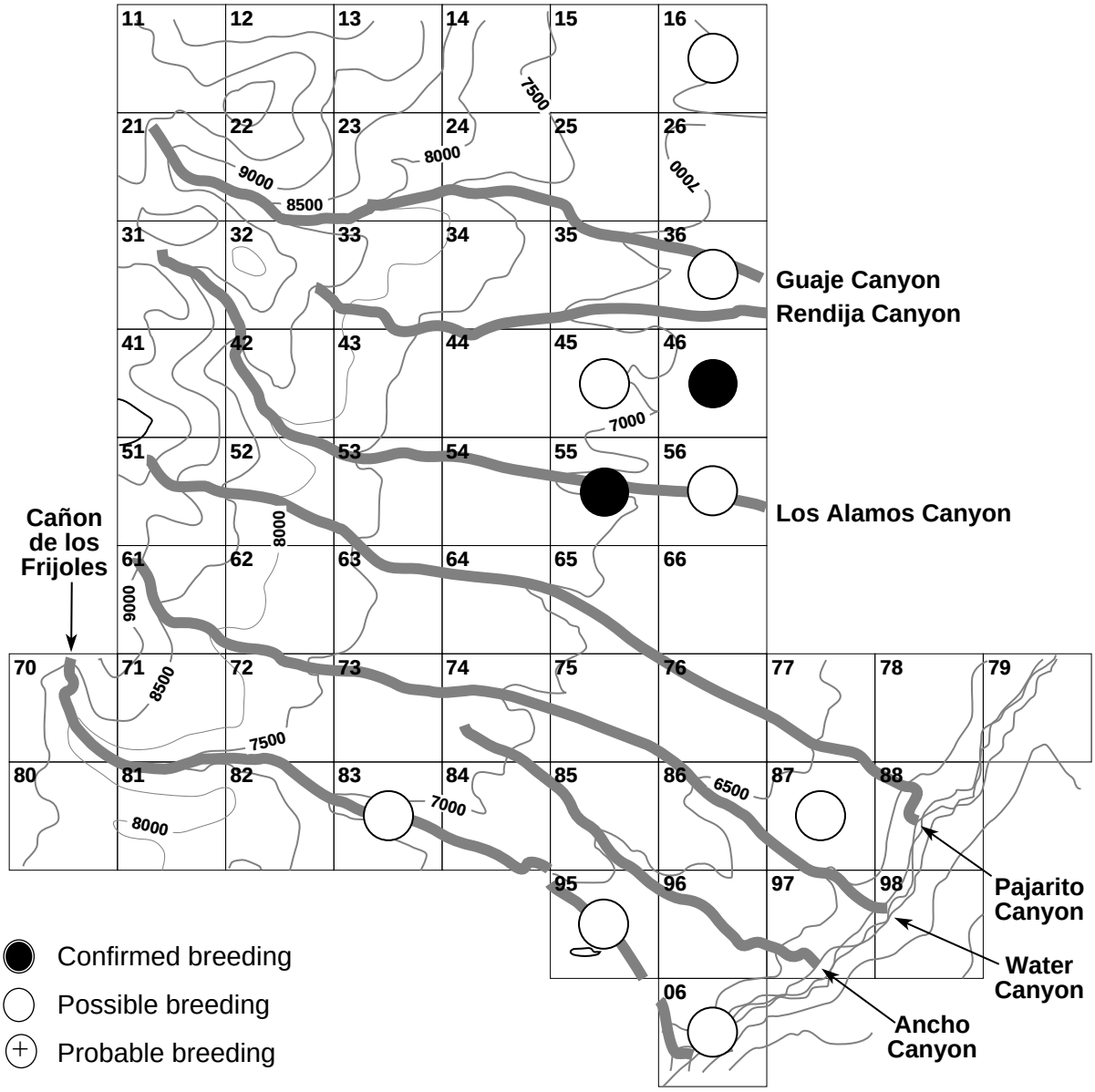
which includes open water for feeding, dense cover for protection, and an open area of land—a loafing area—for preening and resting. During the time of nest building and egg laying, the female joins the male in his territory, but she drives him away shortly after she begins incubating. The male retires to a safe place and molts into eclipse plumage (Stokes 1979). The nest is usually in cover on the ground, among tall vegetation, grasses, or bushes, and may be on a small island (Harrison 1978). Ground litter may be as important in the choice of a nest site as the surrounding cover (Laughlin and Kibbe 1985). The young are led to water the day after hatching and are cared for by the female for about 2 months before she leaves them and goes to a protected area to molt.

Mallards are regular transients and winter visitors at ponds in Los Alamos from September to early May and are found uncommonly year-round along the Rio Grande from Española to Albuquerque.

MALL

Habitat	Occurrence	Conf	Prob	Poss
Rio Grande gorge (6)	3	1	1	1

Turkey Vulture



Turkey Vulture

Turkey Vulture
(Cathartes aura)

The Turkey Vulture is a common summer resident in New Mexico. Because it ranges widely and evinces little territorial or courtship activity, we had problems determining its local breeding status.

Vultures were observed overhead in almost all blocks during the atlas project, but few of these observations could be attributed to possible breeding. Vultures could be seen daily drifting away from their overnight roosting areas to forage and then returning to roost again at sunset. Two historic communal roosts have existed for decades in Los Alamos: one in Frijoles Canyon in the tall cottonwoods along the stream 70 yards south of the Bandelier National Monument headquarters (Block 9-5), and the other in Los Alamos Canyon 150 yards west of the skating rink (Block 5-3). In a typical summer, 80 vultures roost in Frijoles Canyon and 20 in Los Alamos Canyon.

Two active nests were found during the atlas project, both in caves in the tuff cliffs. One nesting cavity was 70 feet above the floor of Barranca Canyon (Block 4-6) on May 15, 1984; the other, containing one nestling in early July 1987, was 35 feet above the ground in an offshoot of Sandia Canyon (Block 5-5). Possible breeding was accepted for the atlas only when a vulture was observed on or near the ground, but not feeding or roosting alone away from the communal roosts.

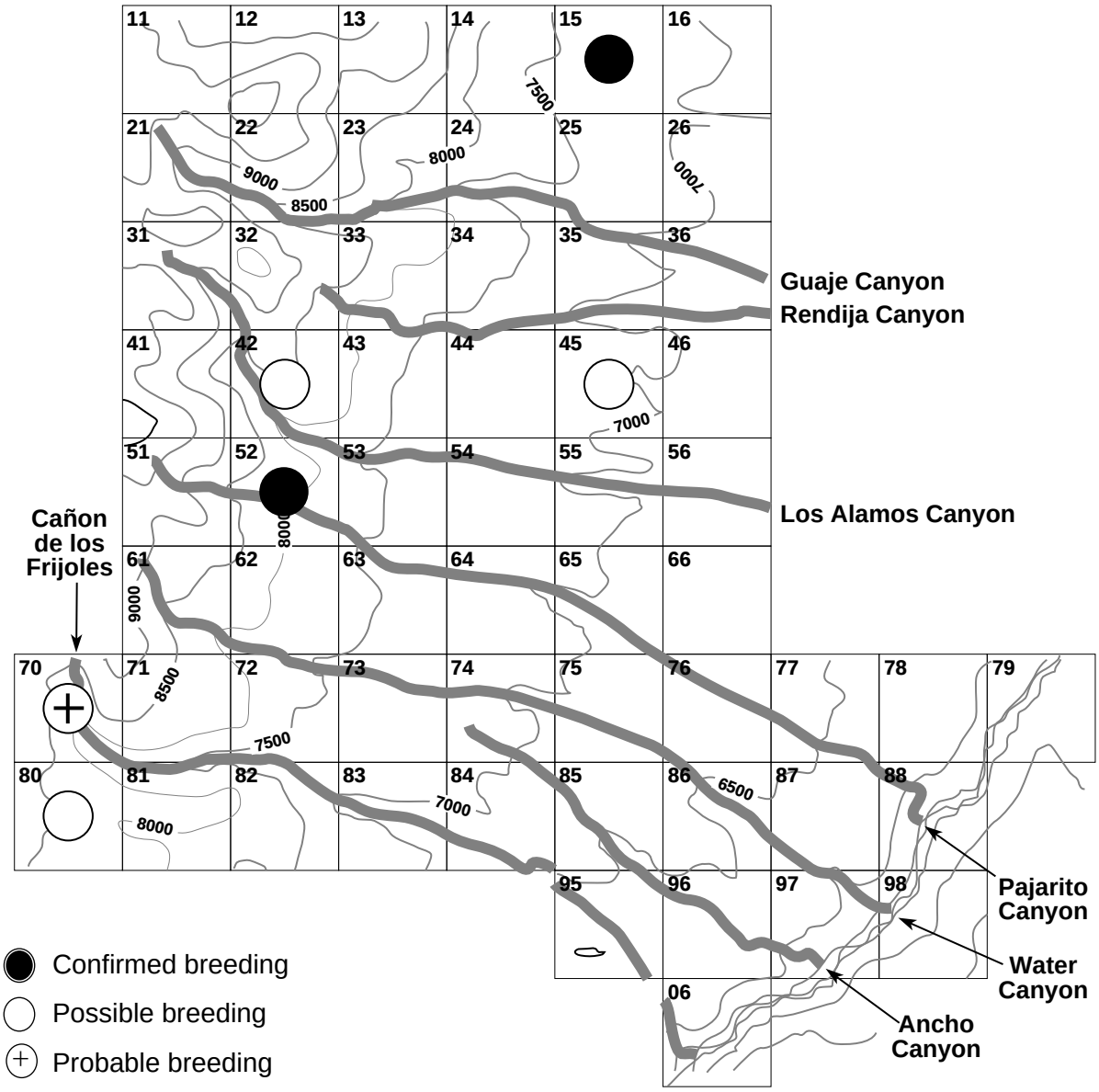
The Turkey Vulture is recognized by its dihedral wing position and habitual rocking flight by which it alternately exposes and hides its silvery underwings (Dunne *et al.* 1988), but the similar appearance and behavior of the Zone-tailed Hawk can be confusing.

Turkey Vultures arrive in Los Alamos in late March (March 31 median date in 28 years) and depart in late September (October 1 median date in 19 years).

TUVU

Habitat	Occurrence	Conf	Prob	Poss
Cliff (30)	10	2	0	8

Sharp-shinned Hawk



Sharp-shinned Hawk

Sharp-shinned Hawk
(Accipiter striatus)

The Sharp-shinned Hawk is resident in New Mexico in mountainous areas southward to the Mogollon and Sacramento highlands (Hubbard 1978). In the summer it is less common, nesting sparingly in the montane forests (Ligon 1961).

During the atlas project, a few nesting, or potentially nesting, Sharp-shinned Hawks were found scattered in the forests. Breeding was confirmed in two blocks. Both confirmations were of fledglings attended by adults.

Typically, the nest is placed in a small stand of dense young conifers near a forest opening. Apparently concealment near a suitable hunting area is of prime importance (Palmer 1988). While in its territory, the bird is quiet and secretive.

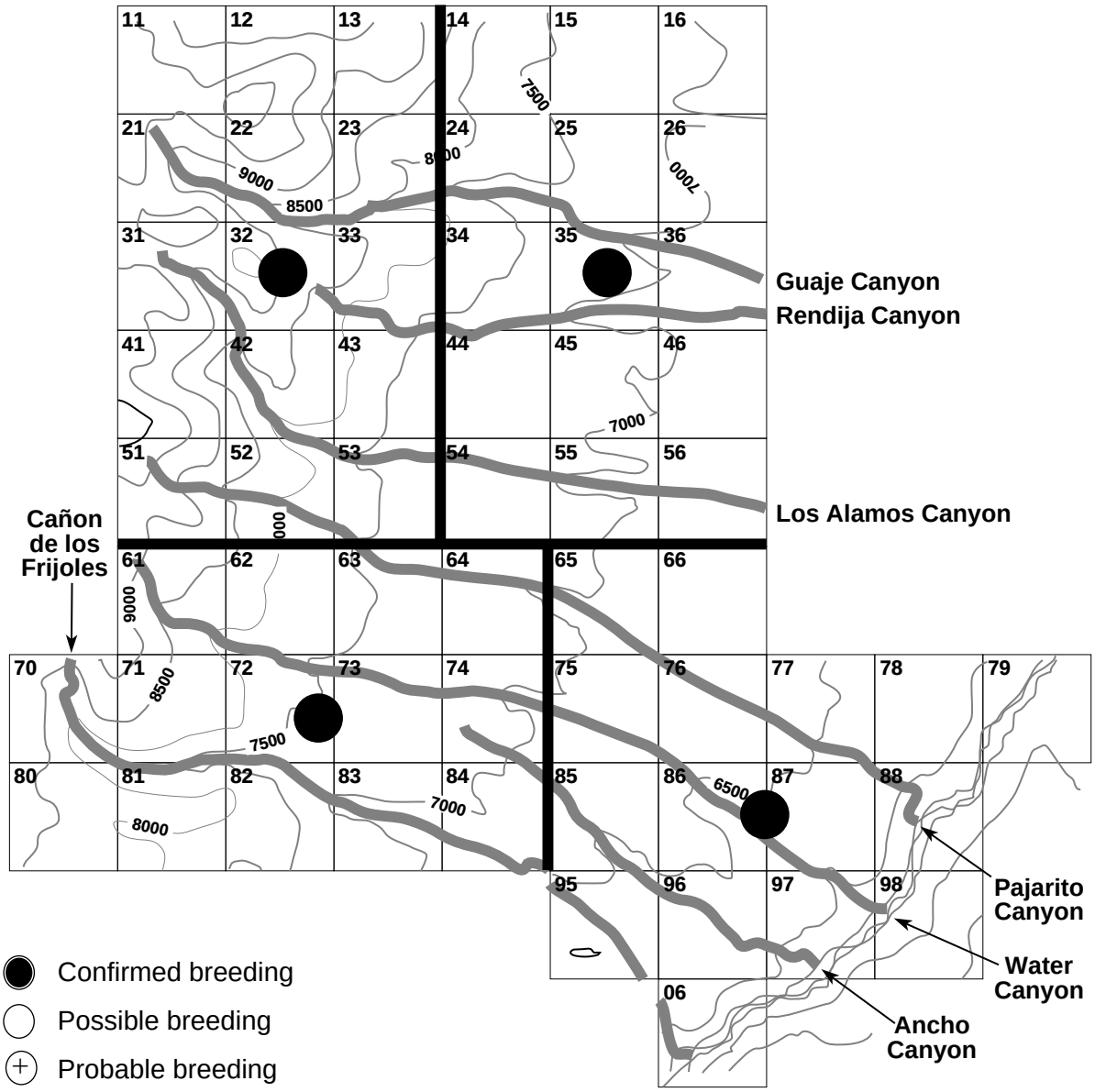
It is the most common accipiter in the winter in Los Alamos, frequenting the lower forested areas and from time to time preying on birds attracted to a feeding station.

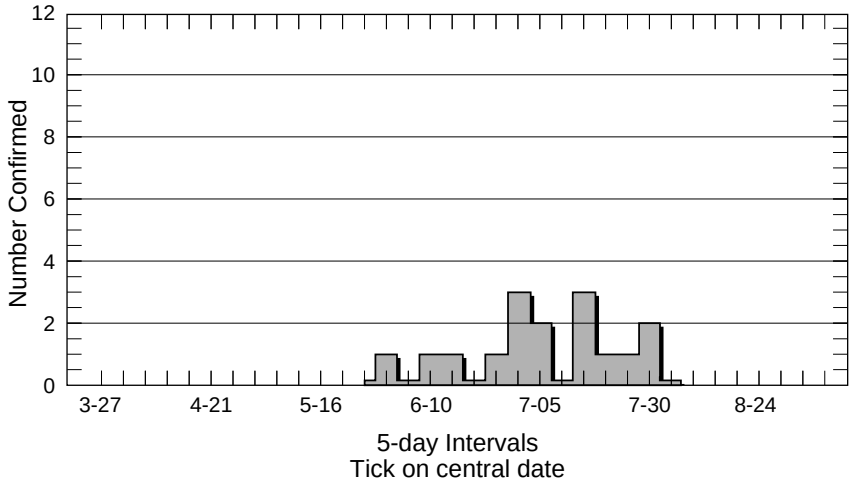
Sharp-shinned Hawks and Cooper's Hawks have similar plumages and are difficult to tell apart. Size is definitive, but a small male Cooper's Hawk is only slightly larger than a large female Sharp-shinned Hawk. In proportion to body size, the Sharp-shinned Hawk has larger wings and a shorter tail than the Cooper's Hawk (Palmer 1988).

SSHA

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	3	0	1	2
Mixed conifer/ ponderosa pine (5)	1	1	0	0
Ponderosa pine (11)	1	1	0	0
Ponderosa pine/ piñon/juniper (21)	1	0	0	1
Total	6	2	1	3

Cooper's Hawk





Cooper's Hawk

Cooper's Hawk
(Accipiter cooperii)

The Cooper's Hawk is resident almost statewide, nesting mainly in riparian and adjacent woodlands and locally in middle elevation forests (Hubbard 1978).

During the atlas project, Cooper's Hawks nested in all quadrants of the county. Nest location by block has not been shown on the map because of persistent nest raiding in Los Alamos County.

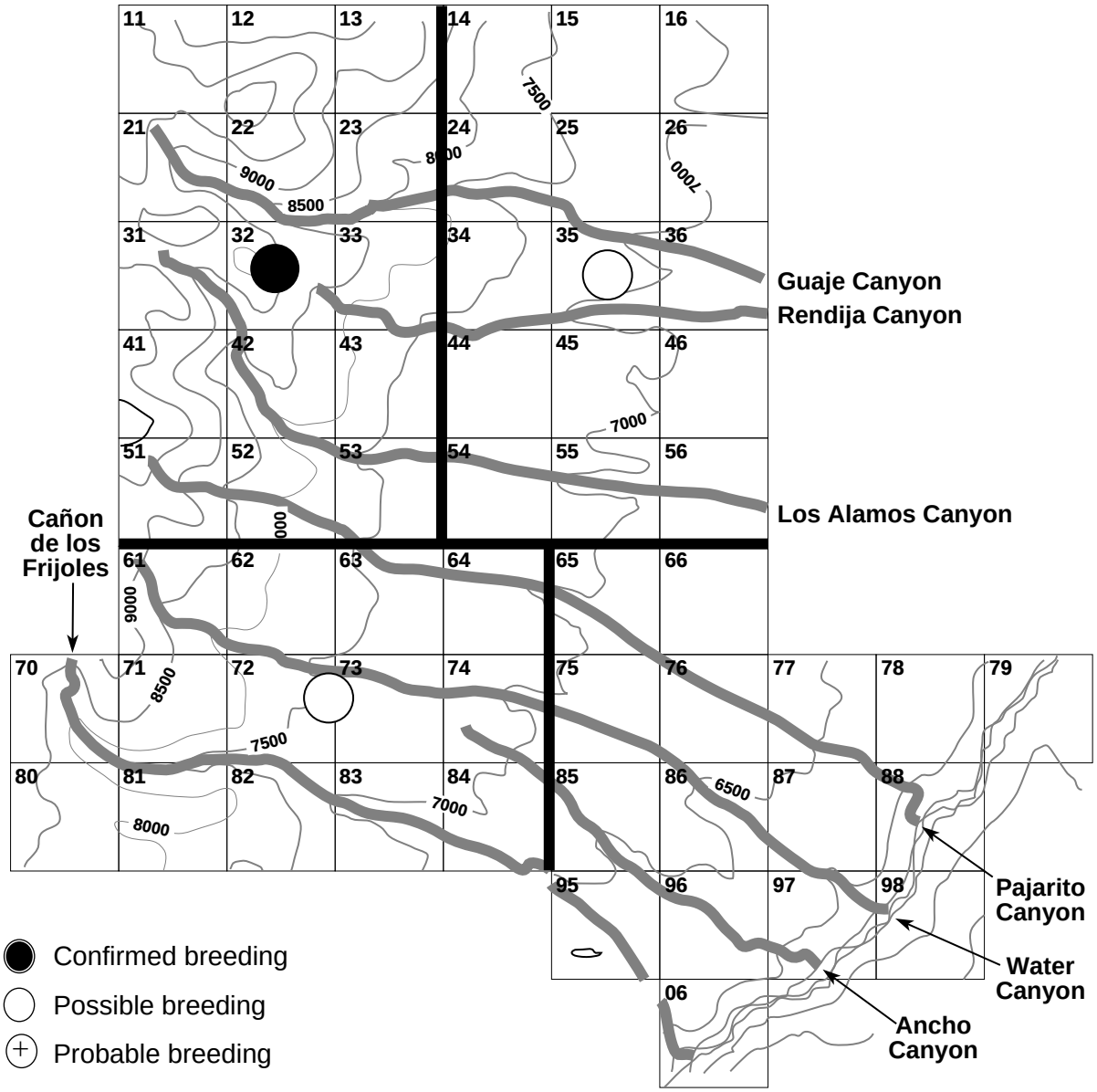
A few Cooper's Hawks spend the winter in Los Alamos, but most of those that breed here migrate. They return in early spring usually to last year's territory. Although quiet most of the year, when nesting commences, the pair, like other accipiters, begins each day with a duet. The nesting cycle can be followed by recognizing the different vocalizations related to the phases of breeding activity through to the persistent calling of young fledglings.

A dense canopy cover is a consistent vegetative characteristic of nest sites (Palmer 1988). All seven nest trees identified during the project were ponderosa pines. Nest heights ranged from 25–50 feet.

COHA

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	3	1	0	2
Mixed conifer/ ponderosa pine (5)	1	0	0	1
Ponderosa pine (11)	6	4	0	2
Ponderosa pine/ piñon/juniper (21)	14	8	0	6
Piñon/juniper (6)	4	0	0	4
Total	28	13	0	15

Northern Goshawk



Northern Goshawk

Northern Goshawk
(Accipiter gentilis)

The Northern Goshawk is resident in the Northern, Mogollon, and Sacramento highlands, nesting in forests and adjacent woodlands (Hubbard 1978).

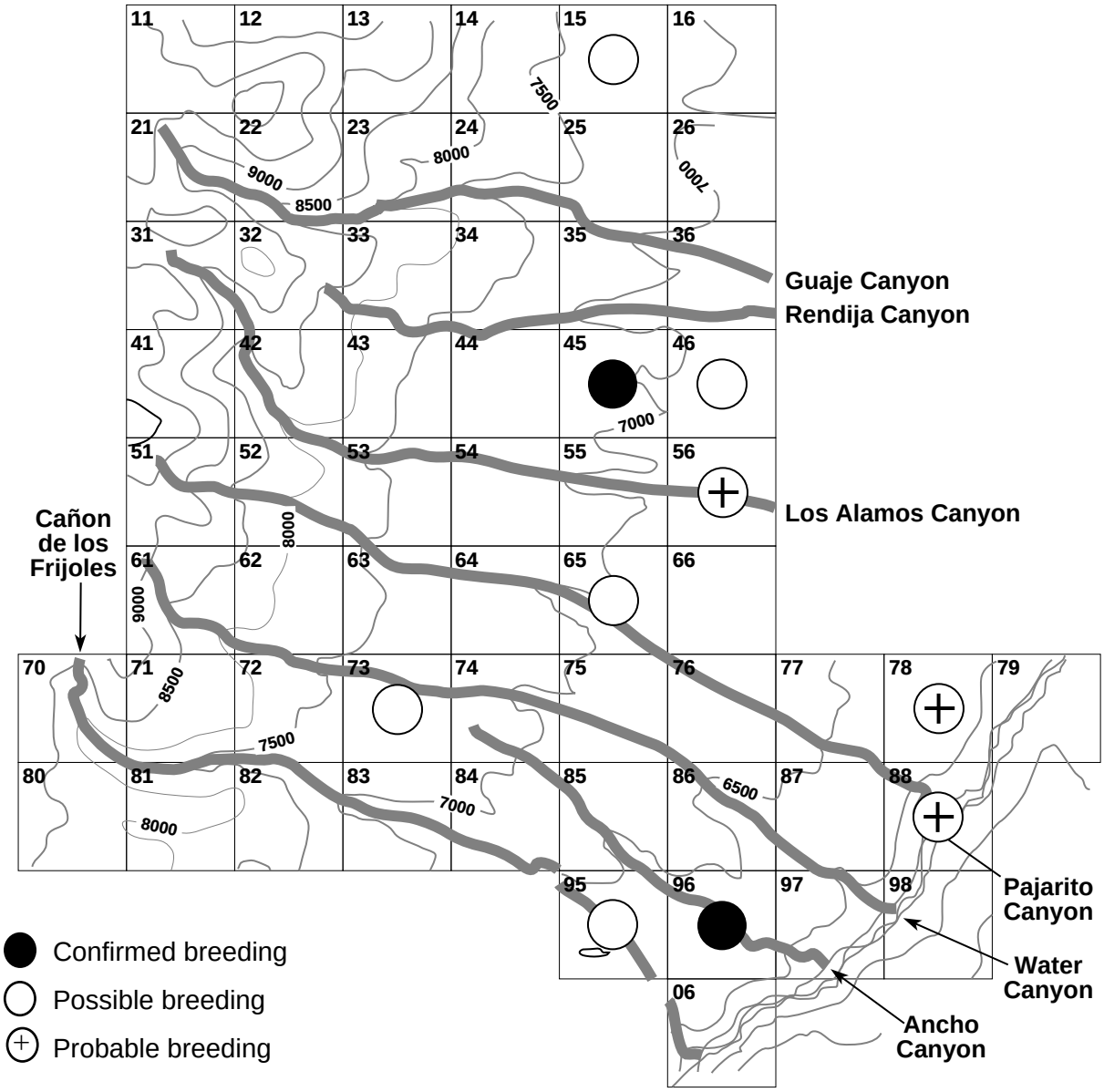
During the atlas project, goshawks nested in the northwestern quadrant of the county and were present in two others. Because of persistent nest raiding, block locations are not shown on the map. Nesting goshawks leave Los Alamos for the winter, returning early in the spring.

Except in definitive breeding plumage, the Northern Goshawk can be confused with the Cooper's Hawk. It can best be identified in flight. In proportion to its larger size, the tail of the Goshawk appears shorter than that of the Cooper's Hawk and is less rounded, appearing squarish when folded. The wings appear longer than those of the Cooper's Hawk (Palmer 1988).

NOGO

Habitat	Occurrence	Conf	Prob	Poss
Forest (53)	4	1	0	3

Zone-tailed Hawk



Zone-tailed Hawk

Zone-tailed Hawk
(Buteo albonotatus)

The Zone-tailed Hawk summers in the southern part of the state, most regularly in the southwestern and southeastern canyonlands, and northward very locally to the Jemez Mountains. It nests in canyons in pine/oak, evergreen, and riparian woodlands (Hubbard 1978). Zone-tailed Hawks were first identified in Los Alamos in the mid-1950s and nested, albeit unsuccessfully, in Los Alamos Canyon below the Laboratory's Technical Area 21 in 1964 (*Audubon Field Notes* 1964).

During the atlas period, we discovered one nest with two nestlings in Ancho Canyon (June 1, 1986) and another occupied nest in Bayo Canyon (June 1, 1988). Both were stick platforms 70 to 75 feet above the ground in mature ponderosa pines located in canyon bottoms. The adults defended their nest vigorously. Most conspicuous were the dives on intruders with accompanying series of raspy, whistled, descending "tseer" nest-defense calls.

The number of breeding Zone-tailed Hawks varied annually during the atlas period. The highest number was in 1986 when pairs were found in three of the lower canyons: Pueblo (Blocks 4-5 and 4-6), the Rio Grande (Blocks 7-8 and 8-8), and [illegible] hawks were seen during the atlas period as well.

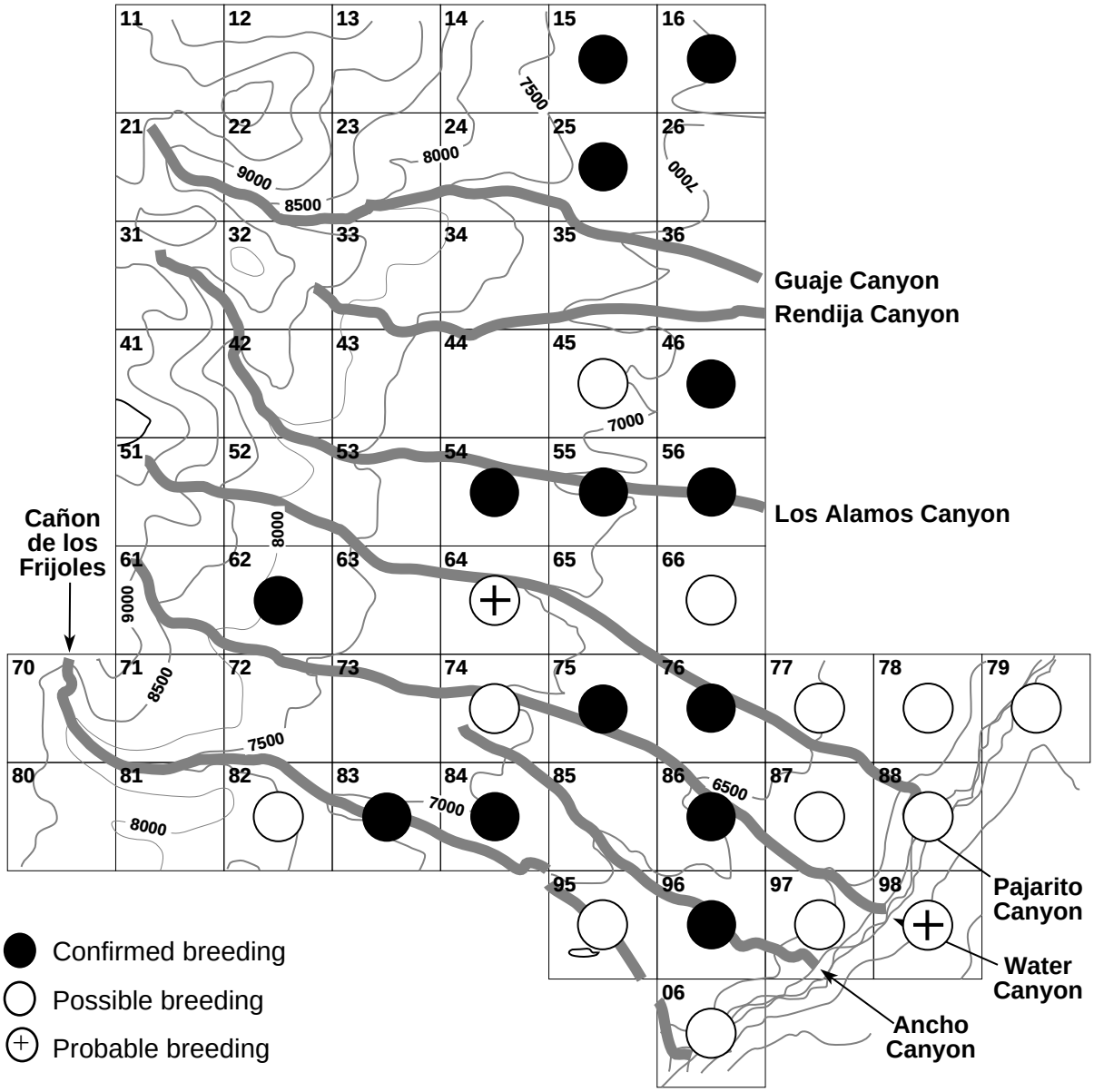
The striking resemblance between soaring Zone-tailed Hawks and Turkey Vultures causes confusion in identification. They both have the same two-toned underwing pattern of dark in front and lighter behind and the dihedral wing position while soaring. The tendency for this hawk to associate with vultures in the air adds to the confusion.

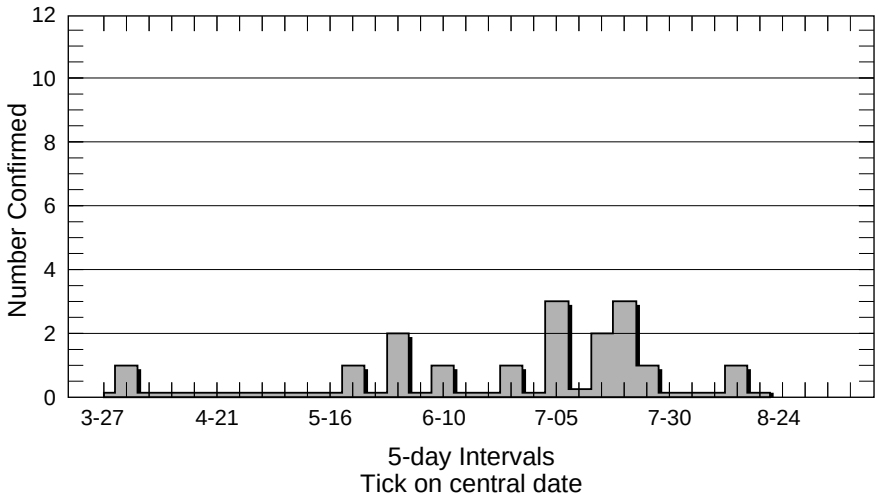
Based on only a few years' sightings, spring arrival is in late April (April 25 median date in 4 years) and fall departure is in mid-September (September 19 median date in 3 years).

ZTHA

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	2	0	0	2
Ponderosa pine/ piñon/juniper (21)	6	2	1	3
Piñon/juniper (6)	2	0	2	0
Total	10	2	3	5

Red-tailed Hawk





Red-tailed Hawk

Red-tailed Hawk
(Buteo jamaicensis)

The Red-tailed Hawk is resident almost statewide, breeding from the lowland shrublands up into the mountain forests (Hubbard 1978). In high mountainous country, these hawks usually nest in pines or on rimrock ledges (Ligon 1961).

Red-tailed Hawks inhabited most of the suitable habitat over the eastern half of the county during the atlas project. Nesting was confirmed in 48% of the occupied blocks. Of the 12 nests found, 7 were in tuff cliffs either on a ledge or inside a cave, and 5 were built high in the crowns of ponderosa pines.

Pairs of Red-tailed Hawks defend large home ranges year-round in Los Alamos. A home range includes hunting and nesting areas and a few frequently used perch trees. Courtship activities begin in late March with spectacular aerial displays—high circling and contact soaring of the pair over its territory and the precipitous dives of the sky-dance (Palmer 1988).

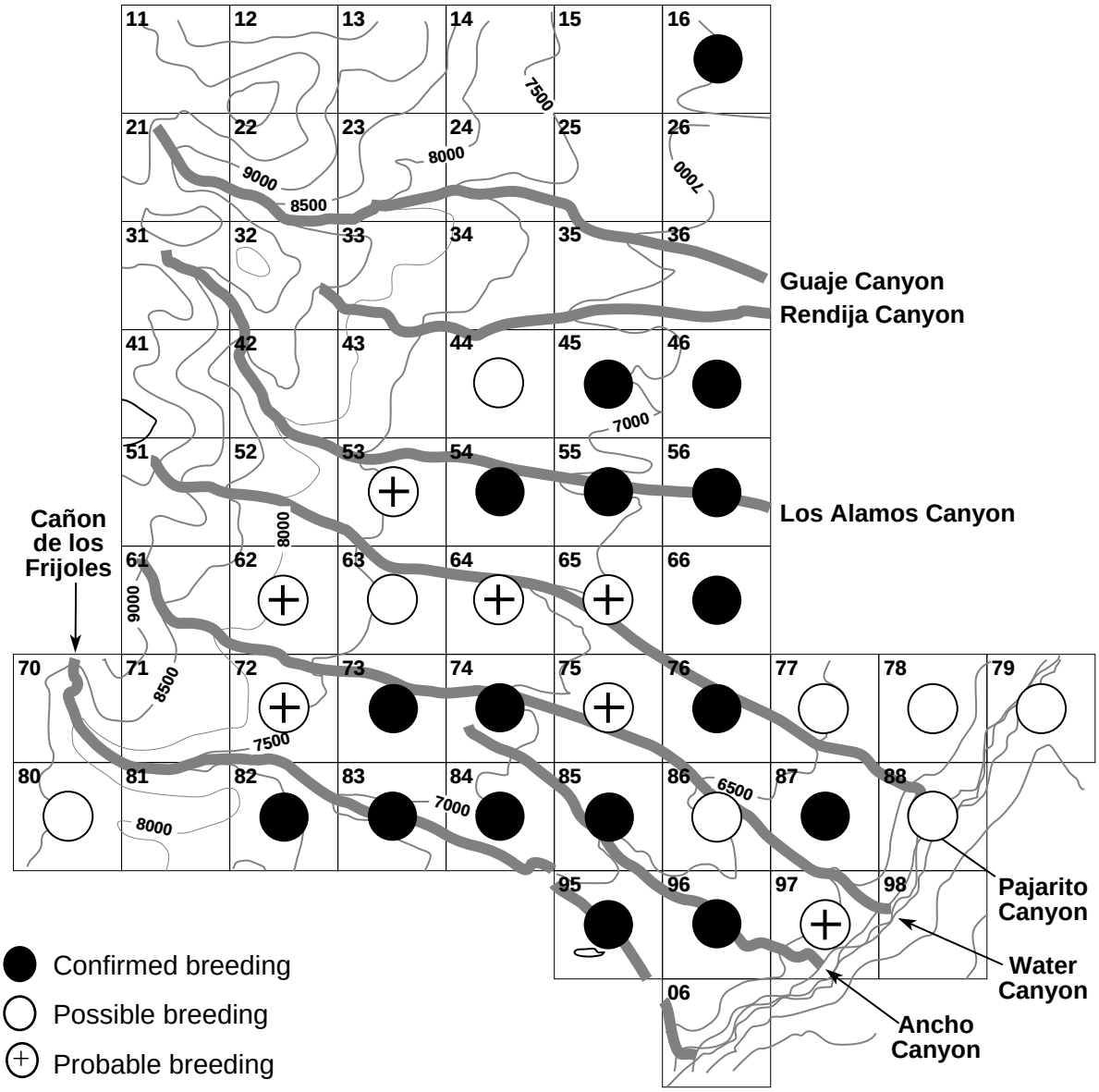
One incidence of nest building was noted (April 3, 1984). Several pairs used old nests, and at least two nests were occupied in more than 1year during the atlas project. Requisites for the nest site are isolation from disturbance, a commanding view, unobstructed access, and an adequate hunting ground (Palmer 1988).

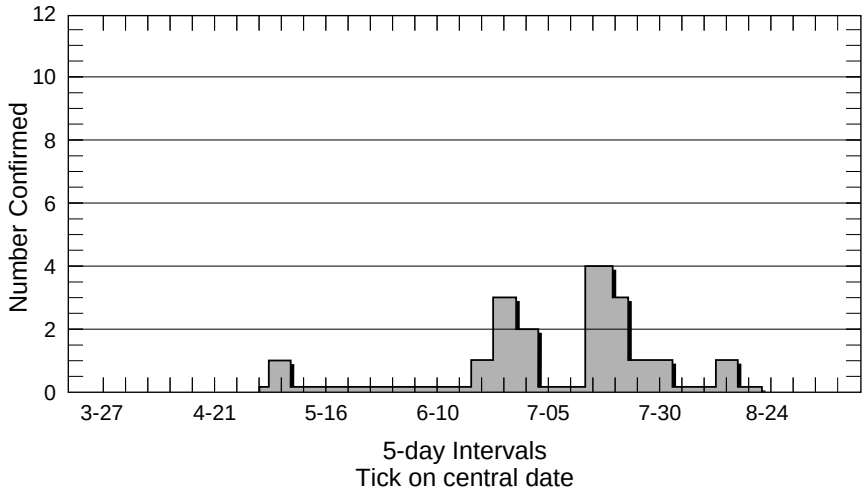
Six of the confirmations were of females on the nest (June 1 to July 4); the others were of nestlings and fledglings being fed (from the first week in June to the first week in August).

RTHA

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	6	5	0	1
Ponderosa pine/ piñon/juniper (21)	16	9	1	6
Piñon/juniper (6)	6	0	1	5
Total	28	14	2	12

American Kestrel





American Kestrel

American Kestrel
(Falco sparverius)

The American Kestrel is resident almost statewide, breeding in the higher pine forests and down into lowlands where nestholes are available (Hubbard 1978).

During the atlas project, kestrels were found in 76% of the blocks containing wooded mesas and lower canyon bottoms, and they were confirmed breeders in 55% of these blocks. Most of the atlas confirmations were of adults feeding dependent young.

About every other year, kestrels have been found here in winter (from late December to late March). The spring influx of kestrels occurs in late March when they can be seen perched on power lines along Pajarito Road, in San Ildefonso, Pojoaque, and along the highway to Santa Fe. In a 7-year period, the median date for peak migration was April 10. Two weeks after their return, males are establishing territories. Courtship is evident, characterized by nest site inspection, aerial display, and much vocalization—series of rapid, high-pitched "klee klee klee" calls expressing excitement (Willoughby and Cade 1964). The earliest sightings of pairs in Los Alamos were April 24, 1985, and April 23, 1986.

Their preferred nesting habitat is in open or broken stands of ponderosa pine and pine/grassland borders. Most commonly they nest in old flicker holes on east-facing slopes in sheltered areas like canyon bottoms. Protection from stormy weather, access to suitable hunting grounds, and easy transport of prey to the nest influence the choice of the nest tree location (Balgooyen 1976). Kestrels hunt from high exposed perches overlooking forest openings and fields, or by hovering over open areas.

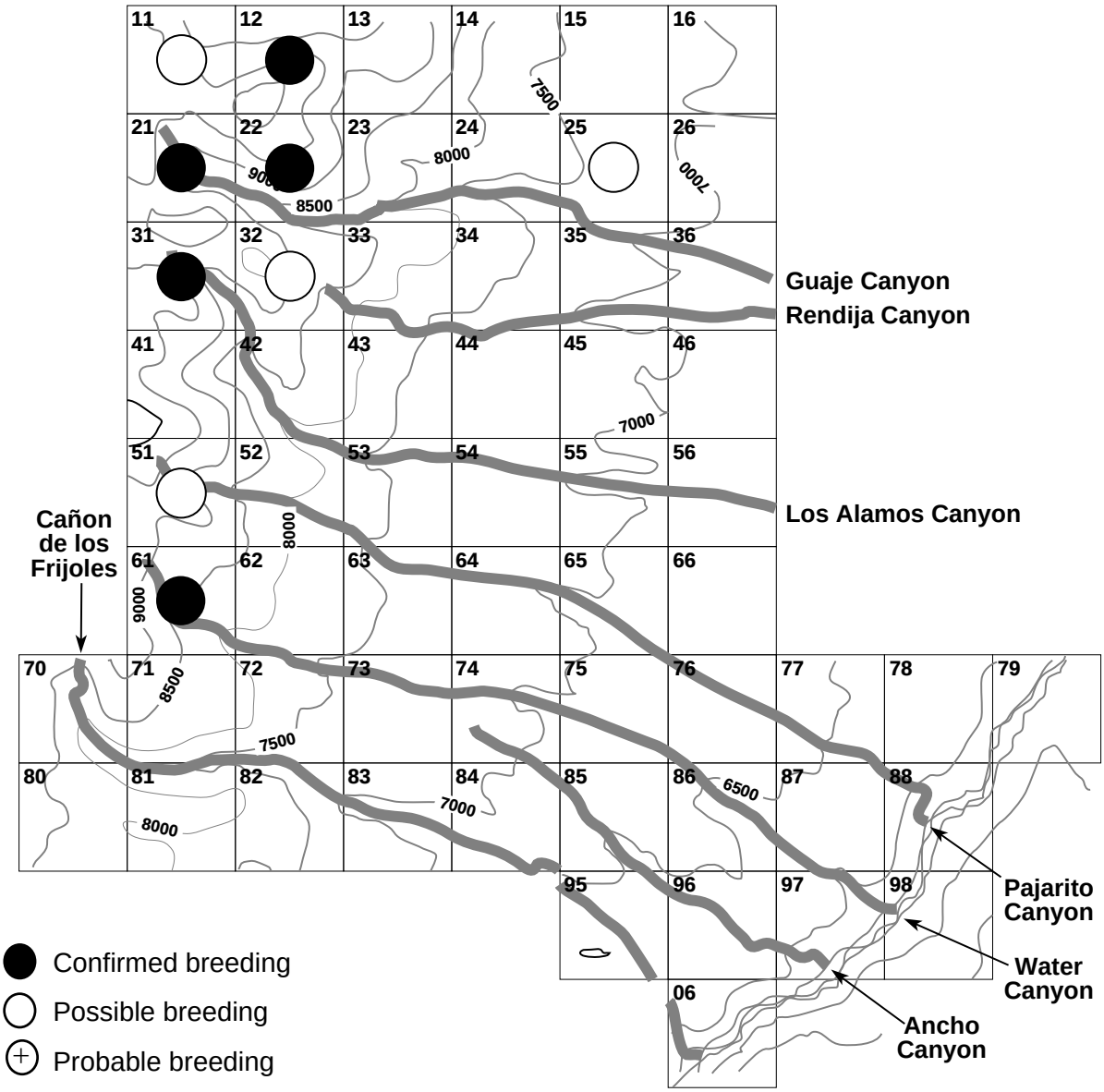
The three nest sites reported by atlas fieldworkers were cavities in ponderosa pines, 23 to 40 feet above the ground. We observed nest activity at one nest in 1985, visiting it almost weekly from April 24 to July 1. At another nest, a male was seen feeding a lizard to nestlings. Adults attending dependent young were reported from June 26 to July 24. The reported fledging success was nine cases of two fledglings and two cases of one fledgling.

Kestrels typically leave the county at the end of October (October 31 median date for 15 years).

AMKE

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	1	0	0	1
Mixed conifer/ ponderosa pine (5)	2	0	2	0
Ponderosa pine (11)	7	4	1	2
Ponderosa pine/ piñon/juniper (21)	17	13	3	1
Piñon/juniper (6)	5	0	1	4
Total	32	17	7	8

Blue Grouse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Guaje Canyon
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding

Blue Grouse

Blue Grouse
(Dendragapus obscurus)

The Blue Grouse is resident in the spruce/fir and adjacent pine forests in the northern and southwestern mountains of New Mexico (Hubbard 1978). It prefers somewhat open forests, especially forest edges and ridges with scattered trees and shrubs (Farrand 1983).

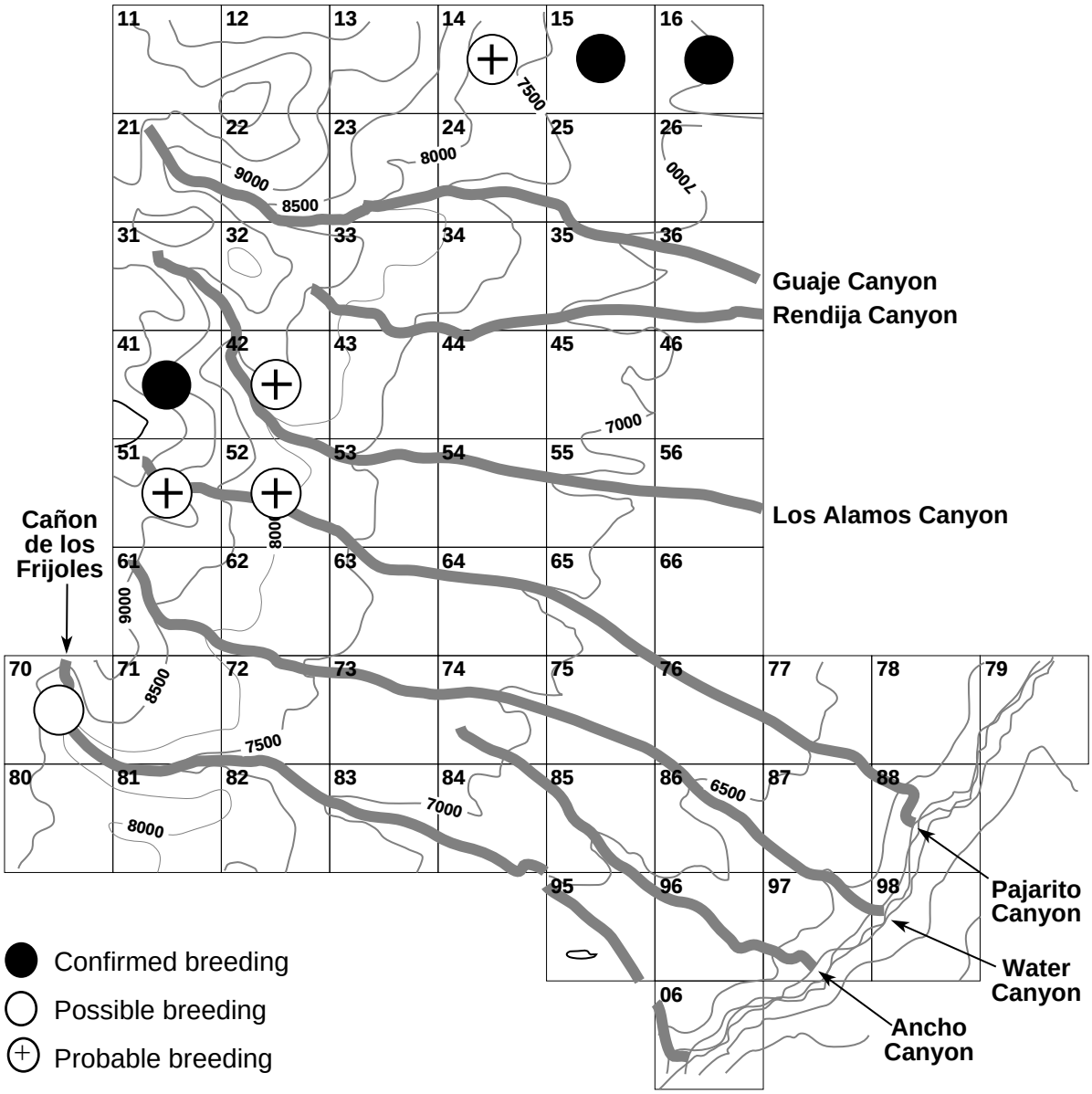
During the atlas project, Blue Grouse inhabited 36% of the mixed conifer blocks. The presence of broods attended by the female parent provided confirmation of breeding in 56% of the occupied blocks. Broods were found from late June to mid-July.

Blue Grouse winter in the spruce/fir forest high in the mountains. In spring both sexes move to lower elevations, and males seek out areas suitable for territories—flat, open ground in stands of conifers or conifers mixed with aspens. Females mate on the hooting grounds, then nest on their own nearby territories. They reappear in July at the higher altitudes with their downy young (Johnsgard 1983a).

BUGR

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	8	5	0	3
Ponderosa pine (11)	1	0	0	1
Total	9	5	0	4

Wild Turkey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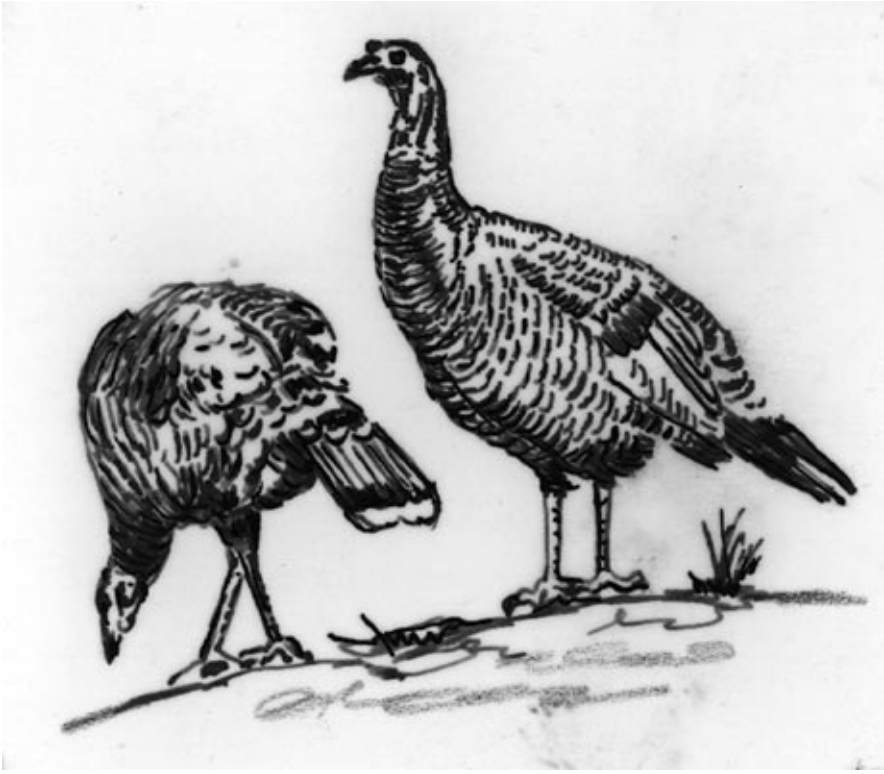
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding

Wild Turkey



Wild Turkey
(Meleagris gallopavo)

The Wild Turkey is resident in montane regions of New Mexico and locally in canyon areas. Turkeys live in forests and evergreen, pine/oak, and adjacent riparian woodlands, where there are brushy cover, open water, roost trees, and a supply of mast.

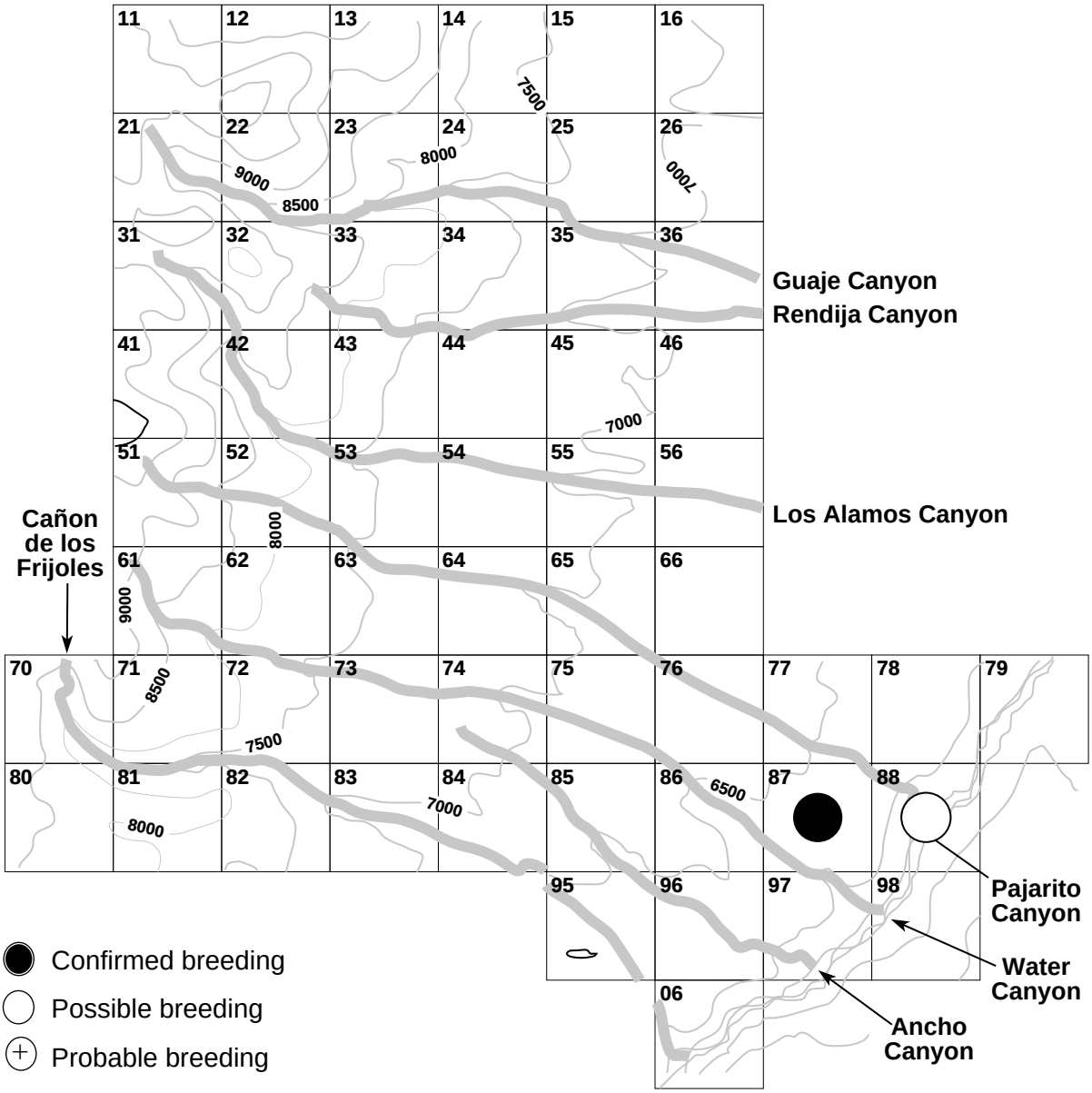
The population of Wild Turkeys in Los Alamos has fluctuated over the years since the time of the Los Alamos Ranch School. Formerly, flocks wintered regularly in Frijoles Canyon, Water Canyon, and the open forest in the southwestern corner of the Laboratory's Technical Area 16, but in recent years, few turkeys have been seen in these areas. During the atlas period, nesting success was poor and only a few scattered records were obtained. Breeding Wild Turkeys were found in two areas: in the mixed coniferous forest on the north and eastern slopes of Pajarito Mountain and in the ponderosa pine forest around Sawyer and Garcia canyons in the northeastern corner of the county. One nest with eggs and three separate broods constituted the confirmed breeding records.

Ligon (1961) described the plight of Wild Turkeys in disrupted mountain forests. Turkeys travel some miles from their nesting areas to a winter range where food supplies are plentiful, particularly where the mast crop (acorns, piñon, and other pine nuts) is good. Manmade disturbance of winter range and habitual routes between summer and winter ranges have seriously disrupted the natural life patterns of the turkey, resulting in diminished populations.

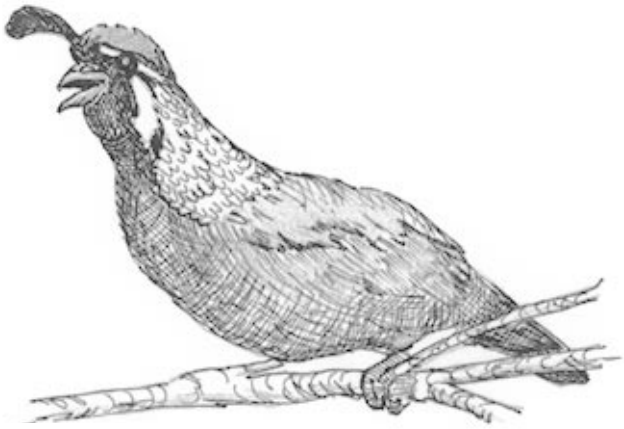
WITU

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	4	1	2	1
Mixed conifer/ ponderosa pine (5)	2	0	2	0
Ponderosa pine (11)	1	1	0	0
Ponderosa pine/ piñon/juniper (21)	1	1	0	0
Total	8	3	4	1

Gambel's Quail



Gambel's Quail



Gambel's Quail
(Callipepla gambelii)

Gambel's Quail is a native resident in southwestern New Mexico north to about latitude N 34°. Extension of its range further northward, e.g., into the San Juan Valley and up the Rio Grande Valley to the Española area, appears to be the result of human introduction (Hubbard 1978).

This quail is fully adjusted to a wide variety of climatic conditions, from desert to the upper reaches of canyon watercourses, as high as 6500 feet (Ligon 1961). It is found in shrubby lowlands and locally up into evergreen woodland (Hubbard 1978).

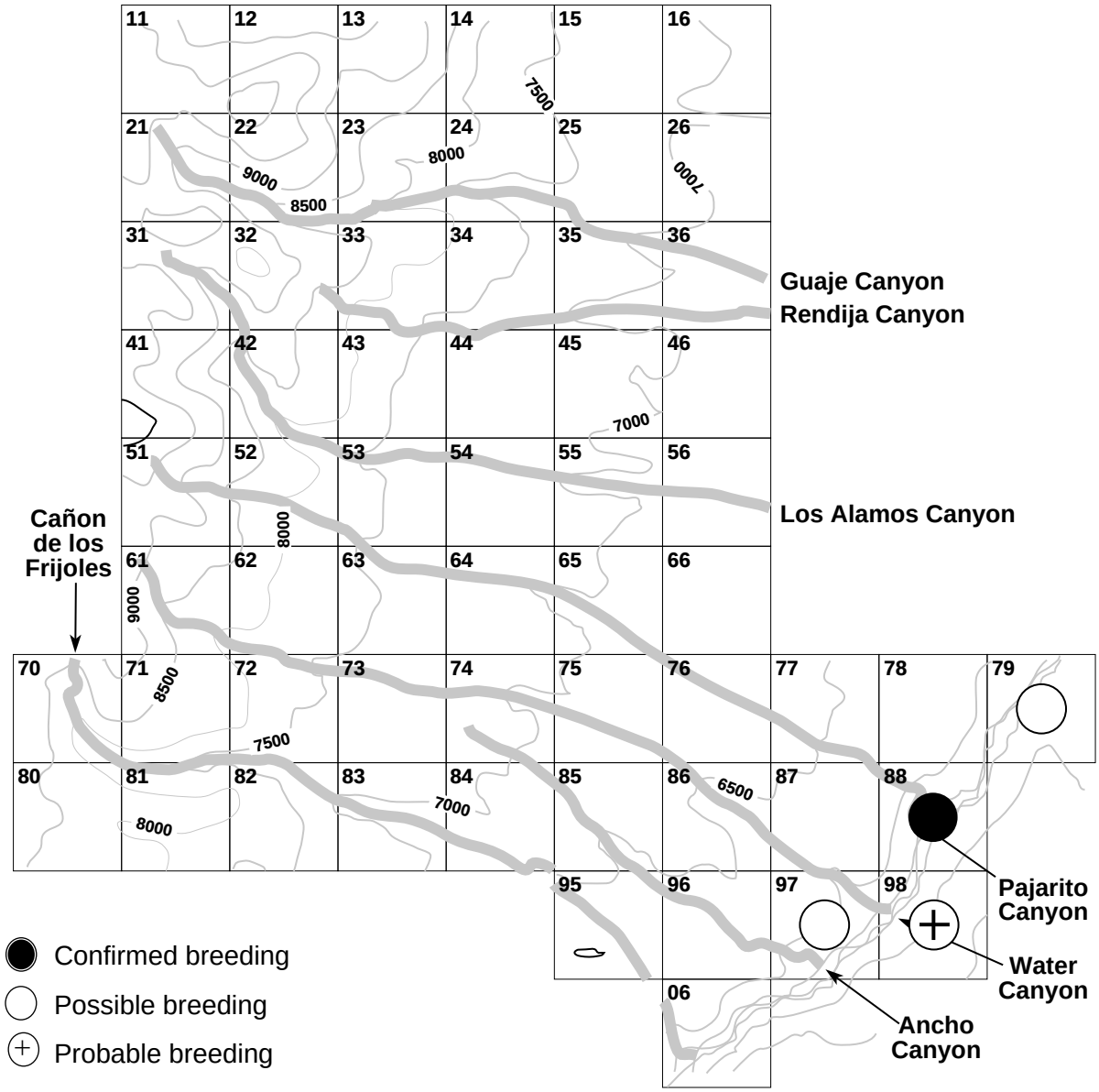
During the atlas project, Gambel's Quail were reported from two blocks in residential piñon/juniper woodland above the Rio Grande gorge. One was a confirmed breeding record—a covey of chicks with a parent in late July 1984, the other an adult in early June 1985. Because game-farm stock has been kept in the area, it is suspected that these sightings resulted from the release or escape of local domestic quail.

Occasionally in the past, Gambel's Quail, considered to be naturally wild, have been seen in the lower canyon bottoms in Los Alamos.

GAQU

Habitat	Occurrence	Conf	Prob	Poss
Piñon/juniper (27)	2	1	0	1

Spotted Sandpiper



Spotted Sandpiper

Spotted Sandpiper
(Actitis macularia)

The Spotted Sandpiper summers along streams locally in the north (west of the plains) and west (south to the Gila Valley). It occurs most regularly in the Northern and Mogollon highlands, in the Rio Grande Valley south to Elephant Butte Lake, and near Clayton (Hubbard 1978).

During the atlas project, Spotted Sandpipers were found in 67% of the blocks containing riverine habitat (the Rio Grande shoreline) in Los Alamos. Young sandpipers attended by an adult on the river bank (August 11, 1986) were the only confirmed breeding record for the atlas. Pairs were observed at other locations June 6, 1987, and June 28, 1986.

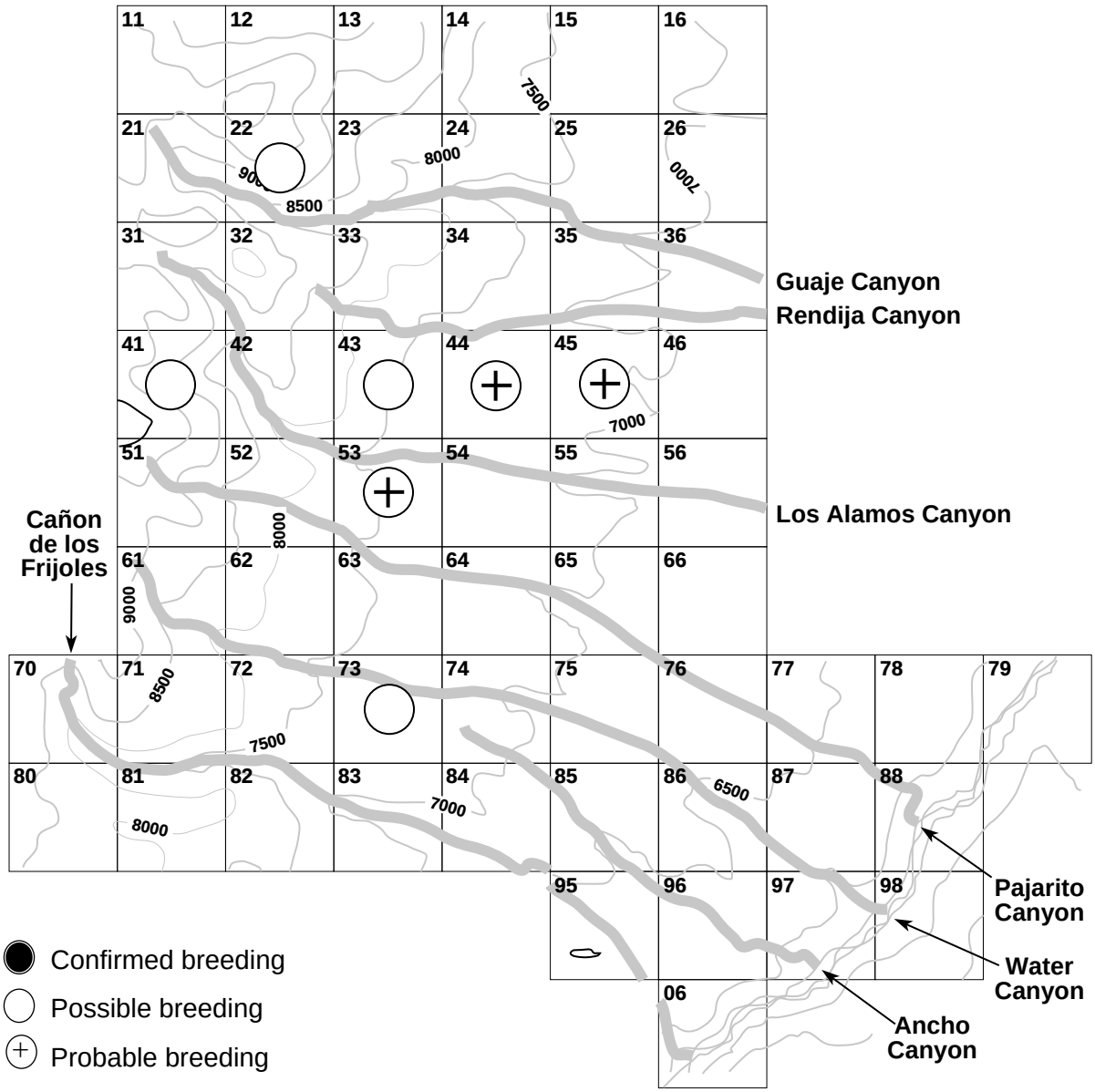
Spotted Sandpipers arrive in late April and early May in the upper Rio Grande Valley. The females, identical to the males but a little larger, arrive first and establish territories, often returning to the same ones each year. Territories contain mainly the nest site because feeding is done elsewhere. The nest is a shallow depression in the ground lined with a few grasses. In response to intrusion, the nesting bird may give an aggressive song—a rapid series of short ascending whistles—and when disturbed may perform a distraction display which consists of fluttering along the ground with wings partly opened, and tail spread and dragging on the ground. For about 3 weeks before they can fly, the downy young are watched over by one or both parents (Stokes and Stokes 1983).

Occasional Spotted Sandpipers are seen in the winter along the Rio Grande.

SPSA

Habitat	Occurrence	Conf	Prob	Poss
Rio Grande gorge (6)	4	1	1	2

Band-tailed Pigeon



Band-tailed Pigeon

Band-tailed Pigeon
(Columba fasciata)

The Band-tailed Pigeon summers in the mountains of New Mexico, breeding in forests and nearby woodlands—especially pine/oak, oak, and piñon/juniper. Breeding appears to be mainly in June, July, and August in the northern part of the state (Hubbard 1978).

During the atlas project, Band-tailed Pigeons were found in seven blocks containing mixed conifer or ponderosa pine forests. They occurred most frequently in upper Rendija Canyon. Nesting was not confirmed, but the presence of pairs was indicative of probable breeding in three blocks. Pairs were reported May 5, 1985, May 25, 1984, and June 8, 1987.

Although uncommon in the summer, they occur regularly in the oak shrub/ponderosa pine habitat in late summer (from August 20 median date in 13 years, to September 9 median date in 11 years).

The Band-tailed Pigeon is considered migratory, but its movements to locate an adequate food supply, primarily mast, are not far from its summering areas, although occasionally it reaches the lowlands. Even during nesting season, there is evidence that when a dependable food supply is lacking they may shift and wander and even forego normal breeding activities (Ligon 1961).

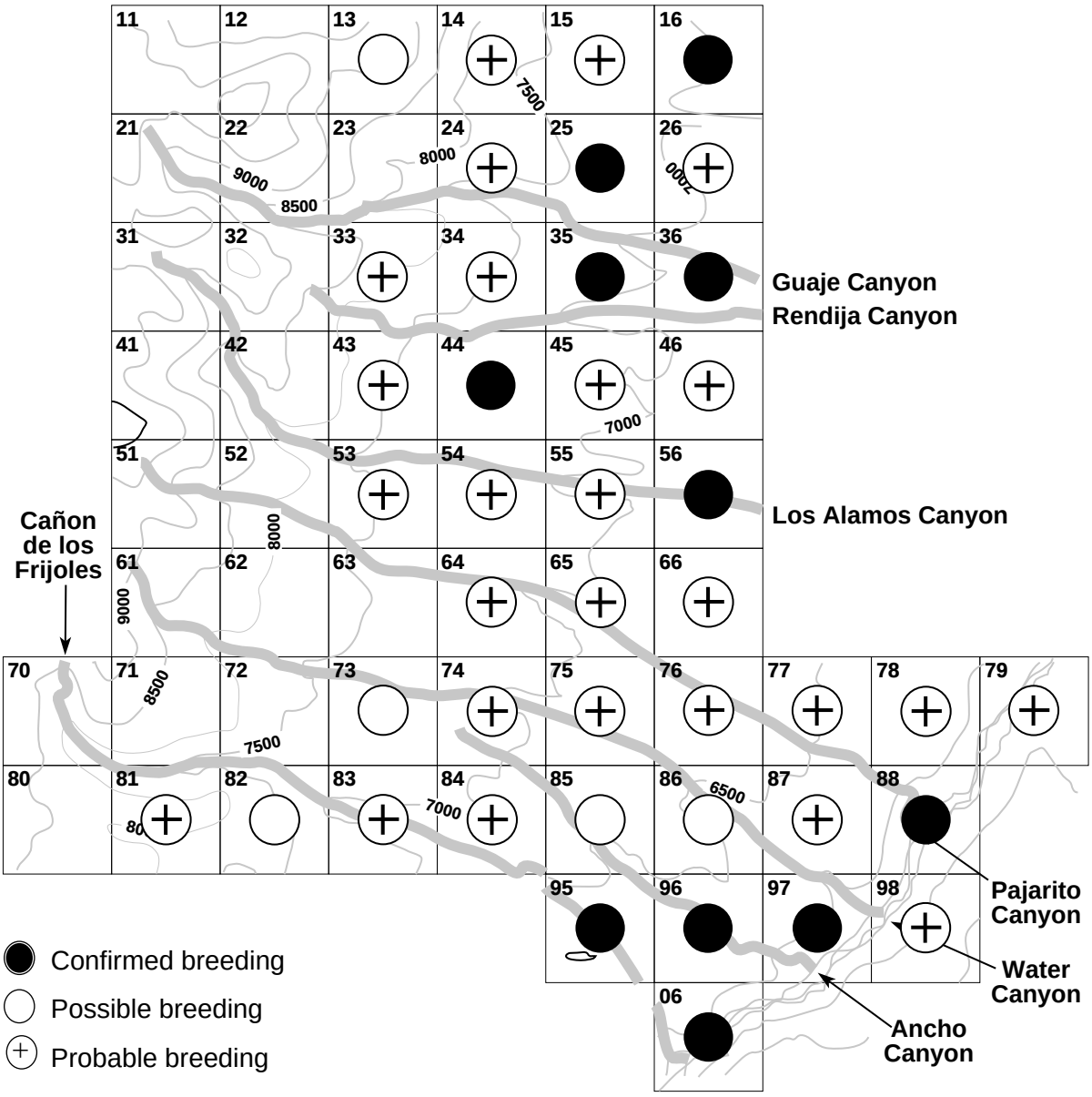
Nests, usually loose, bulky platforms of twigs, are in pine, Douglas fir, or oak 10 to 45 feet from the ground (Ligon 1961). The nest tree usually stands above a small precipice or slope and is adjacent to or very near a clearing (Goodwin 1976).

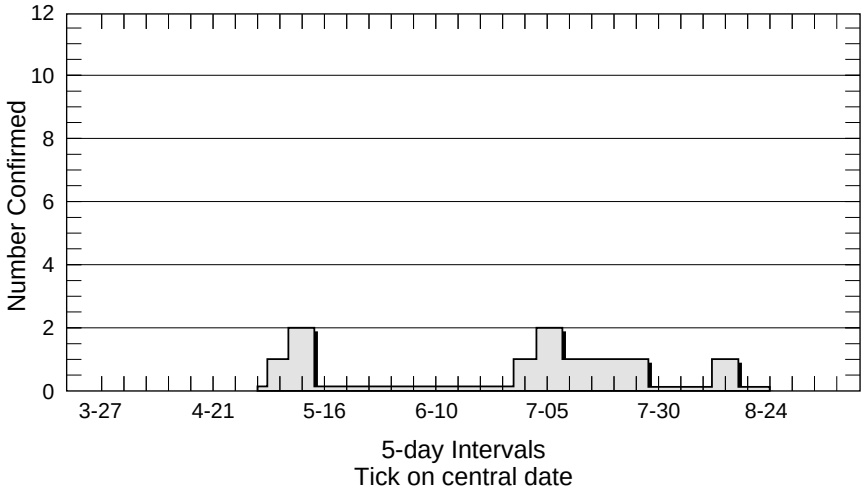
The quality of the advertising coo used in pair formation and courtship is like that of other pigeons, not owl-like as described in several field guides. The coo is typically a two-noted "whoo-hoo," repeated several times. It lasts 2 seconds and is tonally low and weak. The second syllable in each coo tends to be shorter and to drop in pitch (Peeters 1962). Their courtship flight is described by Pough (1957). They launch horizontally from a high perch and fly slowly around in a circle several hundred feet in diameter, frequently uttering a drawn out, rasping, buzzy note. Display flights and cooing occur with highest frequency in late afternoon (Peeters 1962).

BTPI

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	2	0	0	2
Mixed conifer/ ponderosa pine (5)	0	0	0	0
Ponderosa pine (11)	4	0	2	2
Ponderosa pine/ piñon/juniper (21)	1	0	1	0
Total	7	0	3	4

Mourning Dove





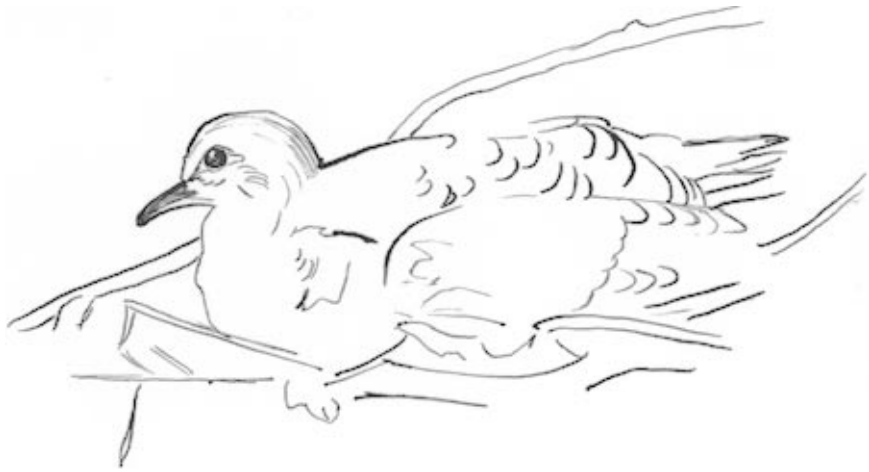
Mourning Dove

Mourning Dove
(Zenaida macroura)

The Mourning Dove breeds statewide from the lowlands up into the pine forest. An adaptable species, it nests in open woodland, cultivated areas with trees or shrubs, and semiarid areas, but not in heavily forested areas.

During the atlas project, Mourning Doves were scattered throughout the ponderosa and piñon pine forests of the mesas and lower canyons (in 98% of the appropriate blocks), but they were difficult to confirm as breeders. Only 26% of the atlas records were confirmations; six of these were nests. Probable breeding was determined for 59% of the occupied blocks mostly from observation of courtship and pairs.

The male advertizes for a female shortly after his spring arrival with the long coo: "oo-ah-oo, oo, oo, oo." The males sing to attract a mate, but do not set up territories until they are paired. The short coo, which sounds like the first three notes of the long coo, "oo-ah-oo," reveals the location of the nest site. It is given by the male when calling the female to the nest site during nest selection or during nest building, and by the female while she is on the nest (Stokes and Stokes 1983). When frightened from its nest, it may do a distraction display, falling to the ground,



hopping, and fluttering about. The nest is a platform of sticks, usually on a horizontal tree branch, 4 to 30 feet above the ground.

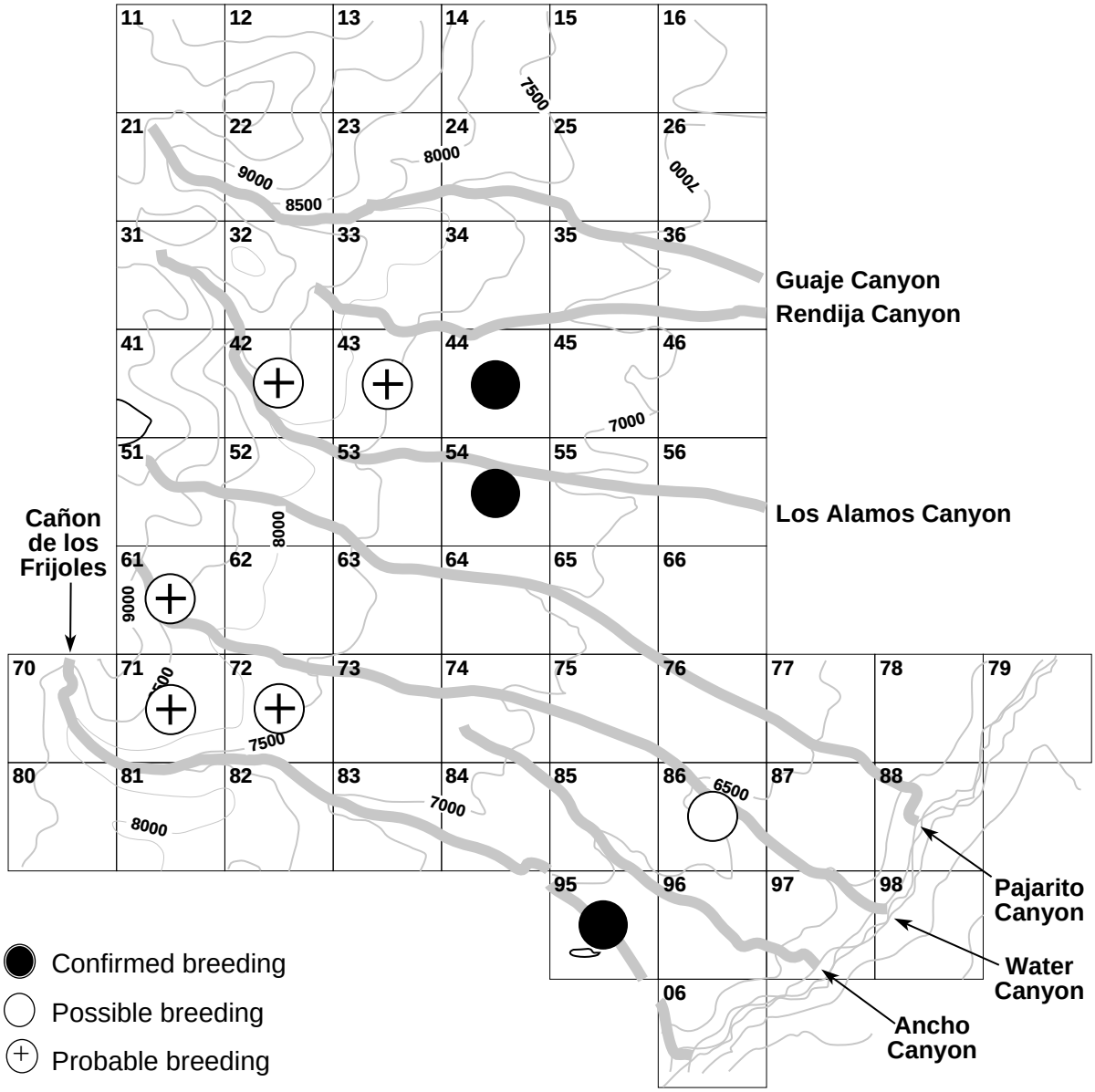
Doves have a long breeding season—from April to September—probably because they are renesting. One nest with eggs was discovered May 5 and two others on May 9 in ponderosa pine forest. A late nest with one egg was found on August 16 in a lone piñon pine in the dry mouth of Frijoles Canyon. Wing-fluttering distraction displays were observed at five different sites (July 7 to 26). A nest with two nestlings was found June 28 in piñon/juniper woodland. Nest heights were from 4 to 8 feet off the ground.

Mourning Doves arrive in Los Alamos in late April (April 25 median date in 24 years) and leave in late September (September 21 median date in 13 years).

MODO

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	3	0	2	1
Mixed conifer/ ponderosa pine (5)	2	0	2	0
Ponderosa pine (11)	10	2	6	2
Ponderosa pine/ piñon/juniper (21)	21	7	12	2
Piñon/juniper (6)	6	2	4	0
Total	42	11	26	5

Flammulated Owl



Flammulated Owl

Flammulated Owl
(Otus flammeolus)

The Flammulated Owl summers in the mountains almost statewide. It is found in pine and fir forests, pine/oak woodland, and locally, as in the Santa Fe area, in middle-elevation riparian woodland (Hubbard 1978).

Flammulated Owls were found in 17% of the forested blocks in Los Alamos. The presence of fledglings confirmed breeding in one-third of these blocks, all in the second week of July. Probable breeding was ascertained from territorial calling in five blocks. They usually nest in an old woodpecker hole in a conifer or aspen.

These owls arrive in the southwestern United States from late March to mid-April. They are the most common of the small owls in Los Alamos. Walking along a forest trail, such as the one from Ponderosa Campground to Frijoles Canyon in Bandelier National Monument, on a still night in early May, one male after another can be heard hooting repetitiously. They start a half hour after sunset and may continue for 30 or 40 minutes.

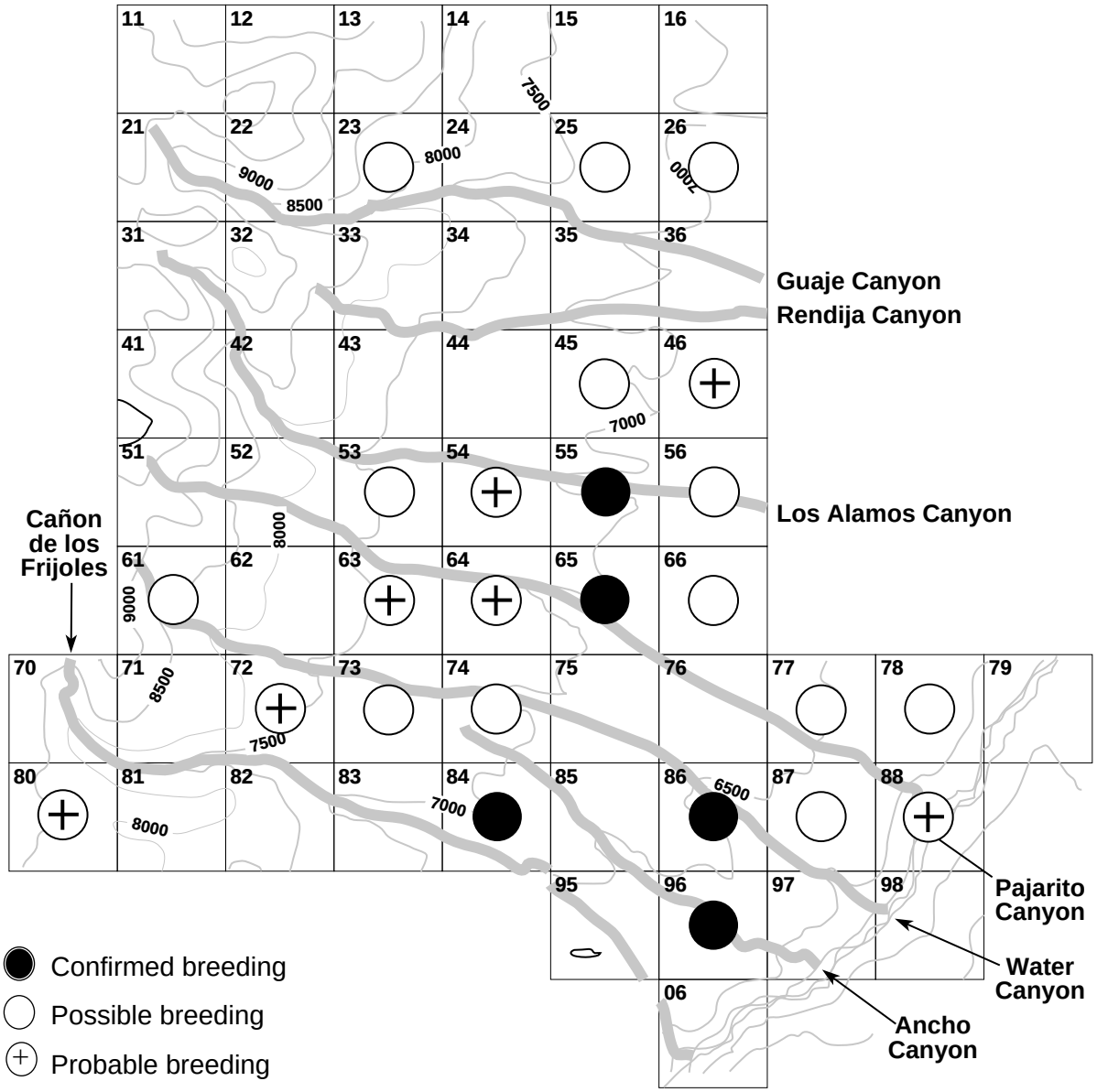
The call of the male is a single hoot (sometimes preceded by two lower pitched grace notes) uttered at regular intervals from 2 to 8 seconds. The mating song is a two part "boo-boot" with accent on the second syllable (Tyler and Phillips 1978). The female is hardly ever seen or heard.

The earliest spring date for arrival of the Flammulated Owl in Los Alamos is April 23. There are records of the banding of the birds on September 3, 1958, and September 14, 1963.

FLOW

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	3	0	3	0
Mixed conifer/ ponderosa pine (5)	1	0	1	0
Ponderosa pine (11)	3	2	1	0
Ponderosa pine/ piñon/juniper (21)	2	1	0	1
Total	9	3	5	1

Great Horned Owl



Great Horned Owl

Great Horned Owl
(Bubo virginianus)

The Great Horned Owl is resident statewide—from the lowest elevations to the montane ponderosa pine forest (Hubbard 1978).

Many evening and predawn hours were spent searching for Great Horned Owls during the atlas project—more than for any other species. They were found widespread but well separated in the county (their breeding territory ranges from 2 to 4 square miles) most commonly in canyons characterized by cliffs with crevices. They occupied 56% of the blocks containing mesa and lower canyon woodlands. Breeding was confirmed in 20% of the occupied blocks; of these, three were nests built in caves or crevices in cliff walls. One nest, in a crevice 16 feet up a cliff face, contained young on April 24. Attended young were seen on June 15 and July 15.

Probable breeding was determined for 28% of the occupied blocks from repeated observation of male hooting. The call of the male is a deep resonant "whoo, hu-hoo, whoo, whoo;" that of the female a shorter, higher pitched sequence of notes with a less regular cadence. Calling begins approximately 30 minutes after sunset and recurs just before dawn. On nights when the moon is full the calling continues for a longer time.

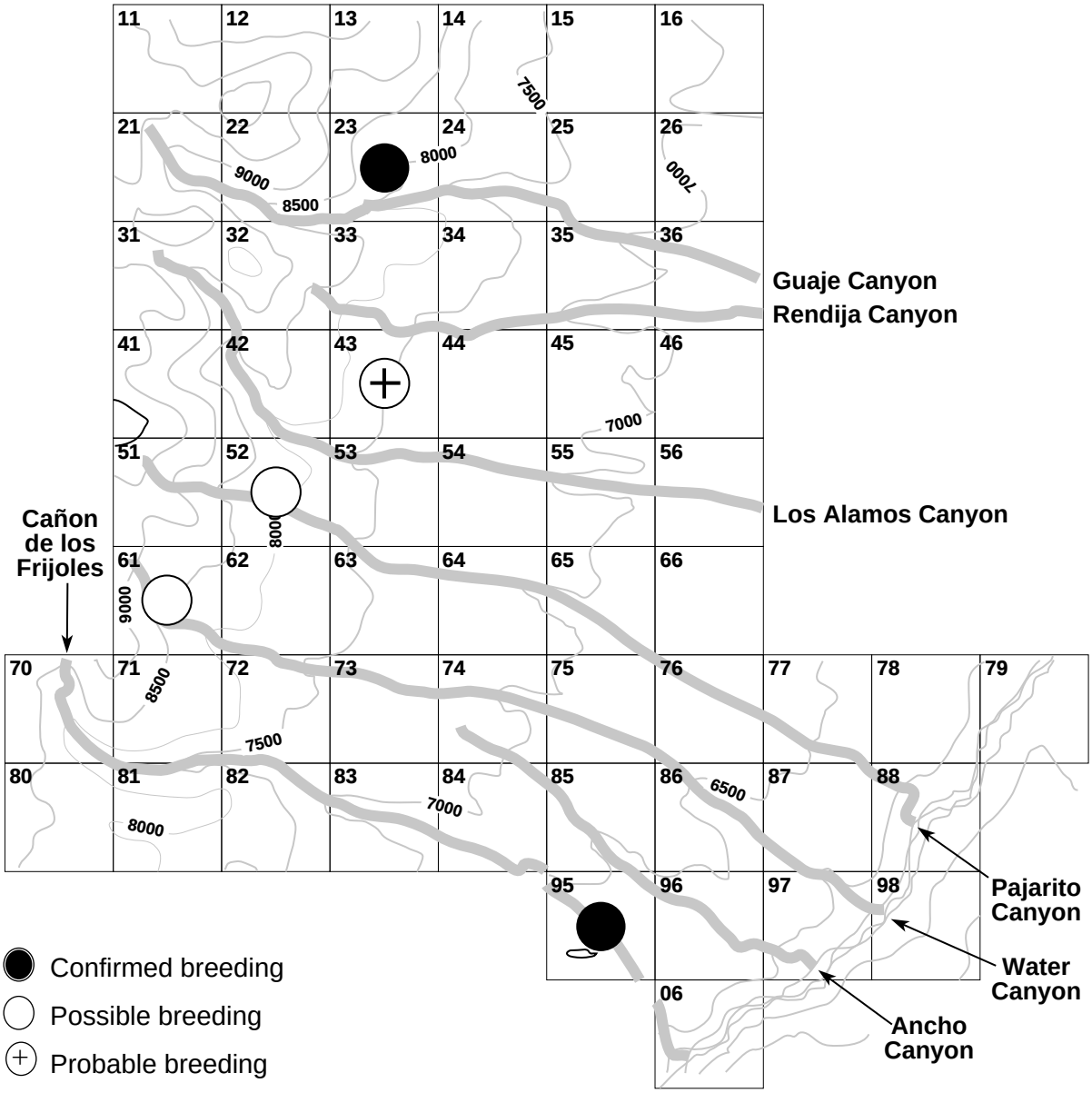
nestlings

These owls, the largest in the county, are especially careful about revealing themselves near the nest location. They seem programmed to avoid predation. In Vermont, atlas fieldworkers confirmed breeding in only 12% of the total blocks from which they were reported.

GHOW

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	3	0	1	2
Mixed conifer/ ponderosa pine (5)	1	0	1	0
Ponderosa pine (11)	5	0	2	3
Ponderosa pine/ piñon/juniper (21)	13	5	2	6
Piñon/juniper (6)	3	0	1	2
Total	25	5	7	13

Northern Pygmy-Owl



Northern Pygmy-Owl

Northern Pygmy-Owl
(Glaucidium gnoma)

The Northern Pygmy-Owl is resident in almost all mountainous areas of New Mexico.

These little owls were found in five blocks during the atlas project. All were in open mixed conifer woodland, either in canyon bottoms or on south slopes of major canyons. There were two confirmed breeding records: nest occupation in Frijoles Canyon (May 5, 1987) near the trail to Ceremonial Cave and a fledgling in Vallecitos Canyon (Block 2-3) on July 16, 1988.

Pygmy-Owls are largely diurnal—feeding early and late in the day. They call during the day as well. The call is a series of mellow, uninflected, evenly spaced short whistles uttered at 1- to 2-second intervals. The call note has been likened to that of the Townsend's Solitaire, but is more "liquid sounding" (Bailey and Niedrach 1965). Mobbing by a group of noisy songbirds will frequently reveal the presence of the Northern Pygmy-Owl.

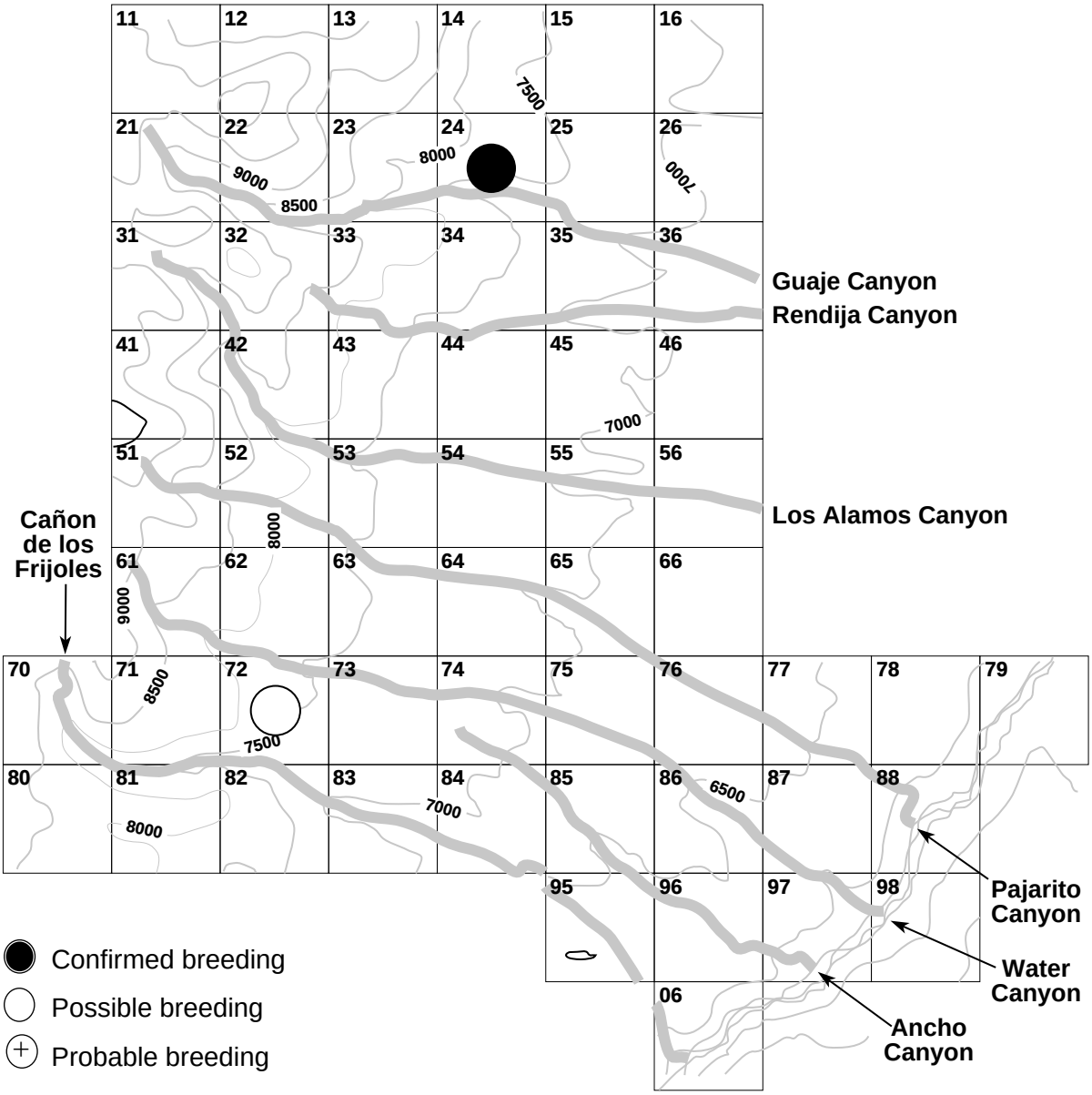
In the summers of 1977 and 1978, after the La Mesa fire, Wauer (Foxx 1984) found two Northern Pygmy-Owls on each of his three 100-acre study areas (on Burnt Mesa, Escobas Mesa, and Apache Springs).

Their nests are built in old woodpecker holes or natural cavities in trees. Ligon (1961) reported nest holes only in aspens.

NPOW

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	2	1	0	1
Mixed conifer/ ponderosa pine (5)	1	0	0	1
Ponderosa pine (21)	1	0	1	0
Ponderosa pine/ piñon/juniper (21)	1	1	0	0
Total	5	2	1	2

Spotted Owl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Guaje Canyon
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding

Spotted Owl

Spotted Owl
(Strix occidentalis)

Spotted Owls are resident almost statewide in forest canyons, pine/oak woodlands, and adjacent riparian habitats (Hubbard 1978). They are secretive and seldom seen. In his study in New Mexico, Ligon (1926) found them generally in dense Douglas fir growing in box canyons where there was little or no penetration of sun rays. Nesting of the Spotted Owl usually begins in late March or early April. Nests are placed in pockets or crevices in well-shaded caves in canyon walls (Ligon 1961).

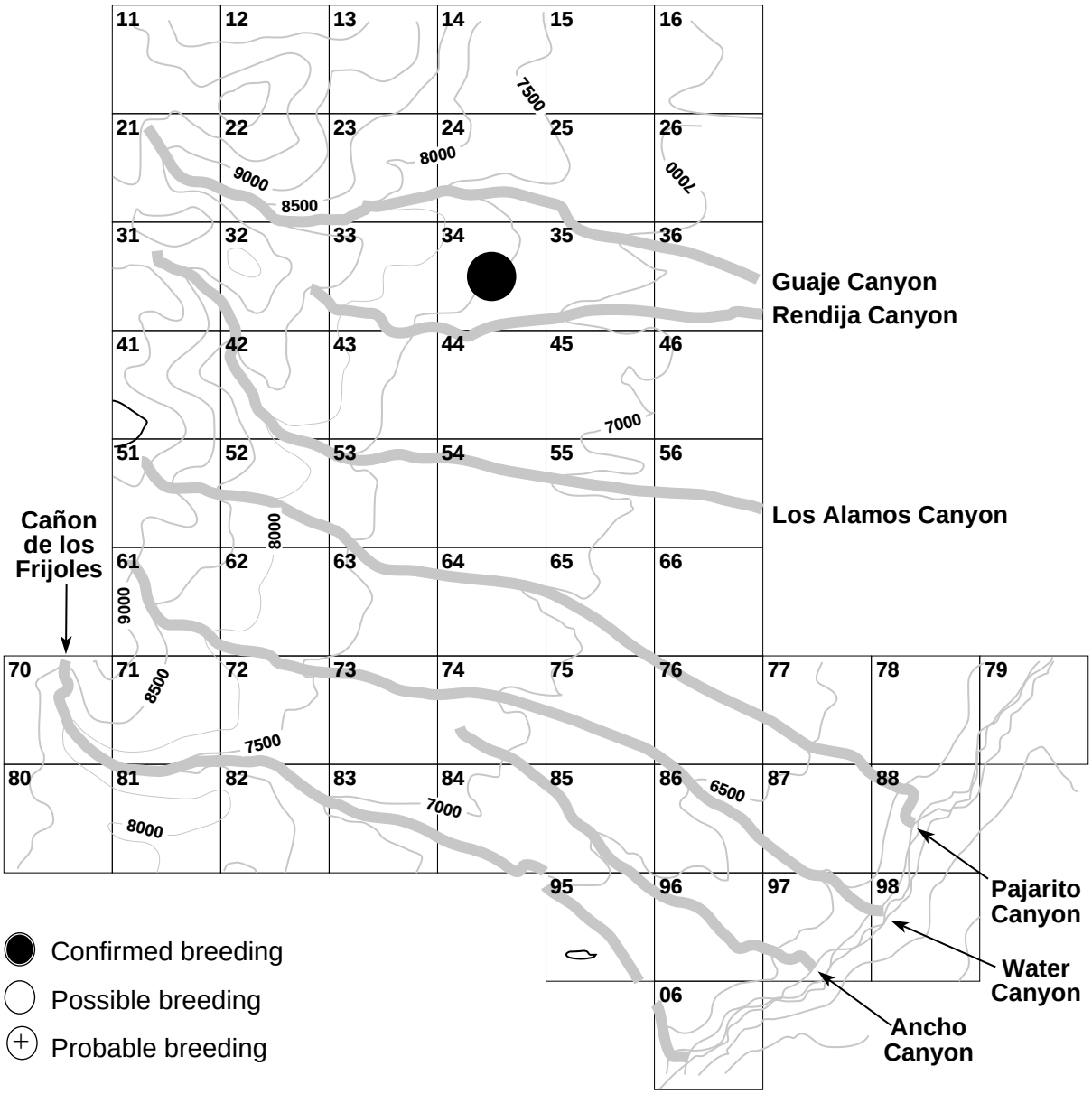
Spotted Owls were found in two blocks during the atlas project. An attended fledgling in Guaje Canyon on August 31, 1986, was the only confirmed breeding record. The other, calling from the north rim of Frijoles Canyon above Upper Crossing on April 29, 1986, was a possible breeding record.

This owl's basic call, transcribed as "hoo…ho-hoo…hoo," consists of an initial short hoot followed by a pause, then two more short hoots followed by a larger pause, and then a final hoot of longer duration (Tyler and Phillips 1978). The basic call of the Great Horned Owl is lower in pitch and is a series of five hoots.

SPOW

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer/ ponderosa pine (5)	2	1	0	1

Northern Saw-whet Owl



Northern Saw-whet Owl

Northern Saw-whet Owl
(Aegolius acadicus)

The Northern Saw-whet Owl summers in mountainous areas. It is local in forests and riparian and evergreen woodland at middle elevations (Hubbard 1978).

A fledgling found in ponderosa pine woodland near the south rim of Rendija Canyon on August 5, 1985, was our only atlas record.

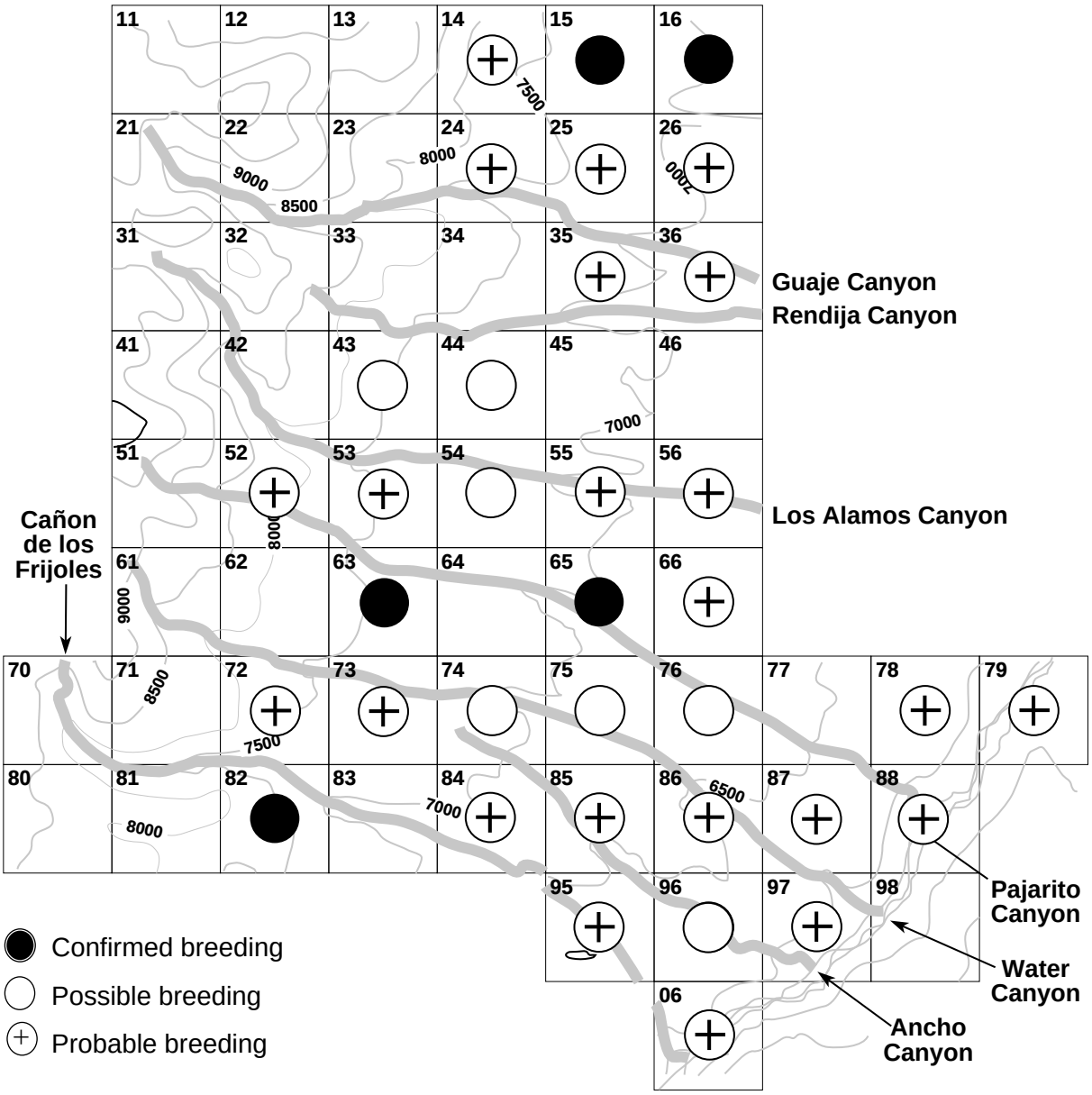
The nest is placed typically in a tree cavity 14 to 60 feet above ground, usually in an abandoned flicker hole. Saw-whet Owls are silent except in late winter and early spring. The most common call, "a very long series of toots or whistles, 2 to 3 notes per second" (Farrand 1983), may be heard as early as February or March and through the nesting season. The saw-whetting call is seldom given but is best heard in the early morning (Tyler and Phillips 1978). This call is a rasping "skree-awe, skree-awe, skree-awe" that sounds like the filing of a saw.

There are records of the banding of Saw-whet Owls in Los Alamos on September 14, 1959, and October 24, 1966, and the sighting of one bird in winter, February 14–21, 1989.

NSWO

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	1	1	0	0

Common Nighthawk



Common Nighthawk

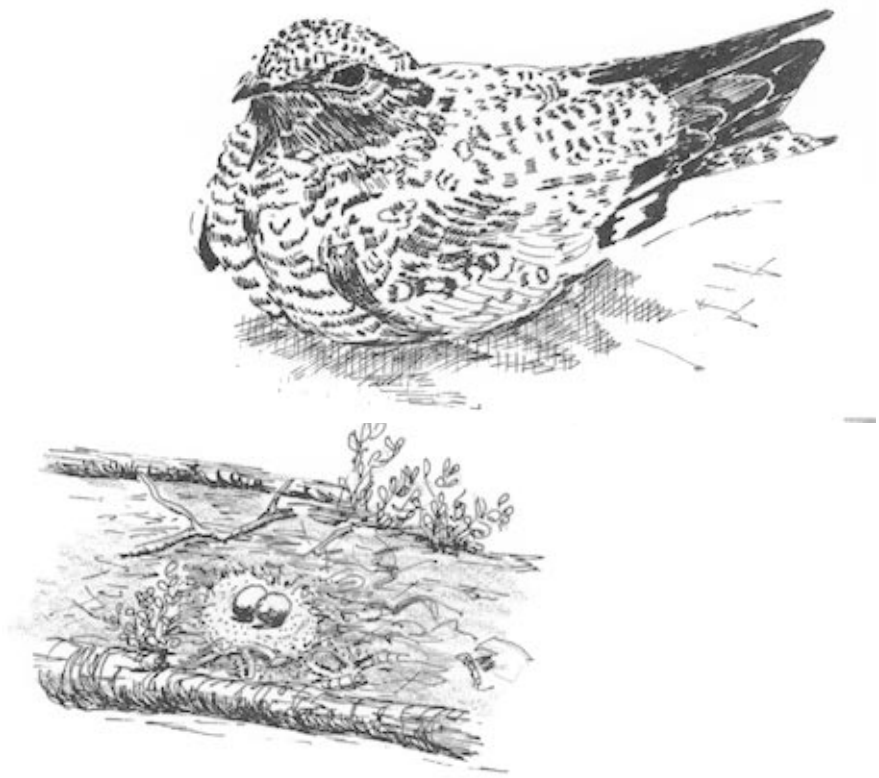
Common Nighthawk
(Chordeiles minor)

The Common Nighthawk is one of the most widely distributed birds in the state during the breeding season. It nests from grasslands up locally into open forest (Hubbard 1978).

During the atlas project, nighthawks were found in 84% of the mesa and lower canyon woodlands, but breeding was confirmed in only 14% of the occupied blocks. The confirmations were of attended eggs or young.

Nighthawks arrive in Los Alamos at the end of May (May 30 median date in 21 years)—the latest of our spring migrants. Within a few days, territories are assumed and courtship activities can be heard and seen. Males defend their territories against other males, chasing them while uttering loud "peent" calls. The defense may include periodic dives from high above that end with a loud booming sound, which comes from the spread primaries as the bird pulls out of the dive above the intruder.

No nest is built; the eggs are laid on open ground and a strong preference is shown for outcrops or barren gravel (Pough 1953). In a study of nighthawk nesting in Idaho, Rust (1947) describes its breeding behavior. In June when the evening feeding begins, males in the vicinity of the incubating females circle over their respective nesting sites, where they execute dives, each ending with a boom. Rust could locate a nesting site by watching the male nighthawk dive and boom over it. Almost invariably he could flush the female from some portion of the area thus pointed out. When disturbed at the nest, the female nighthawk may show resistance, displaying her fully opened bright red mouth. At other times, the female simulates crippling by fluttering her wings on the ground and taking short flights away from the nest.

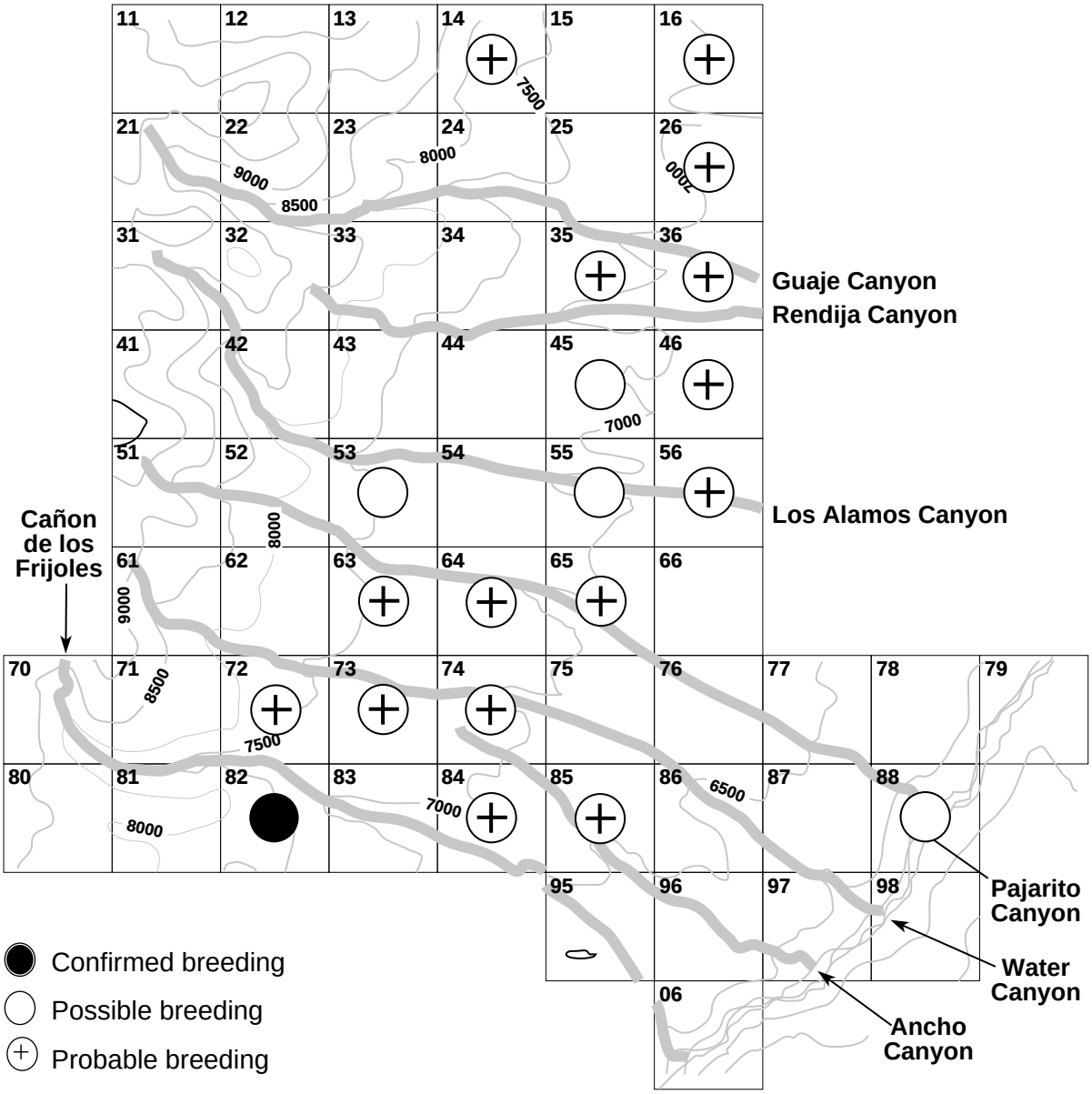


Nighthawks gather in feeding flocks in late August and leave the county by the end of September (August 31 median date in 10 years).

CONI

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer/ pondersosa pine (5)	4	0	4	0
Ponderosa pine (11)	9	3	3	3
Ponderosa pine/ piñon/juniper (21)	18	2	12	4
Piñon/juniper (6)	4	0	4	0
Total	35	5	23	7

Common Poorwill



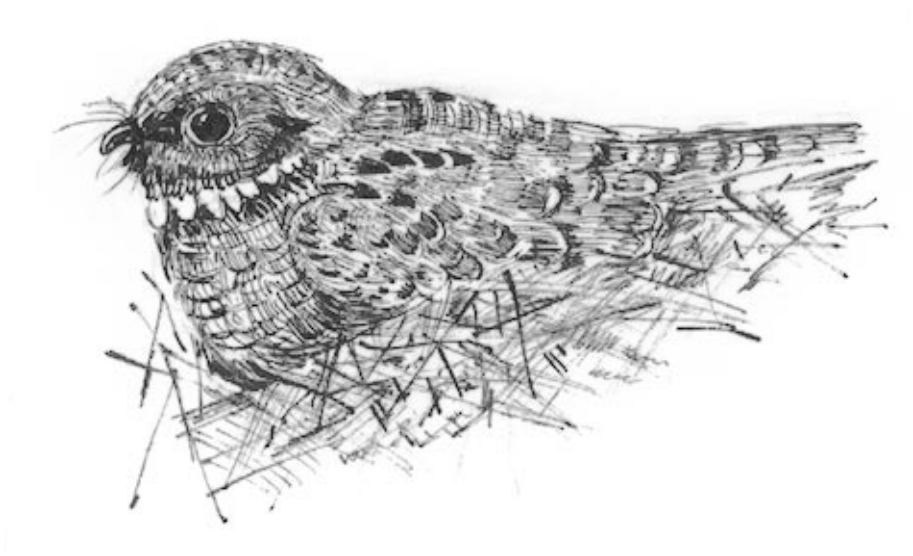
Common Poorwill

Common Poorwill
(Phalaenoptilus nuttallii)

The Common Poorwill summers locally in open forest statewide up to about 9000 feet elevation (Hubbard 1978). It nests on the woodland floor in gravel-paved, scattered stands of piñon/juniper or ponderosa pine, or in rocky, brush-grown canyons (Blackford 1956).

During the atlas project, Common Poorwills were found primarily in the mesa forest and woodland between 6500 and 7500 feet elevation. They occupied 58% of the mesa ponderosa pine blocks and 40% of the lower canyon blocks. Breeding was confirmed in only one block: a recently hatched young guarded by a parent performing a distraction display. Probable breeding, found in 75% of the occupied blocks, was determined from persistent calling for periods greater than a week.

Although the poorwill is easily heard in the dusk before dawn, the ventriloquial character of its song makes it difficult to locate. Additionally, its color camouflage makes finding one a nearly hopeless task that succeeds only by accident. In his study of poorwills in southern California, Brauner (1952) found regular daily singing patterns starting in spring and continuing into June.



Poorwills called nightly starting 20 minutes after sunset and then again shortly before dawn. Feeding—typically hawking after moths from the ground—started shortly after calling had begun. The active period of feeding and calling was only 30 minutes, except on nights of full moon, then it lasted 2 hours or more. Occasional calls are given in the daytime. Otherwise poorwills rest quietly on the ground during the day.

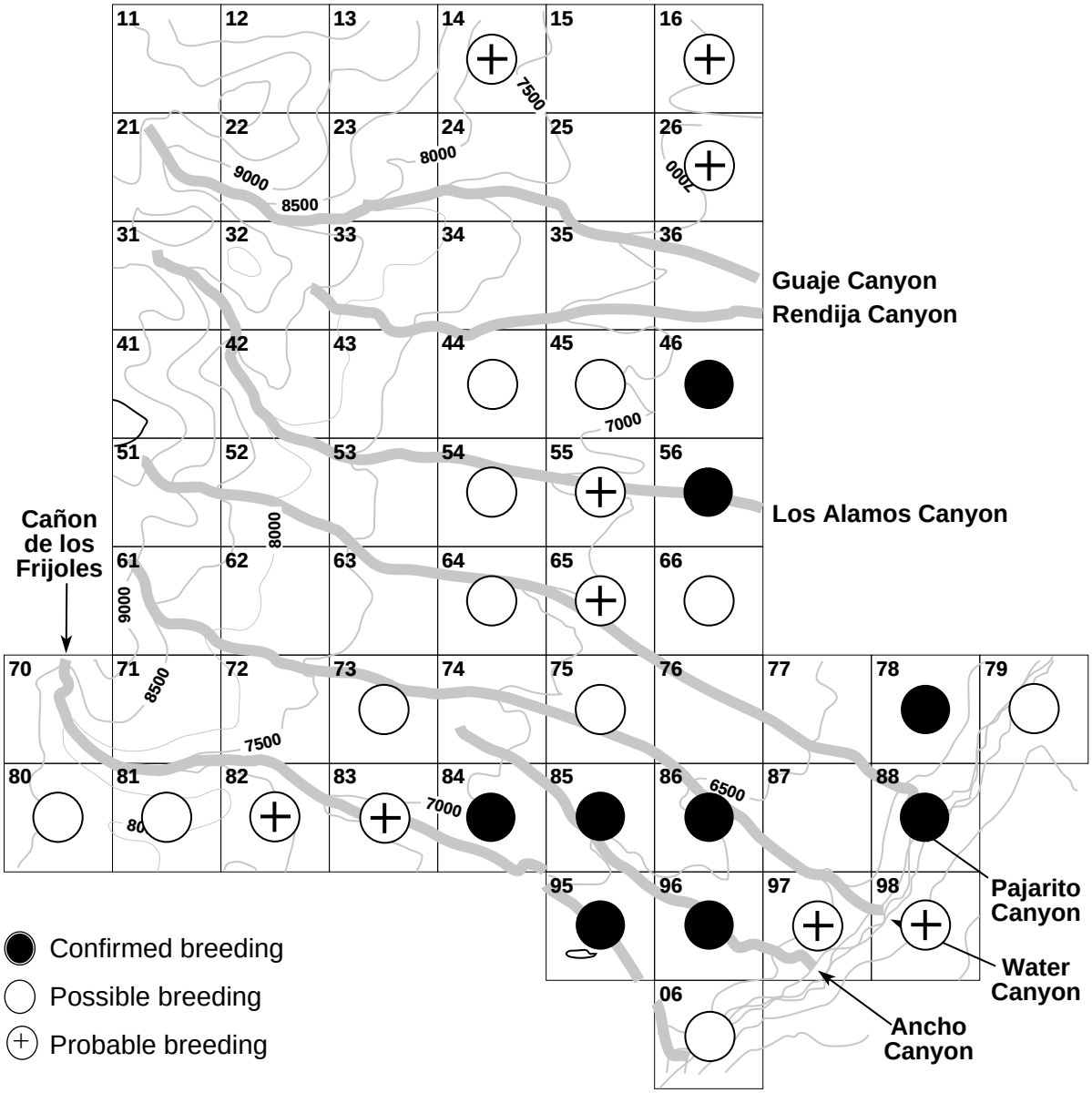
The eggs may be laid in a scrape on gravelly ground or on flat rock (Harrison 1979). When disturbed near the nest, the parent birds flop about on the ground hissing loudly with their mouths open widely.

Common Poorwills arrive in Los Alamos in mid-April (April 25 median date in 4 years). The latest fall report is October 30.

COPO

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	6	1	4	1
Ponderosa pine/ piñon/juniper (21)	13	0	11	2
Rio Grande gorge (6)	1	0	0	1
Total	20	1	15	4

White-throated Swift



White-throated Swift

White-throated Swift
(Aeronautes saxatalis)

The White-throated Swift summers widely in montane areas and canyonlands in New Mexico. During the atlas project, there was breeding evidence in 77% of the blocks containing cliffs. Breeding was confirmed in 31% of the occupied blocks.

Swifts are among our earliest spring migrants, some years arriving in Los Alamos in early March (March 28 median arrival date in 19 years). They range widely while foraging and seeking water, but are found most frequently coursing at high speed over the steep-walled canyons where they nest. Pairs and small groups frequently engage in vociferous chases during which they make repeated passes at the face of their nesting cliff, only to turn aside at the last moment and continue their aerial pursuit (Pough 1957). The far-reaching, chittering song is a series of high, shrill, strident notes that almost run together.

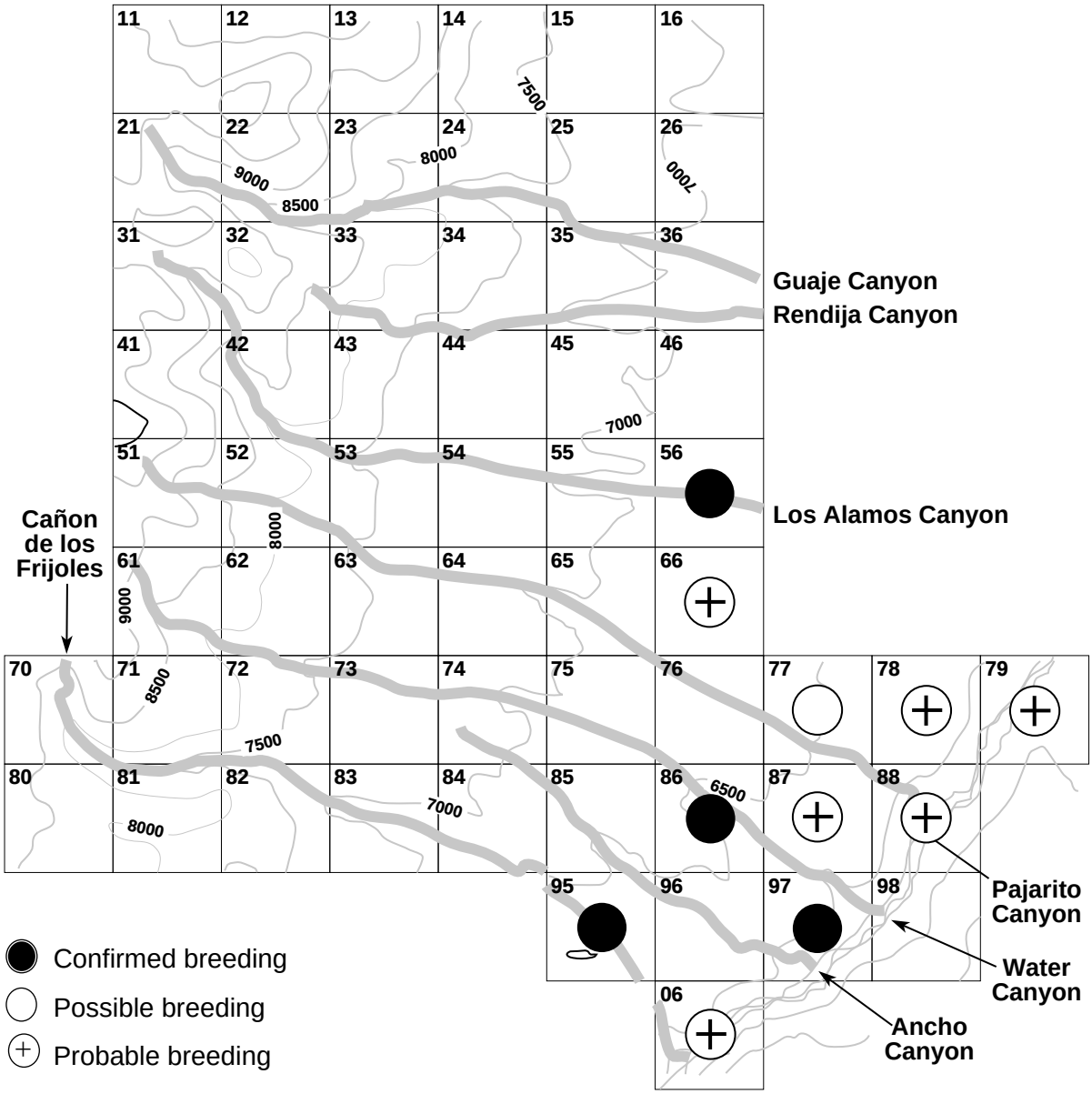
Nesting takes place in cracks and crevices in rocky cliffs and often in colonies (Ligon 1961). The nest of plant material glued together with the bird's saliva is built far back in a narrow crevice, often beyond reach and out of sight. Presence of the nest is betrayed by the twittering calls of the female or pair from within the crevice. Nest building in a cliff crevice was observed on May 27. Eight occupied nests, all in crevices in the steep cliff walls, were reported from June 9 to July 21.

White-throated Swifts leave the county by the end of September (September 24 median date in 11 years).

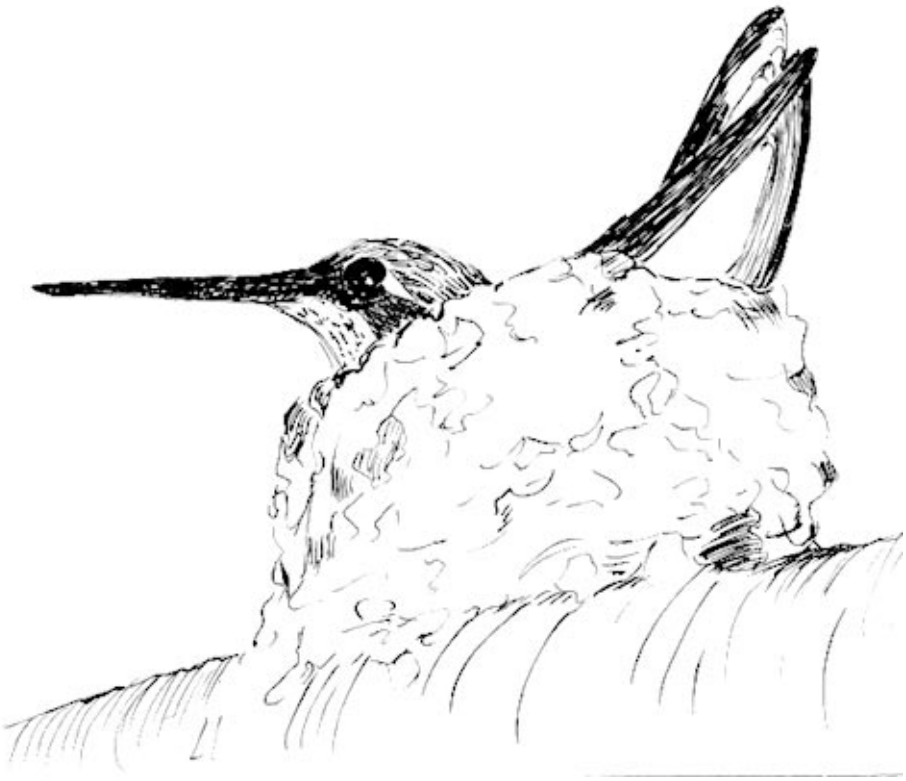
WTSW

Habitat	Occurrence	Conf	Prob	Poss
Cliff (30)	23	9	6	9
Adjoining	6	0	3	2
Total	29	9	9	11

Black-chinned Hummingbird



Black-chinned Hummingbird



Black-chinned Hummingbird
(Archilocus alexandri)

The Black-chinned Hummingbird summers almost statewide, nesting in woodland—especially in riparian and residential areas—up to elevations of 7500 feet (Hubbard 1978).

It reaches the southeastern edge of Los Alamos in residential areas in the piñon/juniper woodlands and in the lower canyon bottoms. The local range of the Black-chinned Hummingbird overlaps the range of the more common Broad-tailed Hummingbird in the canyon bottoms. However, the latter is usually found on the mesas west of the piñon/juniper woodlands.

During the atlas period, Black-chinned Hummingbirds were found in 41% of the blocks containing piñon/juniper woodland. Breeding was confirmed in 36% of those blocks. Three nests were found: nest building on May 10 and 31 and a female incubating on June 21. Reported nest heights were from 7 to 12 feet above the ground.

Males arrive in Los Alamos in late April (April 29 median date in 8 years) a week or so before the females. With the appearance of females on the male's territorial areas, aerial display begins. It consists of a series of long, swooping, pendulum-like maneuvers about 30 meters long, with the male passing very close to the female at the bottom of the arc (Johnsgard 1983b). Courtship flights were observed from May through early July during the atlas period.

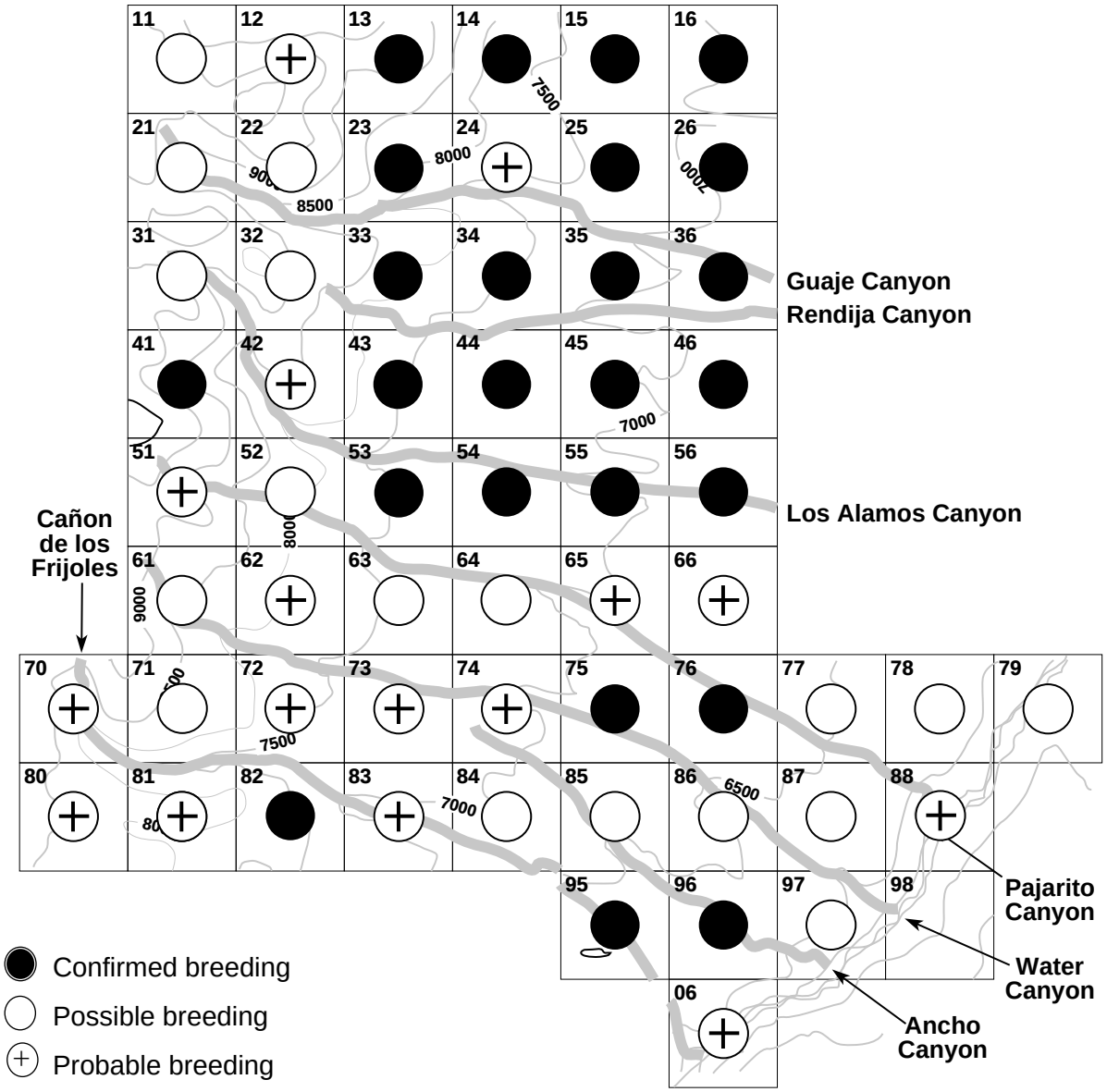
The nest is built typically 4 to 8 feet above the ground saddled on a branch or in a fork of a limb, frequently over water or a dry creek bed (Terres 1980).

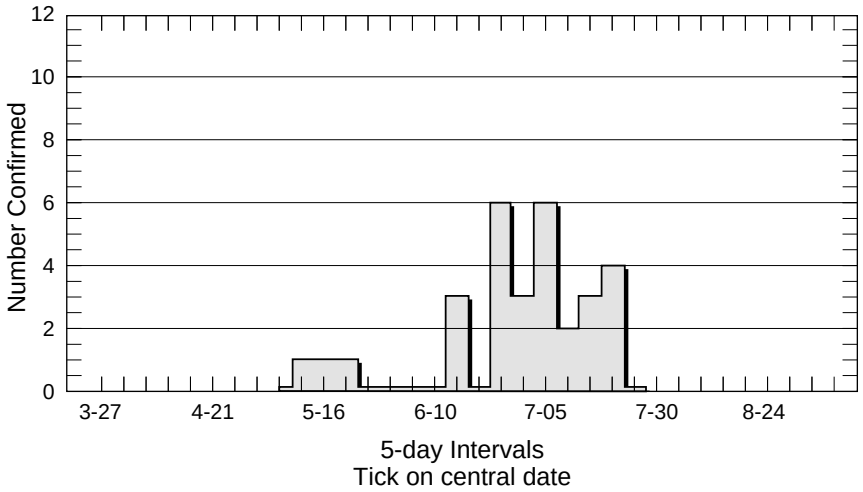
Fall departure is in mid-September (September 10 median date in 4 years).

BCHU

Habitat	Occurrence	Conf	Prob	Poss
Piñon/juniper (27)	11	4	6	1

Broad-tailed Hummingbird





Broad-tailed Hummingbird

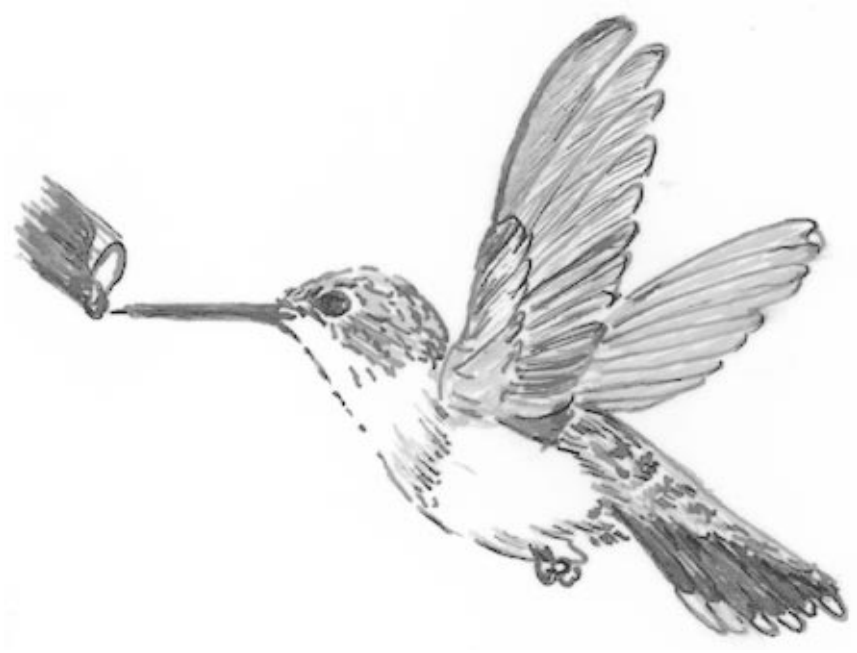
Broad-tailed Hummingbird
(Selasphorus platycercus)

The Broad-tailed Hummingbird summers in mountainous areas statewide. It is ubiquitous in Los Alamos, summering throughout the forested, wooded, and residential areas. It favors ponderosa pines, Douglas firs, and aspens in moist canyons for nesting and forages in forest parks and gardens (Johnsgard 1983b).

Broad-tailed Hummingbirds were found in 98% of the atlas blocks and breeding was confirmed for 42% of them.

Males arrive in mid-April (April 15 median date in 22 years) and establish actively defended feeding territories. Their defense is by visual and vocal display, dive displays, and chases. An intruding hummingbird invokes the spectacular U-shaped dive display from the hummingbird whose territory has been encroached. Females arrive a week or so later and establish nesting territories different from the males and from which they drive out all intruders including the males. Essentially all of the activities associated with nesting and the rearing of the young are the sole responsibility of the female (Johnsgard 1983b).

Nineteen occupied nests were found between May 12 and July 27. Nests were built from 2 to 30 feet above the ground on horizontal branches of a variety of trees. Ponderosa pines were most frequently used.

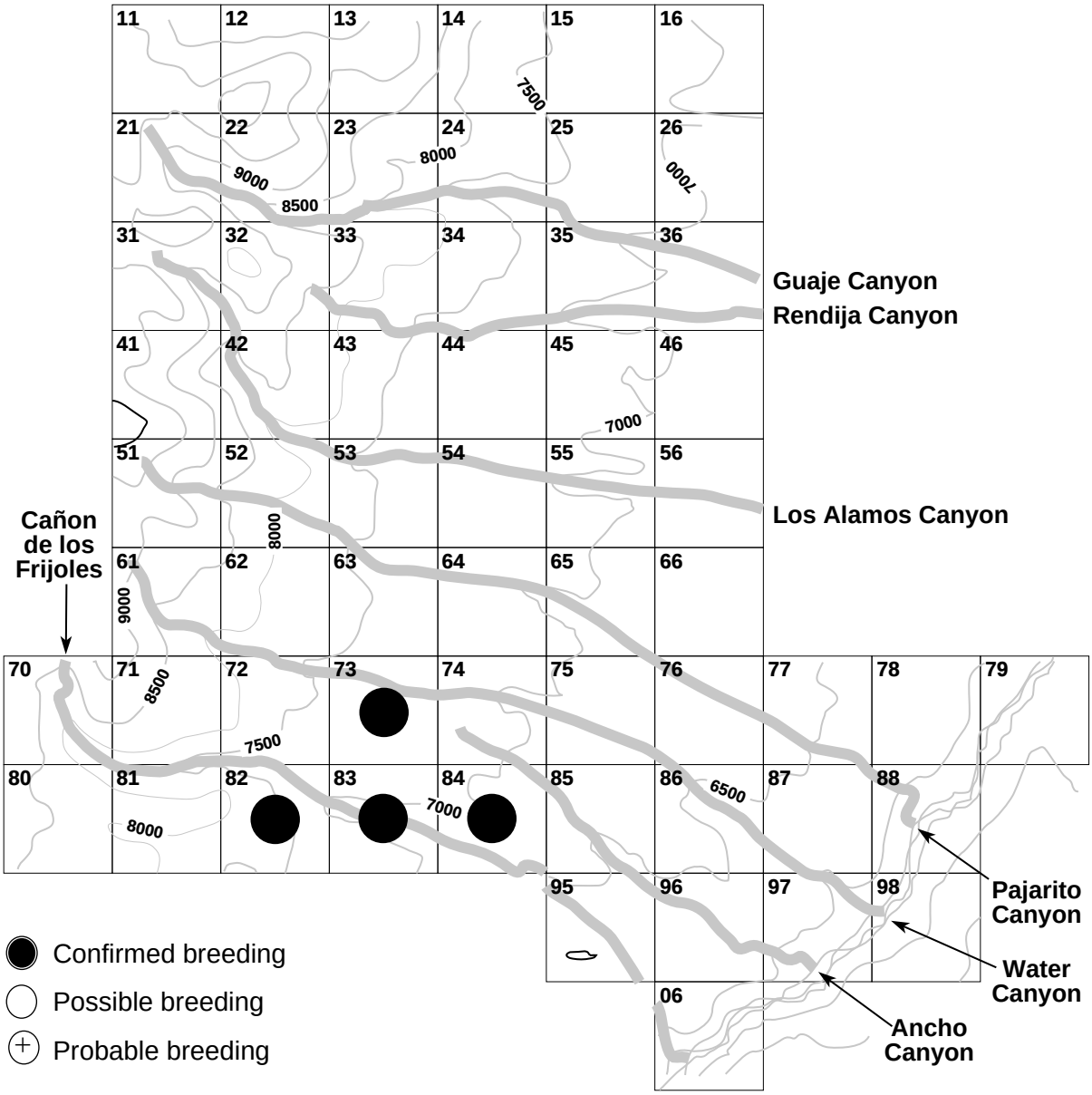


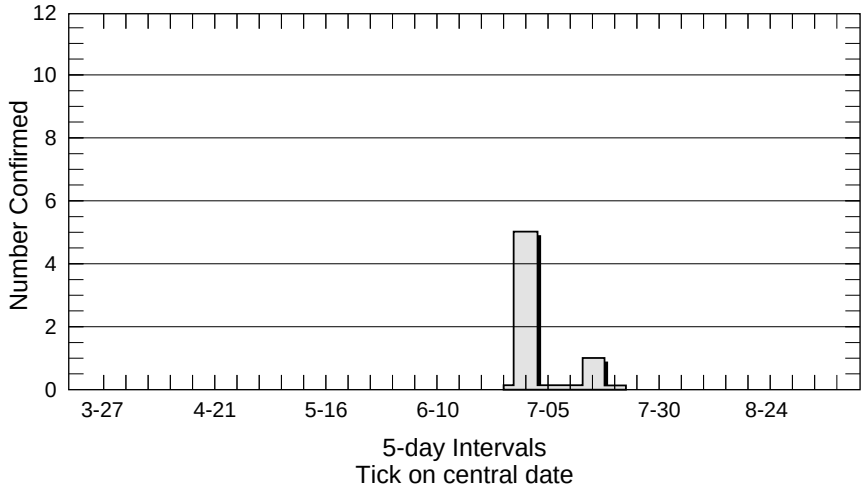
Broad-tailed Hummingbirds leave Los Alamos in mid-September (September 15 median date in 21 years).

BTHU

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	17	4	6	7
Mixed conifer/ ponderosa pine (5)	5	1	3	1
Ponderosa pine (11)	11	8	2	1
Ponderosa pine/ piñon/juniper (21)	21	12	4	5
Piñon/juniper (6)	5	0	1	4
Total	59	25	16	18

Lewis' Woodpecker





Lewis' Woodpecker

Lewis' Woodpecker
(Melanerpes lewis)

Lewis' Woodpecker is resident in river valleys in the northern part of the state and in mountainous areas from the Mogollon and Sacramento highlands northward. It is migratory in Los Alamos moving into the lower valleys for the winter where the species is found year-round.

Its preferred habitat is open country with scattered trees, forest clearings with tall snags, and blackened ghost forests left by fires. It nests in pine forest, evergreen woodland, and locally in orchards and lowland riparian woodland.

The atlas data show that the present breeding range of Lewis' Woodpecker in Los Alamos is the burned-over ponderosa pine forest resulting from La Mesa fire (Foxx 1984). Breeding was confirmed in all the blocks containing this habitat. Three active nests were found, all in isolated ponderosa pine snags in the burned areas. Three other records of confirmed breeding were of adults feeding young. All of the breeding records were from the end of June to the third week in July.

Before La Mesa fire, Lewis' Woodpeckers were rarely seen in summer in Los Alamos.

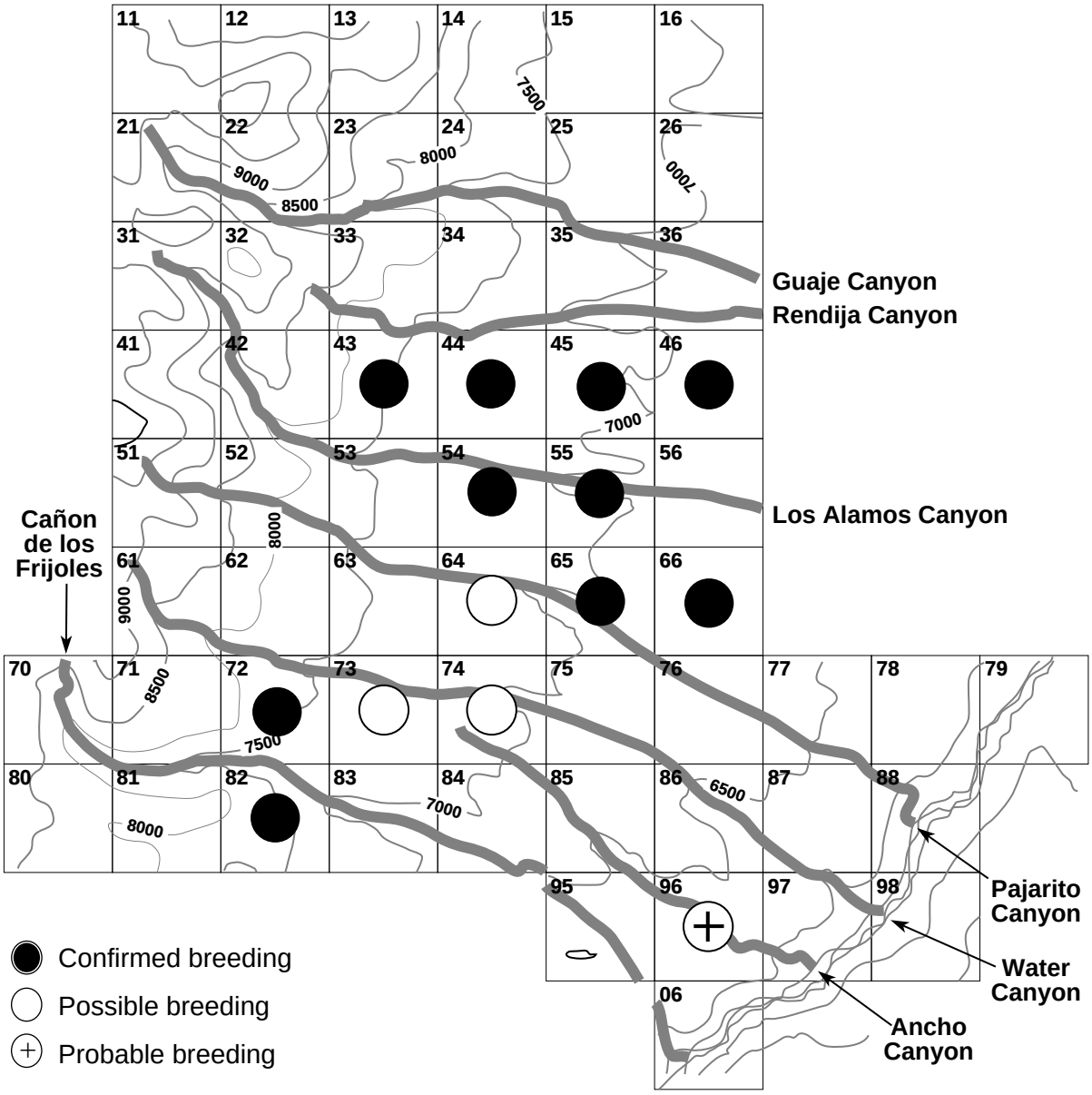
Wauer (Foxx 1984) did not find them in his censuses on the burned-over mesas neither before nor in 2 years after the fire, but during the atlas period they nested regularly.

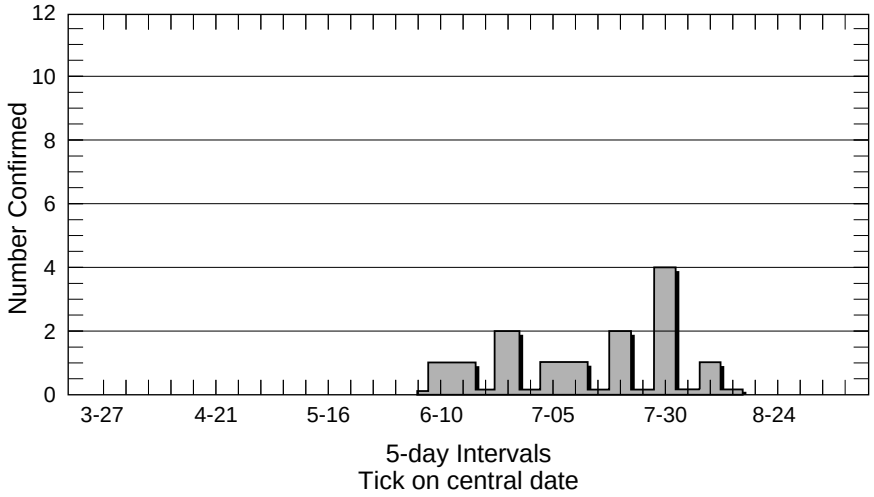
Lewis' Woodpeckers have seldom been seen in Los Alamos in winter or spring—there are only four records from these seasons in 30 years, but they do occur regularly in fall, usually in the piñon woodlands where they forage on piñon nuts. They are here typically from September 14 (median date in 7 years) to October 2 (median date in 5 years).

LEWO

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine—La Mesa Fire (7)	4	4	0	0

Acorn Woodpecker





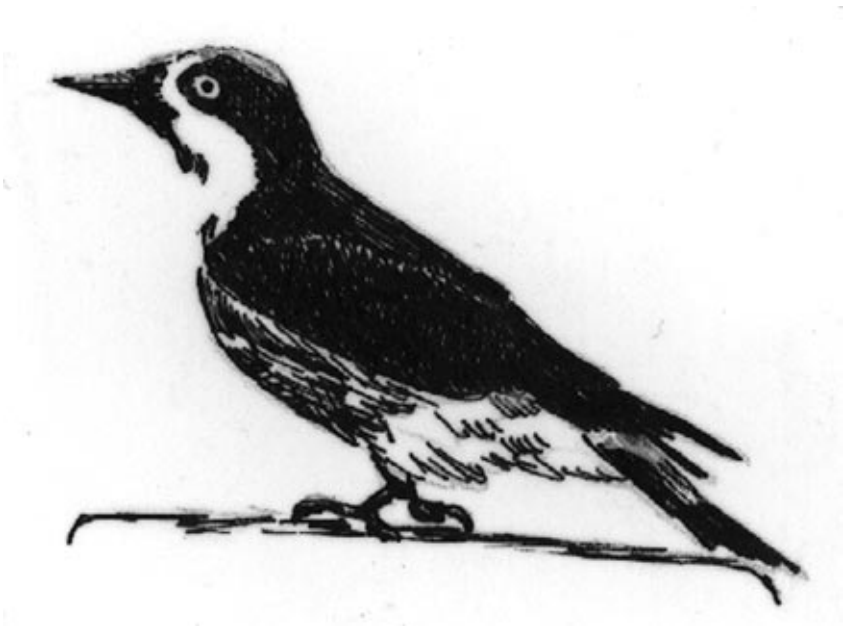
Acorn Woodpecker

Acorn Woodpecker
(Melanerpes formicivorus)

The Acorn Woodpecker is resident in the mountains of New Mexico almost statewide, but is very localized in the Jemez, Sangre de Cristo, and other northern mountains (Hubbard 1978). It prefers areas where various species of oaks and pines overlap, at elevations ranging from 7000 to 8000 feet (Ligon 1961).

During the atlas project, Acorn Woodpeckers were found in localized canyons in 42% of the blocks containing ponderosa pine forest and in 30% of the blocks containing the lower canyon bottoms. Breeding was confirmed in 71% of the occupied blocks. Granary trees were noted in lower Pueblo Canyon (Block 4-6) and Los Alamos Canyon (Block 5-5).

Acorn Woodpeckers are communal nesters. Members of the colony share in territorial defense, excavation of cavities, and caring for nestlings. Highly vocal, their presence is easily detectable. Their interactive "waka, waka" calls may carry 500 yards.

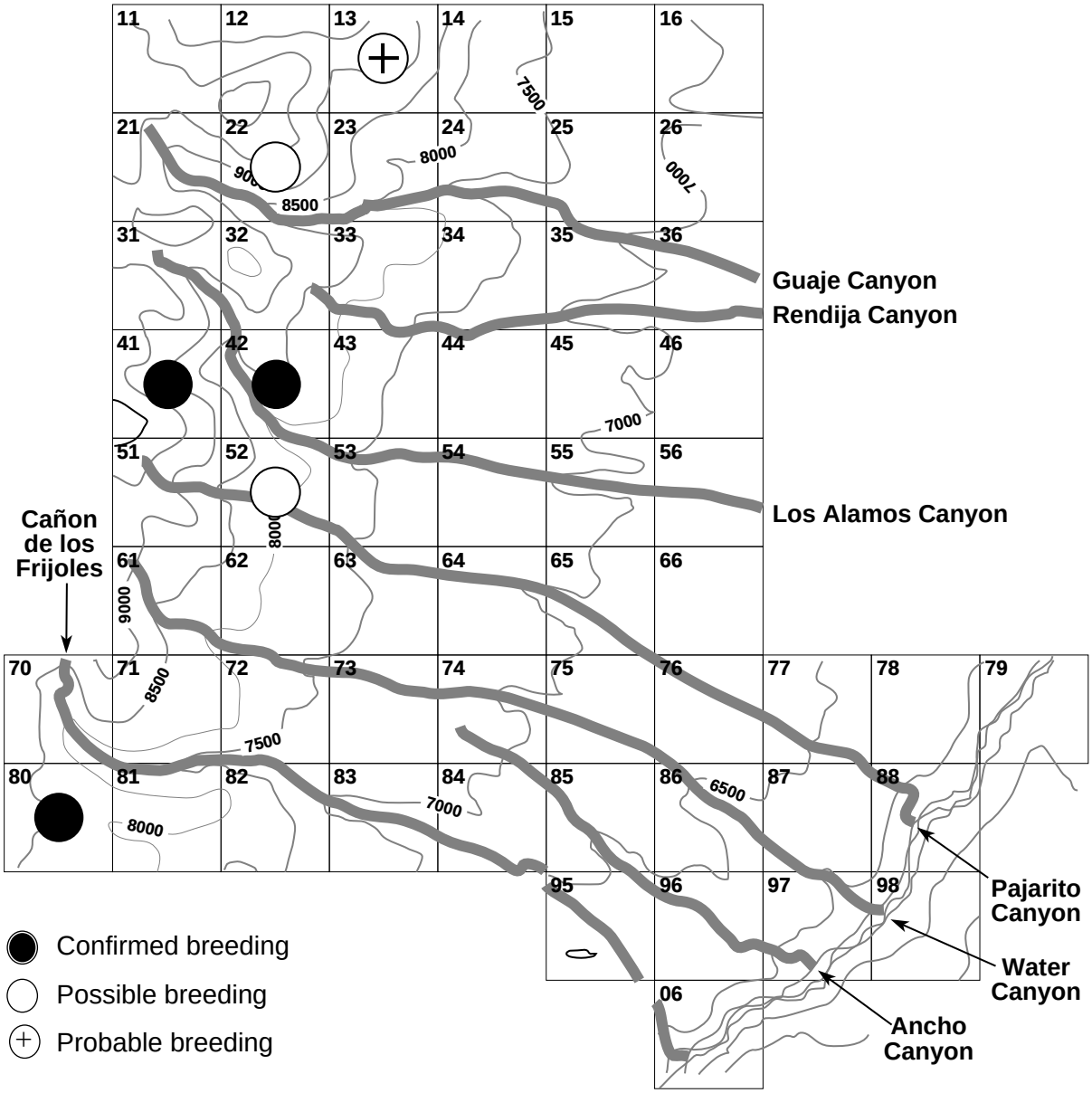


Wauer (Foxx 1984) found no Acorn Woodpeckers on his censuses in the forested areas burned over by La Mesa fire, neither before nor after the fire, but they were readily observed in those areas during the atlas period. Among the locations were Escobas, Burnt, and Frijoles mesas, and Mesa del Rio (Blocks 7-2, 7-3, 7-4, and 8-2).

ACWO

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer/ ponderosa pine (5)	1	1	0	0
Ponderosa pine (11)	5	4	0	1
Ponderosa pine/ piñon/juniper (21)	8	5	1	2
Total	14	10	1	3

Red-naped Sapsucker



Red-naped Sapsucker

Red-naped Sapsucker
(Sphyrapicus nuchalis)

The Red-naped Sapsucker, until recently considered to be a form of the eastern Yellow-bellied Sapsucker, summers in the mountains primarily in coniferous forests containing aspens.

The Red-naped Sapsucker is an uncommon breeding bird in Los Alamos. It was found in only 27% of the blocks containing the mixed conifer habitat. Breeding was confirmed in 60% of those. One nest hole was found—30 feet up in an aspen on June 24. The other confirmations were adults feeding young (June 26 to July 9).

Red-naped Sapsuckers are among the earliest of the spring migrants in Los Alamos (April 7 median date in 11 years). Within a few weeks of their arrival, their calling and drumming are conspicuous in the forest as the males establish their territories.

Drumming of the Red-naped Sapsucker is usually two to three rapid beats followed by an irregular series of double and triple beats, all within 2 to 4 seconds (Farrand 1983). The Red-naped Sapsucker shares the mixed conifer/aspen habitat with the more common Williamson's Sapsucker from which it can be distinguished by its drumming pattern as well as by its plumage. The presence of both sapsucker species is revealed by regularly spaced, squarish holes drilled in trees from which the birds feed on sap and insects attracted to the sap pits. They usually nest in green aspens, 10 to 30 feet above the ground (Ligon 1961). Their nests are easily found because the food calls of the young are loud and the adults become very vocal when alarmed (Harrison 1979).

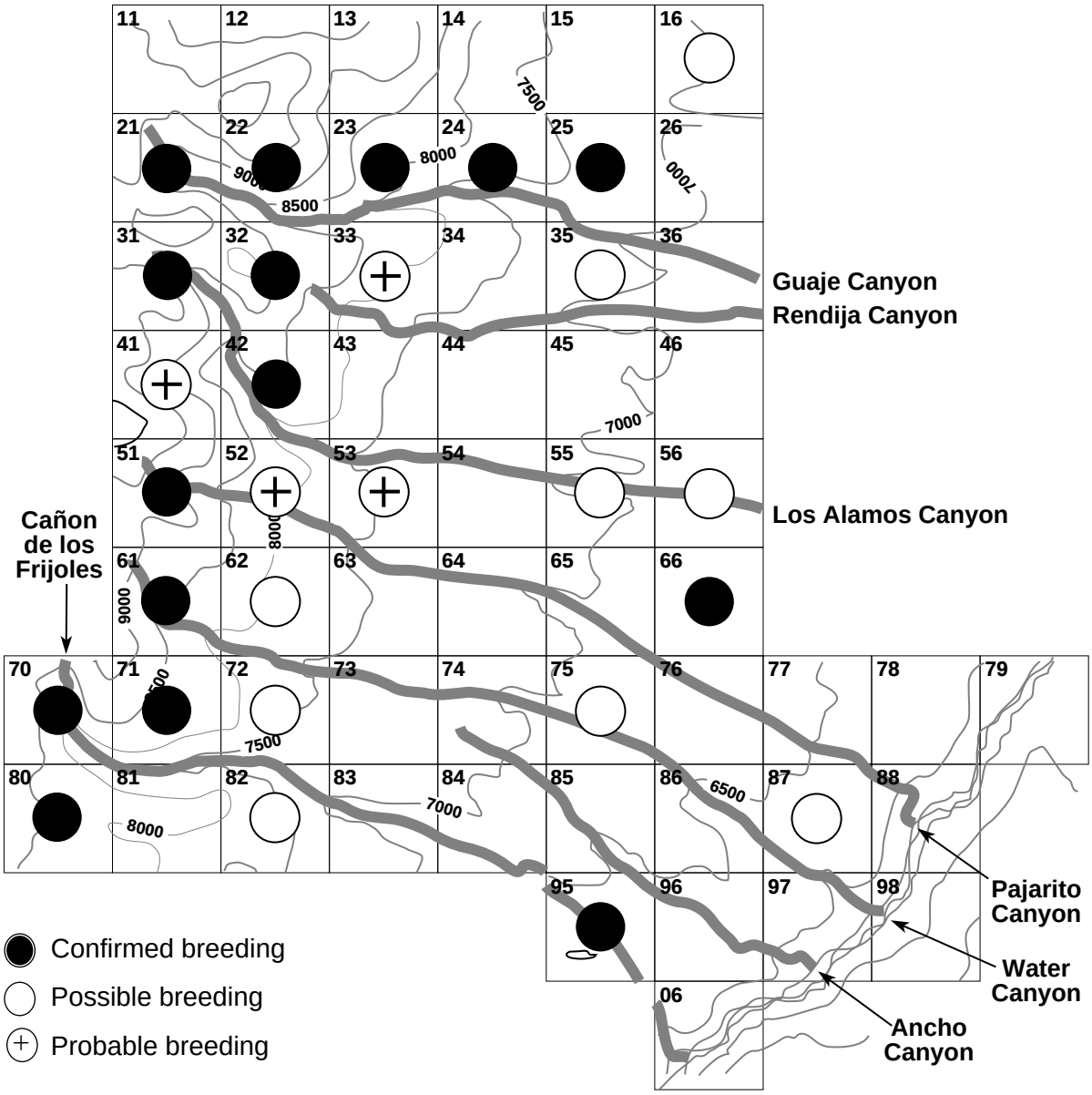
Red-naped Sapsuckers leave Los Alamos near mid-October (October 10 median date in 6 years).

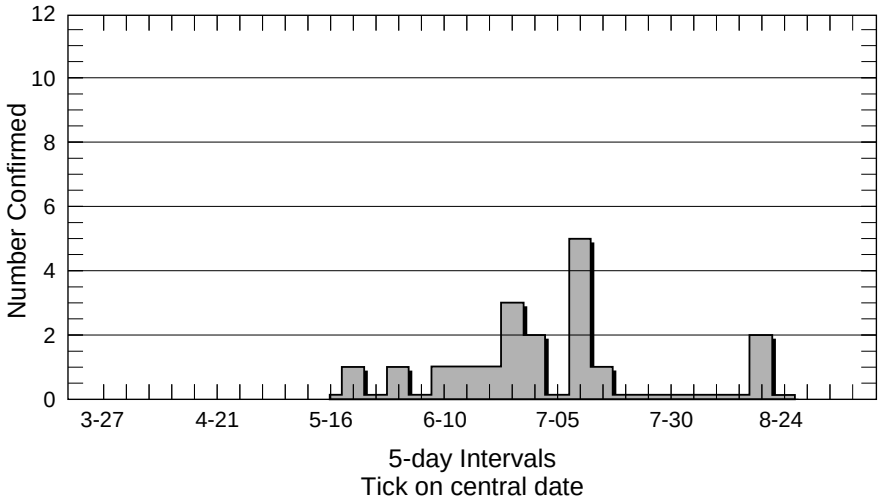
In his study of breeding birds in the Sandia Mountains, Tatchl (1967) found 10 nests, mostly in aspens in the midst of dense stands of trees. In contrast to Los Alamos, the Red-naped was the more common sapsucker in the Sandia Mountains.

RNSA

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer/ ponderosa pine (5)	1	0	0	1
Mixed conifer (17)	5	3	1	1
Total	6	3	1	2

Williamson's Sapsucker





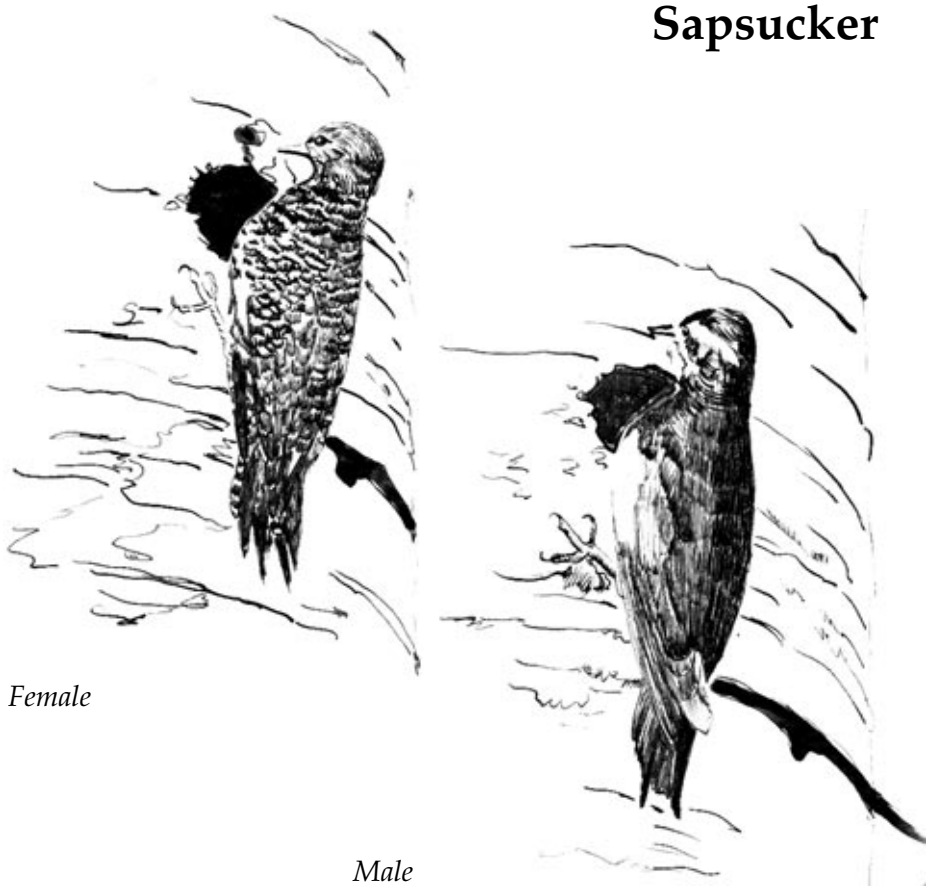
Williamson's Sapsucker

Williamson's Sapsucker
(Sphyrapicus thyroideus)

Williamson's Sapsucker summers and is variably resident in the mountains of northern New Mexico and is resident southward to the Mogollon Highlands. It nests in pine and fir forests where there are aspens (Hubbard 1978).

During the atlas period, Williamson's Sapsuckers occupied 77% of the blocks containing mixed coniferous forest. Nesting was confirmed in 85% of these. They were scattered locally through the ponderosa pine woods and in the lower canyon bottoms but only 29% of these were confirmed breeders. Discovery of nest holes comprised half of the confirmed records. Of the seven nest trees identified, five were aspens, one was a ponderosa pine, and one was a spruce. The nest holes were 9 to 50 feet above the ground. Nestling dates (9) were from May 20 to July 13.

The Williamson's Sapsucker is considerably more abundant and widespread in Los Alamos than is the Red-naped Sapsucker. Tatchl (1967) found it to be an uncommon breeding bird in the Sandia Mountains. Territorial drumming of the Williamson's Sapsucker is slower and more regular than that of the Red-naped Sapsucker, whose range it overlaps. It consists of a roll or two followed by three or four taps.



Female

Male

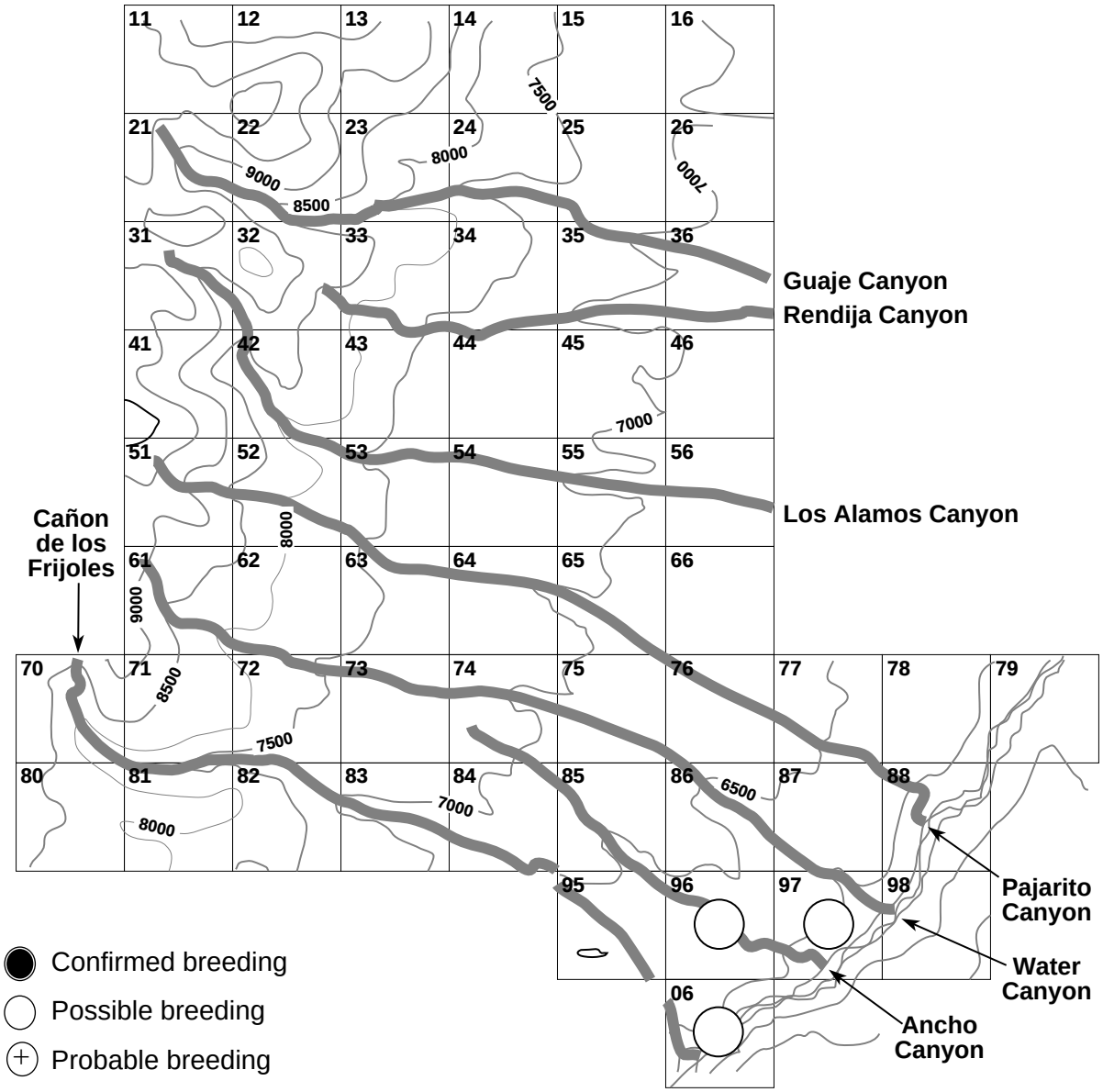
This sapsucker is unique among American woodpeckers in the degree of difference between the sexes, which were originally considered to be different species.

Although occasionally a Williamson's Sapsucker has been seen in the winter in Los Alamos, the species has usually left the county by October (September 29 median date in 8 years). Its spring arrival, determined from years in which there were no winter reports, is in early May (May 1 median date in 5 years).

WISA

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	13	11	2	0
Mixed conifer/ ponderosa pine (5)	4	1	1	2
Ponderosa pine (11)	3	1	1	1
Ponderosa pine/ piñon/juniper (21)	8	2	0	6
Total	28	15	4	9

Ladder-backed Woodpecker



Ladder-backed Woodpecker

Ladder-backed Woodpecker
(Picoides scalaris)

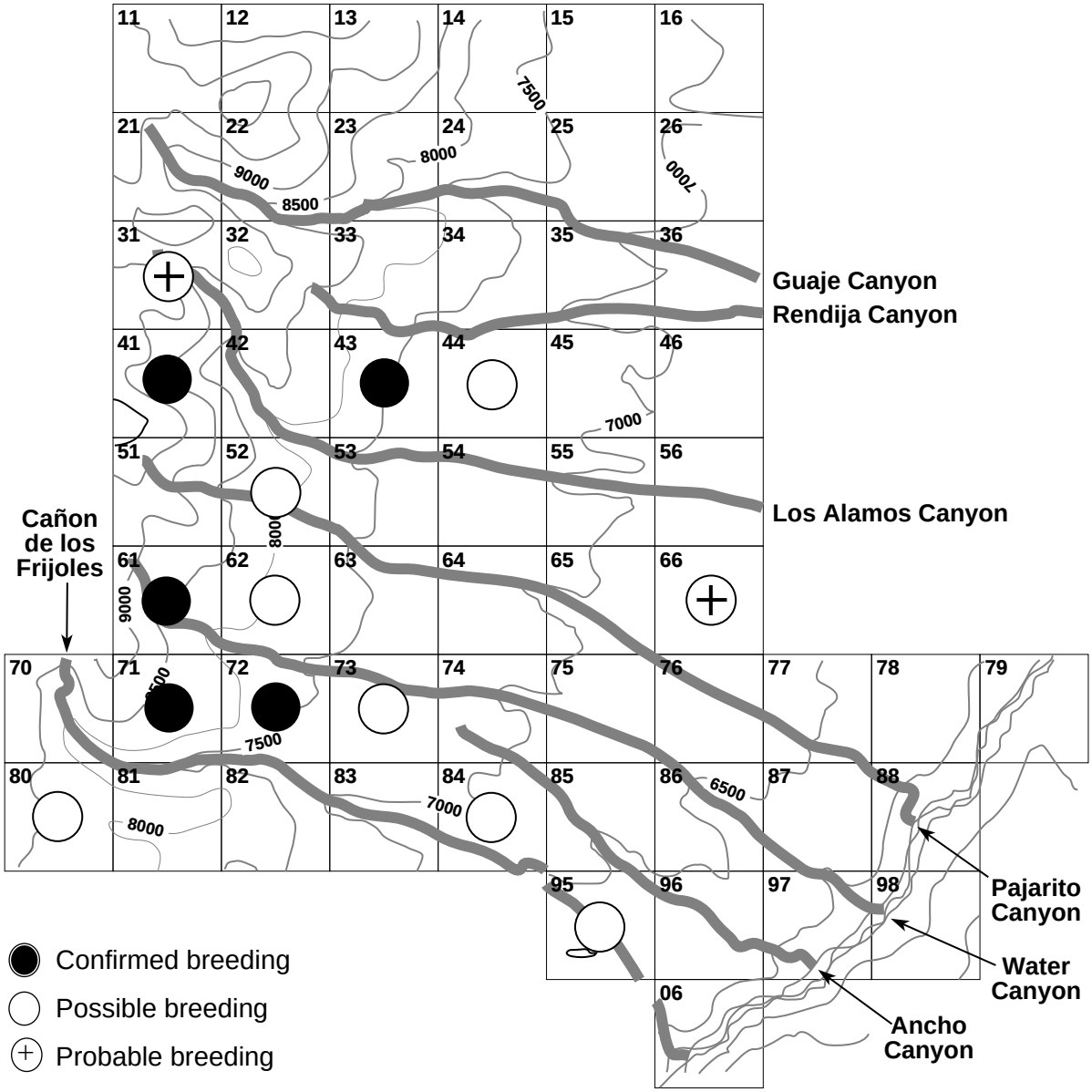
The Ladder-backed Woodpecker is resident in southern New Mexico and north locally to the Mogollon Plateau, the upper Rio Grande Valley to Dixon, the Mora Valley, and the Dry Cimarron Valley. It is found in lowland shrubland up locally into evergreen woodland (Hubbard 1978).

Ladder-backed Woodpeckers are uncommon but of regular occurrence in Los Alamos and are resident in the juniper/yucca/cholla grassland of the lower canyon bottoms where they open into the Rio Grande. During the atlas project, they were possibly breeding in three blocks in the southeast tip of the county, but breeding was not confirmed. There were only three reports, each from a different year (1986–1988). Both sexes were seen.

LBWO

Habitat	Occurrence	Conf	Prob	Poss
Rio Grande gorge (6)	2	0	0	2
Adjoining	1	0	0	1
Total	3	0	0	3

Downy Woodpecker



Downy Woodpecker

Downy Woodpecker
(Picoides pubescens)

The Downy Woodpecker is resident in mountainous areas and adjacent river valleys, south locally to the Mogollon and Sacramento highlands and in the lowland river valleys including the San Juan, Rio Grande, and upper San Francisco. It is found in forests containing aspens and in riparian woodland (Hubbard 1978).

In Los Alamos it occupies the same major habitats as the Hairy Woodpecker, but its occurrence is more localized and its numbers fewer. Downy Woodpeckers prefer mixed, broken forest where there are aspens. Their habitat preference is in subtle contrast to that of the Hairy Woodpecker. Although often found in conifers, they feed and nest chiefly in deciduous trees (Udvardy 1977).

During the atlas project, they were found in 36% of the mixed conifer blocks with a scattering of possible or probable breeding records from the lower forested blocks. Breeding was confirmed in 36% of the occupied blocks.

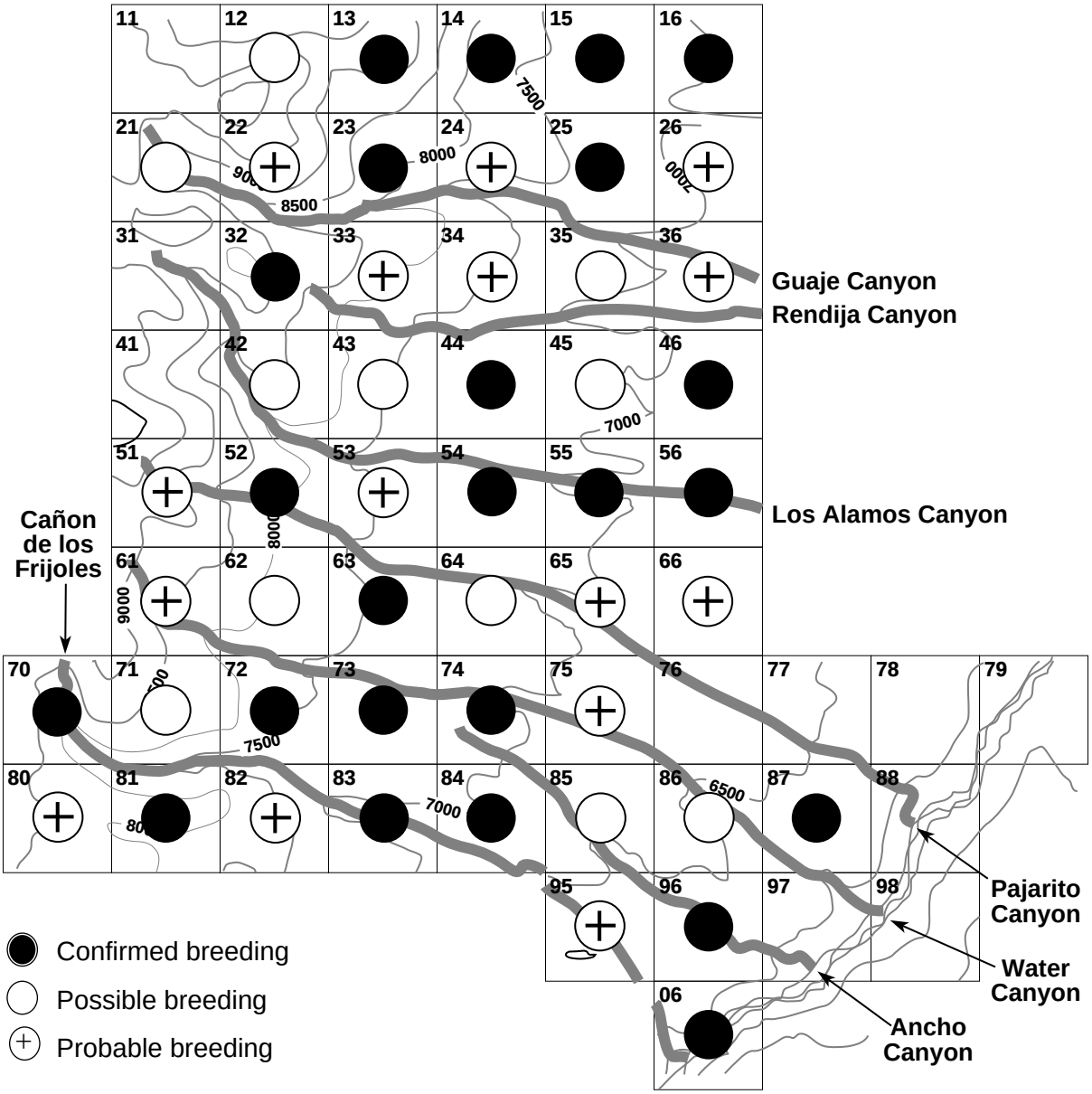
The soft incessant twittering of nestlings revealed nest holes to atlas fieldworkers in several of the blocks in the period June 27 to July 4. The four nest holes containing young were in aspens. Three were from 6–10 feet above the ground and the fourth was 50 feet above the ground.

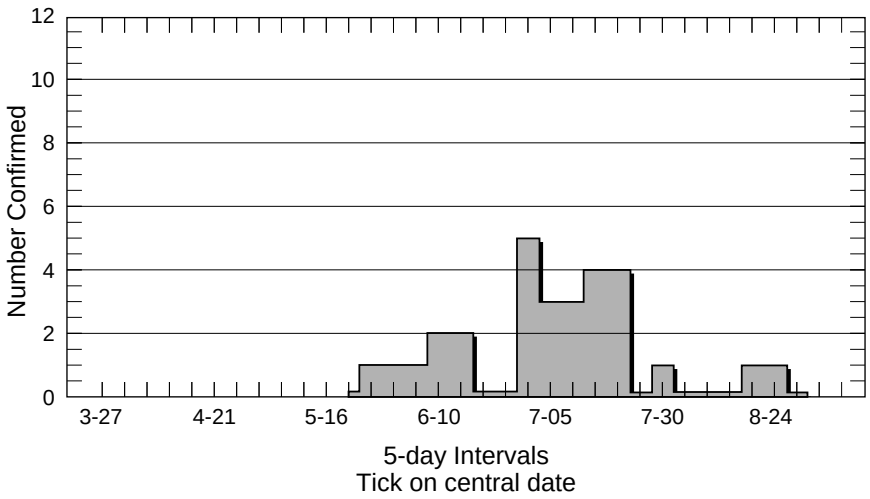
Downy Woodpeckers are uncommon in Los Alamos in winter. They were reported in 6 of 13 winters of adequate observation. Typically, they are last seen in November (November 18 median date in 6 years of late fall observations) and reappear in March or April.

DOWO

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	5	3	1	1
Mixed conifer/ ponderosa pine (5)	3	1	0	2
Ponderosa pine (11)	3	1	0	2
Ponderosa pine/ piñon/juniper (21)	3	0	1	2
Total	14	5	2	7

Hairy Woodpecker





Hairy Woodpecker

Hairy Woodpecker
(Picoides villosus)

The Hairy Woodpecker is resident in the mountains and their vicinities almost statewide (Hubbard 1978). Its preferred habitat is the coniferous forest.

During the atlas project, Hairy Woodpeckers were found in 93% of the forested blocks, although less frequently in the blocks with extensive spruce/fir forest. They did not occur in the piñon/juniper woodland in the southeast corner. Breeding was confirmed in 48% of the occupied blocks.

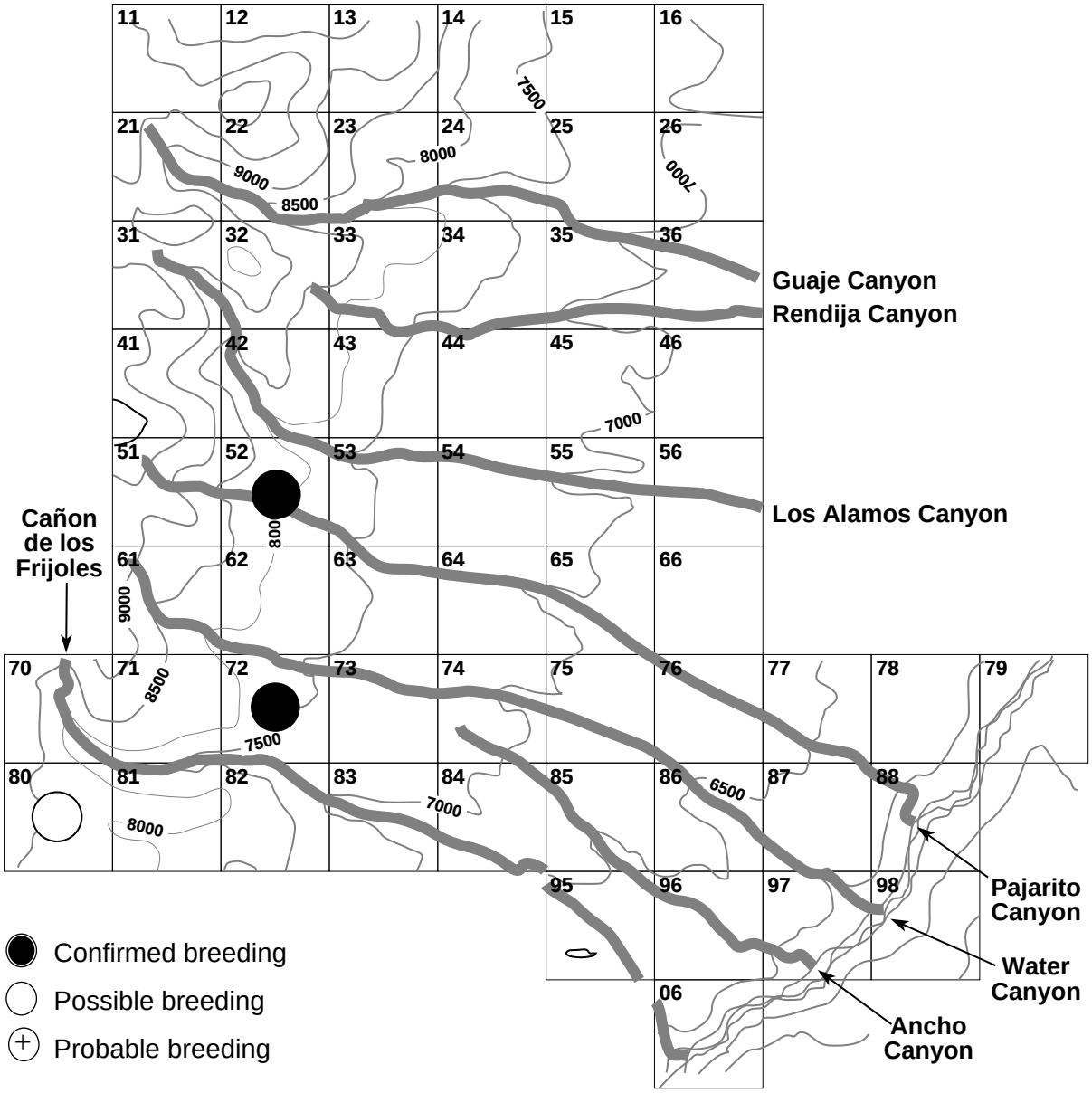
Occupied nests were found from June 2 to June 14. The other confirmations were attended young or fledglings. Of the four nest trees identified, three were dead ponderosa pines and one was an aspen. Nest heights (4 reported) ranged from 5 to 35 feet above the ground. The noisy squeaking of nestlings revealed the nest trees.

The Hairy Woodpecker is the most abundant of the four picoides woodpeckers found in Los Alamos. It is spread rather uniformly through the forests, but it is relatively secretive. Pairs maintain a large foraging range in winter and a contracted breeding territory in summer.

HAWO

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	14	5	5	4
Mixed conifer/ ponderosa pine (5)	5	3	1	1
Ponderosa pine (11)	11	7	3	1
Ponderosa pine/ piñon/juniper (21)	20	9	6	5
Total	50	24	15	11

Three-toed Woodpecker



Three-toed Woodpecker

Three-toed Woodpecker
(Picoides tridactylus)

The Three-toed Woodpecker is resident in mountains south to the Mogollon and Sacramento highlands in spruce/fir, fir, and adjacent pine forests (Hubbard 1978). It is partial to burned-over forest and may be found concentrated in such areas for a few years.

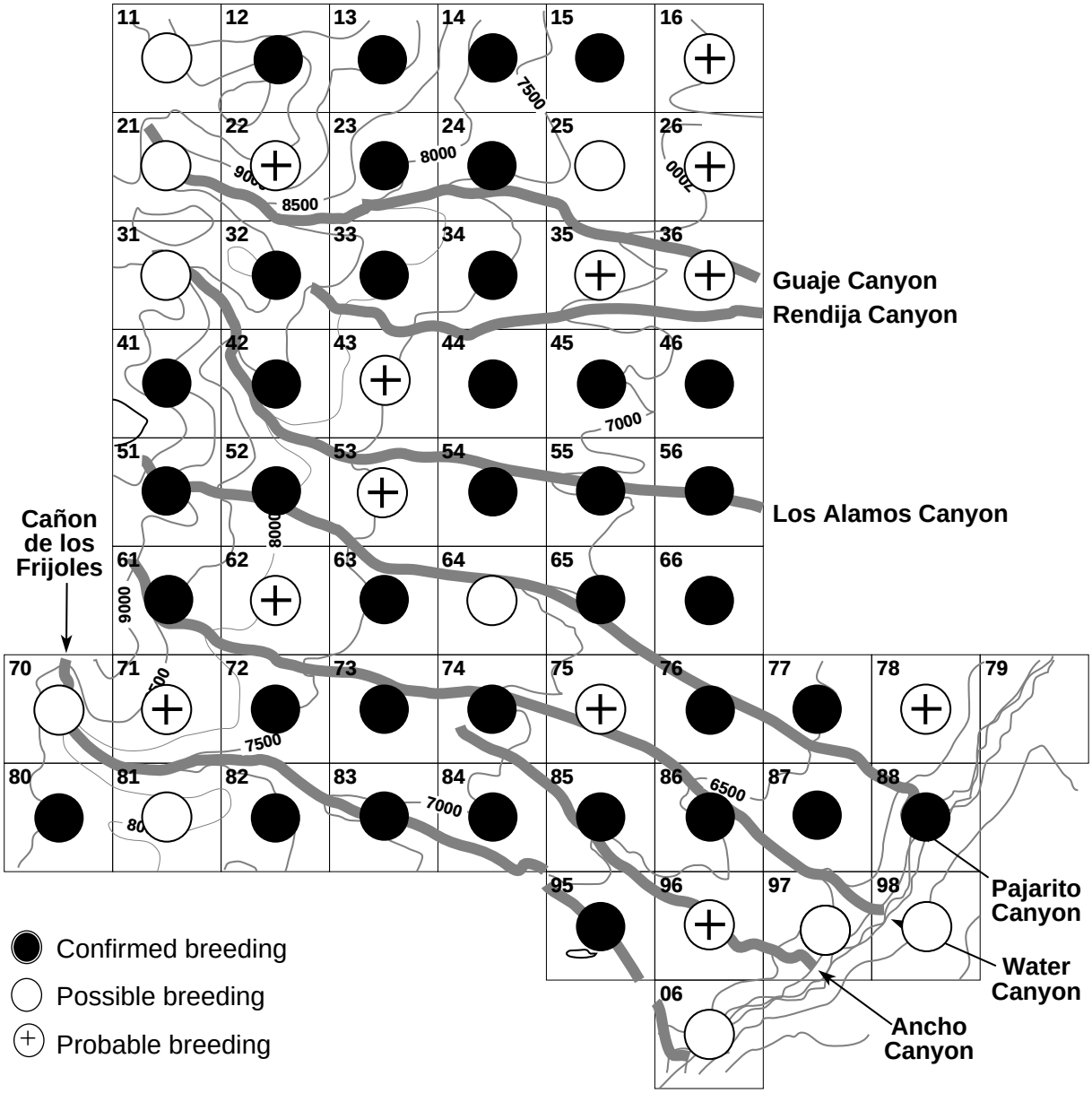
Before La Mesa fire in June 1977, Three-toed Woodpeckers had been rarely seen in Los Alamos. In censuses just before the fire on three of the burned-over mesas in Bandelier National Monument, Wauer (Foxx 1984) found one, but it was in an earlier 1-acre burn. Shortly after La Mesa fire, Wauer found four per 100 acres on transect censuses on Burnt Mesa (Blocks 7-3 and 8-4) and on Escobas Mesa (Blocks 7-2 and 8-3) and two per 100 acres along the Apache Spring Trail (Block 7-1). Censuses in the summer of 1978 and 1979 revealed that the population had increased by threefold in those 2 years.

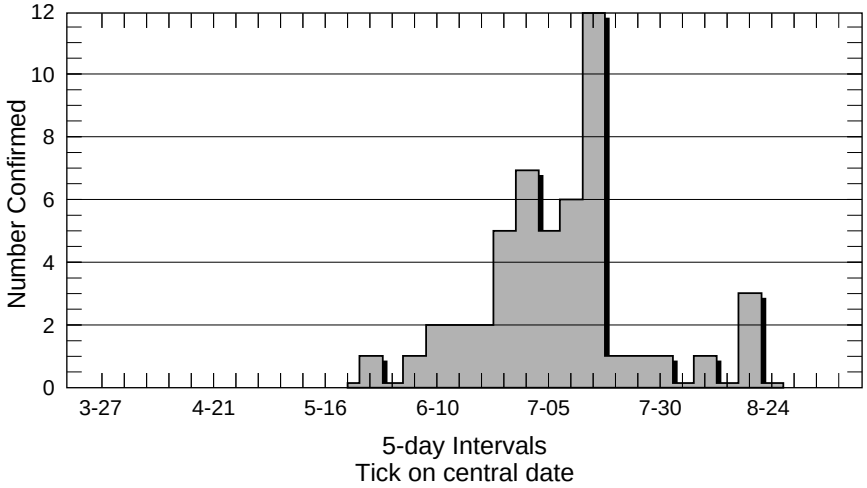
By 1984, the first year of atlas fieldwork, the number of Three-toed Woodpeckers had fallen to the level before the fire. None were found during the atlas period in the blocks containing Burnt and Escobas mesas. One confirmed breeding record was obtained in the partially burned ponderosa pine forest along the Apache Spring Trail (an adult feeding young on July 21, 1985). Another confirmation, again adults feeding young, was obtained in the mixed conifers of upper Pajarito Canyon on July 31, 1988.

TTWO

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	1	0	0	1
Mixed conifer/ ponderosa pine (5)	2	2	0	0
Total	3	2	0	1

Northern Flicker





Northern Flicker

Northern Flicker
(Colaptes auratus)

The red-shafted form of the Northern Flicker is resident in mountainous areas and down into valleys statewide (Hubbard 1978). Flickers breed wherever suitable trees for nest holes are found, from the lowest elevations to near timberline (Ligon 1961). Its habitat is coniferous forests, deciduous and mixed woods, and parks and gardens, with a preference for open situations with scattered trees and snags.

Red-shafted Flickers live throughout Los Alamos County. Primarily a ground feeder, flickers can often be observed eating ants from the red ant hills found along roadsides through the open forests. During the atlas project, they were recorded in 98% of the blocks and nesting was confirmed in 63% of these.

Although present in Los Alamos throughout the year, flickers move out of the higher forests in the winter. Head-bobbing displays, conspicuous calling, and pairing began in late March and early April in the atlas period. The earliest hole digging observed was on April 30. Occupied nests (16) were found from June 3 to July 22. Of the 12 nest trees reported, nine were ponderosa pines, two were aspens, and one was a box elder. Nest heights ranged from 10 to 35 feet with a median of 17 feet (16 records).

Wauer's surveys in blocks partly burned in the La Mesa fire showed a two-fold increase in the Red-shafted Flicker population following the fire (Foxx 1984). The fire created more of the open habitat preferred by flickers. We confirmed breeding in all of those blocks in the atlas period.

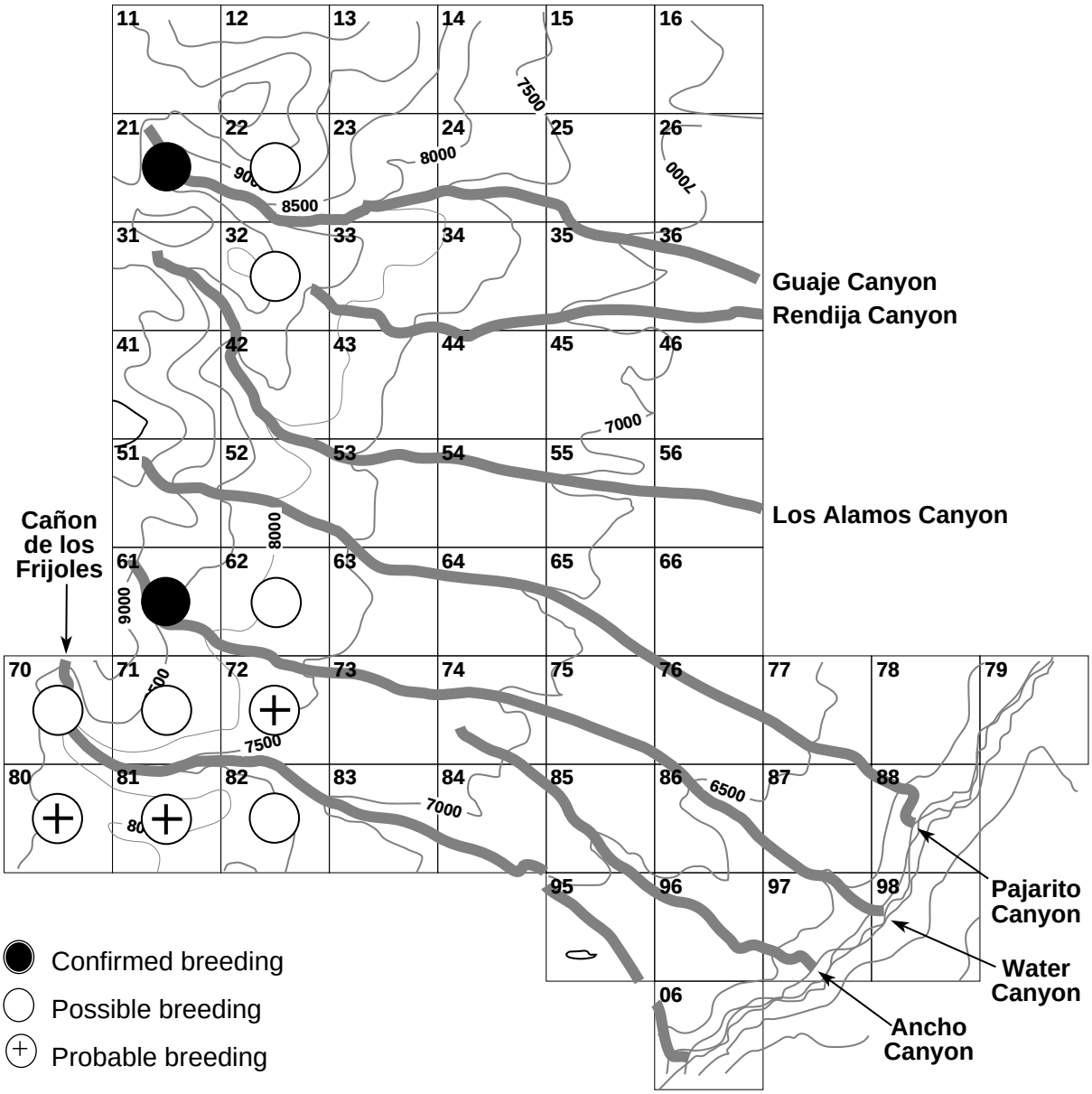
In September, migration brings an influx of flickers, which drift through the area in small groups moving south.

Wintering Red-shafted Flickers roost in cavities in trees or self-excavated holes. In the absence of trees containing such winter retreats, they may resort to sidings of houses or other manmade structures, pecking their way into the interior, thus making their presence objectionable (Ligon 1961).

NOFL

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	17	10	2	5
Mixed conifer/ ponderosa pine (5)	5	4	1	0
Ponderosa pine (11)	11	8	2	1
Ponderosa pine/ piñon/juniper (21)	21	13	6	2
Piñon/juniper (6)	5	2	1	2
Total	59	37	12	10

Olive-sided Flycatcher



Olive-sided Flycatcher

Olive-sided Flycatcher
(Contopus borealis)

The Olive-sided Flycatcher summers in the mountains south to the Mogollon and occasionally to the Sacramento highlands. It is found in spruce/fir, fir, and adjacent pine forests and riparian woodland. Spring migrants persist locally into June, even at lower altitudes, while autumn migration begins by August; thus "summer" occurrence may not be indicative of breeding (Hubbard 1978).

During the atlas project, Olive-sided Flycatchers nested in the highest part of the county. They were found in 50% of the blocks containing mixed coniferous forest. Breeding was confirmed in only 18% of the occupied blocks, and breeding was probable in another 27%. Observations indicating possible breeding from June 12 to July 12 were accepted for the atlas. Earlier and later dates were considered likely to be those of migrants. The earliest evidence of territorial defense was on June 7, 1988. We discovered one nest located high in a lone tall conifer, on July 12, 1986.

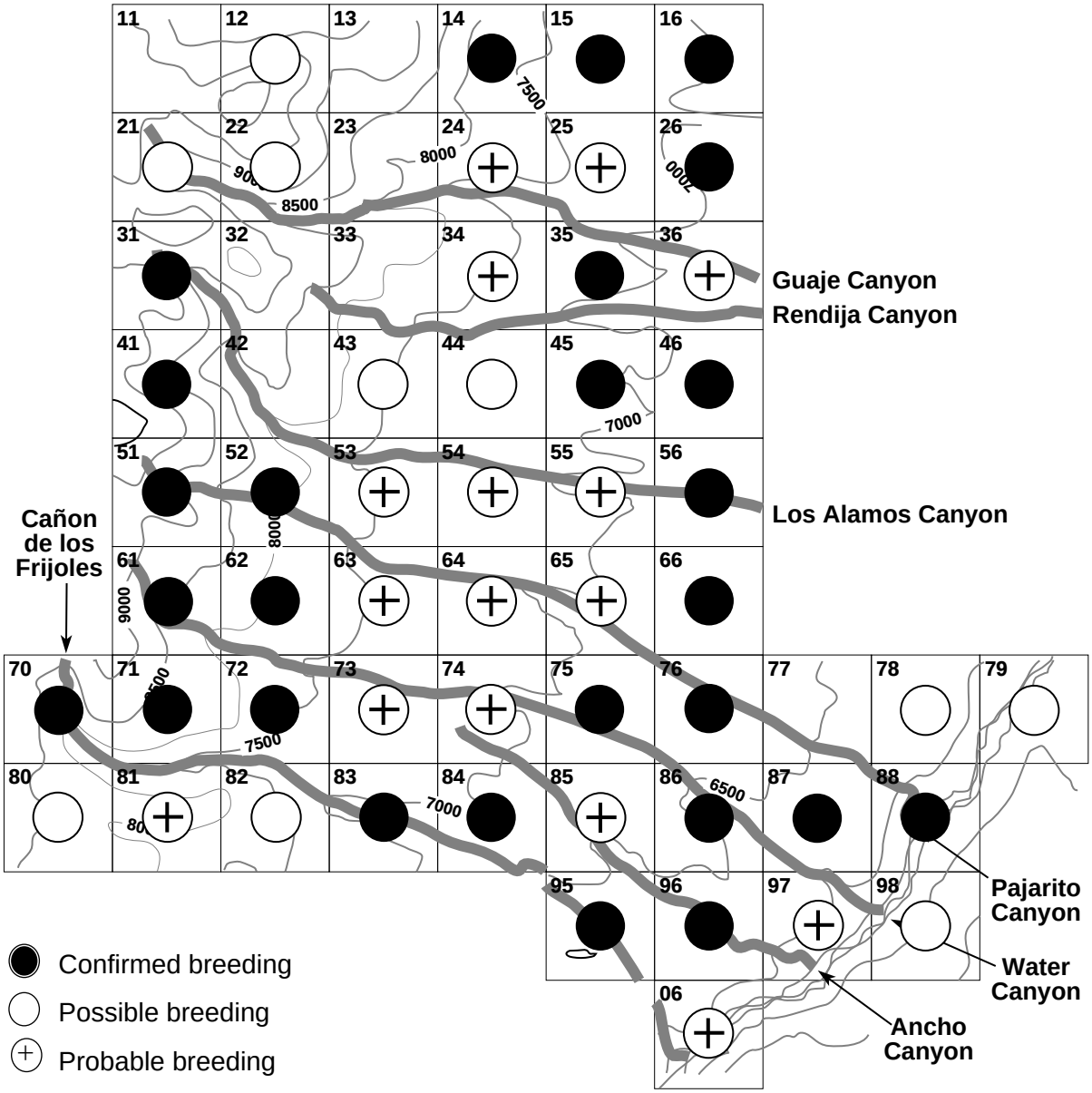
Olive-sided Flycatchers arrive in Los Alamos in mid-May (May 17 median date in 11 years). They announce their arrival with song from conspicuous treetops—a vigorous, far-carrying three-syllable call phoneticized as "whip-three-beers." The dawn song of the Olive-sided Flycatcher is a regular repetition of the three-syllable call. Because of their aggressiveness in defense of their territories, breeding pairs are well separated (Pough 1953).

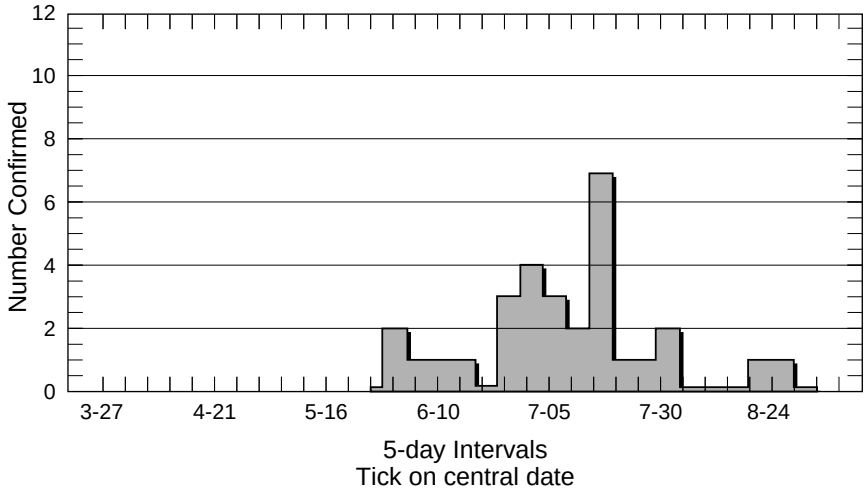
In a typical year, the Olive-sided Flycatcher is last noted in the county in early September (September 9 median date in 7 years).

OSFL

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	10	2	3	5
Mixed conifer/ ponderosa pine (5)	1	0	0	1
Total	11	2	3	6

Western Wood-Pewee





Western Wood-Pewee

Western Wood-Pewee
(Contopus sordidulus)

The Western Wood-Pewee summers statewide, but the eastern limits of the main breeding populations are the Dry Cimarron, Canadian, and Pecos valleys. It is found in ponderosa pines in woodland and forest habitats (Hubbard 1978).

During the atlas project, Western Wood-Pewees inhabited most of the forest and woodland blocks in Los Alamos. They were found in 100% of the blocks containing ponderosa pine forest and 65% of the higher mixed conifer blocks. Breeding was confirmed in 51% of the occupied blocks.

Nesting began early in June, and feeding of fledglings peaked in mid-July. Nest building by five pairs was reported. The nests were typically saddled to a horizontal fork or limb in a ponderosa pine from 10 to 30 feet above the ground.

The territorial song of the Western Wood-Pewee is a long rhythmic sequence of paired phrases—an emphatic, down-slurred phrase, which is much like the daytime call note, followed by a rising, three-syllabled phrase.

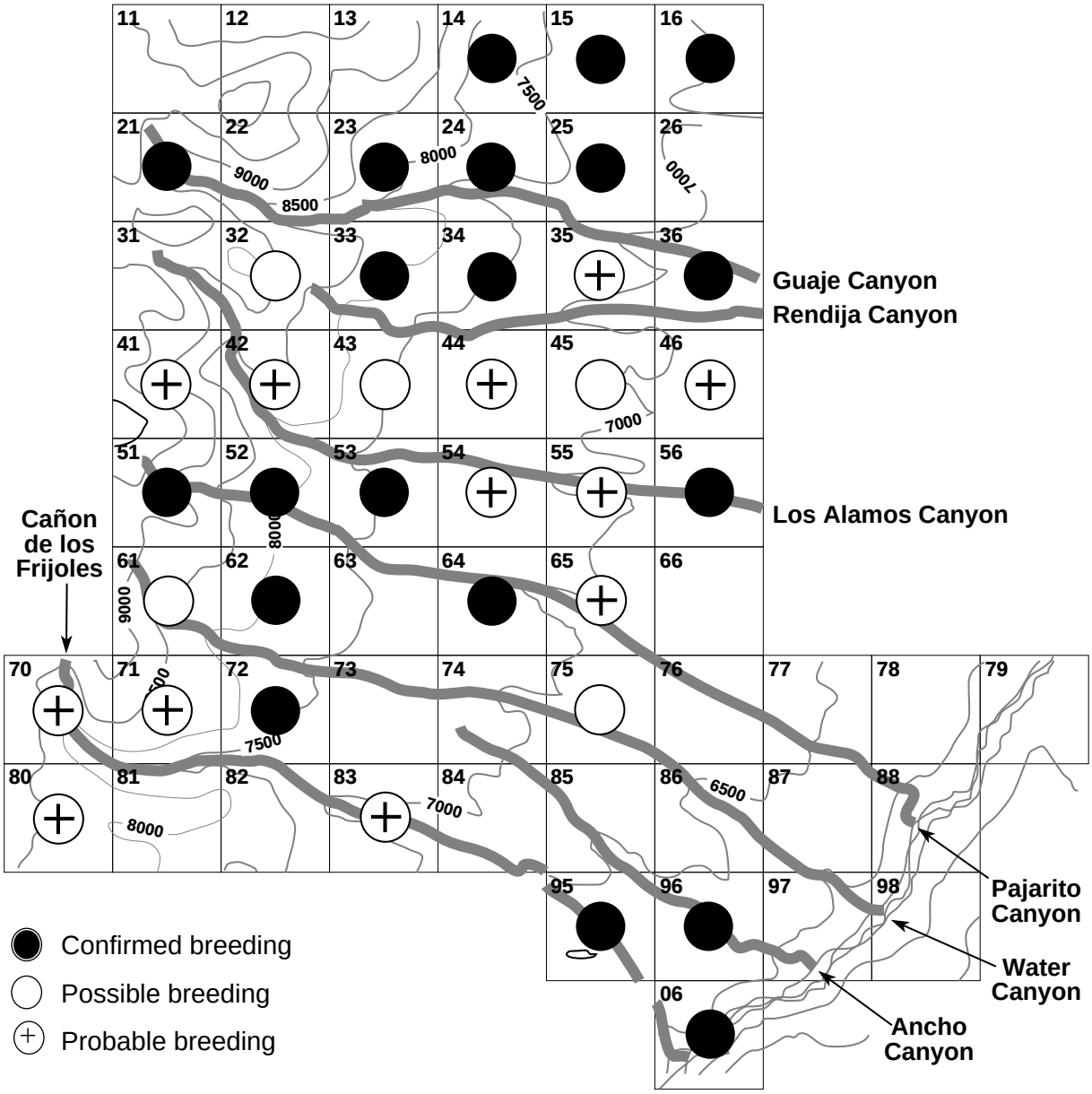
Extended predawn song occurs daily during territorial establishment and courtship. It is one of the earliest in the dawn chorus and usually ends before daylight.

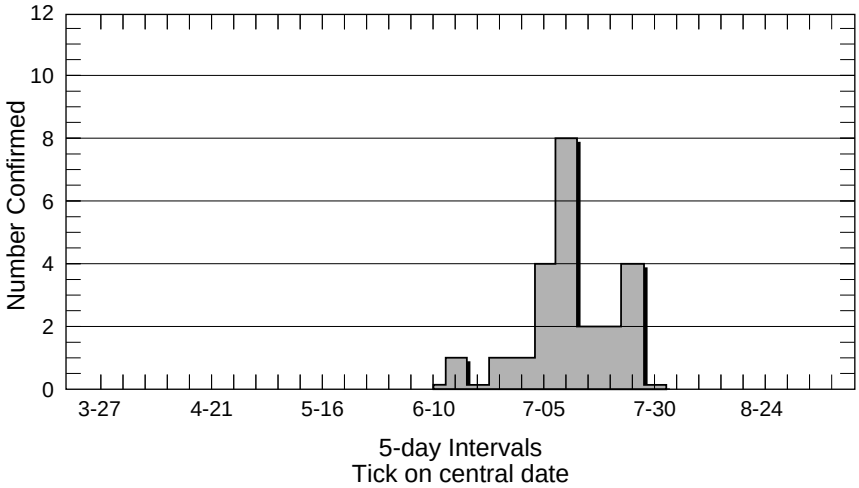
Western Wood-Pewees arrive in Los Alamos in mid-May (May 11 median date in 20 years) and depart in early September (September 13 median date in 8 years).

WWPE

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	11	6	1	4
Mixed conifer/ ponderosa pine (5)	5	4	1	0
Ponderosa pine (11)	11	2	6	3
Ponderosa pine/ piñon/juniper (21)	21	14	7	0
Piñon/juniper (6)	5	1	1	3
Total	53	27	16	10

Hammond's Flycatcher





Hammond's Flycatcher

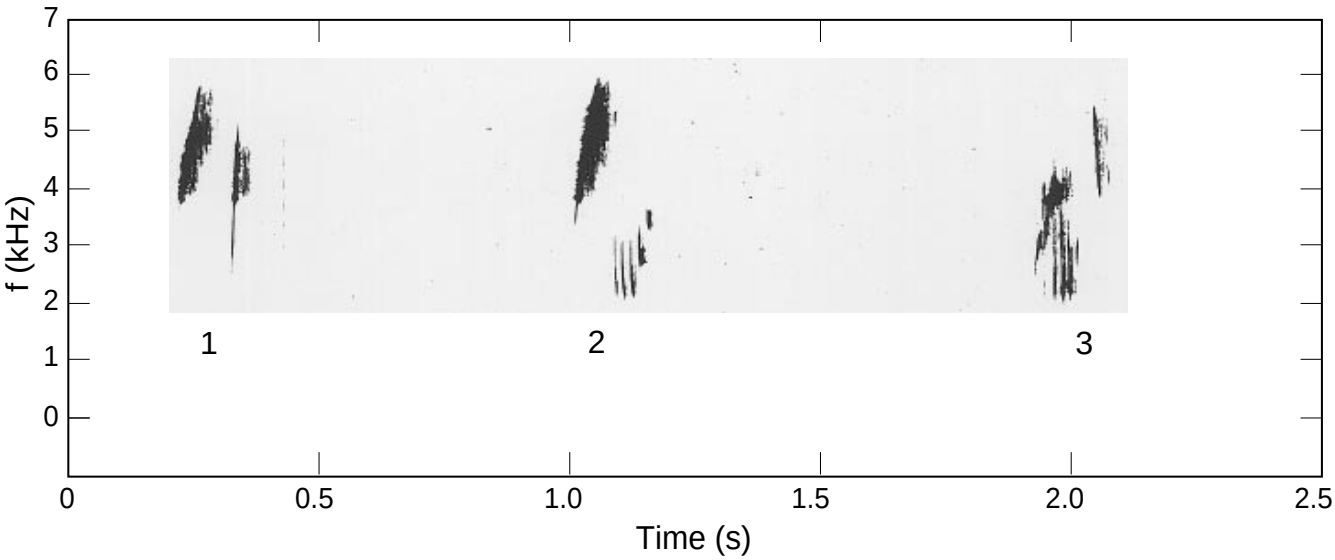
Hammond's Flycatcher
(Empidonax hammondii)

The Hammond's Flycatcher summers locally in the San Juan, Jemez, Sangre de Cristo, and Sandia mountains. Its habitat is principally the montane coniferous forests of spruce/fir, mixed conifers, ponderosa pine, and locally mixed cottonwood/conifer streamside habitat. It frequents midrange to upper levels of mature trees.

During the atlas project, Hammond's Flycatchers were found in 65% of the forested blocks. Breeding was confirmed in 54% of the occupied blocks. Six nests were found between June 26 and July 16 in the ponderosa pine forest and lower canyons, all in ponderosa pines, and from 18 to 40 feet above the ground. Adults feeding young were observed in all of the nests.

Hammond's and Dusky Flycatchers are almost indistinguishable by sight. The only sure way to tell them apart is by song, which is sung with regularity only at dawn. Each utilizes a varied series of three syllables. The distinguishing features are the lower-pitched, heavily burred syllable of the Hammond's (syllable 3) and the higher, up-slurred whistled syllable of the Dusky (syllable 3). Identification of territorial Hammond's Flycatchers was made from the song.

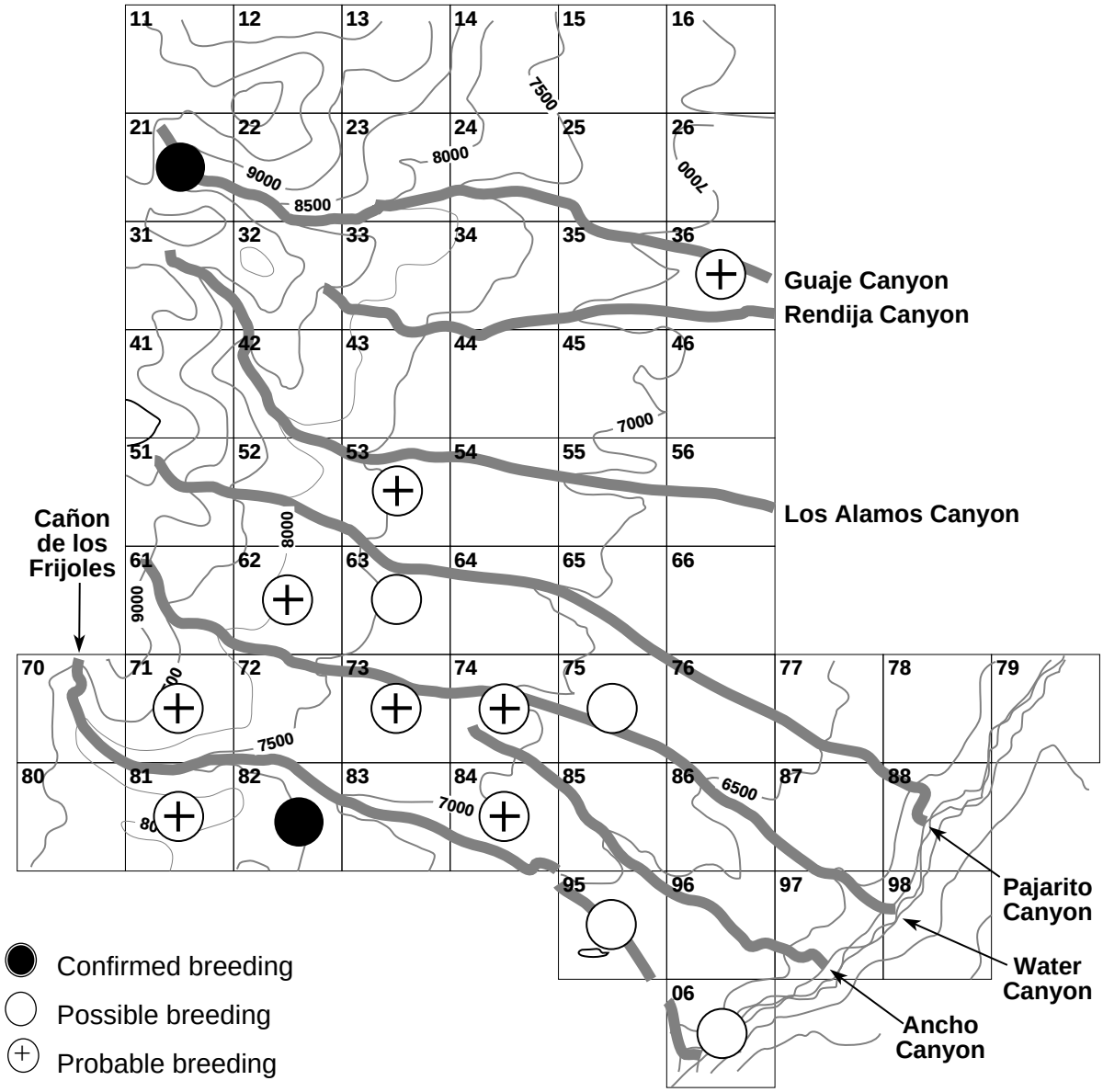
Hammond's Flycatchers arrive in Los Alamos in early May (May 4 median date in 17 years) and depart in mid-September (September 10 median date in 5 years, determined from systematic banding).



HAFL

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	11	4	5	2
Mixed conifer/ ponderosa pine (5)	5	5	0	0
Ponderosa pine (11)	8	4	3	1
Ponderosa pine/ piñon/juniper (21)	13	7	4	2
Total	37	20	12	5

Dusky Flycatcher



Dusky Flycatcher

Dusky Flycatcher
(Empidonax oberholseri)

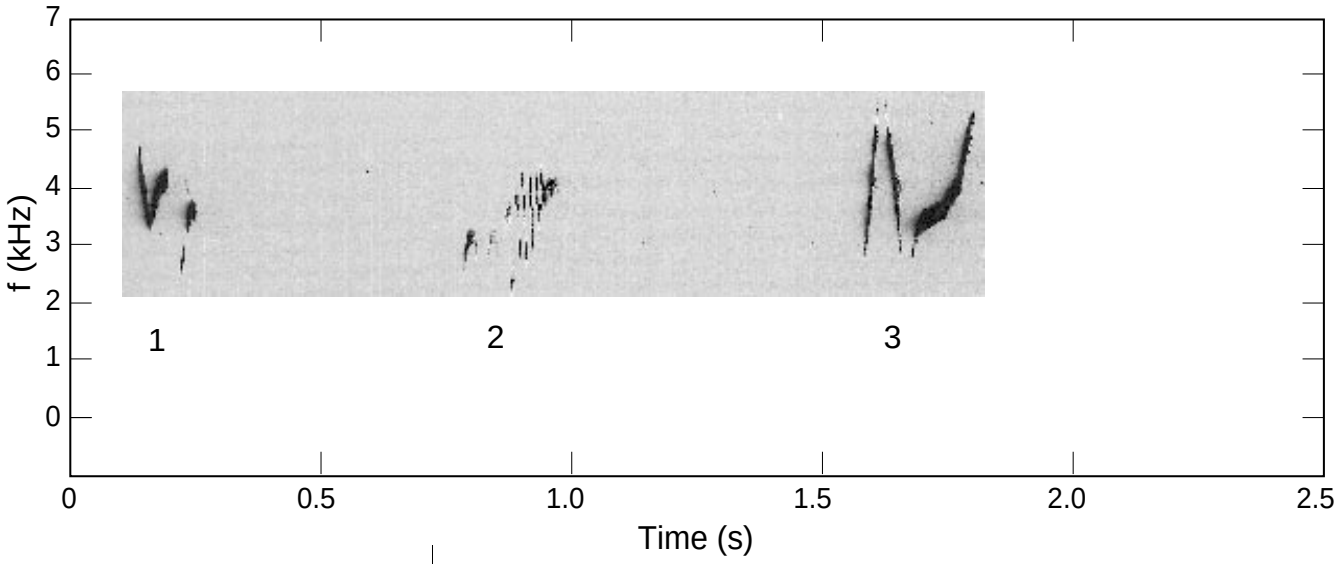
The Dusky Flycatcher summers locally in the San Juan, Jemez, and Sandia mountains, on Mount Taylor and Sierra Grande, and casually elsewhere in the northern part of the state (Hubbard 1978). Its habitat is the oak shrub in open areas in pine forest and forest brushland in open spruce/fir and mixed conifer communities. Its preferred nesting situation is in open, sunny borders and clearings, and the deciduous lower understory of open forests (Blackford 1956).

the species—4 feet above the ground in a crotch of a Gambel's oak in open ponderosa pine woods.

The song, given principally at dawn, is a varied sequence of three syllables (one snappy, one burry, and a clear ascending one) (Farrand 1983). Recognizing differences in the character of the individual syllables that comprise the dawn song is the only reliable way to distinguish Dusky from Hammond's Flycatchers. Characteristic are syllable 3 of the Dusky and syllable 3 of the Hammond's.

Identification of the Dusky Flycatcher during the atlas period was by song, mostly during persistent dawn singing. From the study of recordings, the field leaders learned the songs of the Hammond's and Dusky Flycatchers and how to distinguish between them. Tape recordings were made of singing Duskies from 6 of the 14 blocks from which they were reported.

Dusky Flycatchers arrive in Los Alamos in early May (May 6 median date in 6 years) and depart in mid-September (September 12 median date in 4 years, determined from systematic banding).



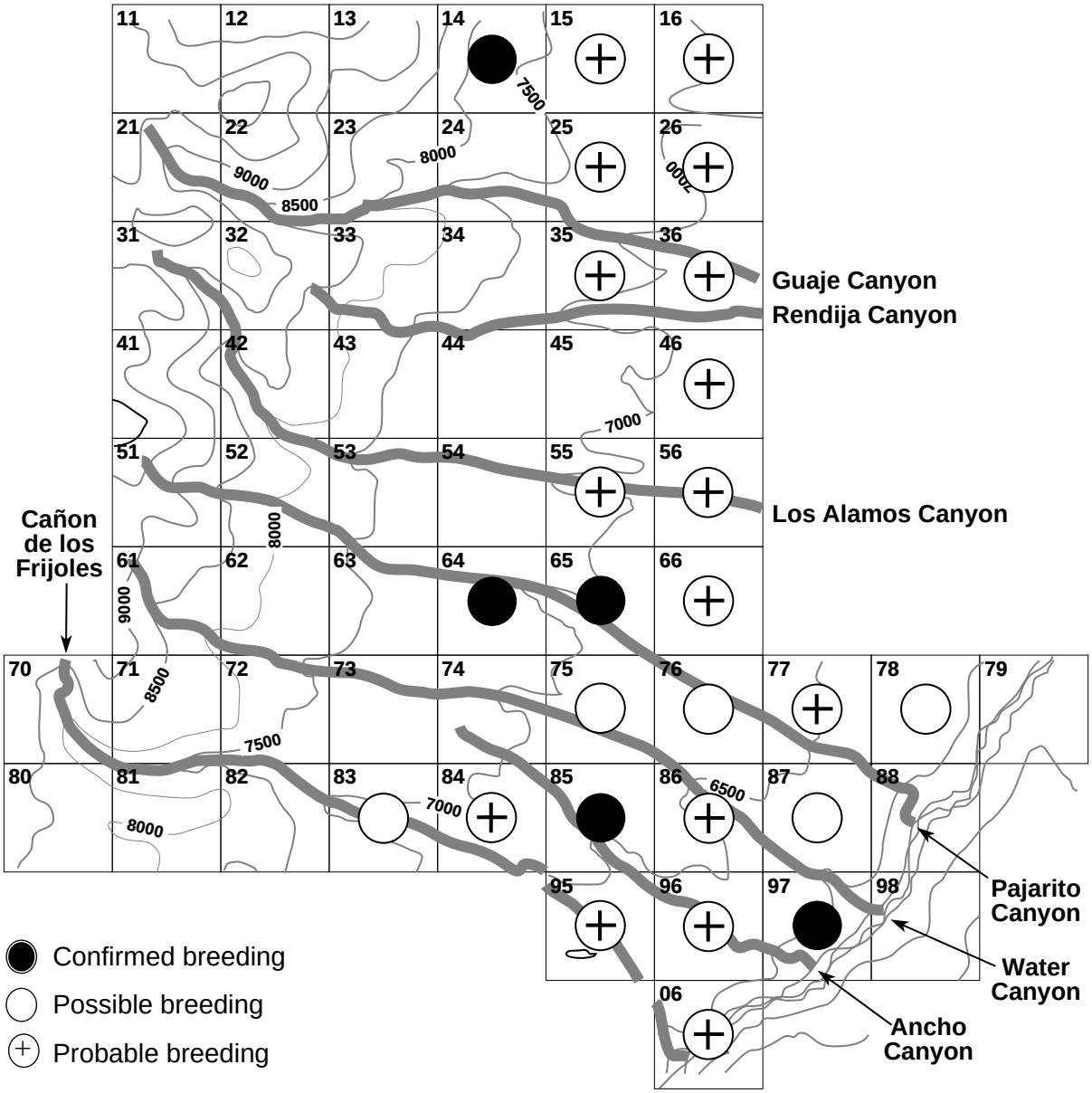
During the atlas project, Dusky Flycatchers were found sparingly, scattered in various open habitats in patchy forest and woodland. They occurred in 26% of the forested blocks. Breeding was confirmed in only two blocks (14% of the occupied blocks). These records were of adults feeding young.

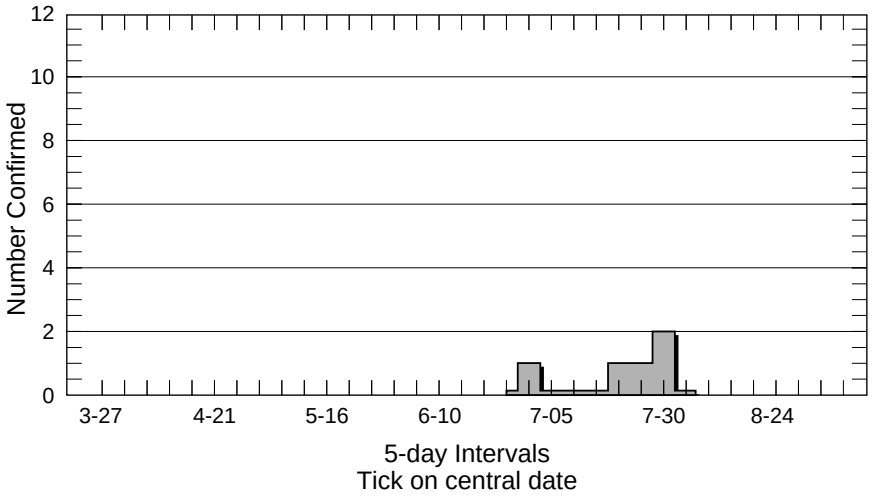
There is one Los Alamos nest record before the atlas project. The nest location was typical of

DUFL

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	3	1	2	0
Mixed conifer/ ponderosa pine (5)	1	0	1	0
Ponderosa pine (11)	4	1	2	1
Ponderosa pine/ piñon/juniper (21)	6	0	3	3
TOTAL	14	2	8	4

Gray Flycatcher





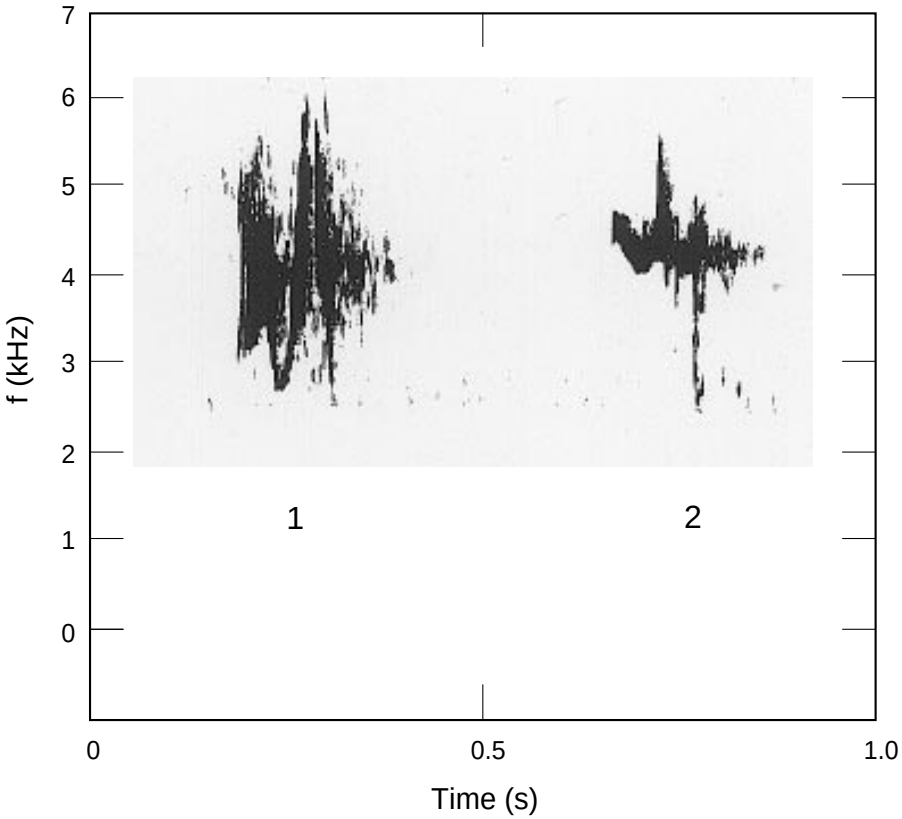
Gray Flycatcher

Gray Flycatcher
(Empidonax wrightii)

The Gray Flycatcher summers in the northwest part of the state, eastward to the Pecos area, and southward locally (and perhaps only occasionally) to the Silver City area and the Jicarillo Mountains. It is most widespread and numerous in evergreen woodlands west of the Rio Grande and north of the Mogollon Plateau (Hubbard 1978). In Los Alamos, it is restricted to the piñon/juniper woodland community, which includes areas of interdigitation of piñon and ponderosa pines.

During the atlas project, Gray Flycatchers inhabited 85% of the piñon/juniper blocks. Breeding was confirmed in 19% of the occupied blocks. One nest was found. It was 11 feet off the ground in a piñon pine tree and contained two nestlings being fed at regular intervals by both parents.

Gray Flycatchers look much like their congeners, the Hammond's and Dusky Flycatchers. They can be identified with certainty in the field by voice. The dawn song of the Gray Flycatcher consists of a series of short double-noted syllables (1) interspersed occasionally with a higher pitched, whistled



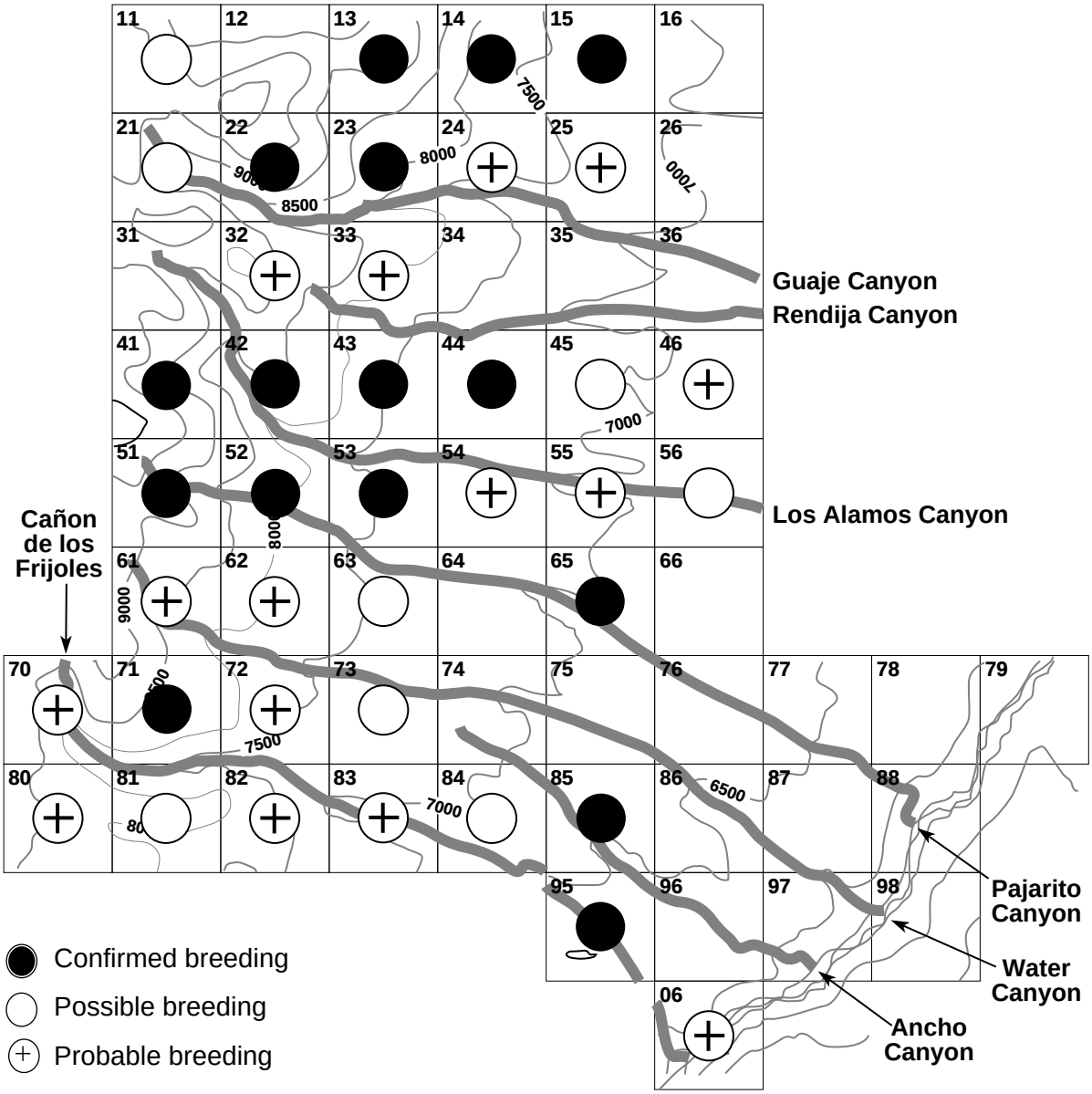
syllable (2). There are typically 5 to 10 of the double-noted syllables to every whistled syllable.

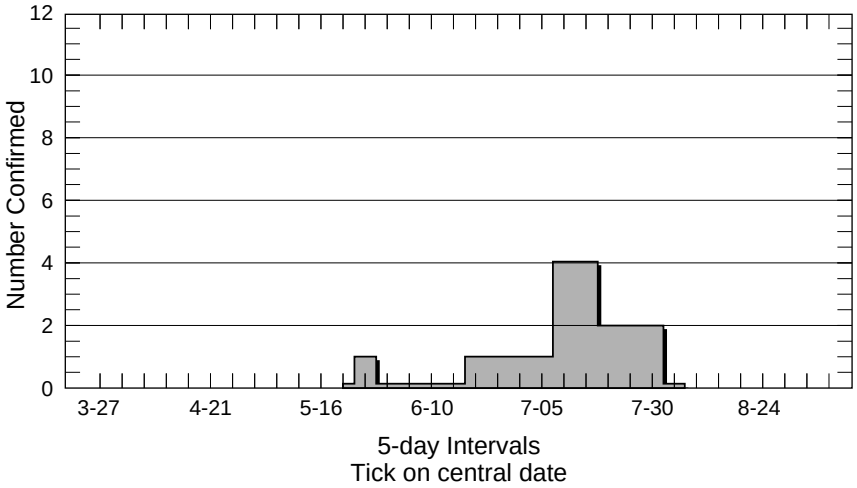
Gray Flycatchers arrive in Los Alamos in mid-April (April 18 median date in 9 years). We have no data on their departure date.

GRFL

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	4	1	2	1
Ponderosa pine/ piñon/juniper (21)	19	3	13	3
Piñon/juniper (6)	4	1	1	1
Total	26	5	16	5

Cordilleran Flycatcher





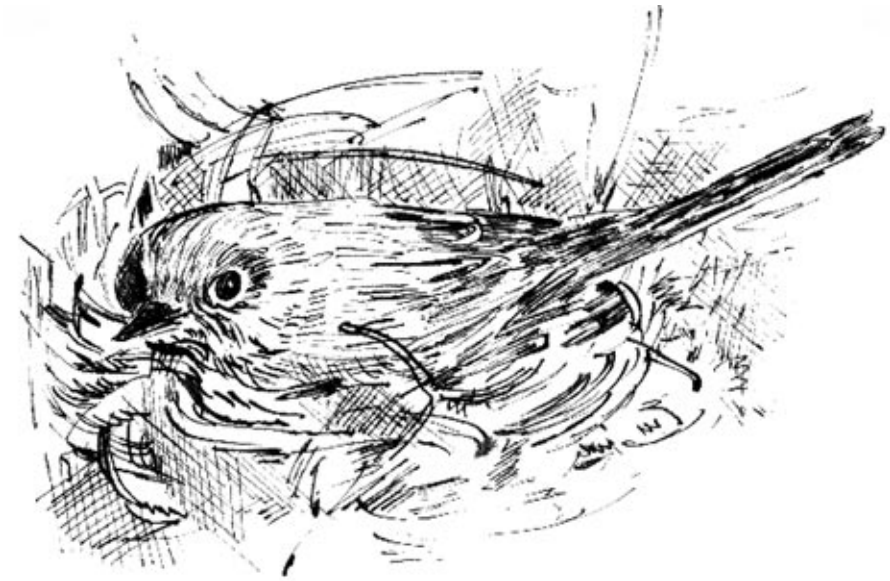
Cordilleran Flycatcher

Cordilleran Flycatcher
(Empidonax occidentalis)

The Cordilleran Flycatcher summers in mountainous areas statewide (Hubbard 1978). It inhabits a variety of habitats in its extensive range, but typical are canyon bottoms with conifers shading a deciduous understory (Farrand 1983).

During the atlas project, Cordilleran Flycatchers were found in 91% of the forested blocks above 7200 feet in elevation. Breeding was confirmed in 41% of the occupied blocks. The location of 11 nests included four in niches on cliff faces, three in unused outbuildings, one in a roadside bank, and two on residential porch rafters. Occupied nests were found between June 21 and July 22.

The Cordilleran Flycatcher is one of the latest spring migrants to arrive in Los Alamos. Nest-building begins shortly after arrival. Males defend their territories vigorously. Their sharply rising, explosive calls are given regularly through the day. The dawn territorial song has three syllables as do the songs of the Hammond's and Dusky Flycatchers, but it is regular in the ordering of the syllables in the sequence.



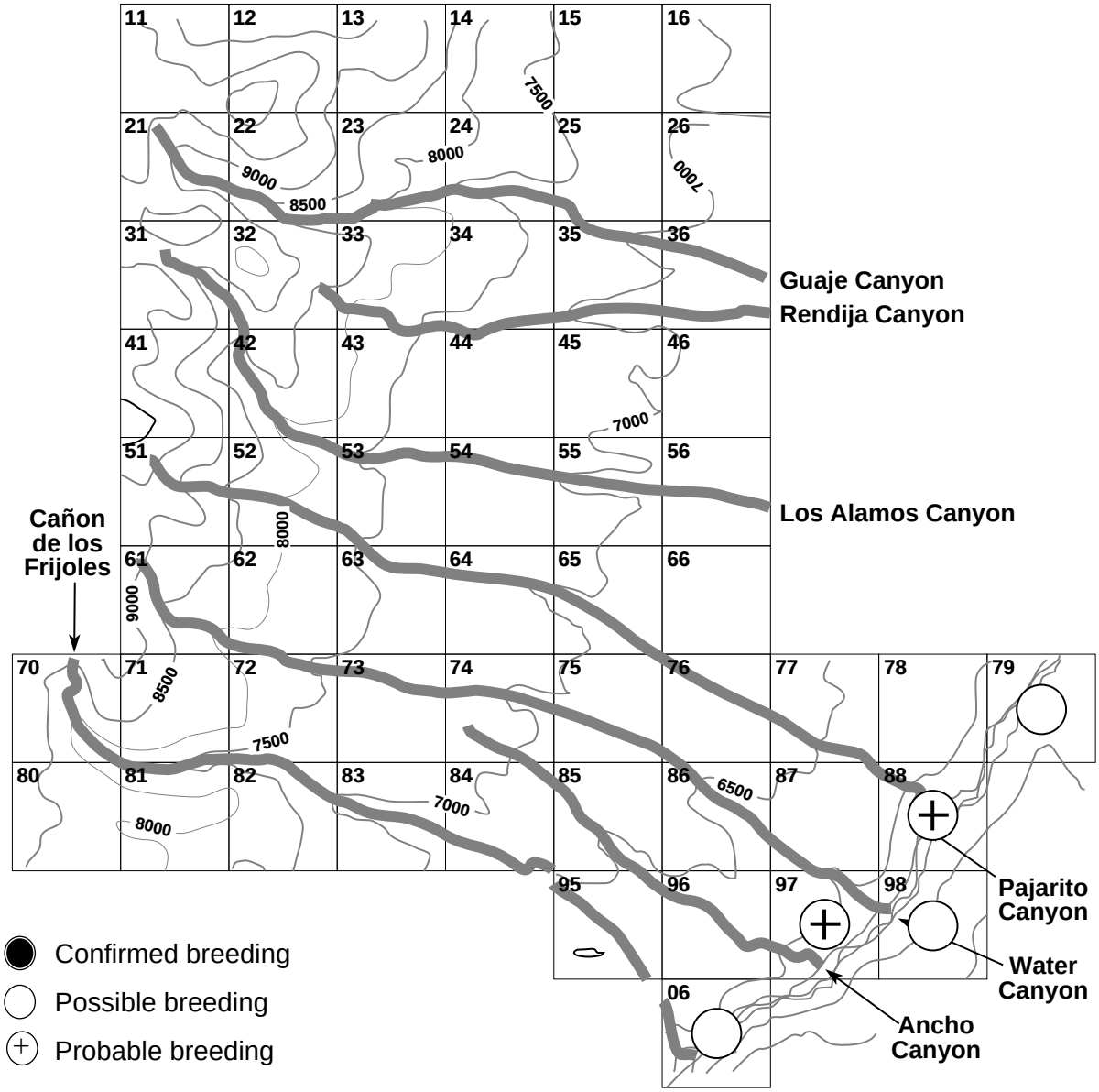
The spring arrival of Western Flycatchers* in Los Alamos is in mid- to late May (May 21 median date in 13 years). We have no information on the date of its fall departure.

*Until recently, the Cordilleran and Pacific-slope Flycatchers were considered conspecific under the name Western Flycatcher ("37th Supplement to the American Ornithologists' Union Check-list of North American Birds," *Auk* **106**, pp. 532–538, 1989). Since both migrate through New Mexico, and are indistinguishable in the field except by song, they are lumped as Western Flycatcher for migration data.

WEFL

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	15	7	5	3
Mixed conifer/ ponderosa pine (5)	5	2	3	0
Ponderosa pine (11)	10	4	4	2
Ponderosa pine/ piñon/juniper (21)	9	3	3	3
TOTAL	39	16	15	8

Black Phoebe



Black Phoebe

Black Phoebe
(Sayornis nigricans)

Black Phoebes are resident along watercourses and ponds in southern New Mexico, and they summer northward in the Rio Grande Valley locally to Alcalde. They nest regularly under bridges crossing irrigation and drainage ditches in the Albuquerque area.

Breeding was not confirmed during the atlas period in Los Alamos, but Black Phoebes were found in 83% of the blocks through which the Rio Grande flows. Observation of courtship activity in one block and a pair in another block indicated probable breeding.

Our lack of confirmation of nesting is probably due to the difficulty of access to the cliff faces bordering the Rio Grande. Typically the phoebe's mud nest is plastered to a vertical surface, often beneath an overhanging projection and over or near water. A Black Phoebe is almost always near water and usually in plain view sitting restlessly on an exposed twig,

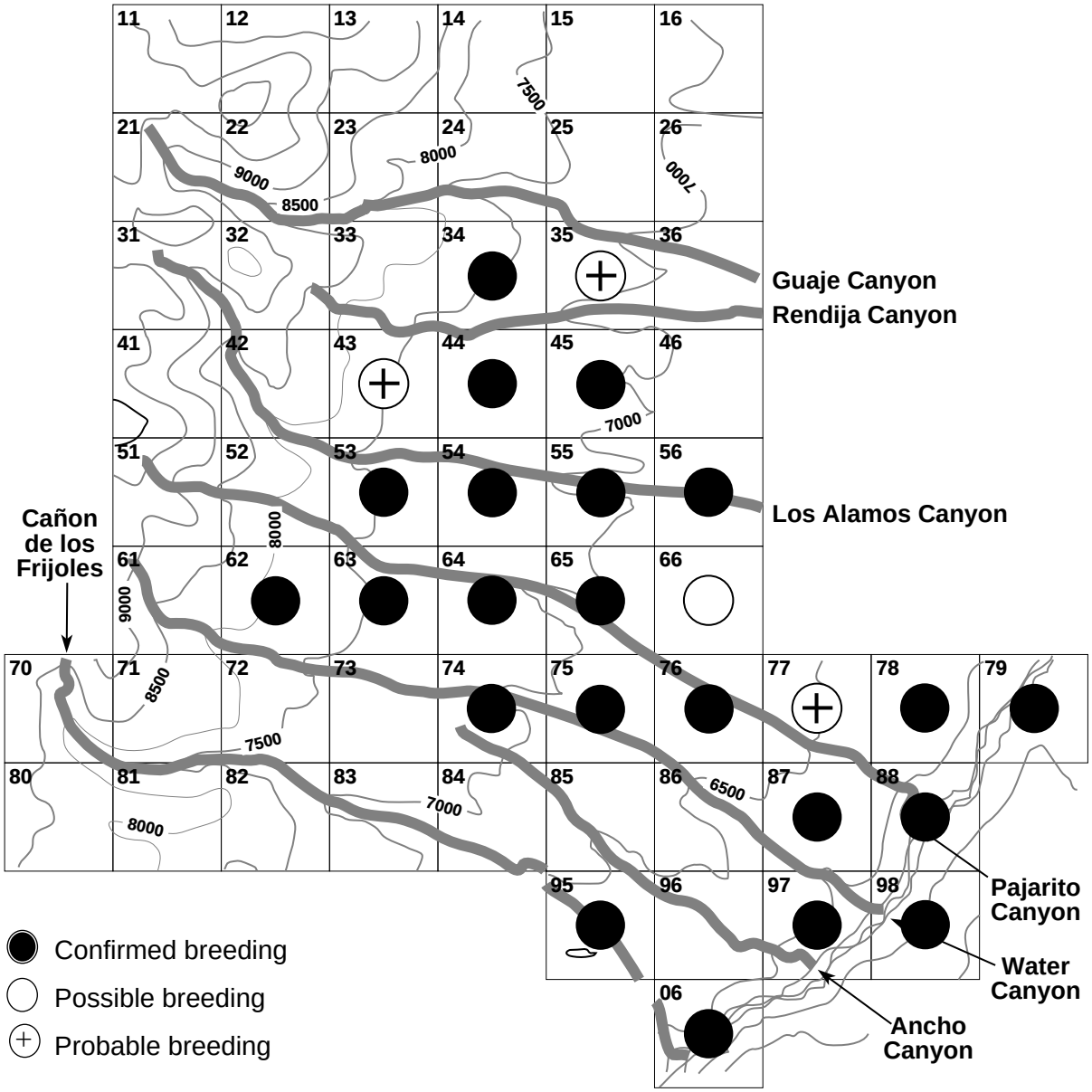
flitting its tail, then flying off to pursue an airborne insect. It usually makes its presence known by its liquid chipping note (Ligon 1961).

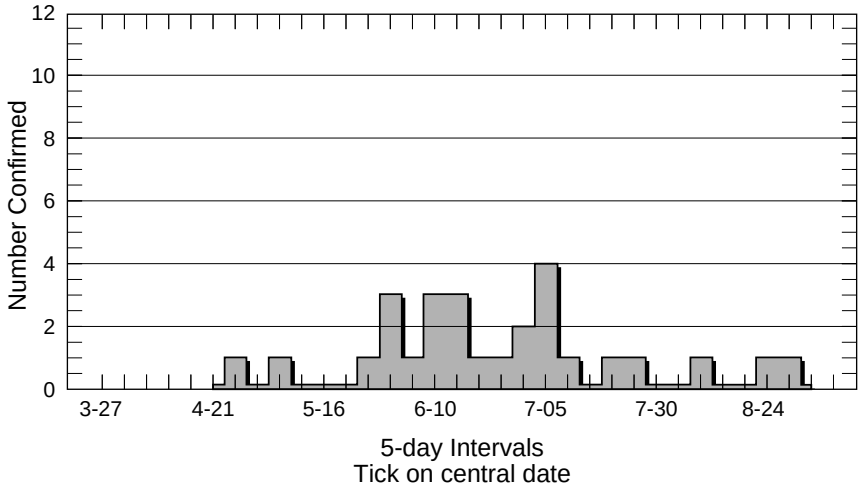
Black Phoebes arrive in the spring along the Rio Grande from Frijoles Canyon to Española in early May (May 9 median date in 5 years) and have been seen as late as the first week of November.

BLPH

Habitat	Occurrence	Conf	Prob	Poss
Rio Grande gorge (6)	5	0	2	3

Say's Phoebe


Guaje Canyon
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding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8-24
5-day Intervals
Tick on central date

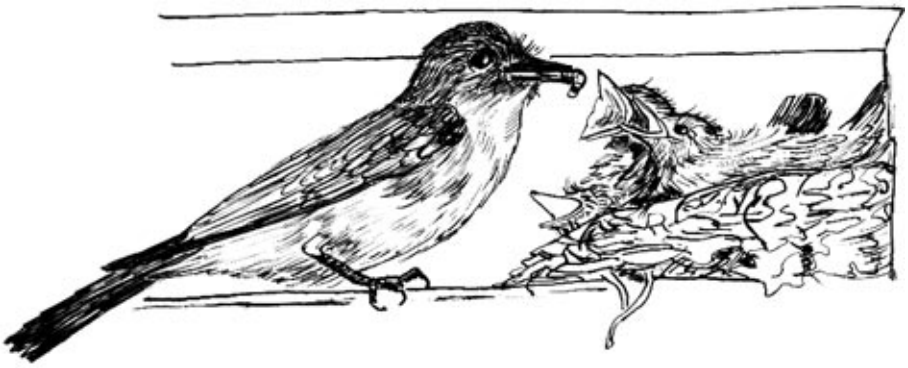
Say's Phoebe

Say's Phoebe
(Sayornis saya)

The Say's Phoebe summers up to middle elevations throughout much of New Mexico. Although resident in the southern part of the state, it is largely migratory in the northern part. It shuns forested areas, preferring more arid, open terrain and has a proclivity for living near human habitation (Ligon 1961).

During the atlas project, Say's Phoebes were found in 90% of the blocks containing residential and Laboratory areas. Breeding was confirmed in 85% of the occupied blocks.

The arrival of Say's Phoebes presages spring in Los Alamos. Some appear in mid-March (March 20 median date in 24 years) and soon set up territories and begin courtship with the pair trilling in unison around the nest site. The nesting season is long, and double broods are frequent. The earliest nest building is in early April. Nest building on June 9 and a nest with eggs on June 16 were second nestings for one season. Nestlings were reported from May 5 to



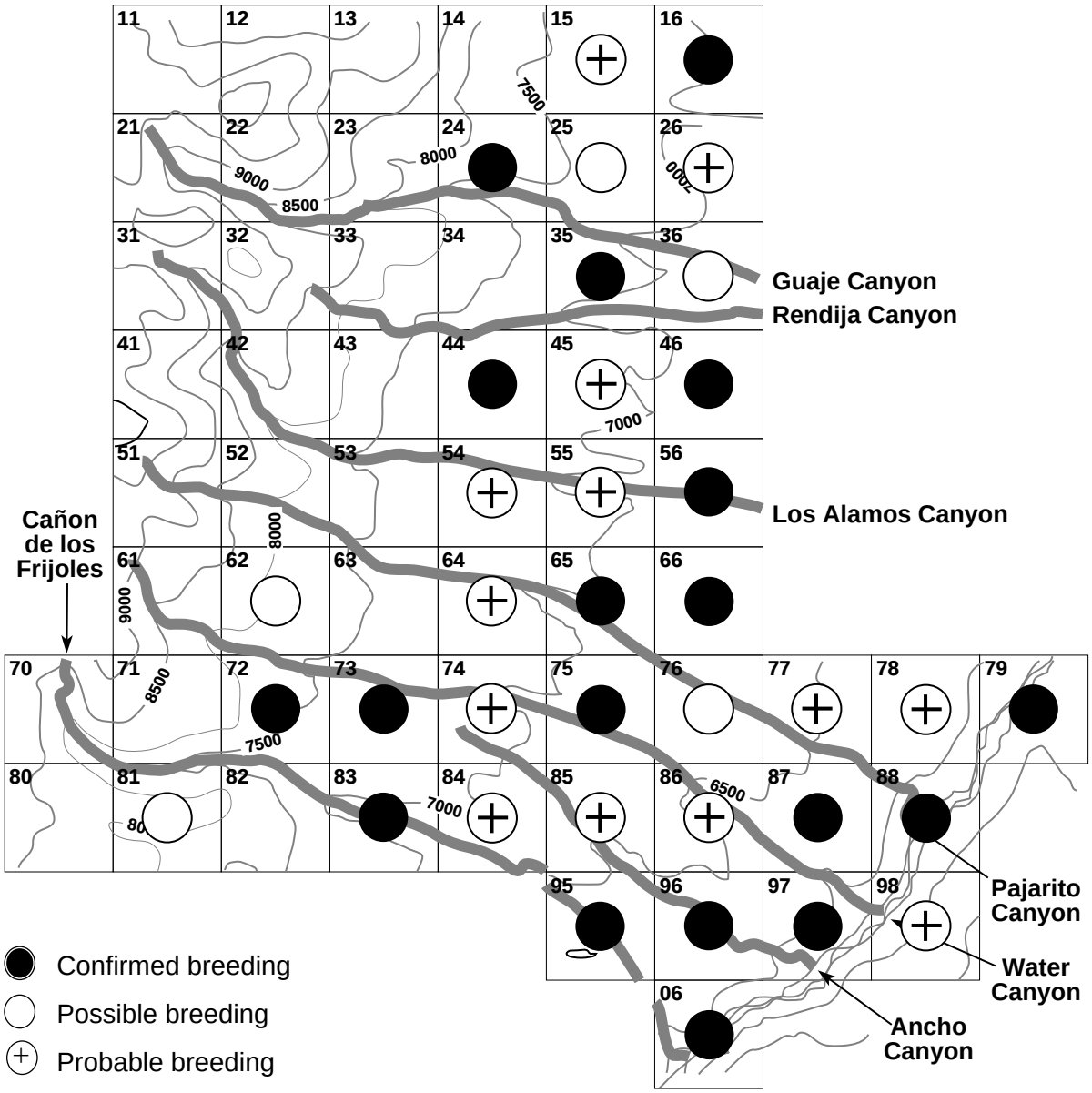
August 23. The typical brood size was three (six of seven records). Of the 15 nests reported, 87% were built on manmade structures: seven were under eaves, four on shelves inside unused buildings, one in the air shaft of a well house, one in a crevice in the berm wall at an explosives firing site, and the two in natural conditions were in holes in cliffs.

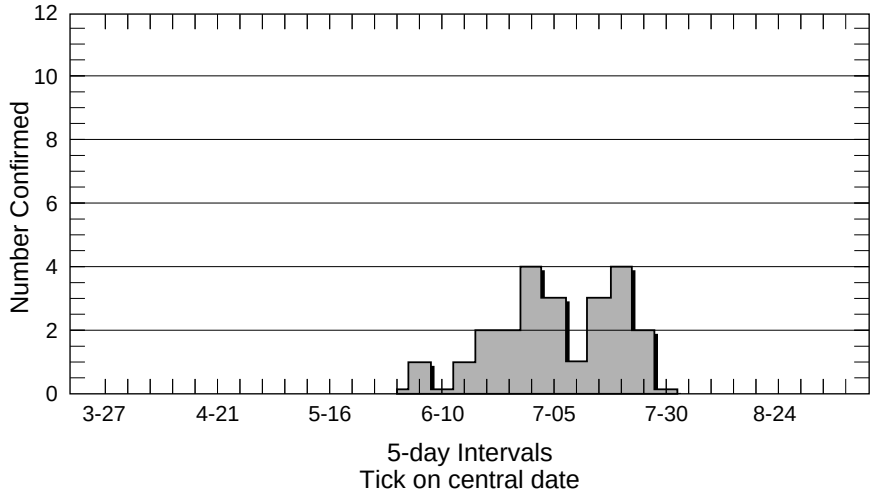
Say's Phoebes generally leave the county in late September (September 20 median date in 7 years).

SAPH

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	7	6	1	0
Ponderosa pine/ piñon/juniper (21)	13	11	1	1
Piñon/juniper (6)	6	5	1	0
TOTAL	26	22	3	1

Ash-throated Flycatcher





Ash-throated Flycatcher

Ash-throated Flycatcher
(Myiarchus cinerascens)

The Ash-throated Flycatcher summers almost statewide from lowland shrubland up into pine/oak woodland (Hubbard 1978). Its habitat is scrub, chaparral, and open and riparian woodlands, especially piñon/juniper in open or scattered stands (Ehrlich *et al.* 1988).

During the atlas project, Ash-throated Flycatchers inhabited 100% of the piñon/juniper blocks and 81% of the mesa ponderosa pine blocks. Breeding was confirmed in 53% of the occupied blocks.

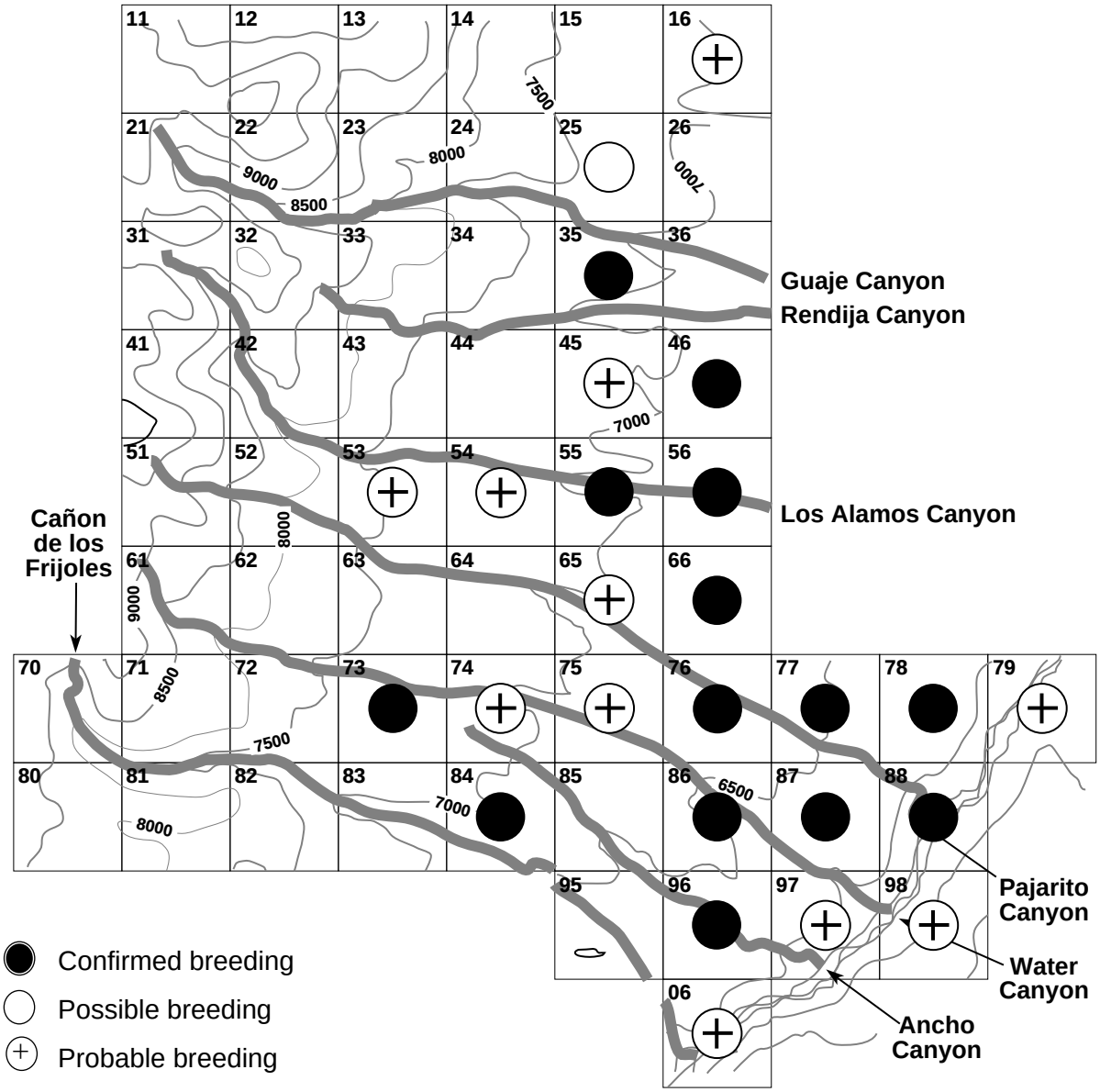
These flycatchers nest in cavities. Eight nests, all with nestlings, were discovered between June 3 and June 29. Three were in residential birdhouses. The others were in holes in trees, including cottonwood, piñon, and ponderosa pine. The nest holes were from 5 to 25 feet above the ground.

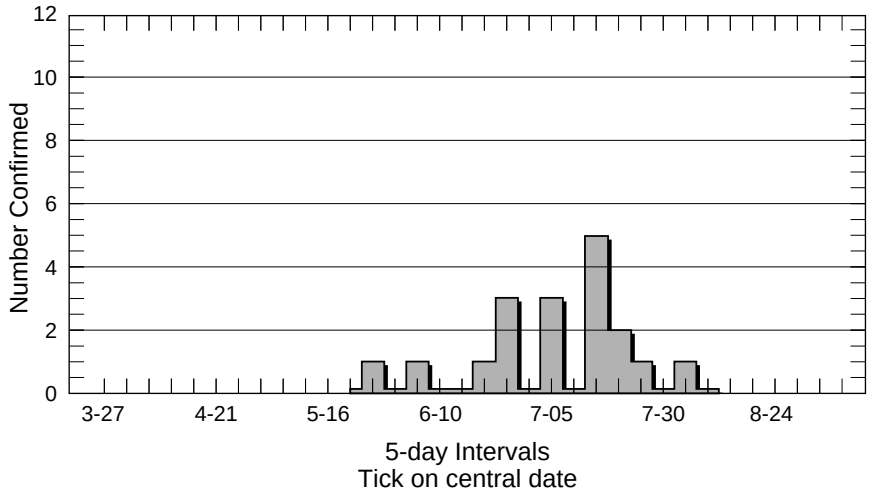
Ash-throated Flycatchers arrive in Los Alamos in early May (May 5 median date in 16 years). The latest fall report is August 17.

ATFL

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	9	5	2	2
Ponderosa pine/ piñon/juniper (21)	21	11	8	2
Piñon/juniper (6)	6	3	3	0
TOTAL	36	19	13	4

Cassin's Kingbird





Cassin's Kingbird

Cassin's Kingbird
(Tyrannus vociferans)

The Cassin's Kingbird summers almost statewide west of the eastern plains from lowland woodland locally into evergreen woodland, including residential plantings (Hubbard 1978).

During the atlas project, Cassin's Kingbirds were found in 81% of the piñon/juniper blocks. Breeding was confirmed in 54% of the occupied blocks.

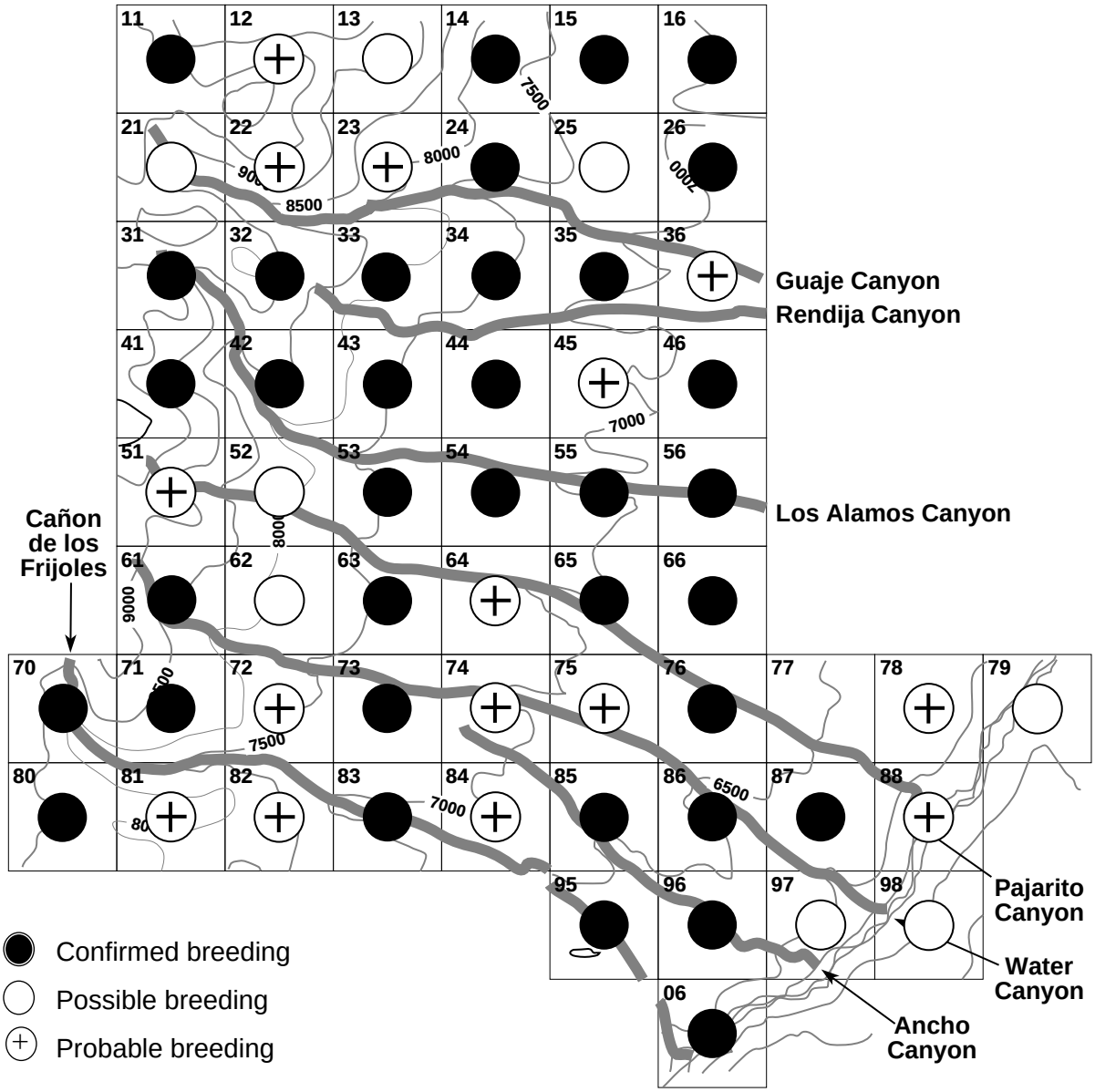
Their nest sites are located typically along the borders of the habitat. Territories are well defended and widely separated. Kingbirds are aggressive toward crows, hawks, and most other intruders. Because of their vigilant, vociferous defense, nest sites are easy to find. Eleven of the 14 confirmations were nests. The nests were placed well out on a limb of an isolated piñon or ponderosa pine tree from 25 to 45 feet above the ground.

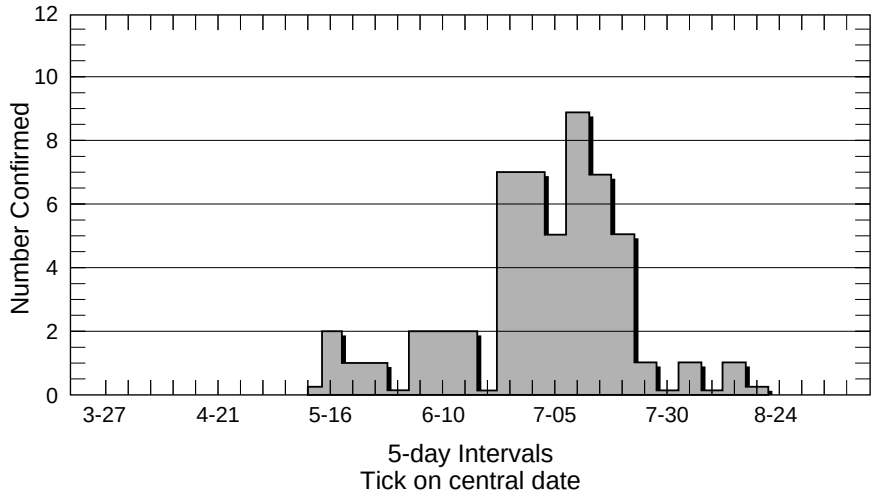
Cassin's Kingbirds arrive in Los Alamos in late April or early May (May 4 median date in 25 years). The latest recorded autumn sighting is September 19.

CAKI

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	4	1	2	1
Ponderosa pine/ piñon/juniper (21)	16	10	6	0
Piñon/juniper (6)	6	3	3	0
TOTAL	26	14	11	1

Violet-green Swallow





Violet-green Swallow

Violet-green Swallow
(Tachycineta thalassina)

The Violet-green Swallow summers in mountainous areas statewide, nesting in forest and pine/oak and adjacent riparian woodlands (Hubbard 1978).

Violet-green Swallows nest throughout Los Alamos, from the rim of the Rio Grande gorge to the mountain tops. During the atlas project, they were found in all blocks but one, with breeding confirmed in 61% of these.

They arrive in Los Alamos mid-April (April 17 median date in 27 years) and nesting begins about a month later, with the height of activity occurring in late June and July. Four instances of nest building were observed from May 23 to July 8. Observations of nestlings being fed were reported from June 27 to August 12. The nests were in holes, mostly old woodpecker holes, from 4 to 50 feet above the ground (two-thirds of them from 20 to 30 feet above the ground). Nest sites were ponderosa pines (13), aspens (4), box elders (2), cottonwoods (2), house sidings (2), and a crevice in a cliff (1).

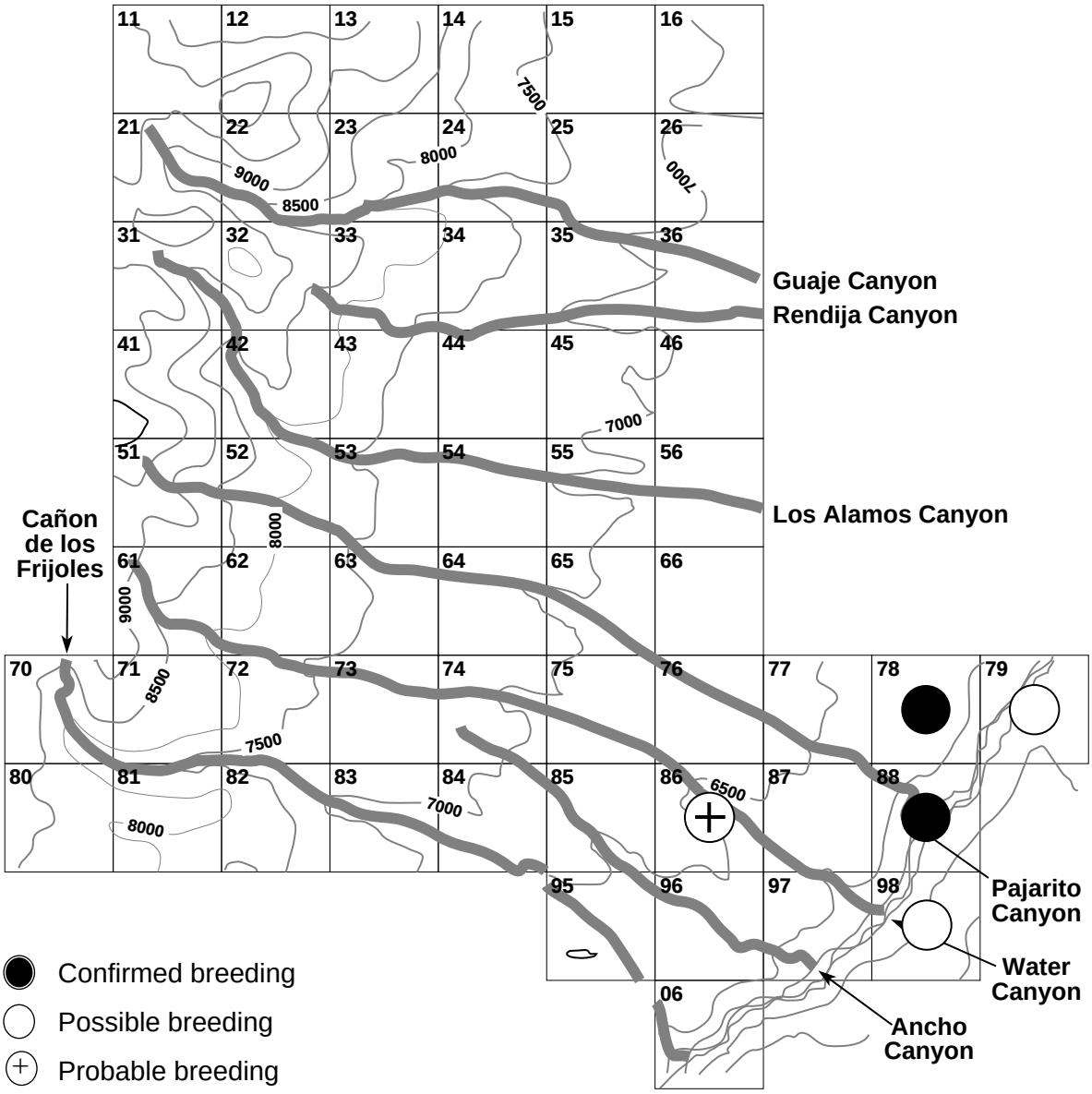
Through the breeding season, until young are in the nest, the male engages in daily, erratic, twisting, predawn courtship flights just above the trees in the vicinity of its nesting area.

The accompanying song is a continuous repetition of shrill chattering notes: "tsip, tseet, tsip . . . ." In late summer the swallows gather in flocks as the young become independent. They leave Los Alamos in early September (September 10 median departure date in 20 years).

VGSW

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	17	10	5	2
Mixed conifer/ ponderosa pine (5)	5	2	1	2
Ponderosa pine (11)	11	9	1	1
Ponderosa pine/ piñon/juniper (21)	21	15	6	0
Piñon/juniper (6)	5	0	2	3
TOTAL	59	36	15	8

Cliff Swallow



Cliff Swallow

Cliff Swallow
(Hirundo pyrrhonota)

The Cliff Swallow summers almost statewide west of the eastern plains, nesting on cliffs and manmade structures (Hubbard 1978), near open country over which to feed, and near water because it needs mud for its nest.

Cliff Swallows are gregarious in their nesting habits, and it is exceptional to find isolated nests distant from others of the species (Bent 1942). During the atlas project in Los Alamos, they were found in two-thirds of the Rio Grande gorge blocks. Isolated nests were discovered in two blocks. They were typical gourd-shaped structures made from mud, plastered against the vertical cliff face 30 to 40 feet above the base. Occupied nests were found May 18, 1986, June 28, 1986, and June 9, 1987. This is the first documented nesting in the county, although Cliff Swallows are seen irregularly alone or in small groups in the Rio Grande gorge or over the open areas near the cliff tops in summer.

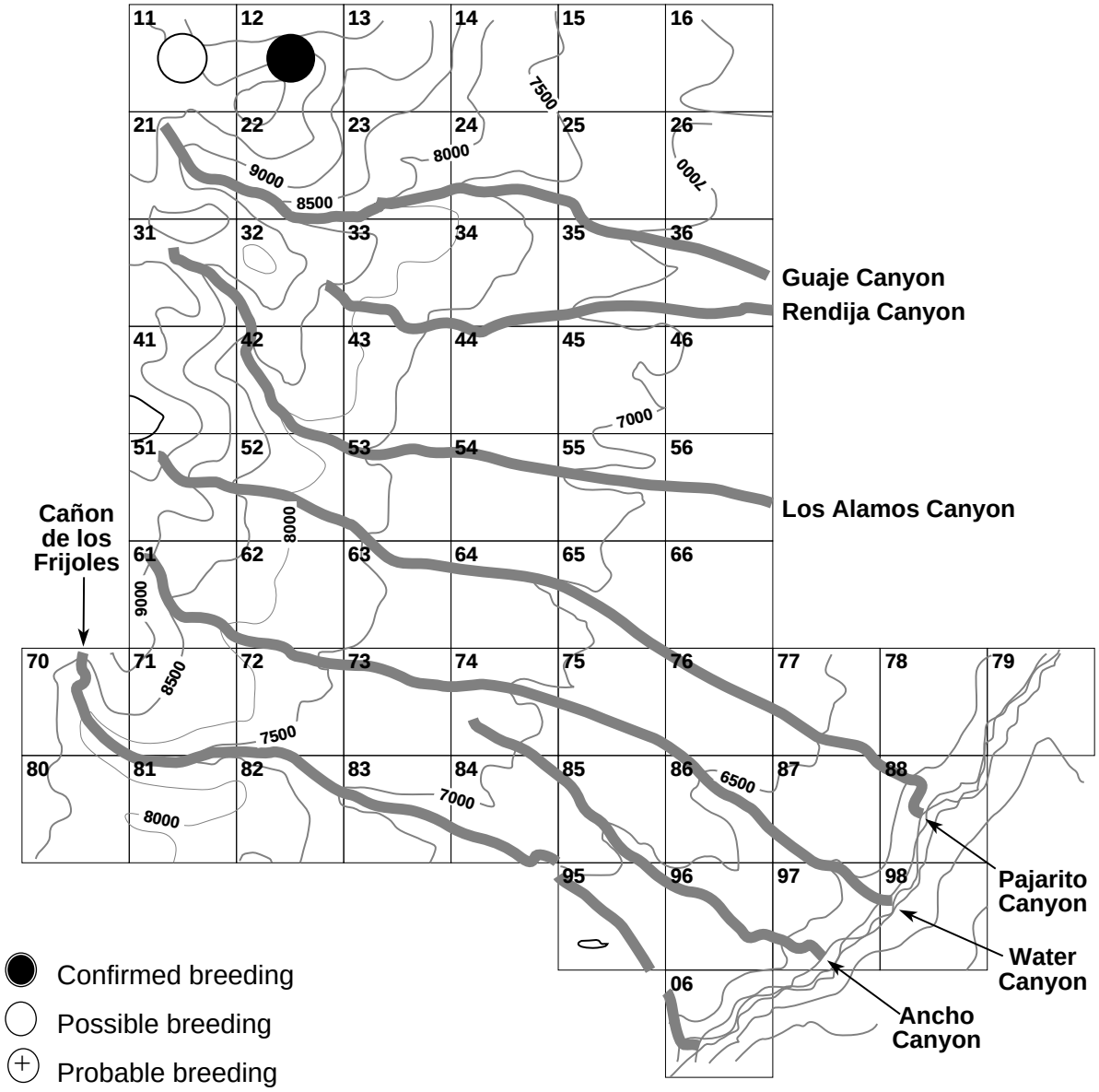
The nearest colony, active at least since the mid-1950s, is in Española on the old bridge spanning the Rio Grande.

Cliff Swallows arrive in Española in the first week in May (May 4 median date in 6 years) and have been observed there as late as October 13.

CLSW

Habitat	Occurrence	Conf	Prob	Poss
Cliff (30)	5	2	1	2

Gray Jay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Guaje Canyon
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding

Gray Jay

Gray Jay
(Perisoreus canadensis)

The home of the Gray Jay is among the firs and spruces of the highest mountains of northern New Mexico. It is a permanent resident in the San Juan, Jemez, and Sangre de Cristo mountain ranges (Hubbard 1978).

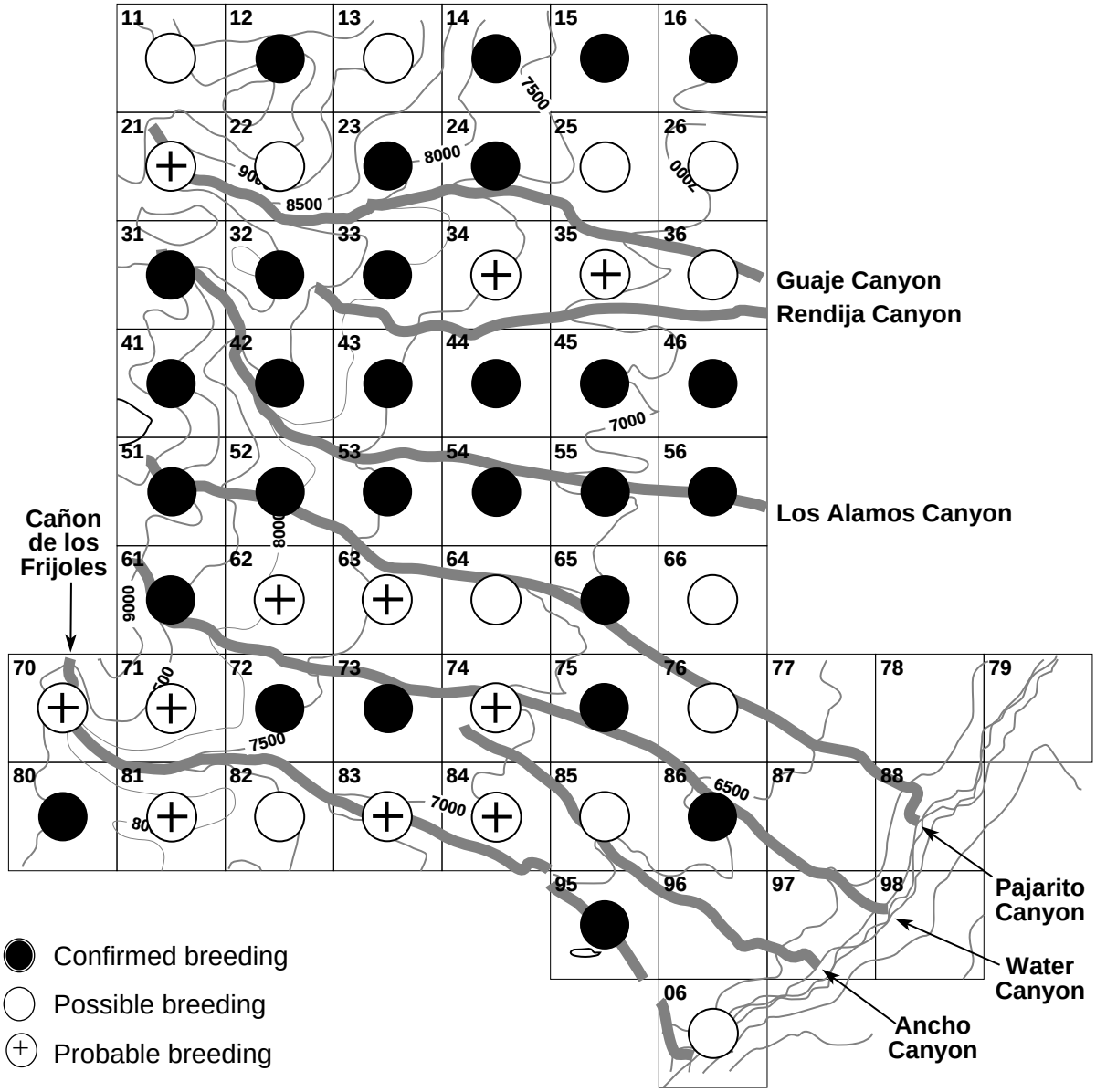
The only contact with Gray Jays during the atlas project was near the top of Caballo Mountain (altitude of 10,400 feet) in the spruce/fir forest surrounding the extensive meadow that covers the south face. A sighting on July 9, 1988, of a young jay being fed by a parent confirmed breeding in Los Alamos.

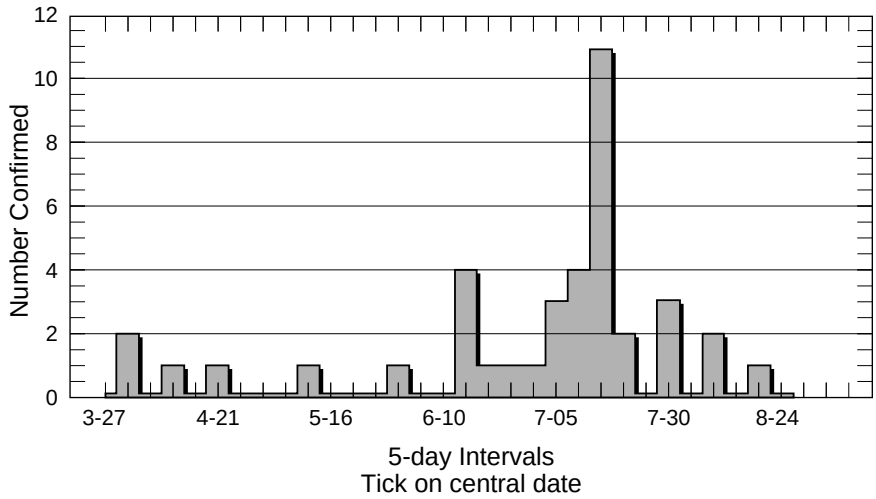
Sightings from earlier years have been on Pajarito Mountain in late May and in winter.

GRJA

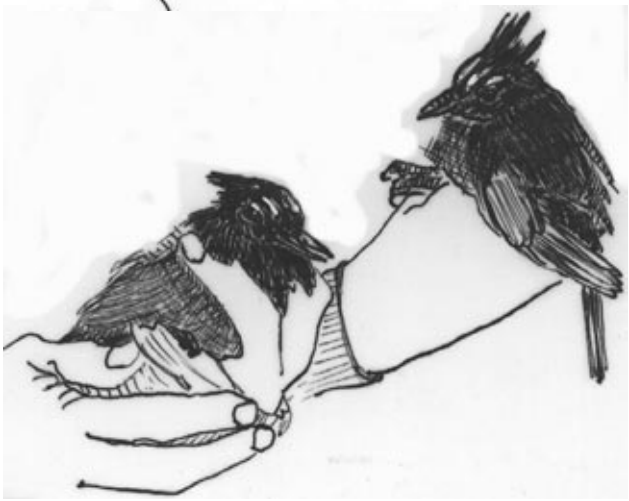
Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	2	1	0	1

Steller's Jay





Steller's Jay



Steller's Jay
(Cyanocitta stelleri)

The Steller's Jay is resident in mountainous areas statewide (Hubbard 1978). It is a characteristic breeding bird of the ponderosa pine, mixed conifer, and spruce/fir forests. Locally it extends its breeding range down into pine/oak and piñon/juniper woodlands.

During the atlas project, Steller's Jays inhabited 96% of the forested blocks. Breeding was confirmed in 56% of these blocks. Atlas fieldworkers observed six nests being built in the time period March 31 to June 16. Ponderosa pines were utilized most (6 of the 8 nest trees identified). Nest heights ranged from 15 to 60 feet above the ground. Two nests were built in residential plantings (5 to 8 feet above the ground).

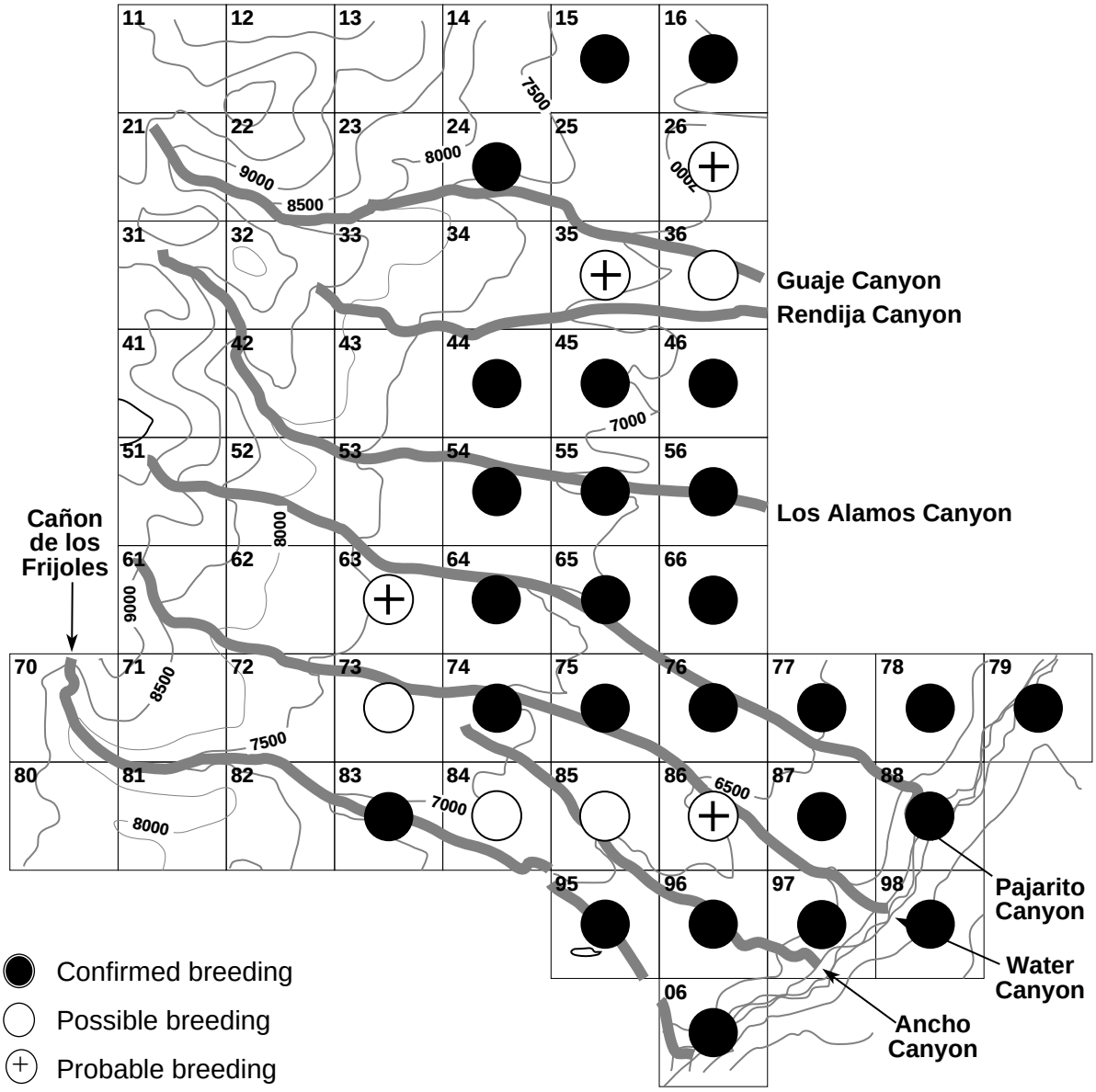
Steller's Jays are noisy during most of the year, as groups roam the forests reacting to intrusion of possible enemies, but they become quiet and unobtrusive while nesting, a clue to the presence of active nests.

There is a narrow overlap in the local ranges of the Steller's Jay and the Scrub Jay where ponderosa pines extend into the piñon/juniper woodland.

STJA

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	17	10	4	3
Mixed conifer/ ponderosa pine (5)	5	4	1	0
Ponderosa pine (11)	11	6	3	2
Ponderosa pine/ piñon/juniper (21)	19	9	3	7
TOTAL	52	29	11	12

Scrub Jay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Guaje Canyon
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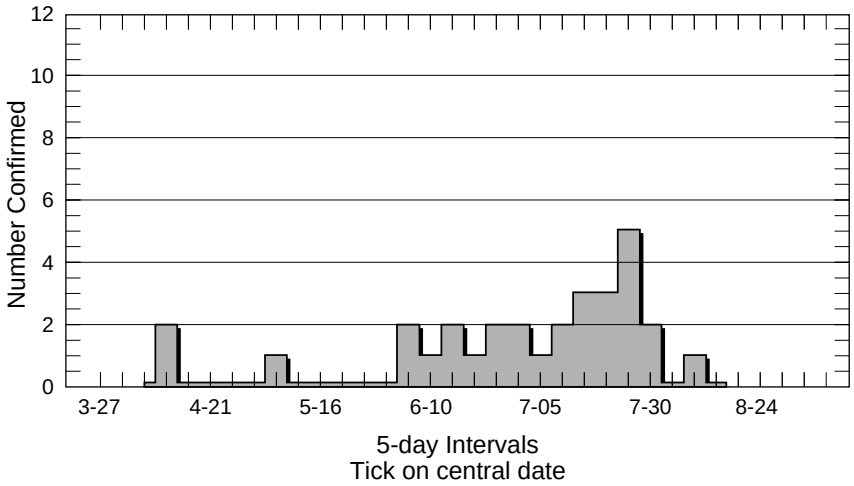
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding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8-24
5-day Intervals
Tick on central date

Scrub Jay

Scrub Jay
(Aphelocoma coerulescens)

The Scrub Jay is resident in mountainous and canyon areas statewide (Hubbard 1978). In summer it occurs wherever there is scrub oak, piñon, and juniper and around human habitation in this habitat from altitudes of 5000 to 7000 feet (Ligon 1961).

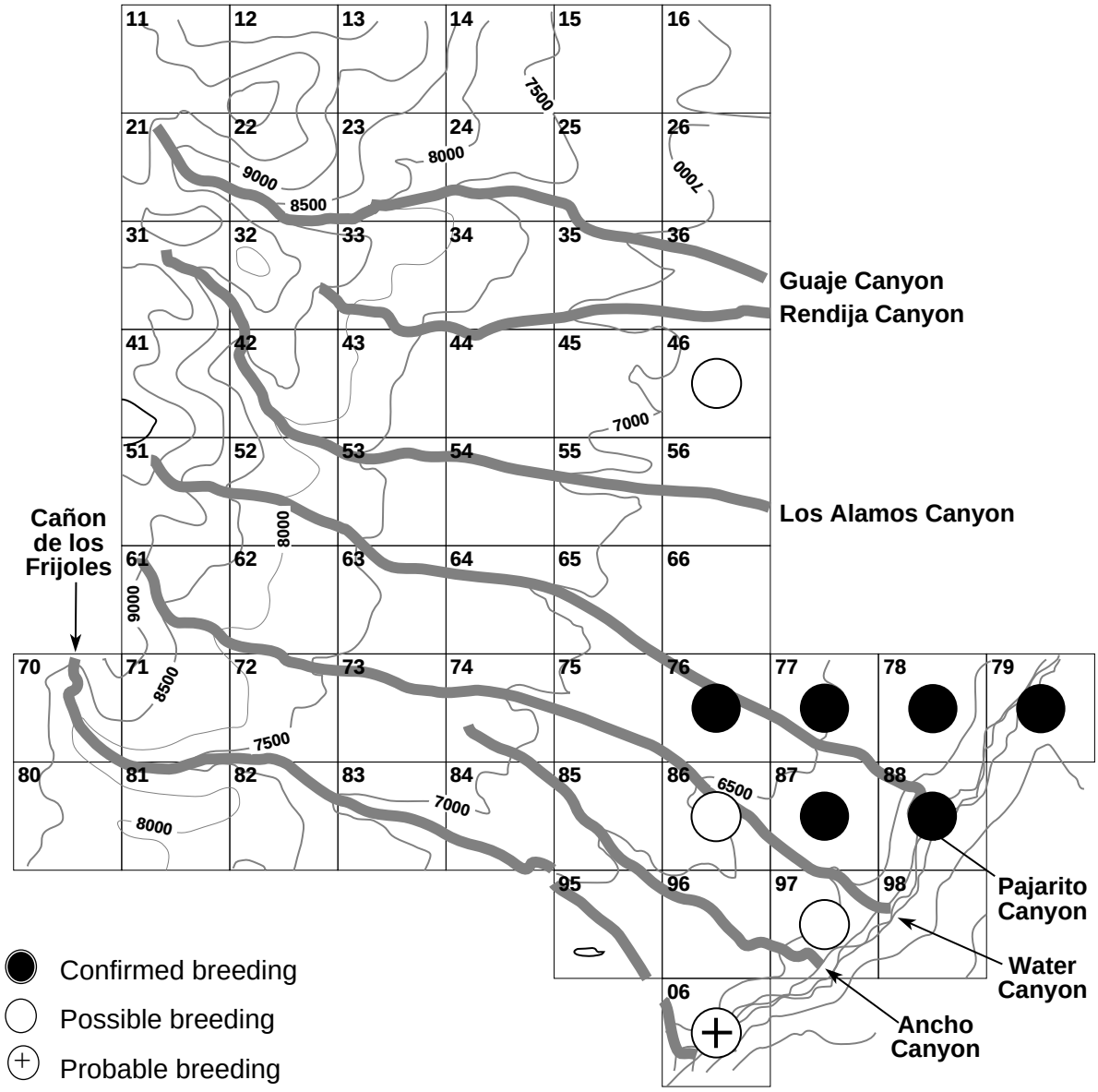
During the atlas project, Scrub Jays inhabited 100% of the piñon/juniper blocks. They also nested successfully where piñons intermingled with ponderosa pines farther to the west. Nest sites included piñon pine, juniper, pyracantha, and a house-climbing honeysuckle at heights ranging from 5 to 8 feet (average of 6.7 feet) above the ground (7 records). Nest building was observed on May 11. Occupied nests were reported from May 10 to June 19 and fledglings or attended young from June 5 to August 10.

Scrub Jays are highly territorial, living as pairs year-round, presumably in family parties just after breeding. Good feeding areas, such as bird feeders, may be frequented by several pairs and not defended by any of the pairs. A sentinel is always alert; one member of the pair keeps watch perched on a shrub or other vantage point, while the other feeds on the ground (Goodwin 1977).

SCJA

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	7	5	1	1
Ponderosa pine/ piñon/juniper (21)	21	15	3	3
Piñon/juniper (6)	6	6	0	0
TOTAL	34	26	4	4

Pinyon Jay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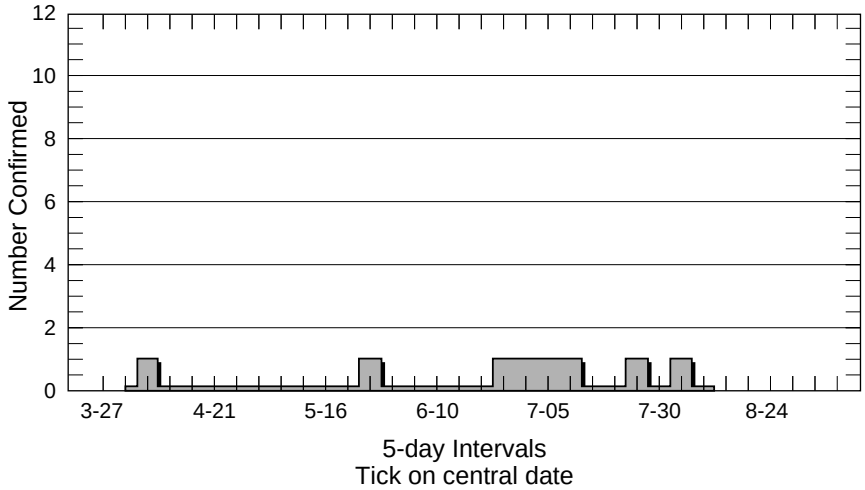
Guaje Canyon
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding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8-24
5-day Intervals
Tick on central date

Pinyon Jay

Pinyon Jay
(Gymnorhinus cyanocephalus)

The Pinyon Jay is variably resident almost statewide in middle elevation areas containing piñon/juniper woodland. The region of regular occurrence is in the north, south to the Mogollon and Sacramento highlands, and along the Canadian Basin.

When not breeding, nomadic and gregarious flocks of Pinyon Jays wander widely in search of food. Nesting is often prolonged, but is unpredictable, depending on availability of food. Fresh eggs may be found in New Mexico from late February into October (Ligon 1961).

During the atlas project, at least possible breeding was recorded for Pinyon Jays in 37% of the piñon/juniper blocks. Breeding was confirmed in 60% of the blocks in which they were found. The only nest record was nest building observed on April 7, 1984. The nest was placed 12 feet up in a piñon pine at the edge of a residential area.

Data for attended young, although scanty and incomplete because all the relevant blocks were not canvassed each year, suggest annual variability. In 1984, attended young were found July 24 and August 3; in 1985, nest building was observed on April 7 and attended young on June 28 and July 2. In 1986, attended young were found even earlier in the year, on May 25 and June 24. No breeding was observed in 1987. In 1988, probable breeding activity, pairs and agitated behavior, were observed in mid-May and attended young on July 11.

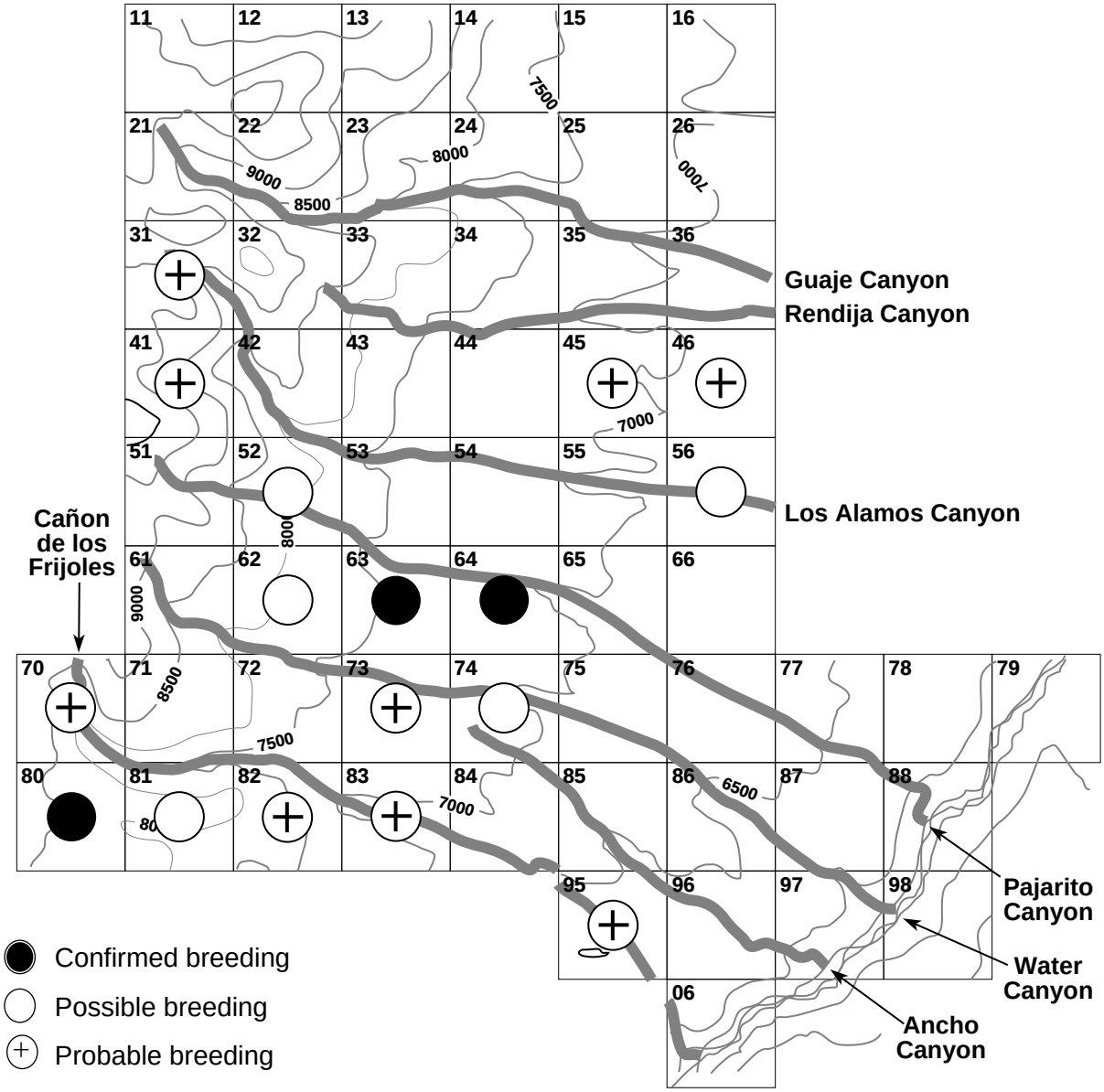
Although Pinyon Jays nest communally in other parts of New Mexico (Ligon 1971), nesting in Los Alamos was by isolated pairs.

Pinyon Jays appear throughout the year in Los Alamos, but are most notable in late summer and fall when they forage in the piñon woodland and frequent feeders in White Rock and Pajarito Acres. Their numbers vary greatly from year to year, probably in relation to the quantity of piñon mast.

PIJA

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine/ piñon/juniper (21)	5	2	1	2
Piñon/juniper (6)	5	4	0	1
Total	10	6	1	3

Clark's Nutcracker



Clark's Nutcracker

Clark's Nutcracker
(Nucifraga columbiana)

Clark's Nutcracker is resident in the montane mixed conifer and spruce/fir forests, but occurs irregularly in summer and fall at lower elevations (Hubbard 1978), particularly in piñon woodlands when the nut crop is good.

Determining the breeding status of Clark's Nutcracker in Los Alamos during the atlas period was problematic. Breeding was confirmed in only three blocks (19% of the blocks in which they were reported). Behavior interpreted to be territorial or pairing activity was considered evidence of probable breeding in another 16% of these blocks. Nutcrackers were observed in many of the other wooded blocks, but most of these were in mid- and late summer when the breeding season was presumed to have finished and the nutcrackers were foraging in the lower elevation woodlands.

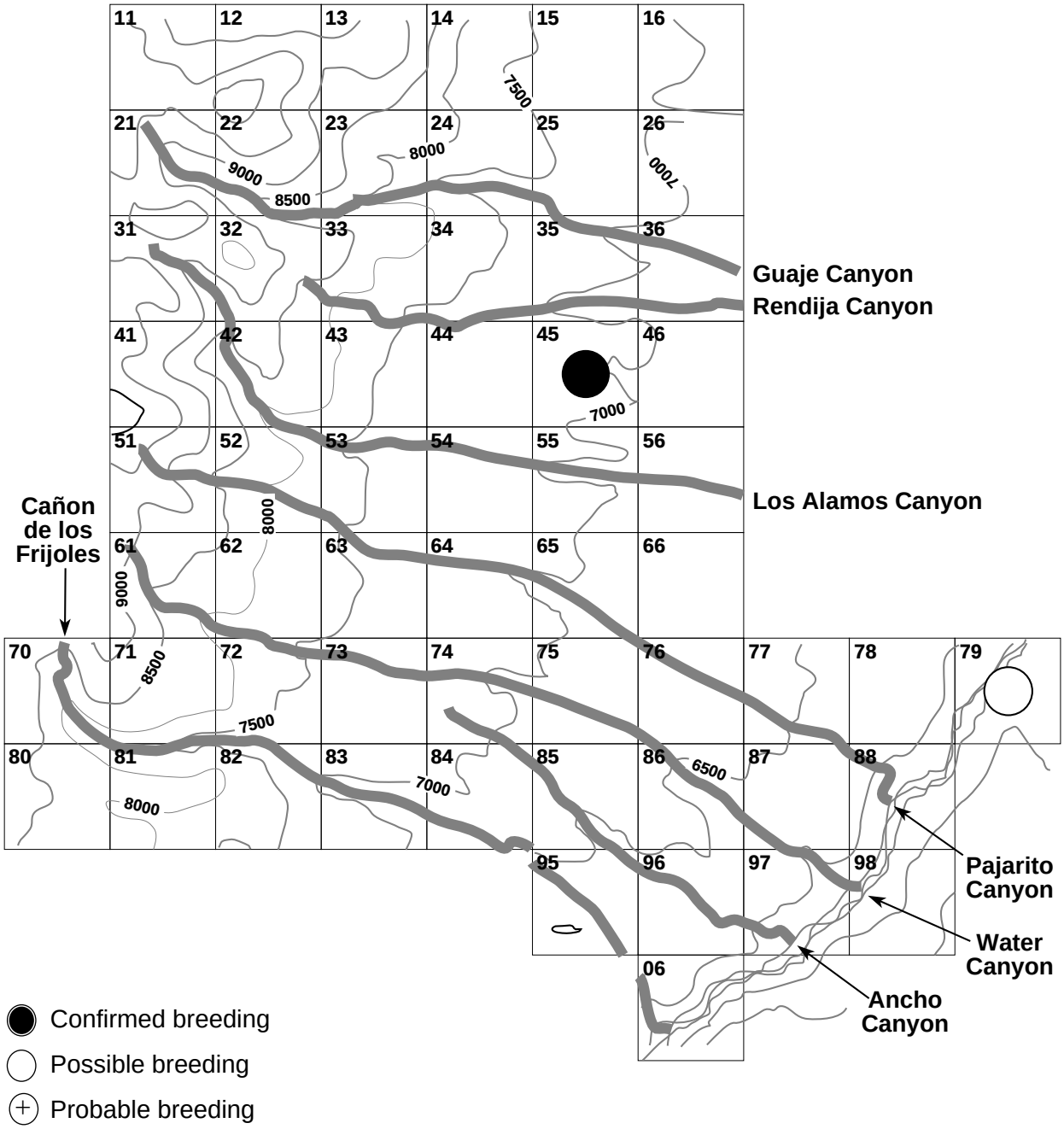
The confirmed breeding records were from slopes of undisturbed deep canyons: Alamo (Block 8-0), Pajarito (Block 6-4), and Cañon de Valle (Block 6-3). An earlier record in 1973 was from Sandia Canyon (Block 5-4). All of these records were of fledglings being fed or attended by adults from May 7 to June 7. These dates imply that nesting began in mid to late March.

No confirmation of breeding was obtained for the higher mountain slopes, despite expectations based on nutcracker nesting behavior elsewhere, such as in Colorado (Bailey and Niedrach 1965) and in the Sandia Mountains (Tatchl 1967).

CLNU

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	5	1	3	1
Mixed conifer/ ponderosa pine (5)	2	0	0	2
Ponderosa pine (11)	4	1	3	0
Ponderosa pine/ piñon/juniper (21)	6	1	3	2
TOTAL	17	3	9	5

Black-billed Magpie



Confirmed breeding

Possible breeding

Probable breeding

Black-billed Magpie

Black-billed Magpie
(Pica pica)

At the southern extent of its range, the Black-billed Magpie resides year-round locally in the Northern Highlands (Hubbard 1978). Magpies avoid dense forest, preferring wooded foothills, meadows, and wooded valleys, generally not far from inhabitated areas. Santa Fe and Las Vegas are as far south as they occur in New Mexico (Ligon 1961).

Although magpies have been seen in winter along the eastern edge of the Pajarito Plateau, only in recent years have they appeared with any regularity. They are rare summer visitants.

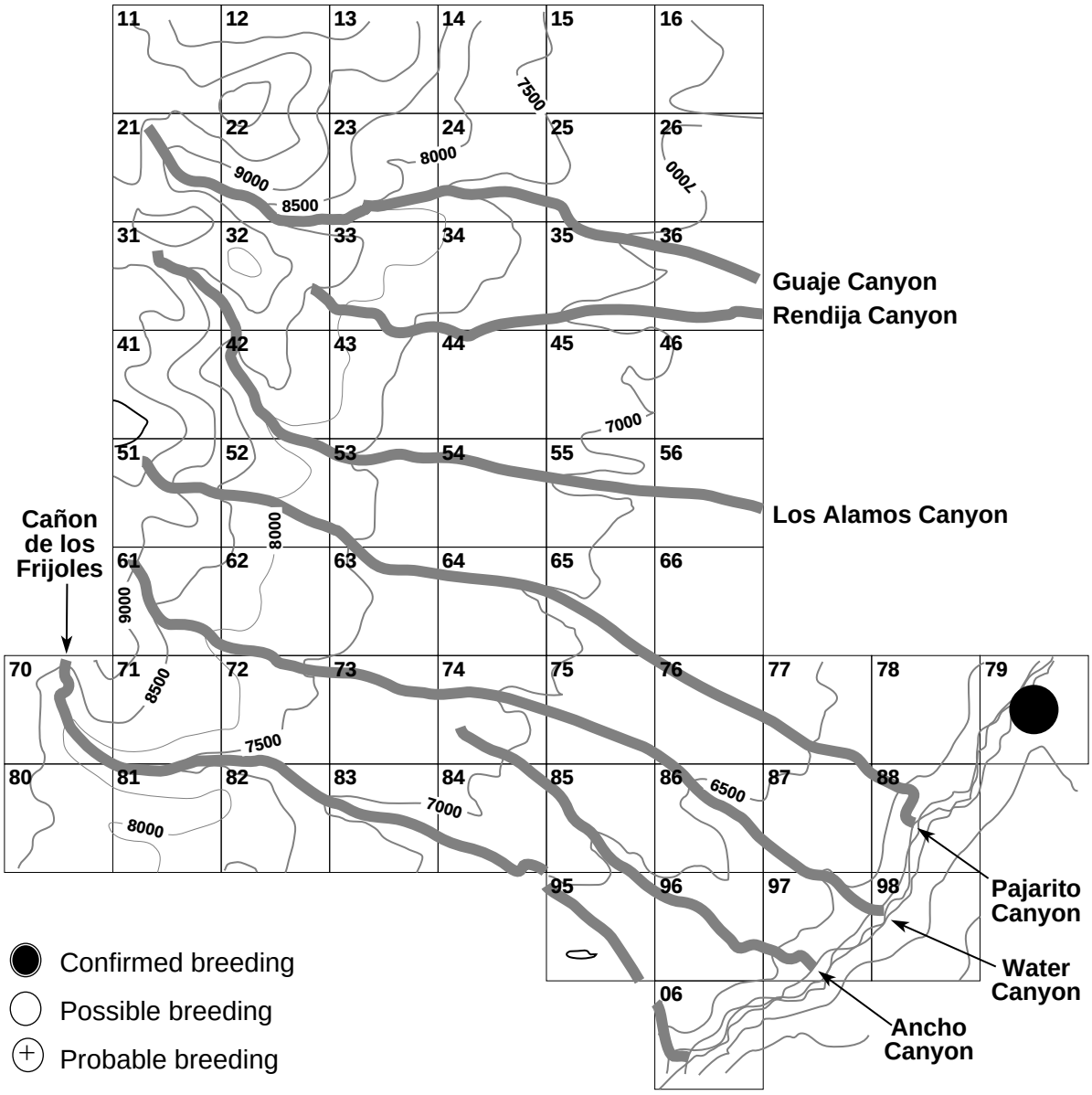
During the atlas project, a pair of magpies fledged six young from a nest in the piñon/juniper woodland on the south rim of Bayo Canyon on North Mesa (east of the rodeo grounds). The nest was 6 feet off the ground in a piñon pine. The female was incubating in early June.

The Black-billed Magpie builds an unusually large, domed nest structure, as much as 3 feet high and 2 feet across, with an entrance on either side.

BBMA

Habitat	Occurrence	Conf	Prob	Poss
Piñon/juniper (21)	1	0	0	1
Ponderosa pine/ piñon/juniper (6)	1	1	0	0
Total	2	1	0	1

American Crow



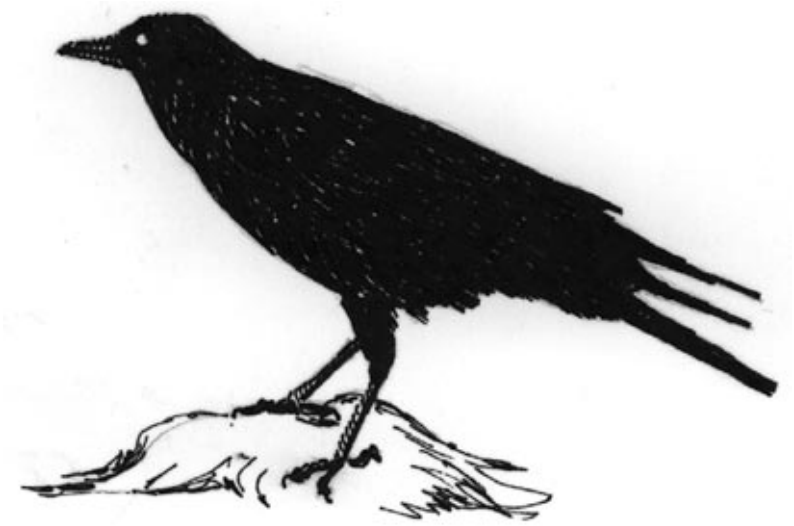
American Crow

American Crow
(Corvus brachyrynchos)

The American Crow is resident in the Northern Highlands and vicinity, southwest locally to the Mogollon and Sacramento highlands, and nests in riparian woodlands and locally in evergreen woodlands and forests (Hubbard 1978).

Small groups of crows are seen sporadically in Los Alamos regularly from October to March, but rarely during the summer breeding season. When the piñon-nut crop has been heavy, flocks of several hundred crows have invaded the piñon/juniper woodlands to forage on the nuts in autumn.

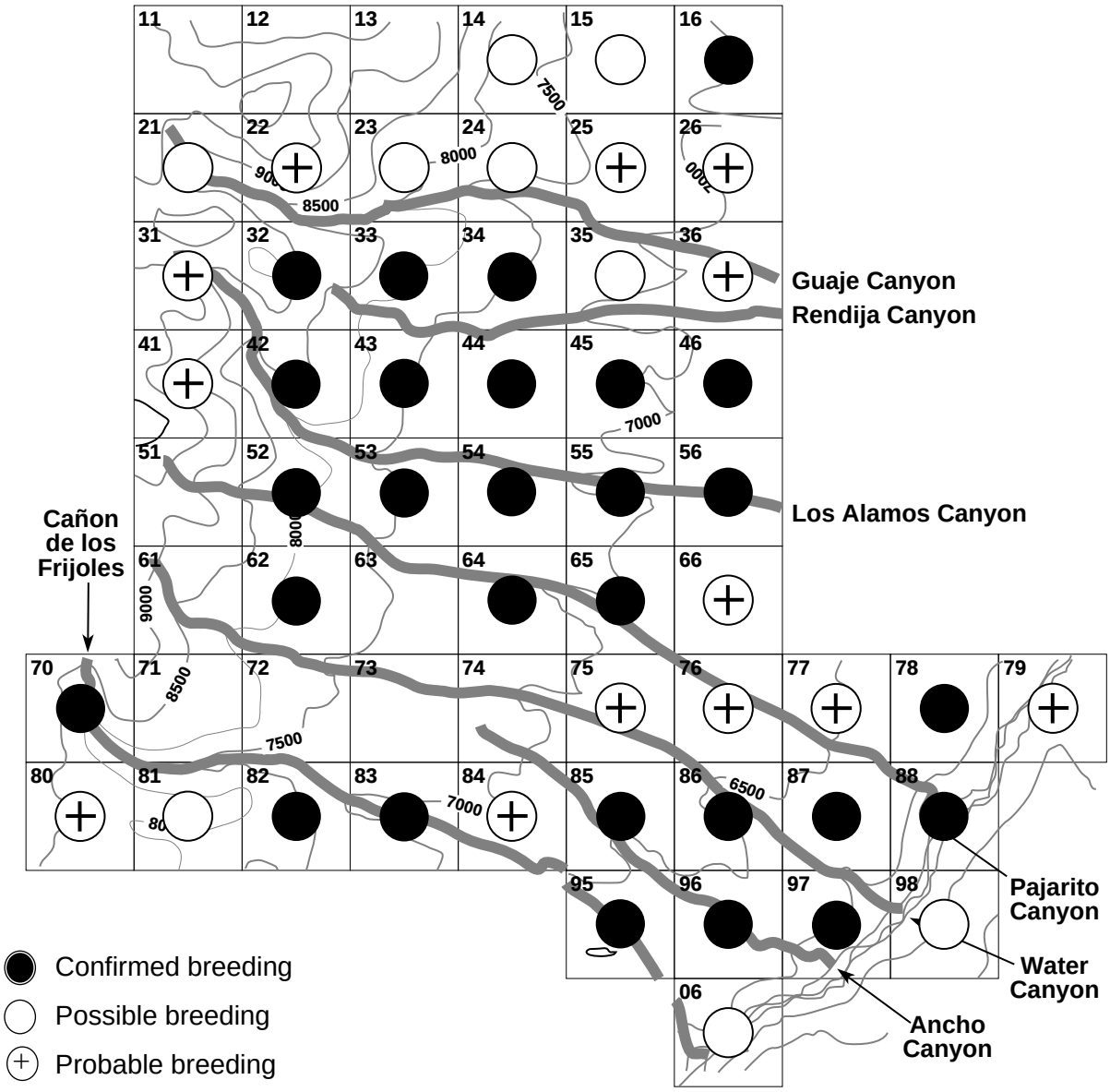
The only confirmed breeding record for Los Alamos, obtained during the atlas project on May 13, 1986, is an occupied nest in a cottonwood on the west bank of the Rio Grande. The nest was located 25 feet above the ground in a fork in the tree.

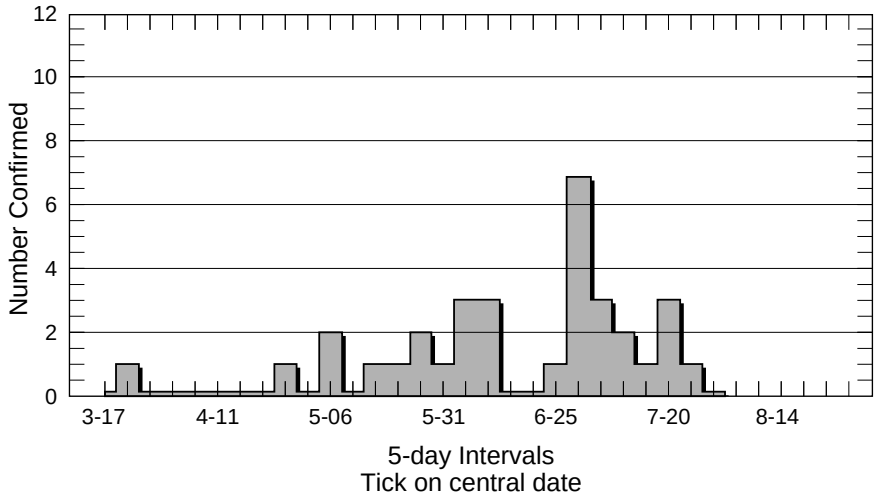


AMCR

Habitat	Occurrence	Conf	Prob	Poss
Rio Grande gorge (6)	1	1	0	0

Common Raven





Common Raven

Common Raven
(Corvus corax)

The Common Raven is resident statewide in varied habitats at all elevations, but perhaps is most common in wooded areas. Typically it breeds on cliffs, but it uses trees and sometimes manmade structures when cliffs are scarce or absent (Hubbard 1978).

During the atlas project, Common Ravens were found throughout the county. They were seen, if only flying over, in all blocks. They were reported breeding in 68% of the mixed conifer blocks and in 91% of the blocks containing the mesa and lower canyon woodlands. Breeding was confirmed in 56% of the occupied blocks. Thirteen nests were found. Eleven were on ledges or in holes in cliffs, one was on top of a building in the Laboratory area, and another was 70 feet up in a ponderosa pine.

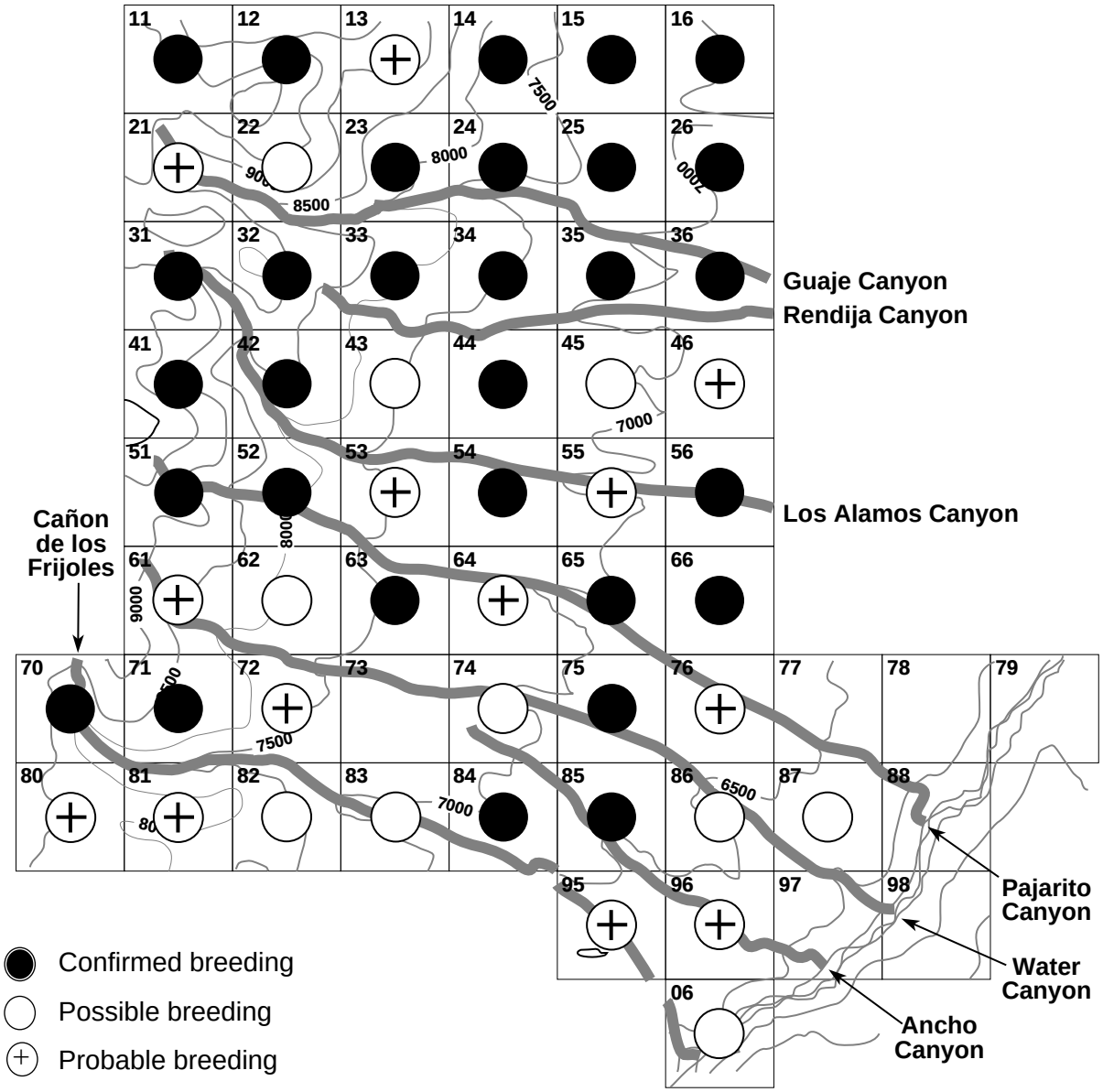
Flocks of ravens can be seen all year in Los Alamos, but are particularly evident in winter. In late winter, courtship activity between mated pairs takes place, sometimes in the form of spectacular aerobatics over the townsite. Nesting

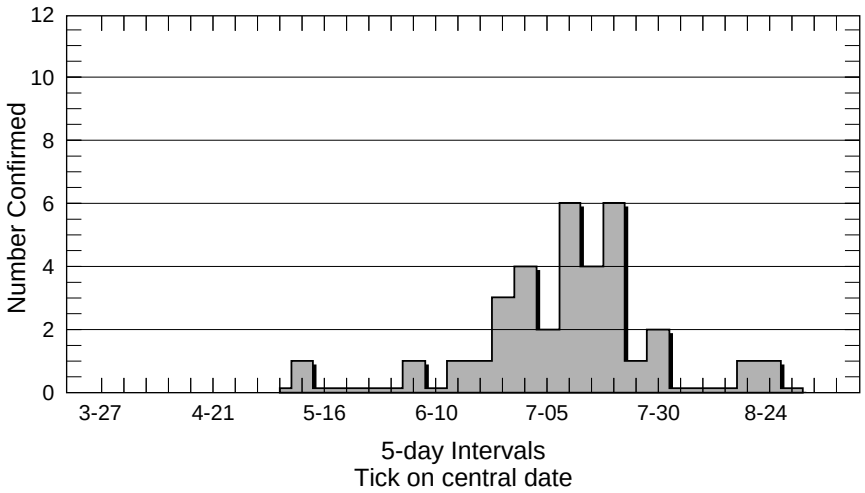
begins in March; the earliest observed nest building activity was on March 15. Nestlings were reported from April 20 to June 28 and attended young or fledglings from May 29 to July 27. The brood size (nestlings or fledglings) ranged from two to four with a mean of 2.7 (from 10 reports).

CORA

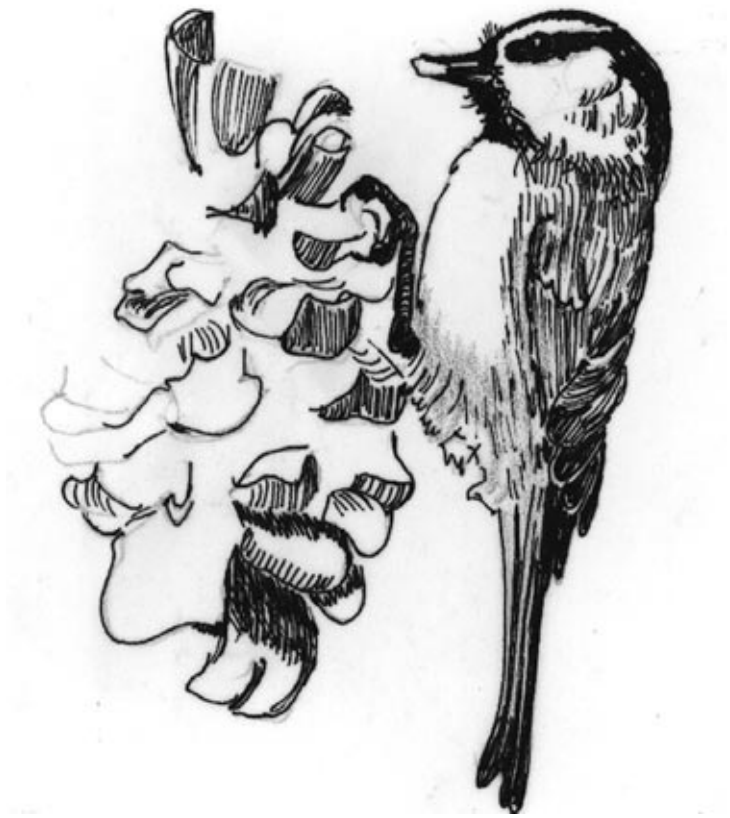
Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	11	4	4	3
Mixed conifer/ ponderosa pine (5)	4	2	0	2
Ponderosa pine (11)	9	7	1	1
Ponderosa pine/ piñon/juniper (21)	20	12	6	2
Piñon/juniper (6)	6	3	2	1
TOTAL	50	28	13	9

Mountain Chickadee





Mountain Chickadee



Mountain Chickadee
(Parus gambeli)

The Mountain Chickadee is resident in New Mexico throughout the montane coniferous forests and in adjacent riparian woodland (Hubbard 1978).

During the atlas project, Mountain Chickadees were found in 98% of the forested blocks. They were absent from the lowest elevation piñon/juniper woodland. Breeding was confirmed in 54% of the occupied blocks, mostly by finding adults attending young.

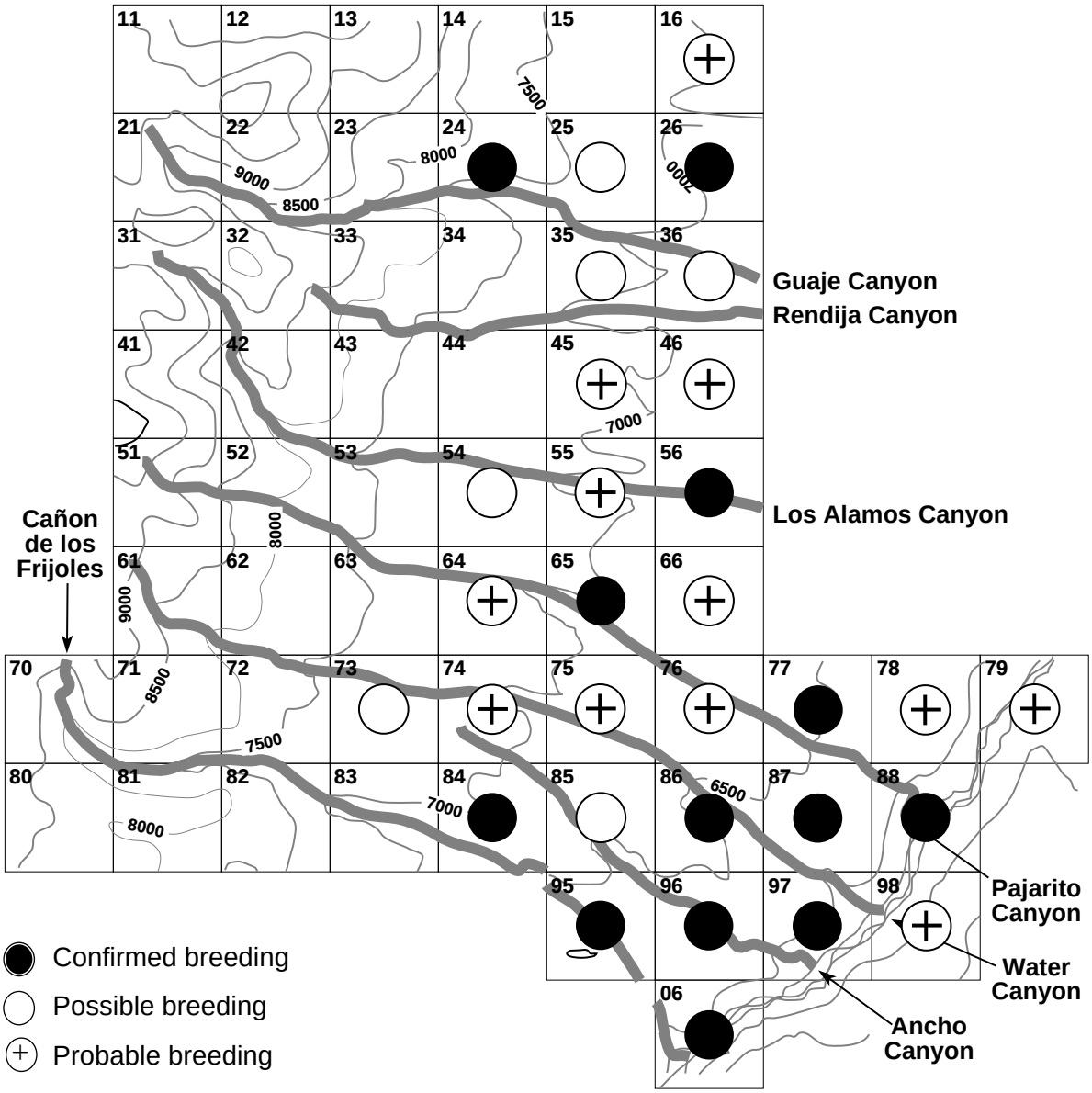
Pairs form and separate from the winter flock in March or April signified by the whistled "fee-bee-bee" song. During territorial formation and defense in April and May, song increases, and often a vocal duel can be heard where neighbors alternate giving the song. A clue to nest location is the whistled dawn song in late April and early May. The male will be singing from the nest tree. The whistled song consists of three or four high, clear whistled notes often of equal length. The pattern varies: the notes may all be on the same pitch, descend the scale in half-tones, or have the second and third notes at the same pitch but lower than the first.

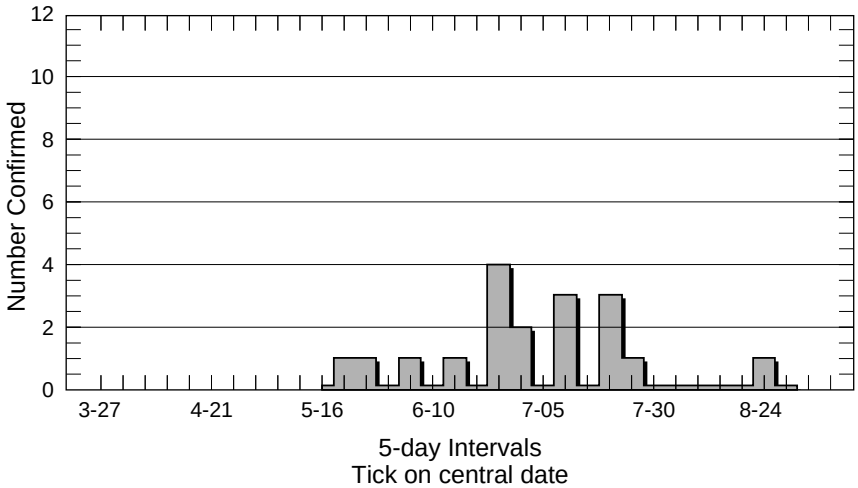
The nest is in a natural cavity or an old woodpecker hole usually a few feet off the ground, but occasionally high off the ground. Nest building was noted on May 13 in a hole high in an aspen. Four more nests were found during the atlas period in ponderosa pines in or near open areas. Occupied nests (3) were reported from June 3 to July 1 and attended young or fledglings from June 26 to August 25.

MOCH

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	17	11	5	1
Mixed conifer/ ponderosa pine (5)	5	3	1	1
Ponderosa pine (11)	10	6	1	3
Ponderosa pine/ piñon/juniper (21)	21	10	6	5
TOTAL	53	30	13	10

Plain Titmouse





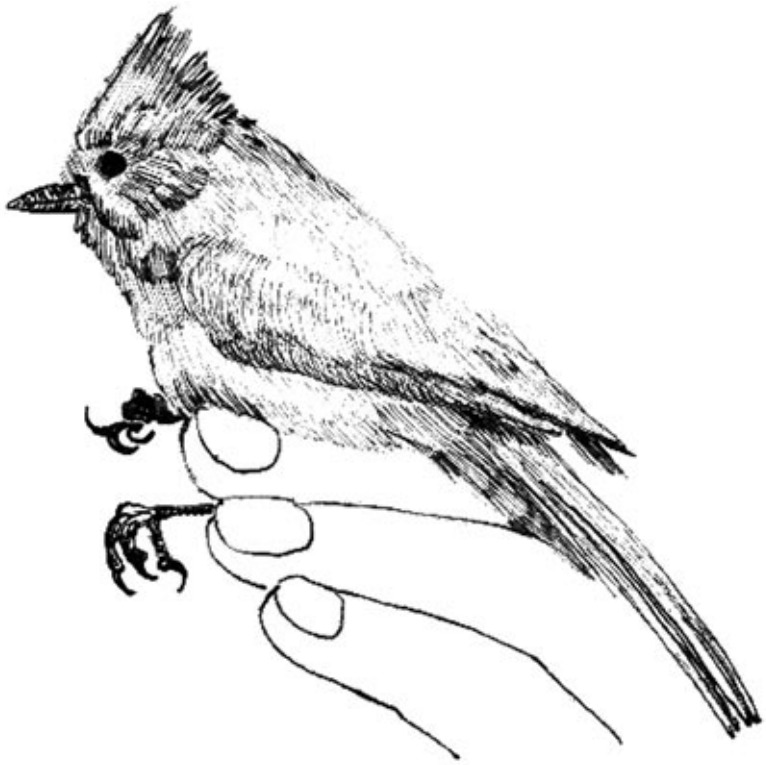
Plain Titmouse

Plain Titmouse
(Parus inornatus)

The Plain Titmouse is resident almost statewide, west of the plains in evergreen woodlands, especially piñon/juniper woodlands.

During the atlas project, the Plain Titmouse occupied 100% of the piñon/juniper blocks. Breeding was confirmed in 42% of the occupied blocks. Three occupied nests, either with eggs or nestlings, were found in late May.

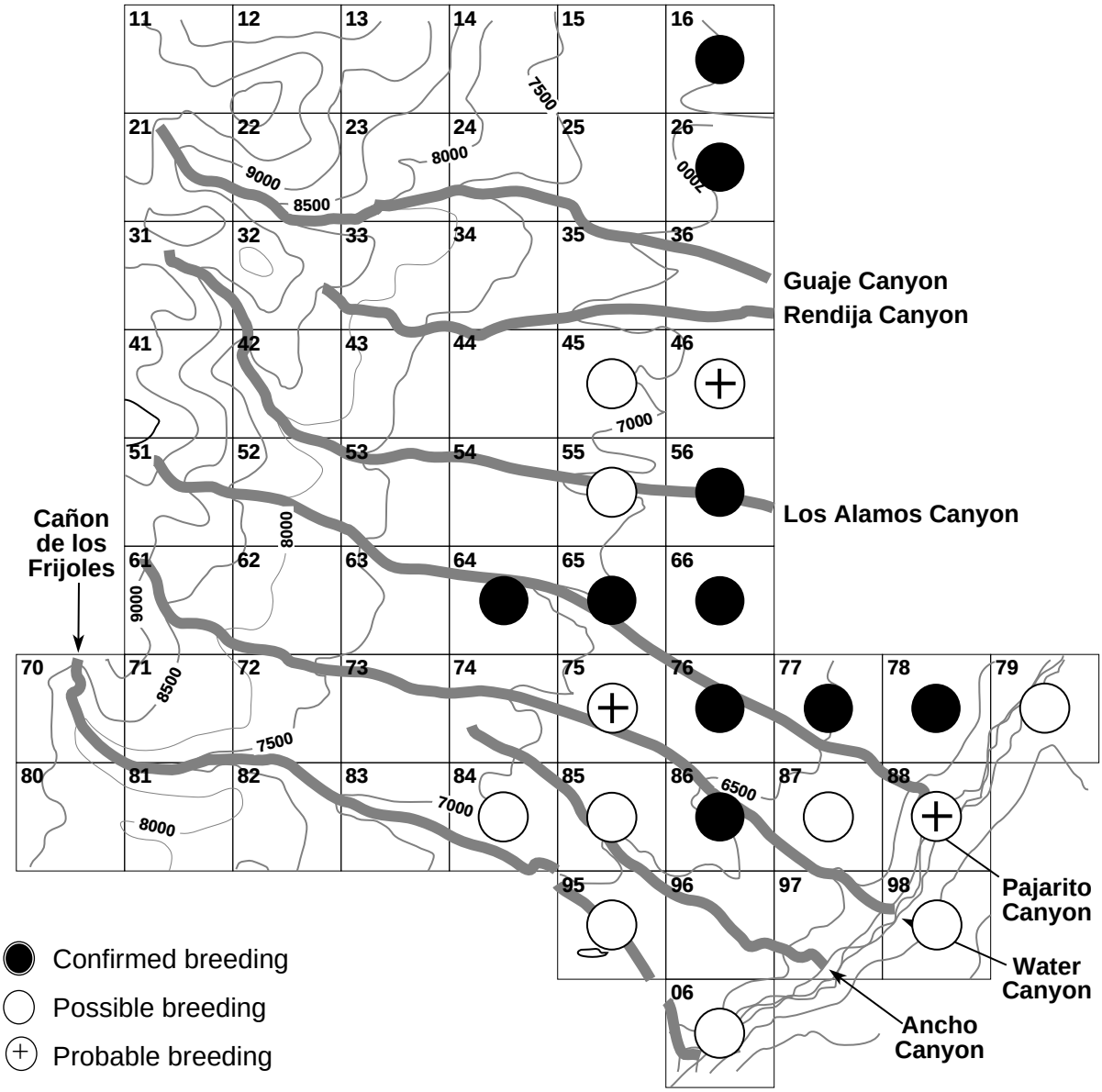
Adults established on territories tend to remain paired for life and defend rather large territories (average 6 acres) throughout the year (Dixon 1949). Their breeding season begins in April announced by male song: a series of three to five double-noted, whistled phrases. The Plain Titmouse nests in a natural tree cavity, an old woodpecker hole, or a nest box.



PLTI

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	4	1	0	3
Ponderosa pine/ piñon/juniper (21)	21	9	9	3
Piñon/juniper (6)	6	3	3	0
TOTAL	31	13	12	6

Bushtit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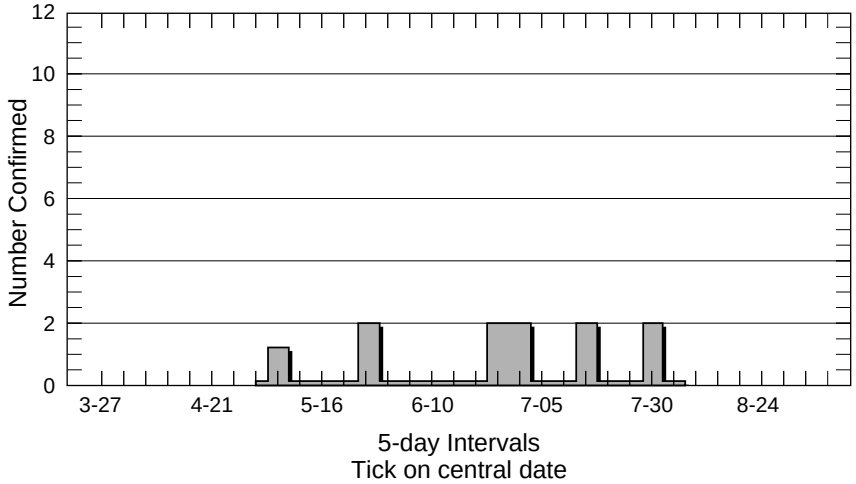
7500
9000
8500
8000
7000
6500
Guaje Canyon
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding


Number Confirmed
0
2
4
6
8
10
12
3-27
4-21
5-16
6-10
7-05
7-30
8-24
5-day Intervals
Tick on central date

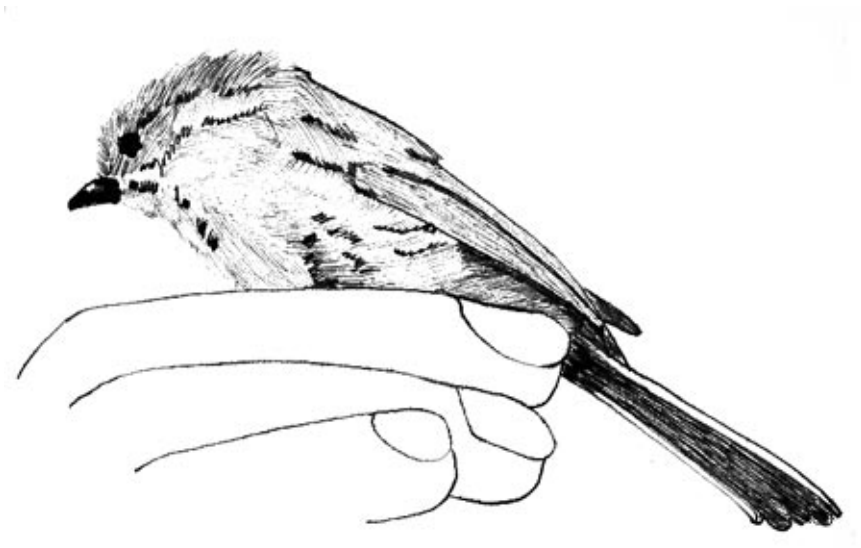
Bushtit

Bushtit
(Psaltriparus minimus)

The Bushtit, a resident species ranging almost statewide in various habitats, breeds exclusively in the piñon/juniper woodland in the Los Alamos area.

During the atlas period, Bushtits were found in 81% of the piñon/juniper blocks. Breeding was confirmed in 45% of the occupied blocks.

Foraging flocks of a dozen or more individuals, formed from the joining of family groups in late summer, roam through the woodland in fall and winter, at times frequenting feeding stations. In late winter these flocks divide into smaller groups, and pairs split off to set up loosely defended territories. Courtship behavior, which consists chiefly of excited location notes, trills, and sexual posturing, may be observed in pairs that have separated from flocks. The song, combinations of the location notes and quivering trills, from a small group is indicative of breeding. The nest is an intricate, elongated pendent structure with an entrance hole on one side near the top, the whole nest widening gourd-like toward the base.

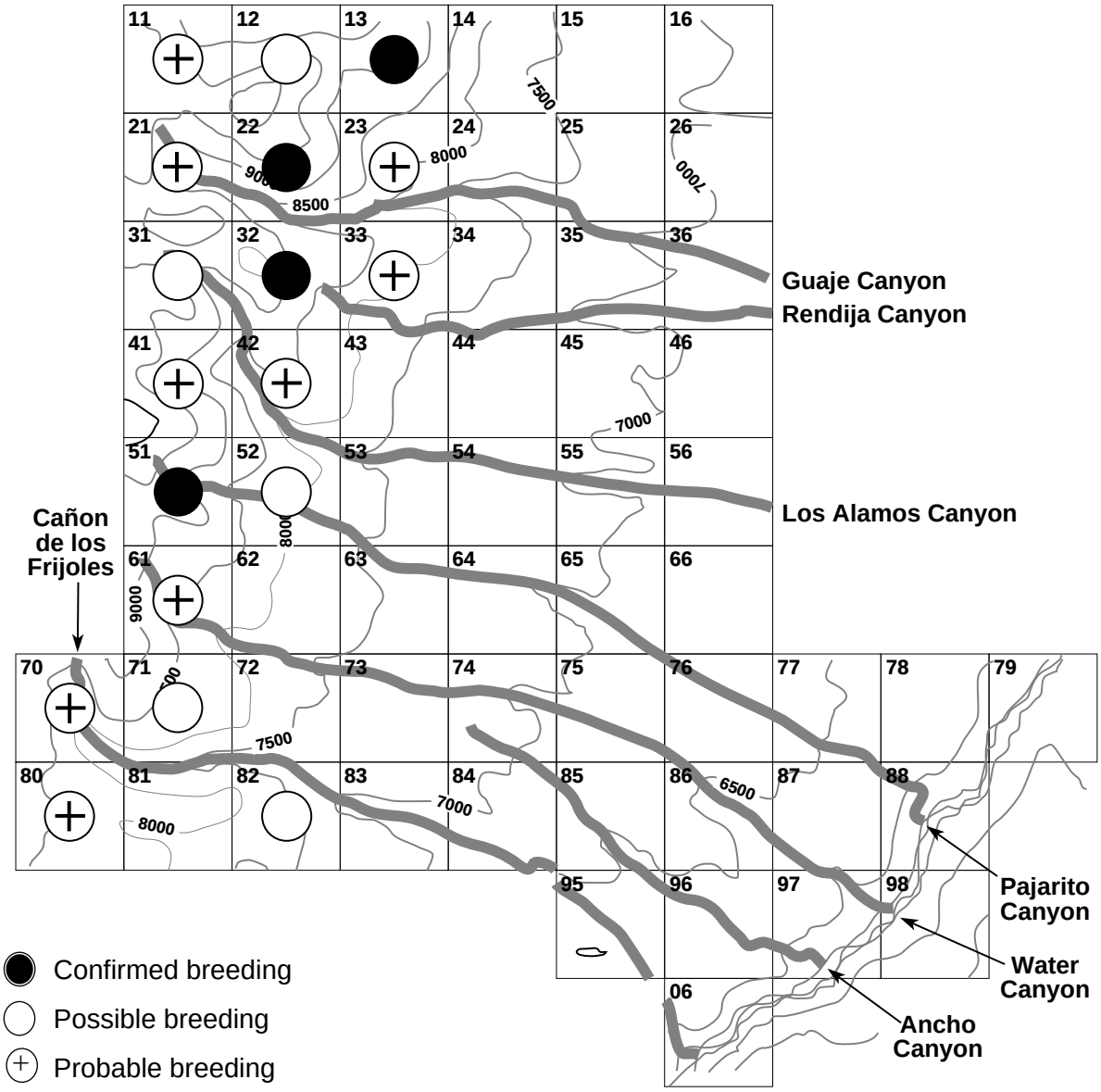


Nest building was observed on May 6. Occupied nests (3) were reported from May 27 to June 26 and attended young from May 28 to July 29. Two broods of four fledglings and one of six were found. Nests were located in junipers (one in a ponderosa pine), from 10 to 25 feet above the ground.

BUSH

Habitat	Occurrence	Conf	Prob	Poss
Piñon/juniper (6)	6	2	1	2
Ponderosa pine/ piñon juniper (21)	16	8	2	7
Total	22	10	3	9

Red-breasted Nuthatch



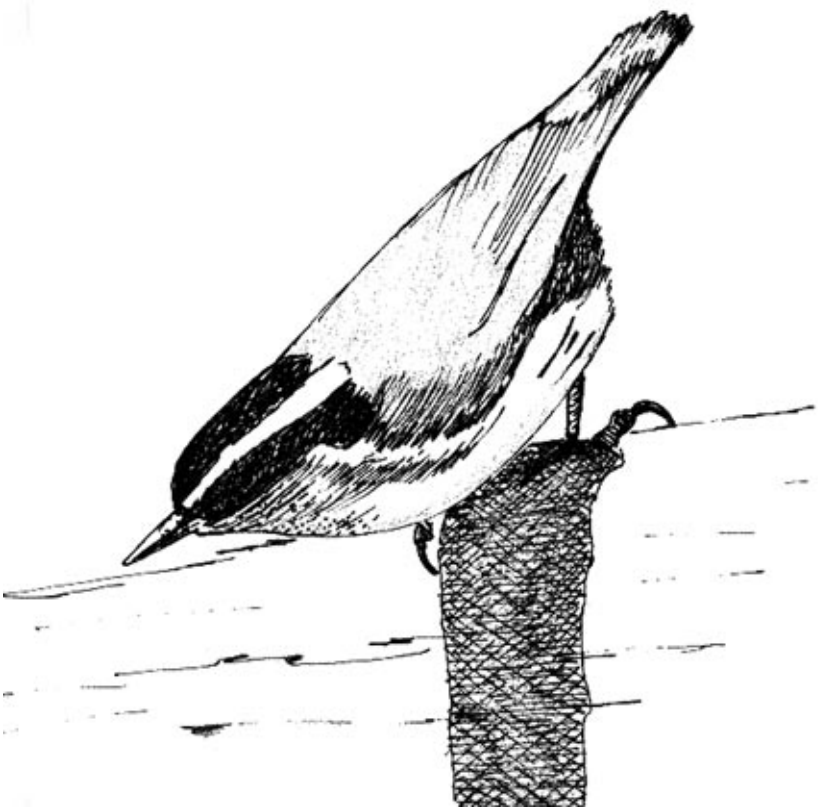
Red-breasted Nuthatch

Red-breasted Nuthatch
(Sitta canadensis)

The Red-breasted Nuthatch is resident in the mountains northward from the Mogollon and Sacramento highlands in spruce/fir and fir forests (Hubbard 1978).

During the atlas period, Red-breasted Nuthatches were found breeding only at elevations above approximately 8500 feet. They inhabited 82% of the blocks containing mixed coniferous forest. Breeding was confirmed in 22% of the occupied blocks. The confirmations were observations of fledglings or adults attending young.

The Red-breasted Nuthatch was common through the entire nesting season in the mixed coniferous forest at the higher elevations, but breeding was difficult to confirm. Atlas records suggest that the breeding season was prolonged in the years of atlas fieldwork in comparison to what is described elsewhere (Laughlin and Kibbe 1985). Territorial song and pair interactions were well along by mid-May and persisted until mid-August. Fledglings and attended young were found in late summer (July 20 to August 1). These dates for dependent young imply egg laying in mid-June [assuming 12 days of incubation and 18–21 days as nestlings—(Harrison 1978)].

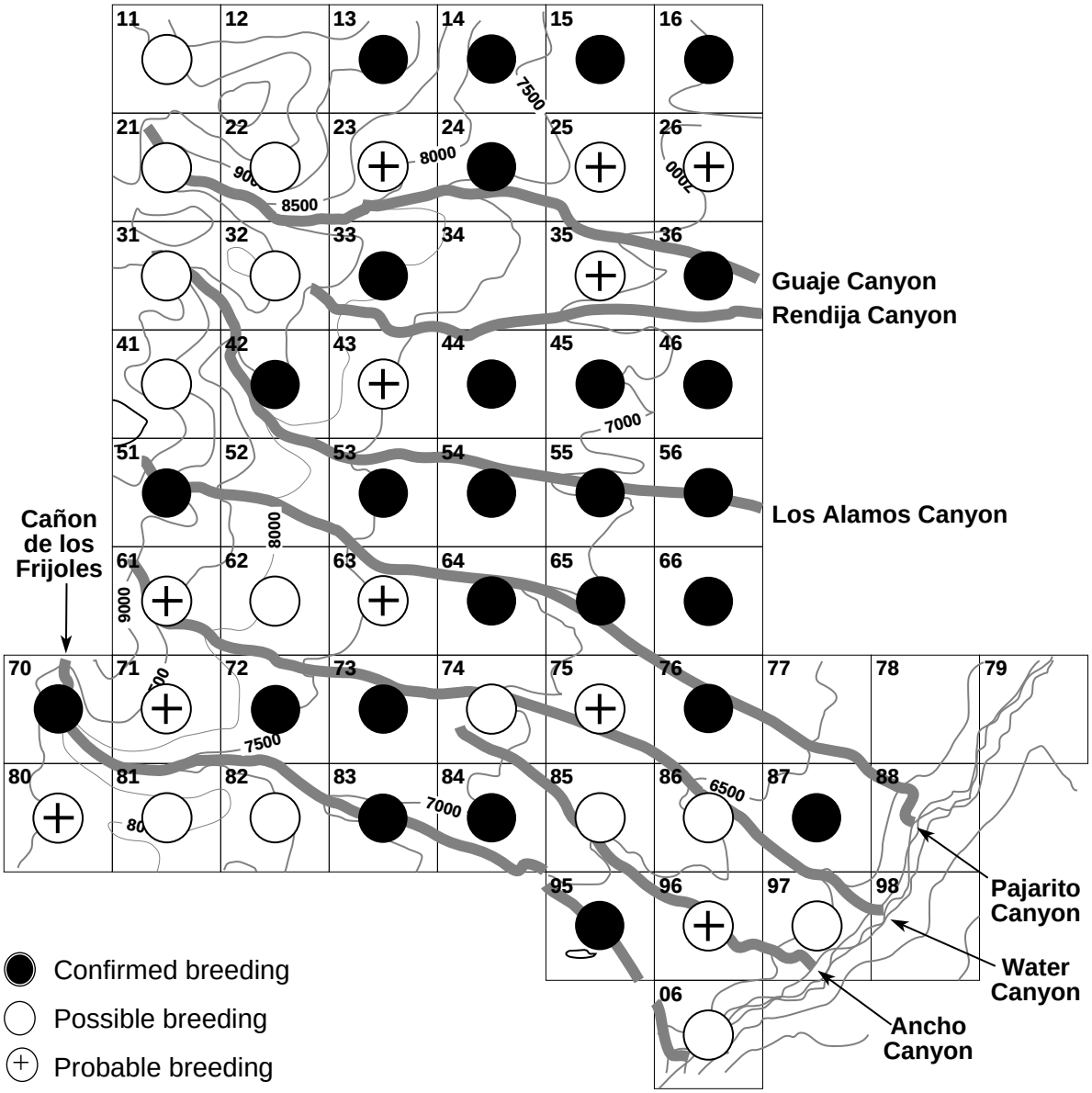


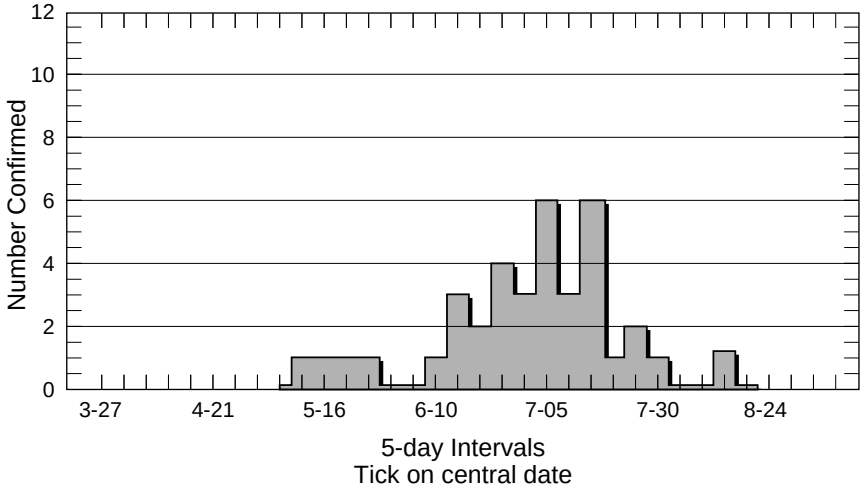
Migration of Red-breasted Nuthatches in New Mexico typically begins in August (occasionally in July) (Hubbard 1978). In Los Alamos they first appear at the lower elevations (ponderosa pine forest and piñon/juniper woodland) in mid-August and September. Irruptive winter flights from the north occur periodically with some individuals lingering even in lower elevation piñon/juniper and riparian woods well into the next breeding season.

RBNU

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	17	4	9	4
Mixed conifer/ ponderosa pine (5)	1	0	0	1
TOTAL	18	4	9	5

White-breasted Nuthatch





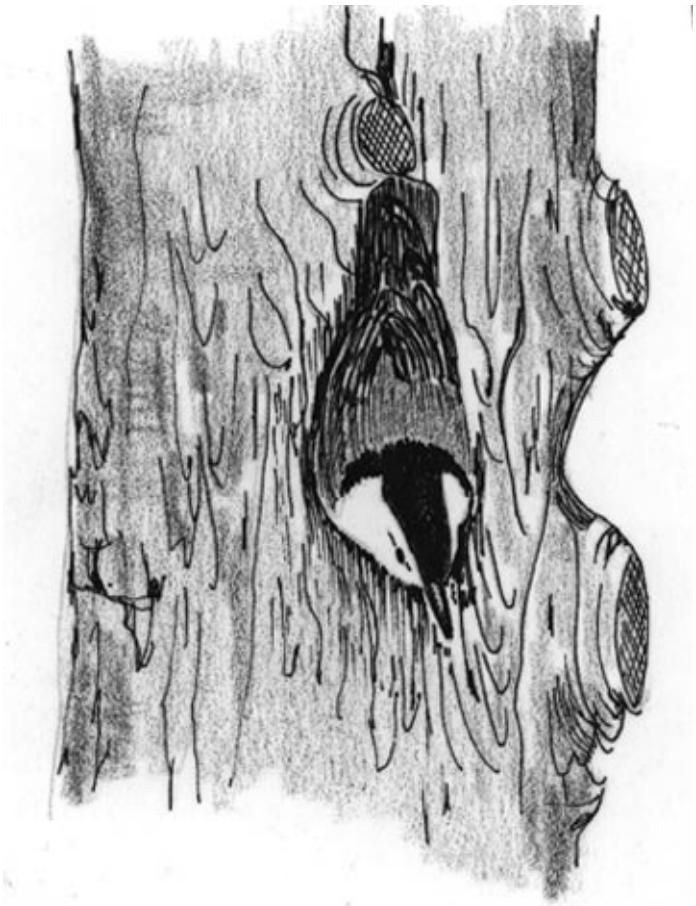
White-breasted Nuthatch

White-breasted Nuthatch
(Sitta carolinensis)

The White-breasted Nuthatch is resident in northern New Mexico, principally from the ponderosa pine to the spruce/fir community. It favors open forest and associated habitat where there are large trees in open areas.

During the atlas project, White-breasted Nuthatches occupied 94% of the blocks that contained lower canyon woodland, mesa-top ponderosa pine forest, and montane mixed conifer forest. Breeding was confirmed in 52% of the occupied blocks.

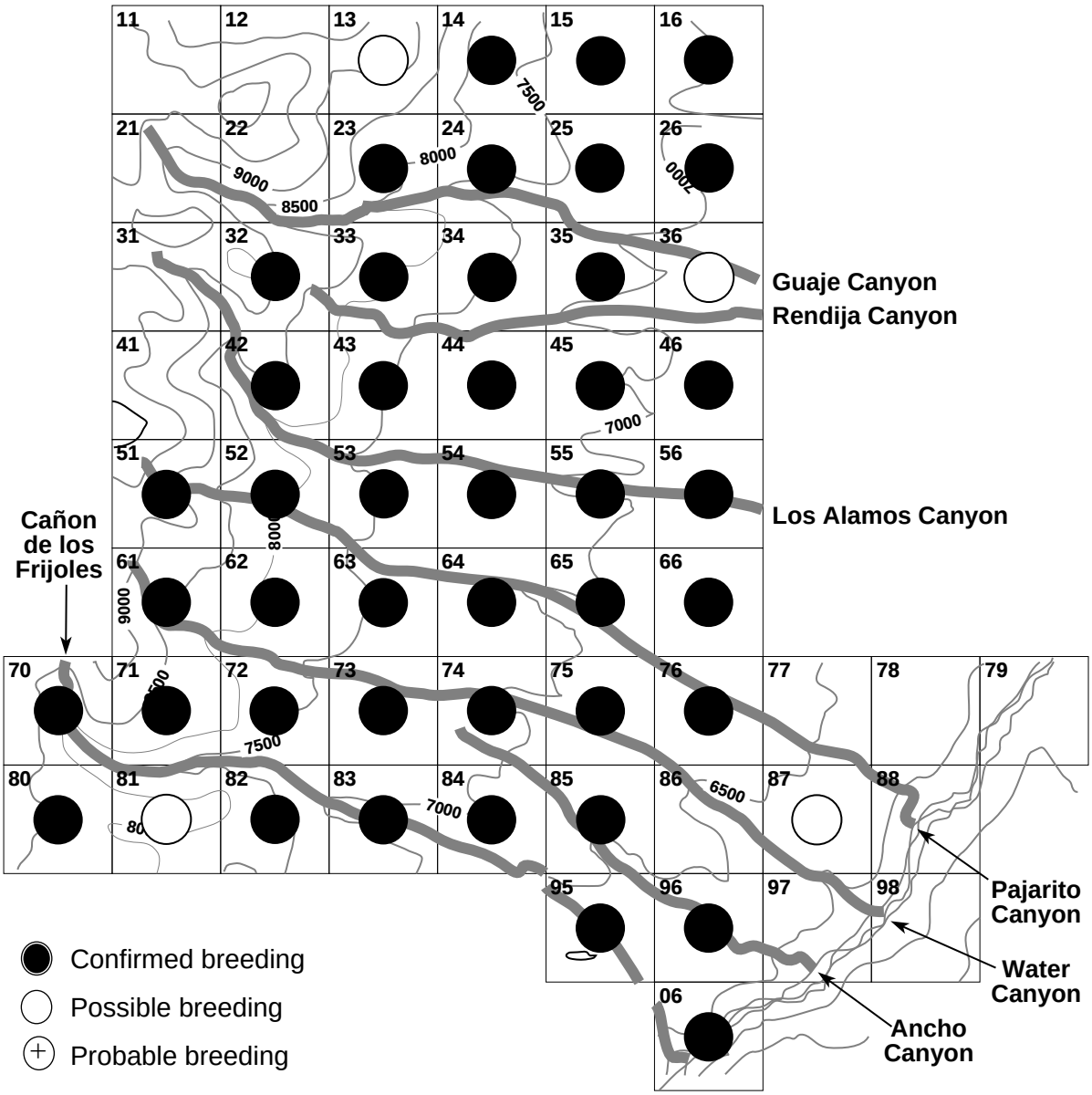
White-breasted Nuthatches remain within a large, fairly fixed range throughout the year, but claim a smaller territory within this range for nesting (Stokes and Stokes 1983). Following establishment of this territory in midwinter is an extended courtship period that includes tree-top song and display of the male at dawn and mate feeding. Nests are built in existing tree cavities, often in rotted-out knot holes. Nest building begins in late April in Los Alamos. Occupied nests (3) were reported from May 17 to July 7. Most of the confirmations were fledglings and attended young, found from June 12 to August 16. The average reported fledgling brood size was 2.5 (either 2 or 3 fledgings from 11 reports).

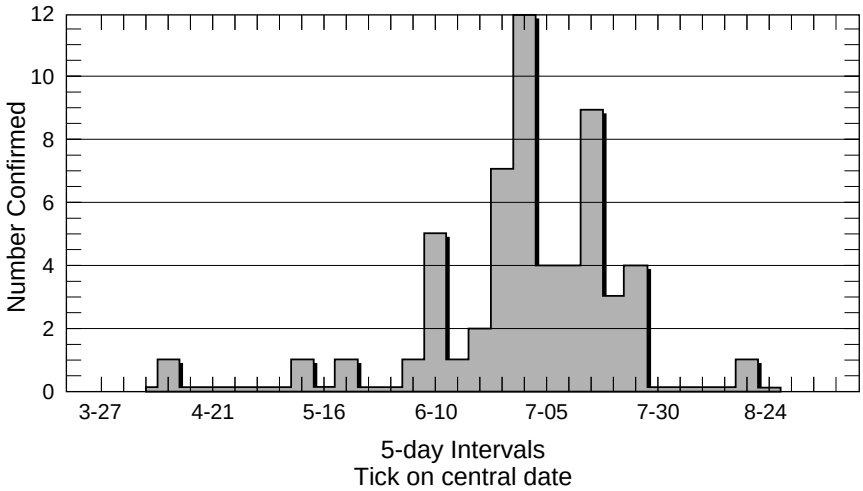


WBNU

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	16	5	4	7
Mixed conifer/ ponderosa pine (5)	4	3	0	1
Ponderosa pine (11)	10	6	3	1
Ponderosa pine/ piñon/juniper (21)	21	13	4	4
Piñon/juniper (6)	1	0	0	1
TOTAL	52	27	11	14

Pygmy Nuthatch





Pygmy Nuthatch

Pygmy Nuthatch
(Sitta pygmaea)

The Pygmy Nuthatch is resident statewide in montane ponderosa pine and mixed conifer forests.

It is the most common species in the ponderosa pine forest in Los Alamos and occurs wherever there are ponderosa pines. During the atlas project, Pygmy Nuthatches inhabited 97% of the blocks containing ponderosa pine and 64% of the higher mixed conifer blocks, nesting where ponderosa pine occurred. Breeding was confirmed in 91% of the occupied blocks, the highest percentage for any native species.

Nest building was observed on three occasions (April 4 to May 11). Of the eight nest sites identified, seven were in ponderosa pines, the other one was in a cottonwood snag. Nest heights ranged from 4 feet above the ground in a ponderosa stump to 30 feet. Occupied nests were reported from June 8 to July 13 and fledglings or attended young from June 12 to August 19.

Dependent fledglings are very vocal. When feeding takes place, the volume of their musical twittering increases, accompanied by wing quivering or fluttering. This behavior makes for easy breeding confirmation.

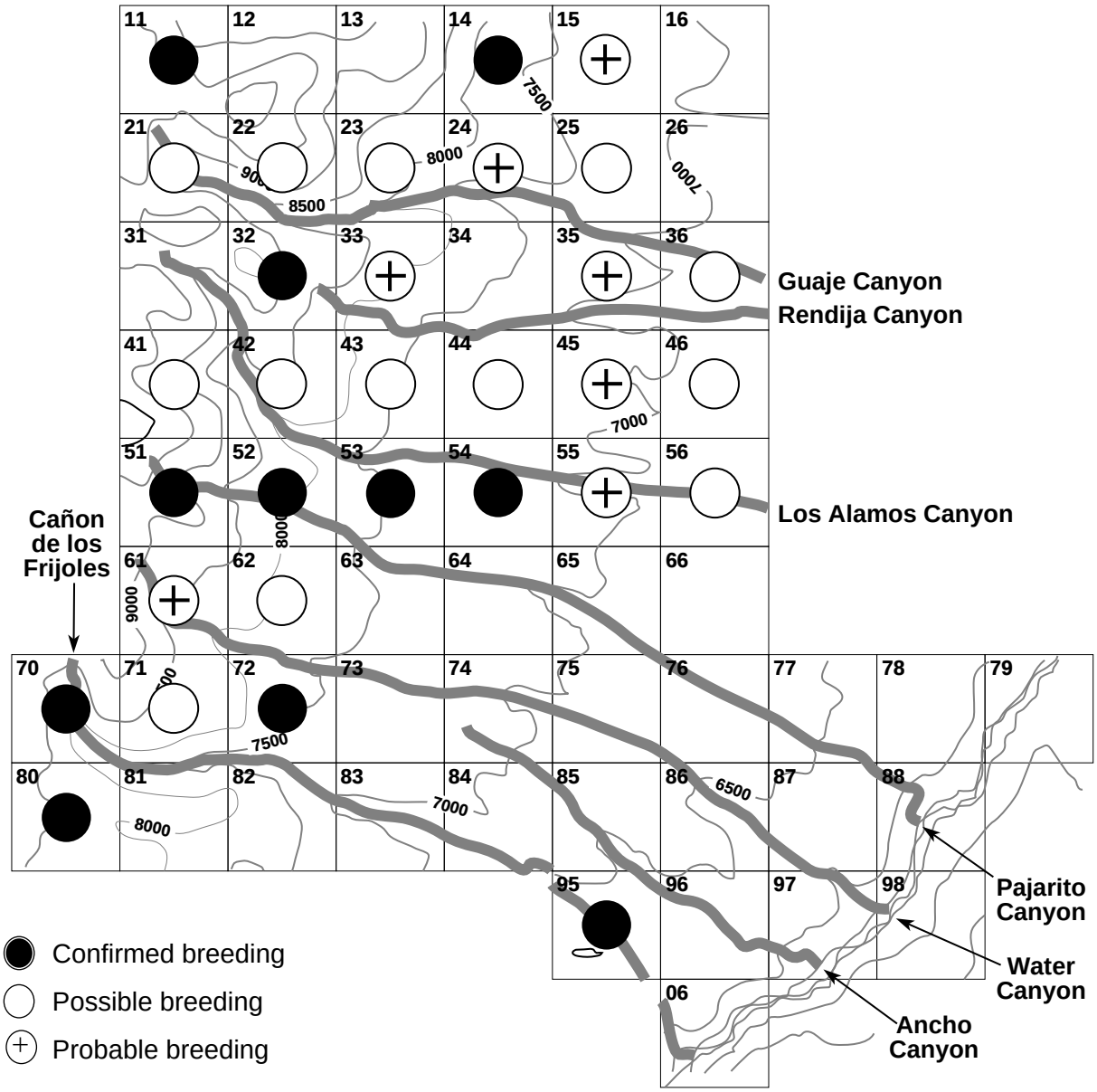
A breeding pair of Pygmy Nuthatches may be assisted by a helper and sometimes by more than one helper. The helpers, unmated males, assist in nest building, maintenance, feeding the female on the nest, and feeding the young (Ehrlich 1988).

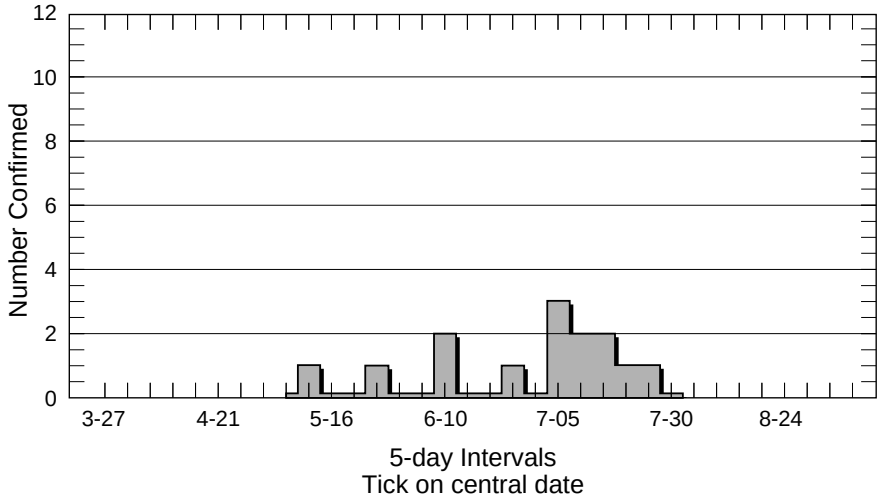
Territories are maintained all year, but defense is limited to the vicinity of the nest cavity. In winter, groups of 4 to 15 forage as a flock and roost communally in nest cavities (Ehrlich 1988).

PYNU

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	11	9	0	2
Mixed conifer/ ponderosa pine (5)	5	5	0	0
Ponderosa pine (11)	11	11	0	0
Ponderosa pine/ piñon/juniper (21)	20	18	0	2
TOTAL	47	43	0	4

Brown Creeper





Brown Creeper

Brown Creeper
(Certhia americana)

The Brown Creeper is resident in montane forests almost statewide (Hubbard 1977).

During the atlas project, Brown Creepers were found in 82% of the blocks containing mixed conifer forest, 43% of the mesa ponderosa pine blocks, and 36% of the lower canyon blocks. Breeding was confirmed in 35% of the occupied blocks.

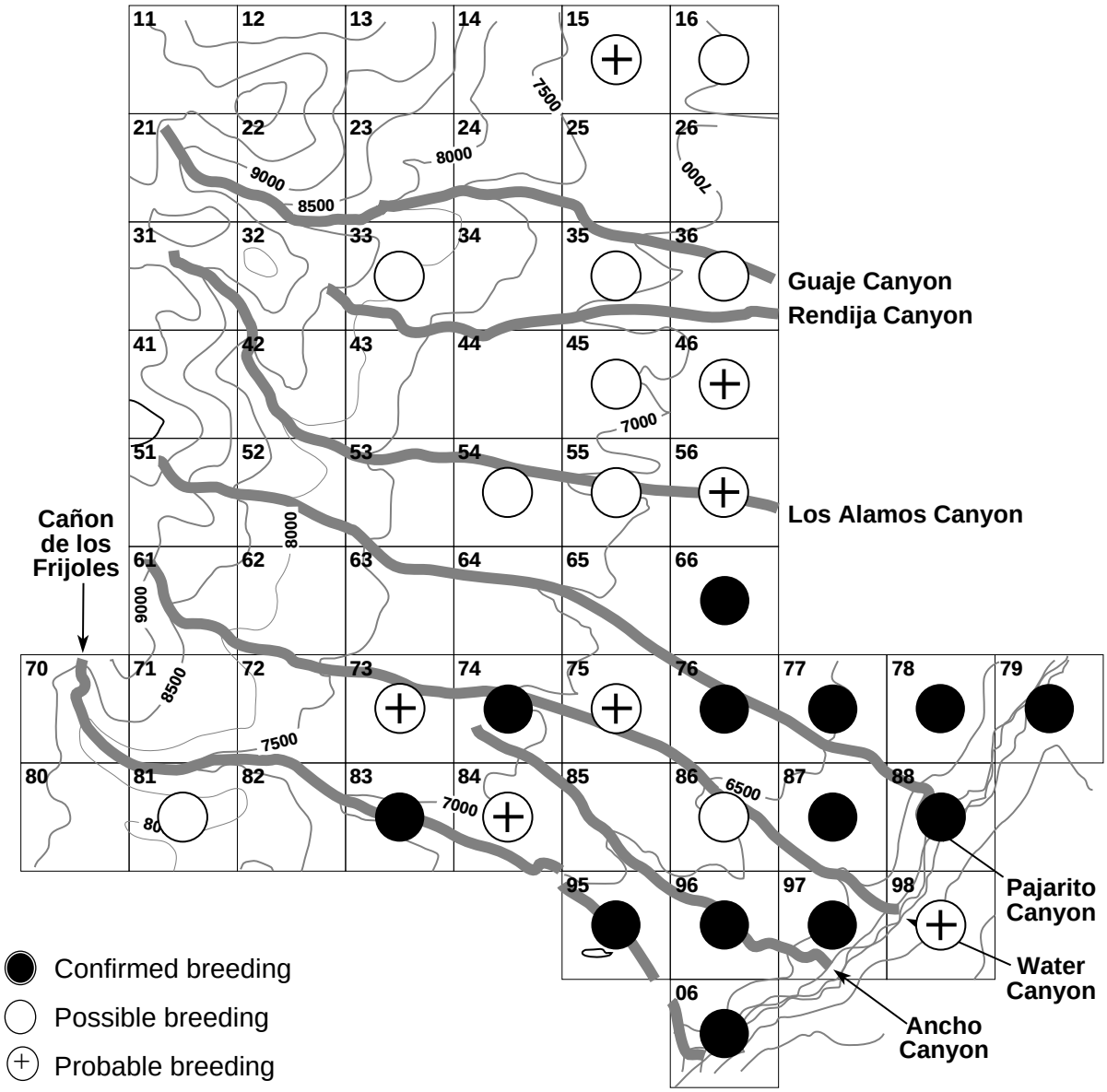
Partially migratory, a few of these birds winter in Los Alamos. Their presence is indicated by the frequently uttered, but faint, position note that sounds like "the shortest, lightest pronunciation of the letters "ts" (Bent 1948). Song is heard most frequently during territory establishment in mid-April and early May.

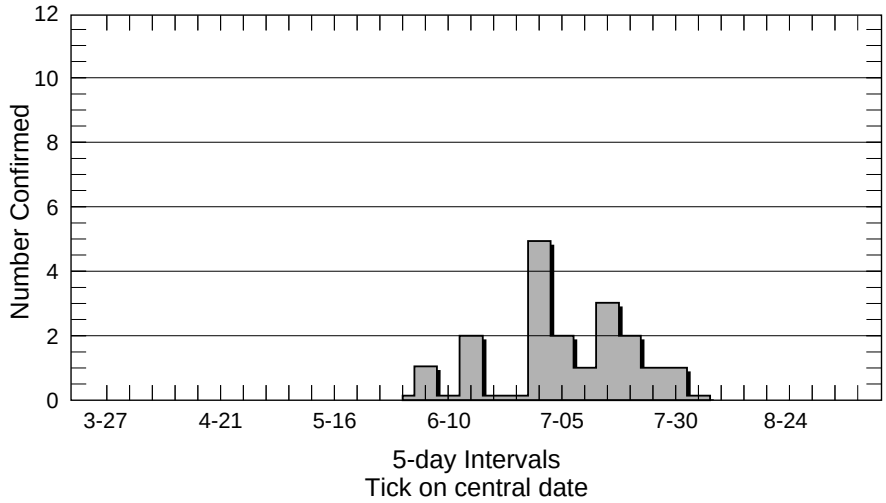
The nest is constructed underneath a long strip of loose bark against the tree trunk and is almost impossible to discover unless it is revealed by the presence of one of the birds. Nest building was seen on May 10 on one occasion. Five nests were found. Three of these were in ponderosa pines (two of them snags), and one in a dead aspen, at heights from 6 to 35 feet above the ground. Occupied nests (4) were reported from June 8 to July 17 and attended young from June 26 to July 23.

BRCR

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	13	5	2	6
Mixed conifer/ ponderosa pine (5)	5	3	1	1
Ponderosa pine (11)	6	2	1	3
Ponderosa pine/ piñon/juniper (21)	7	1	3	3
TOTAL	31	11	7	13

Rock Wren


Guaje Canyon
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding


Number Confirmed
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4-21
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6-10
7-05
7-30
8-24
5-day Intervals
Tick on central date

Rock Wren

ROCK WREN
(Salpinctes obsoletus)

The Rock Wren summers in the mountains of northern New Mexico; it is a permanent resident in the southern part of the state (Hubbard 1978). It inhabits exposed rocky areas, canyons, and cliffs, usually where there is some brushy vegetation.

During the atlas project, Rock Wrens were found in 87% of the blocks containing the major steep-walled canyons. Breeding was confirmed in 45% of the occupied blocks.

Two nests were discovered: one was in a crevice in a canyon wall, the other, atypically, was in a hole in a piñon pine, two feet above the ground. An unusual characteristic of the Rock Wren's nesting behavior is its paving of the entrance to its nesting cavity, and often the area around the nest proper, with small flat stones (Ligon 1961). Fledglings and attended young were reported from June 6 to July 31.

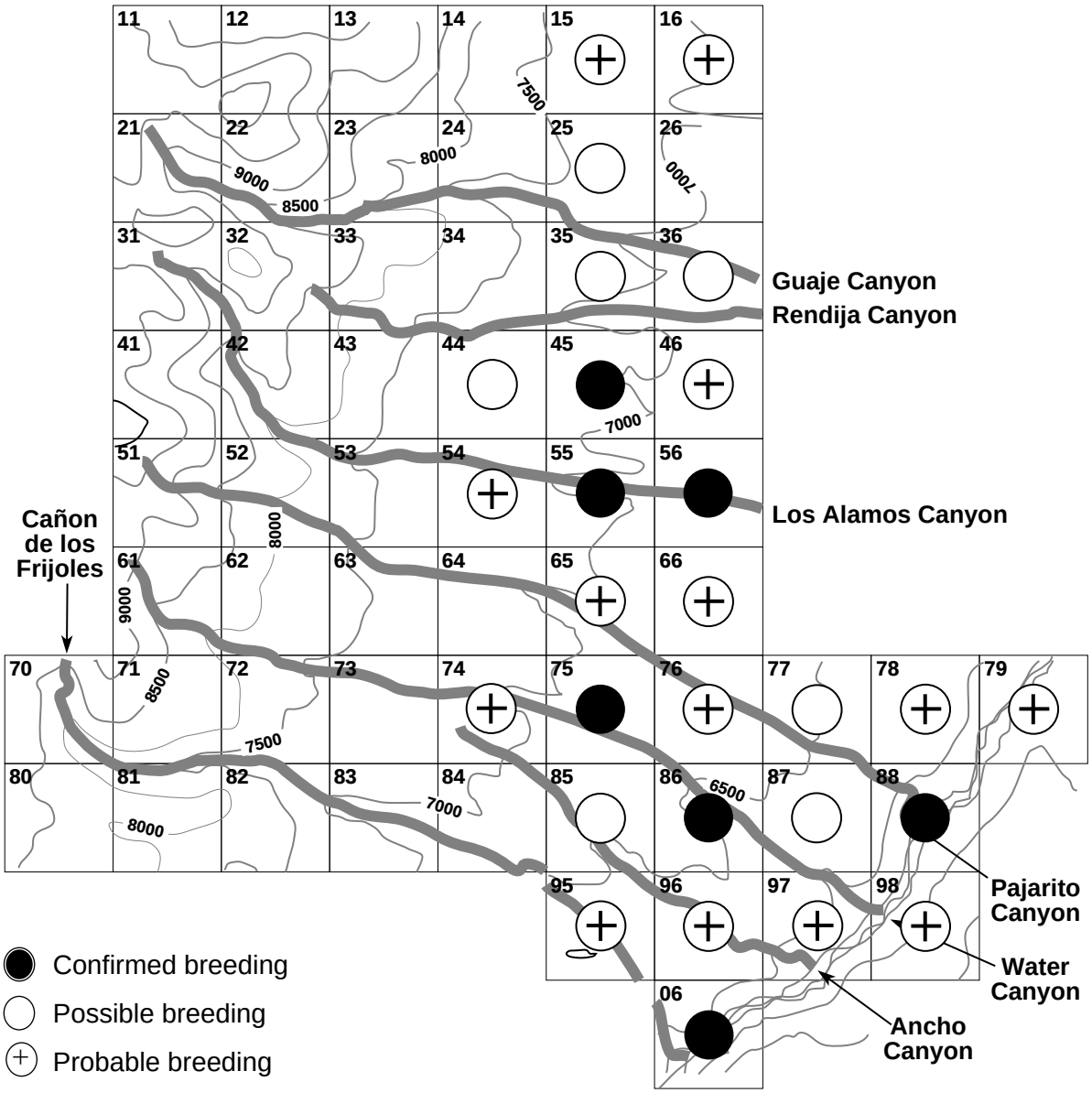
Rock Wrens are early spring arrivals in Los Alamos (April 14 median date in 18 years). They typically leave by late September (September 23 median date in 8 years), but have been seen in November.

The range of the Rock and Canyon Wrens matches almost identically in Los Alamos, although the Rock Wren has a wider habitat tolerance.

ROWR

Habitat	Occurrence	Conf	Prob	Poss
Cliff (30)	26	13	6	7
Adjoining	1	0	1	0
Other	2	0	0	2
TOTAL	29	13	7	9

Canyon Wren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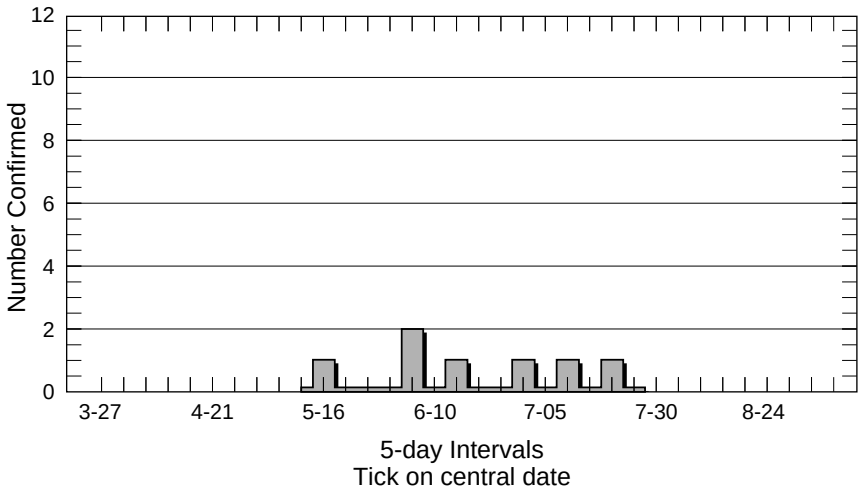
Guaje Canyon
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding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6
8
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3-27
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5-16
6-10
7-05
7-30
8-24
5-day Intervals
Tick on central date

Canyon Wren

Canyon Wren
(Catherpes mexicanus)

The Canyon Wren is resident in the southern part of New Mexico. It summers and is resident, at least locally in the northern part. The degree to which it is resident or migratory is poorly known (Hubbard 1978). Canyon Wrens are partly resident in Los Alamos; at least some of them winter every year (e.g., in Frijoles Canyon).

Cliffs, steep-sided canyons, rocky outcrops, and boulder piles are its natural habitat (American Ornithologist's Union 1983).

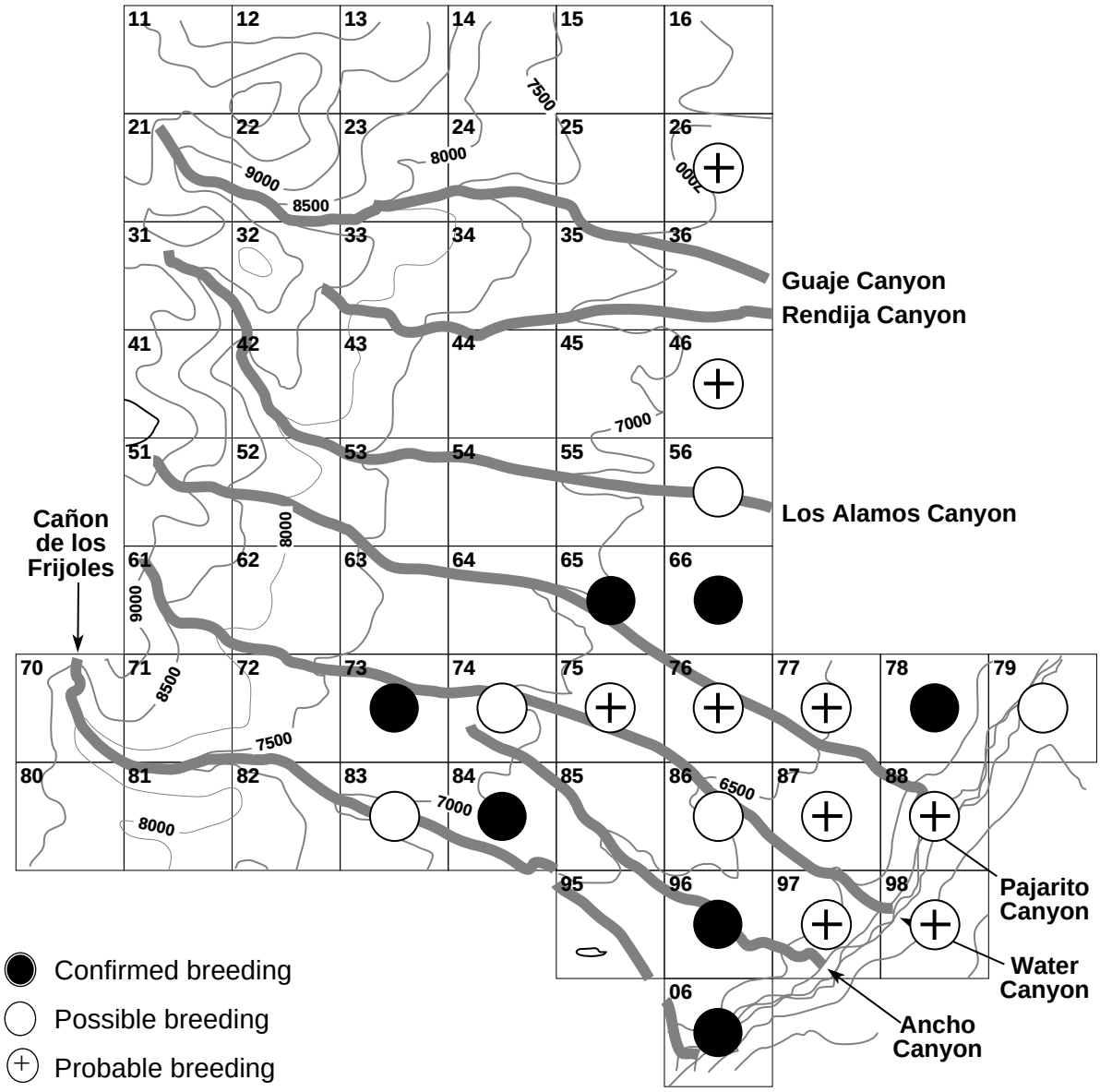
During the atlas project, Canyon Wrens were found in 90% of the blocks containing steep-walled canyons, and breeding was confirmed in 26% of these occupied blocks. Their nests are typically built in crevices and recesses in rock walls. Three such nests were found and nest-site searching was observed in two additional blocks during the atlas fieldwork. Breeding activity began in late April and dependent young were evident from June 4 to July 22 (7 records).

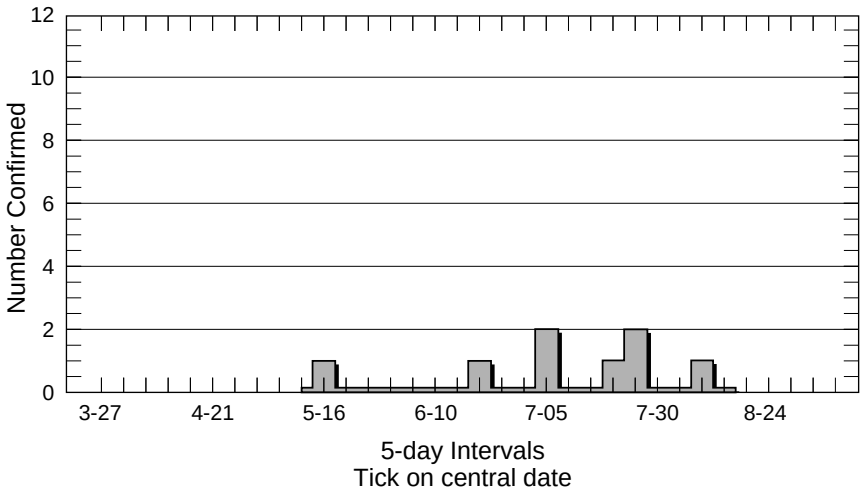
The song, enhanced by the acoustical properties of the rock formations, is a startlingly loud series of silvery, bell-like whistles, beginning high in pitch and running down the scale to end in a low trill or buzz (Pough 1963). Canyon Wren song has been heard every month of the year in Los Alamos.

CAWR

Habitat	Occurrence	Conf	Prob	Poss
Cliff (30)	27	7	14	6
Adjoining	1	0	0	1
TOTAL	28	7	14	7

Bewick's Wren





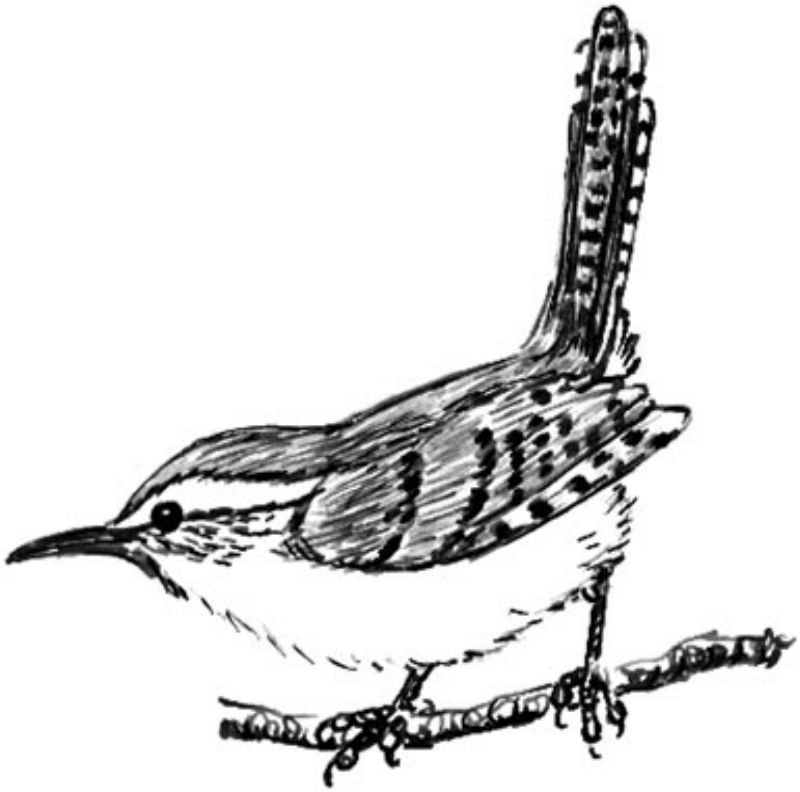
Bewick's Wren

Bewick's Wren
(Thryomanes bewickii)

The Bewick's Wren is resident in the south and summers locally northward to the San Juan and Dry Cimarron valleys. It is found in evergreen woodland and locally in lowland riparian woodland. Its status in the vicinity of the Northern Highlands is poorly known (Hubbard 1978).

Where it is found in the west, the Bewick's Wren breeds in almost any brushy area (Harrison 1979). It is a characteristic breeding bird of the piñon/juniper habitat and regularly nests as well in undercover tangles amidst streamside cottonwoods, willow, and alder (Blackford 1956).

During the atlas project, Bewick's Wrens were found in 70% of the piñon/juniper blocks. In 33% of the blocks in which they were reported, breeding was confirmed. A nest being built was observed in burned-over ponderosa pine forest habitat adjacent to piñon/juniper woodland, and fledglings were seen there later (June 28, 1986). The other confirmed and all the probable breeding records were from piñon/juniper habitat. A pair tried to nest in a backyard birdhouse, but abandoned it (after June 19, 1985). Probable breeding was reported for 43% of the occupied blocks. Pairs were first seen together in



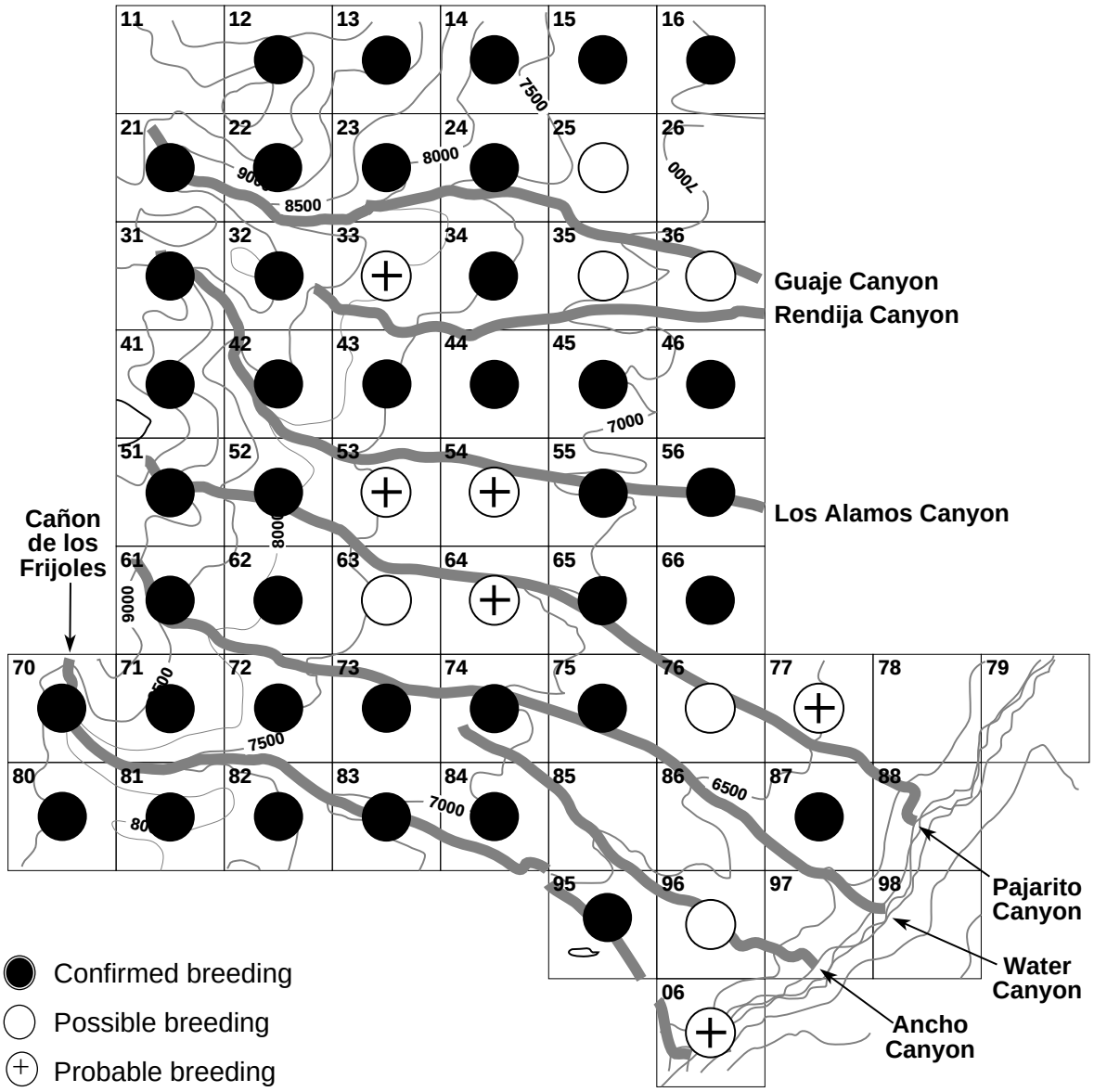
early May (May 6 and 18 in 2 years). Territorial establishment, as indicated by persistent song, was reported from June 6 to July 21.

The Bewick's Wren is an early spring migrant in Los Alamos (April 14 median date in 7 years), typically preceding the House Wren by 2 weeks. October 12, 1958, is the only late fall report on record. Bewick's Wrens winter fairly regularly in the Española Valley.

BEWR

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	2	1	0	1
Ponderosa pine/ piñon/juniper (21)	13	5	5	3
Piñon/juniper (6)	6	1	4	1
TOTAL	21	7	9	5

House Wren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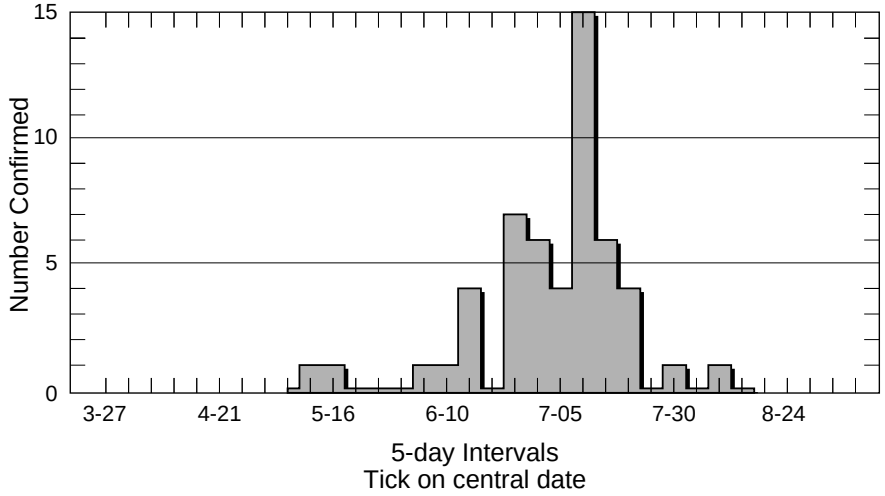
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding


Number Confirmed
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5
10
15
3-27
4-21
5-16
6-10
7-05
7-30
8-24
5-day Intervals
Tick on central date

House Wren

House Wren
(Troglodytes aedon)

The House Wren summers in forests and adjacent riparian woodland in mountainous areas of New Mexico (Hubbard 1978). It is a characteristic bird of the ponderosa pine habitat, and it breeds regularly in mixed fir/ponderosa pine forest (Blackford 1956). It nests in thickets, along edges of woods, and in sunny openings and gardens. Our western House Wren is less domestic and more of a woodland bird than the eastern form (Bent 1948). Primitive nesting sites are in natural cavities or crevices in stumps or in fallen or standing trees; these days a bird box or almost any sort of cavity about a building seems preferred by the eastern House Wren (Pough 1953).

House Wrens are widespread in Los Alamos. During the atlas period, they occurred in 93% of the forested blocks, but they did not nest in the lowest elevation piñon-juniper woodland. Breeding was confirmed in 75% of the occupied blocks. Observation of all stages of the nesting cycle provided breeding confirmation. We found 18 nests. The earliest evidence of nest building was on May 13, the latest on June 28. Nests with young were found from June 28 to July 22. Of the 14 nest-hole sites reported, 7 were in aspens, 5 in ponderosa pines, 1 in a wall of a building, and 1 was a nest box.

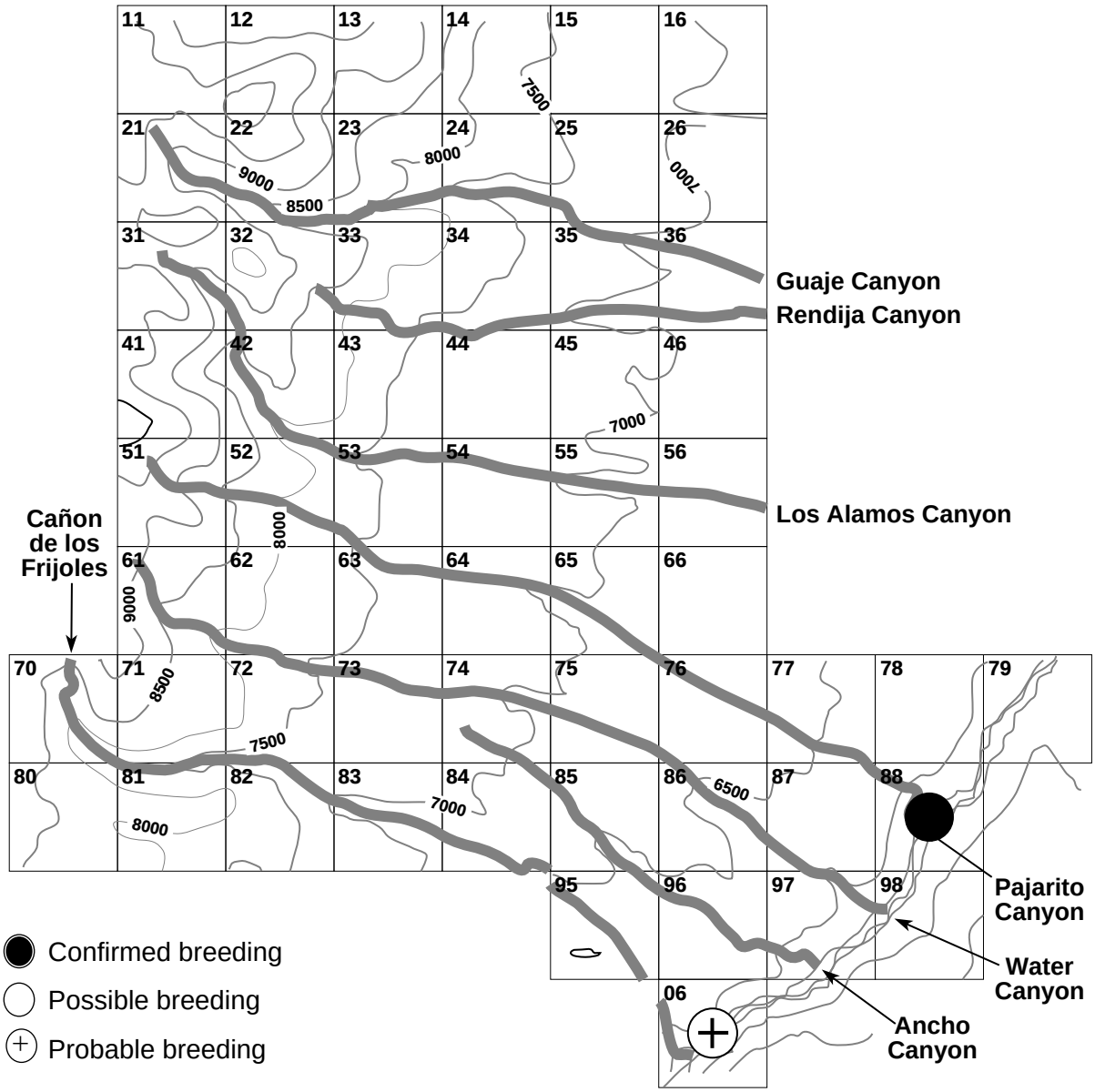
Males usually arrive first, typically by May 1 (median date in 20 years) in Los Alamos, but in some years by mid-April. Progress through the nesting cycle can be monitored by listening carefully to the male's song. They advertize with persistent song and defend small breeding territories. As part of territorial establishment, a male starts to claim nest sites and begins nest building. Several nests may be started before the female appears. She completes the nest or builds a new one and lays the eggs. During this time, the male sings less frequently. During incubation the song rate increases, then drops again while the male helps feed the nestlings and fledglings (Wilson and Bart 1985).

House Wrens may renest, repeating the cycle. They leave Los Alamos in mid-September (September 18 median date in 14 years).

HOWR

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	16	15	1	0
Mixed conifer/ ponderosa pine (5)	5	4	1	0
Ponderosa pine (11)	11	7	2	2
Ponderosa pine/ piñon/juniper (21)	18	12	2	4
Piñon/juniper (6)	1	0	1	0
TOTAL	51	38	7	6

American Dipper



American Dipper

American Dipper
(Cinclus mexicanus)

The American Dipper is resident along streams in the mountains of the Northern, Mogollon, and Sacramento highlands (Hubbard 1978).

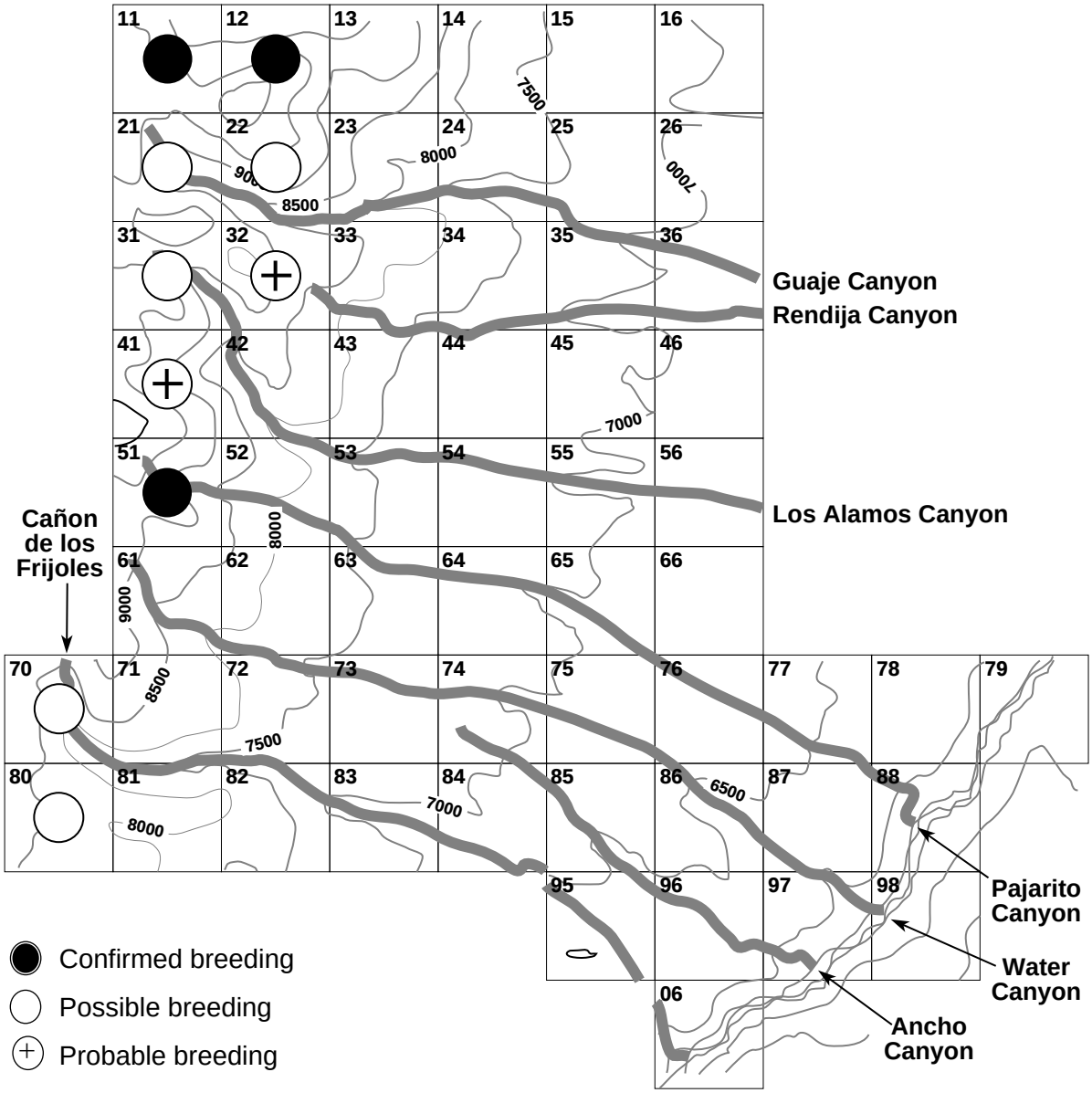
During the atlas project, dippers were found in two blocks in the Rio Grande gorge. A pair nested below Pajarito Spring east of White Rock. This is the only confirmed breeding record for the atlas period. A pair was observed in two different years along the Rito de Frijoles below Lower Falls in Bandelier National Monument, which indicates probable breeding there. Historically, dippers have nested regularly in both of these areas, although these places are near their lower elevational limit in New Mexico, and in high mountain streams to the west of the county.

The nest is always near a stream, often close to or behind a waterfall, beautifully concealed because the living moss of the nest resembles the undisturbed moss of its surroundings (Ligon 1961).

AMDI

Habitat	Occurrence	Conf	Prob	Poss
Lower Canyon (10)	1	0	1	0
Rio Grande gorge (6)	1	1	0	0
Total	2	1	1	0

Golden-crowned Kinglet



Golden-crowned Kinglet

Golden-crowned Kinglet
(Regulus satrapa)

The Golden-crowned Kinglet is resident in the montane spruce/fir forests of New Mexico.

In Los Alamos, Golden-crowned Kinglets nest exclusively in the spruce/fir forest that covers the highest mountain areas of the county's western edge. They were found in all the blocks containing spruce/fir during the atlas surveying. Breeding was confirmed in 30% of the occupied blocks by observations of adults attending young (from July 9 to August 1).

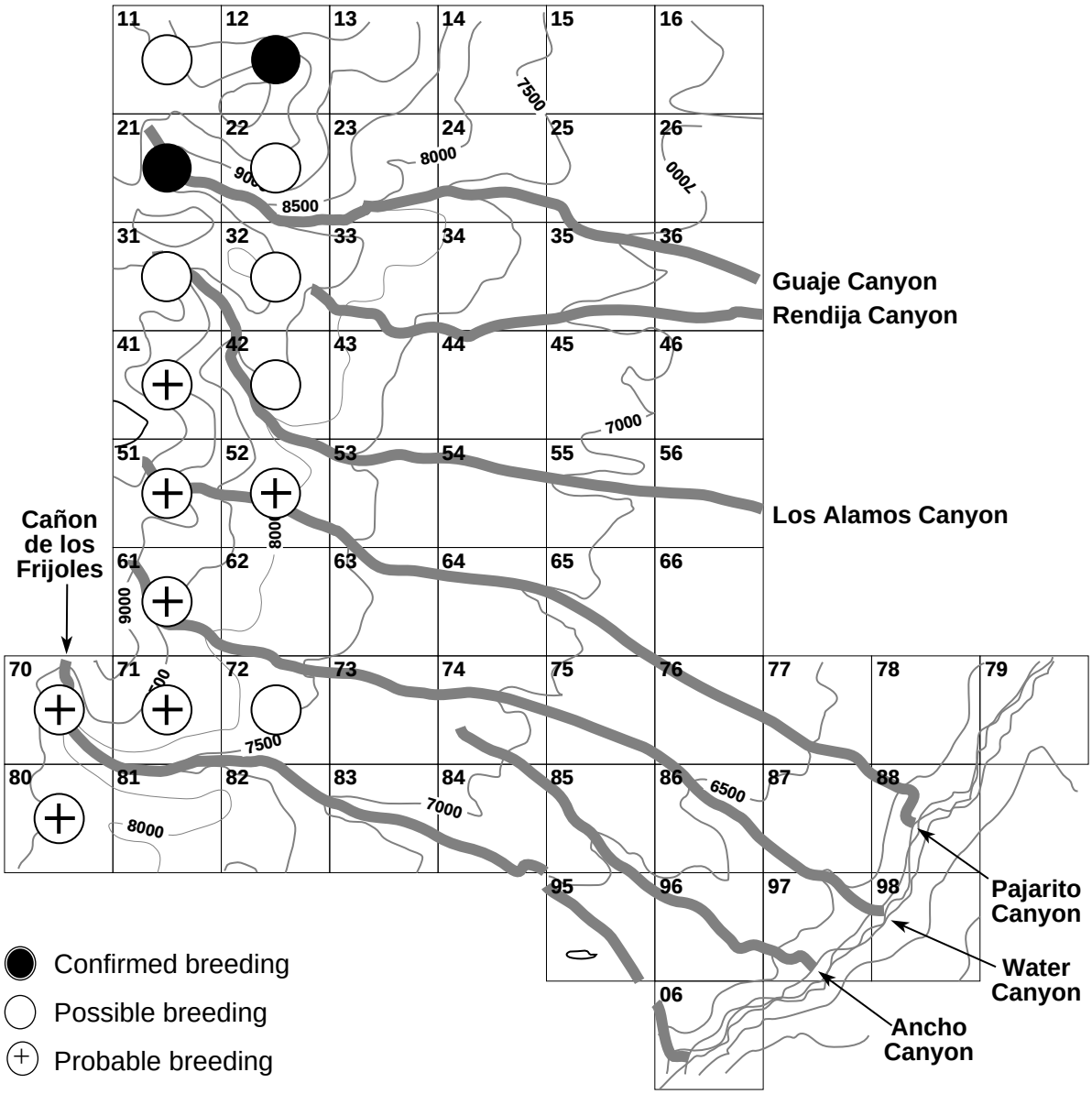
Their nests are extremely well hidden, usually in a fork at a branch tip in thick foliage. None have been found in Los Alamos. Kinglets are difficult to locate because of their diminutive size, the remoteness and concealing characteristics of their habitat, and their thin, very high-pitched calls.

In Los Alamos, although they favor the dense conifers in the summer, Golden-Crowned Kinglets occasionally move down to the lower elevation woodland in winter.

GCKI

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	10	3	2	5

Ruby-crowned Kinglet



Ruby-crowned Kinglet

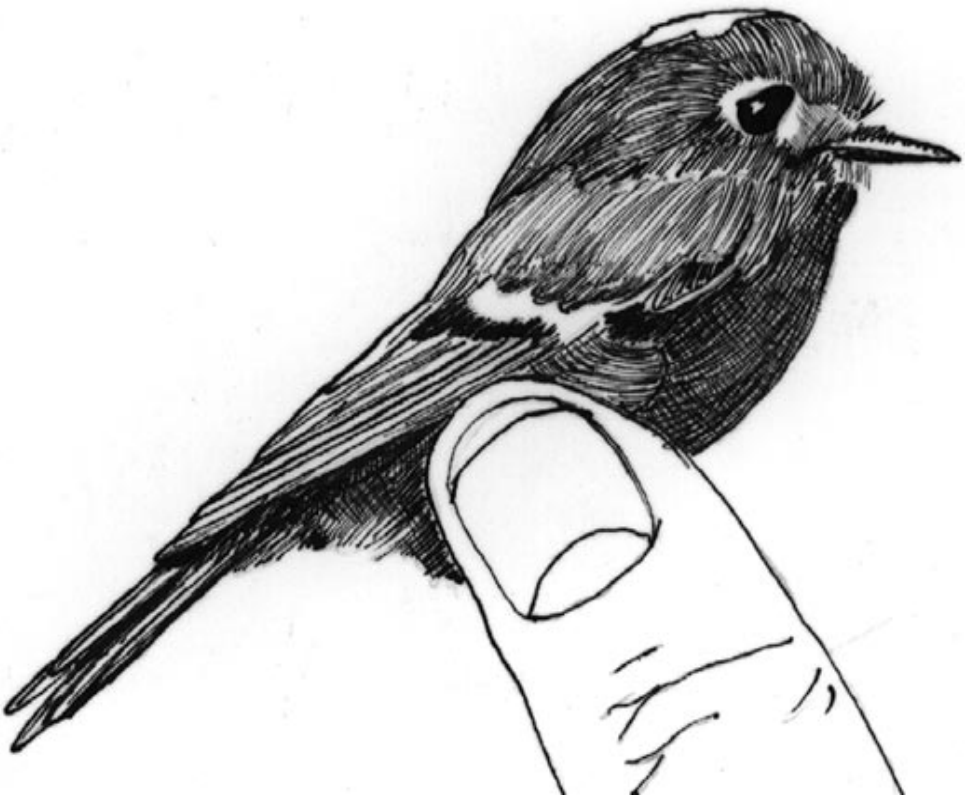
Ruby-crowned Kinglet
(Regulus calendula)

The Ruby-crowned Kinglet summers in the spruce/fir forests of the high mountains of New Mexico.

During the atlas project, Ruby-crowned Kinglets occupied 73% of the blocks containing mixed conifer forest. Breeding was confirmed in only 15% of the occupied blocks, as determined by observation of fledglings being fed by their parents (July 9 to July 20).

Their nests are placed in dense foliage near the tops of tall conifers and much of the kinglet's activities are carried on high in the trees. Thus, confirmation of breeding is difficult to establish. The territorial behavior of a male singing over a period of time indicates probable nesting. Probable nesting was determined for half of the occupied blocks using this criterion (May 25 to July 16).

The song of the Ruby-crowned Kinglet has three distinct parts: it begins with four to eight very high weak notes, followed by a rapid chatter of five to ten notes at a much lower pitch, and then a louder, musical conclusion consisting of a few repeated three- to four-note phrases (Bent 1949).

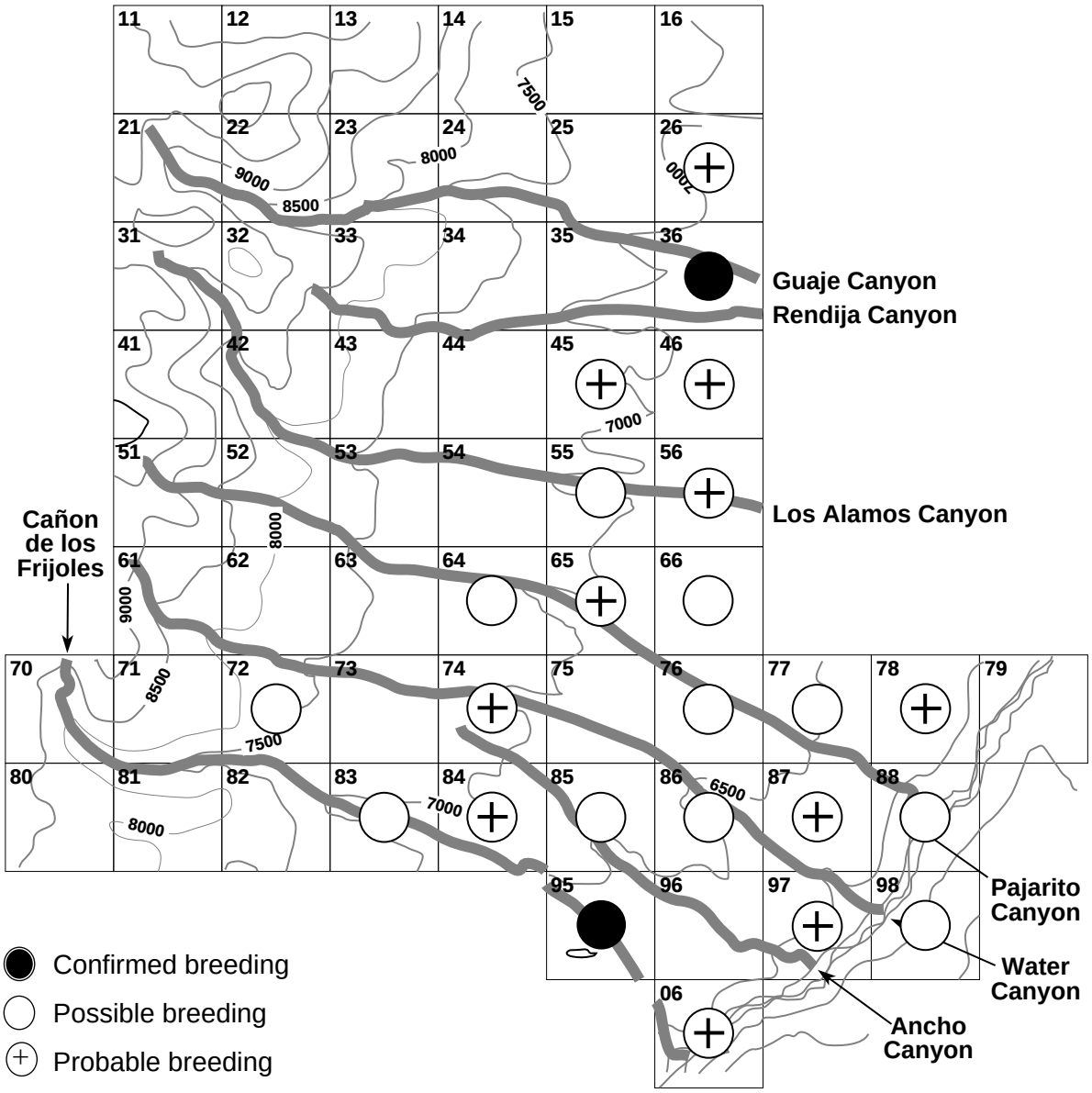


Although migratory, occasionally these kinglets are found in winter in Los Alamos. They are among the earliest spring migrants to appear (April 18 median date in 10 years), and they usually have left the county by November (October 28 median date in 11 years).

RCKI

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	13	2	6	5
Mixed conifer/ ponderosa pine (5)	2	0	1	1
Total	15	2	7	6

Blue-gray Gnatcatcher



Blue-gray Gnatcatcher

Blue-gray Gnatcatcher
(Polioptila caerulea)

The Blue-gray Gnatcatcher summers almost statewide, northward locally to the San Juan and Canadian valleys and the upper Rio Grande to the Dixon area (Hubbard 1978).

During the atlas project, the Blue-gray Gnatcatcher was found in 81% of the piñon/juniper blocks, but breeding was confirmed in only 8% of the occupied blocks. However, evidence of territorial establishment and the presence of pairs indicated probable breeding in 46% of the occupied blocks. One nest was discovered on July 19, 1984. It was saddled at eye level on a limb of a conifer in the piñon/juniper flats.

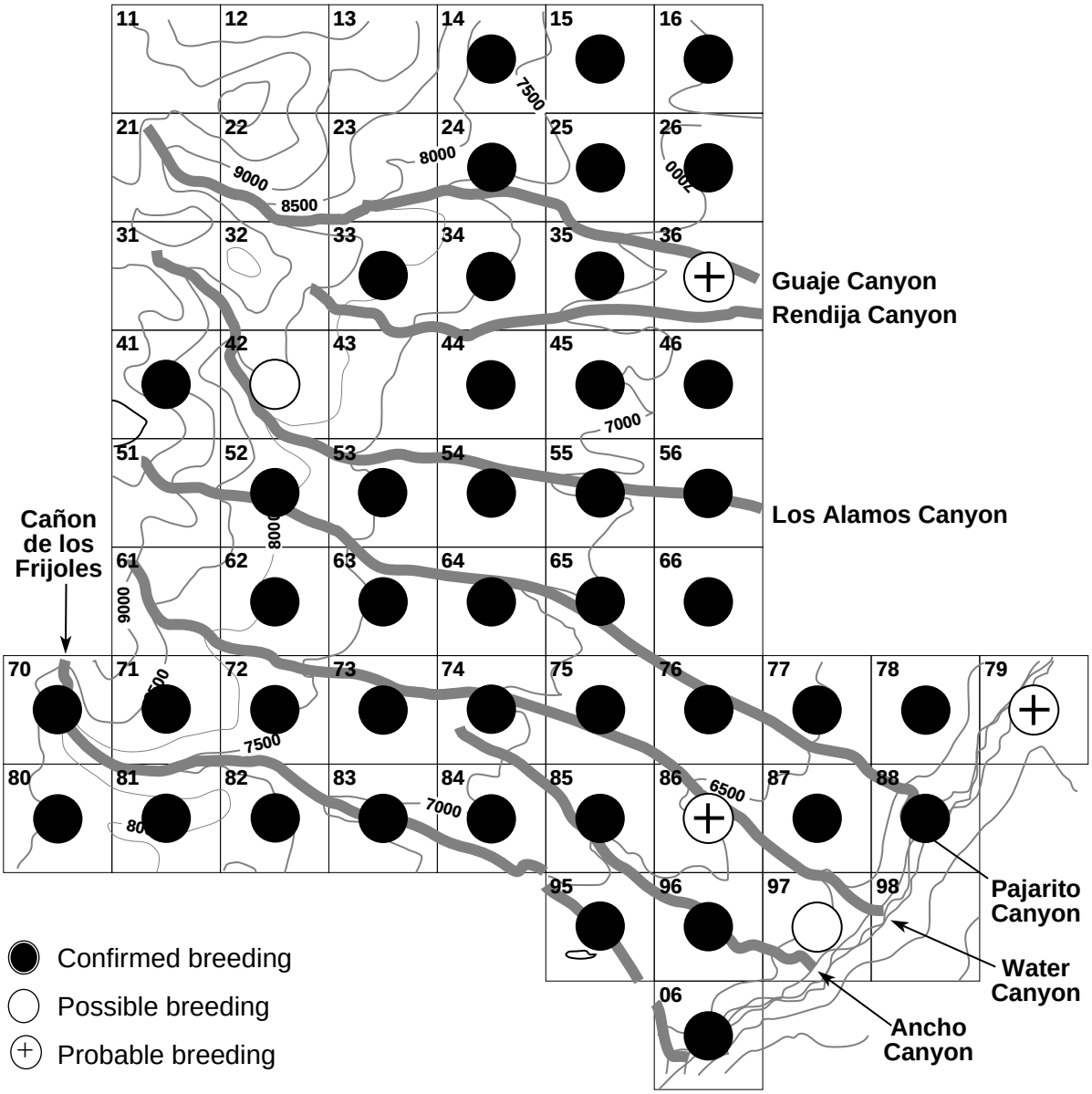
Gnatcatchers are thinly distributed in the Los Alamos area. They betray their presence by their sizzling voices and continual nervous activity. But breeding activity was difficult to observe, which differs from experience elsewhere, where their fearless, intense preoccupation with their nesting activities allows close observation.

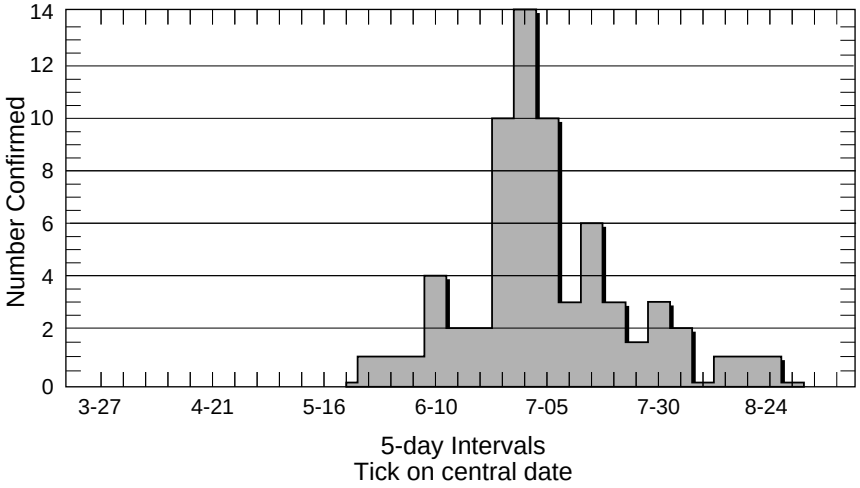
Blue-gray Gnatcatchers are migratory, arriving near the end of April in Los Alamos (April 27 median date in 14 years). They leave the county unobtrusively, probably in late August. There are a few autumn records, of which the latest is September 13.

BGGN

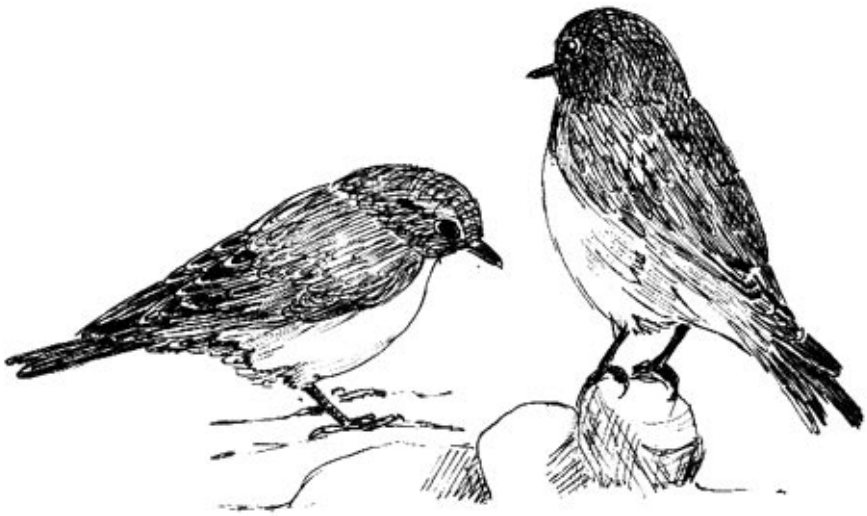
Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	2	0	0	2
Ponderosa pine/ piñon/juniper (21)	17	2	9	6
Piñon/juniper (6)	5	0	2	3
TOTAL	24	2	11	11

Western Bluebird





Western Bluebird



Western Bluebird
(Sialia mexicana)

The Western Bluebird is resident in mountainous areas almost statewide (Hubbard 1978). In Los Alamos it summers from the open ponderosa pine forest and piñon/juniper woodland of the plateau into the higher mixed conifer forest where openings in the canopy occur.

During the atlas project, Western Bluebirds nested throughout the forests and woodlands below 8500 feet elevation. They were found in 94% of the blocks containing this habitat. Breeding was confirmed in 90% of the blocks in which they were found.

Small wintering flocks, found much of the time in piñon/juniper woodland where they feed on juniper berries, begin to break up into pairs in March and move up into the pine forest. Pairs set up territories of about 1 acre and begin the search for a nest hole. Western Bluebirds require foraging perches from which they drop to capture prey on the ground. They prefer well lit areas containing low, sparse vegetation and little understory. Although there is almost complete overlap in habitat occupation by Western and Mountain Bluebirds, Westerns tend to nest higher up in the forest whereas the Mountain Bluebird favors more open areas with fewer trees. Western and Mountain Bluebirds maintain mutually exclusive territories where they share the same habitat (Pinkowski 1979).

In late April and May, territories can be located from the predawn song given as the birds fly around in the dark just above the treetop level. This song, one of the earliest in the awakening dawn chorus, is a rapid repetition, with small variations, of the call note, a liquid descending "kew." The nest is made by filling a natural cavity in a tree or an old woodpecker hole with grasses and other plant material. Bluebirds compete with Violet-green Swallows for nesting sites.

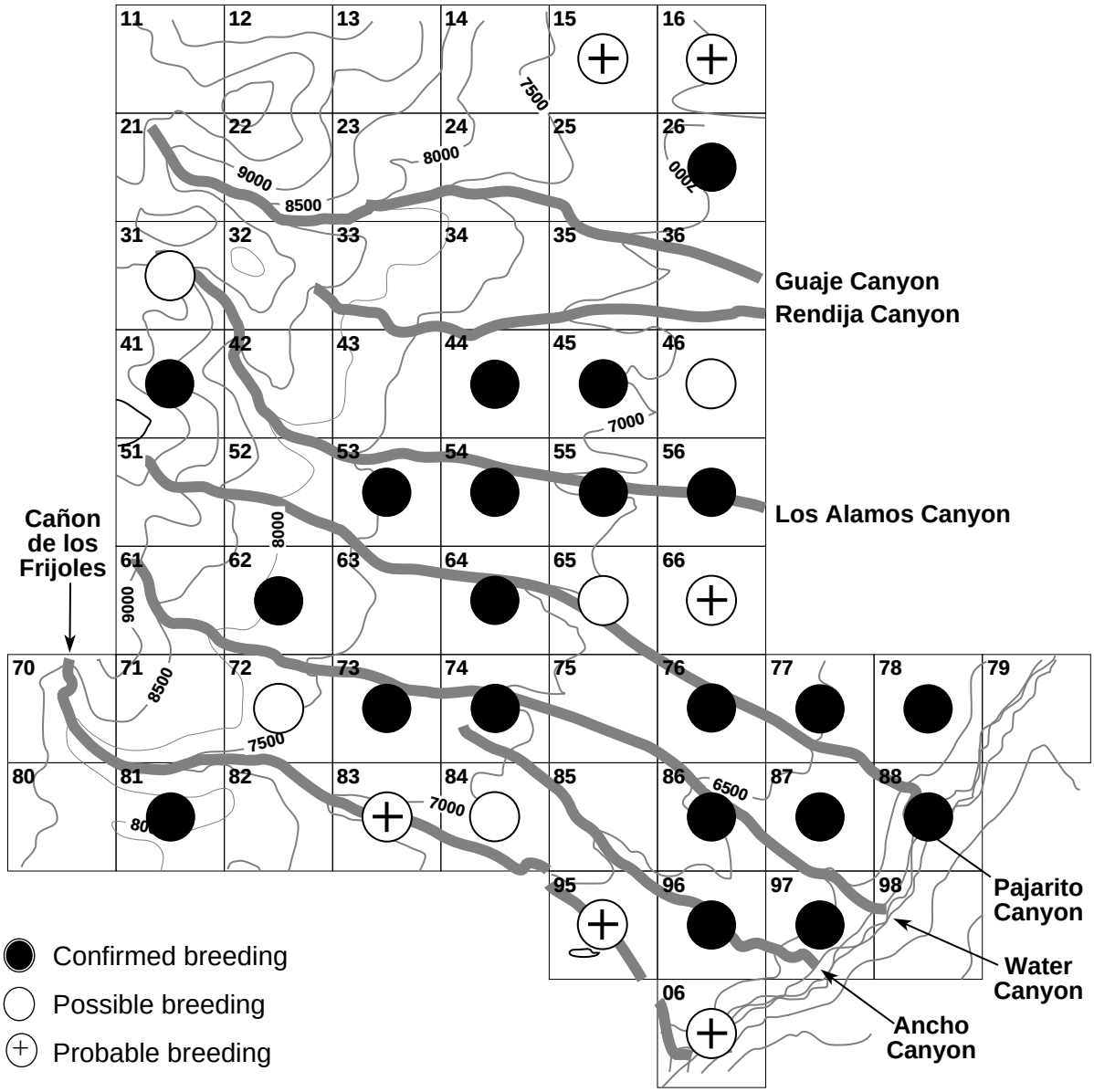
Of the nest holes reported, four were in ponderosa pines and one was in an aspen. Nest heights were from 10 to 40 feet above the ground. Occupied nests (11) were found from May 25 to June 29, and fledglings or attended young were found from May 29 to August 25.

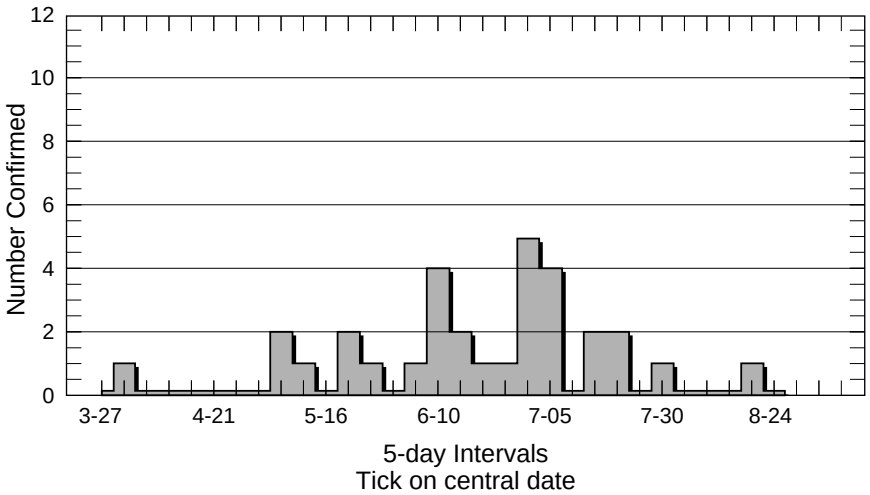
Western Bluebirds often have two broods; the male tends the first brood of fledged young while the female renests. Local evidence was two broods raised in a birdhouse in White Rock.

WEBL

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	7	6	0	1
Mixed conifer/ ponderosa pine (5)	5	5	0	0
Ponderosa pine (11)	10	10	0	0
Ponderosa pine/ piñon/juniper (21)	21	19	2	0
Piñon/juniper (6)	5	3	1	1
TOTAL	48	43	3	2

Mountain Bluebird





Mountain Bluebird

Mountain Bluebird
(Sialia currucoides)

The Mountain Bluebird is resident in mountainous areas almost statewide. In summer it ranges from just below timberline down into piñon/juniper woodland. In winter it moves out of the higher elevations into the lower forests and valleys, often in large flocks (Hubbard 1978).

In the Los Alamos region, the Mountain Bluebird avoids the forested mountain slopes except for sizeable parks widely interspersed in the forest. It is common in the summer in the Valle Grande and in the lower mesa forests. It favors more open habitat than the sympatric Western Bluebird.

During the atlas project, Mountain Bluebirds nested primarily in ponderosa pine and piñon/juniper woodlands below 7500 feet elevation. They were found in 72% of the blocks in this elevational range. Breeding was confirmed in 66% of the blocks in which they were recorded.

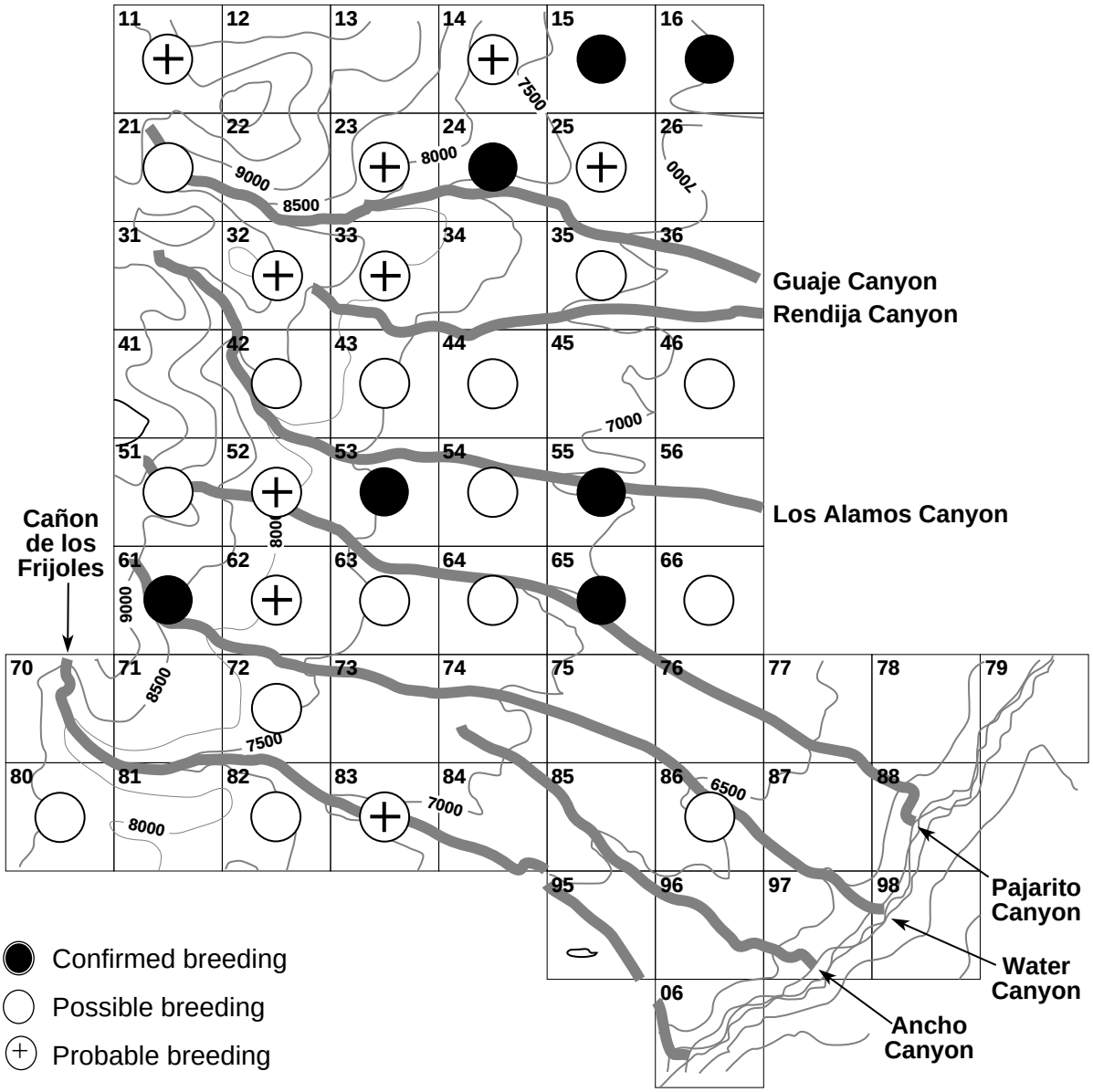
Three of the nests found were in old woodpecker holes in ponderosa snags in burned-over areas (La Mesa fire), three were inside unused outbuildings, two under residential eaves, two in birdhouses, one in a hole in a dead aspen, and one in an external air-conditioner housing. Nest heights ranged from 4 to 25 feet; the higher ones were in the natural sites. Nest building was reported from March 30 to June 9, nestlings from May 22 to July 19, and attended young (or fledglings) from June 4 to August 8. Reported brood sizes for fledglings were two (5), three, and four.

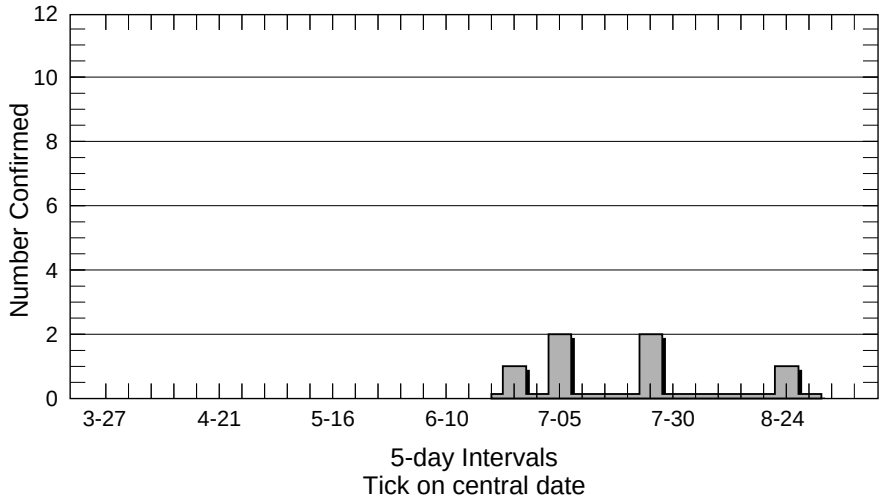
This is a remarkably silent bird. Flocks in flight give a low "terr" call, much like that of the Western Bluebird. Territorial and courtship song is given only before dawn. It consists of a few short warbled and trilled phrases uttered 1 to 2 seconds apart (Bondesen 1977). Its hovering, foraging behavior is distinctive.

MOBL

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	3	2	0	1
Mixed conifer/ ponderosa pine (5)	2	1	0	1
Ponderosa pine (11)	6	4	2	0
Ponderosa pine/ piñon/juniper (21)	17	10	4	3
Piñon/juniper (6)	4	4	0	0
TOTAL	32	21	6	5

Townsend's Solitaire





Townsend's Solitaire

Townsend's Solitaire
(Myadestes townsendi)

Townsend's Solitaire summers in the mountains from the Mogollon and Sacramento highlands northward from timberline down locally into the pine forests (Hubbard 1978).

Nesting of the Townsend's Solitaire in New Mexico has been reported only in the higher forests (above 9000 feet). During the atlas project, solitaires nested primarily in mixed conifer and ponderosa pine forests from 7000 to 8500 feet elevation (in 72% of the blocks in this elevational range).

Solitaires nest on the ground. One nest was discovered in a roadside bank 6 feet above the roadbed on June 27, 1987, in mixed conifer habitat. Two weeks later the nest contained two eggs. Recent fledglings were observed in disturbed ponderosa pine forest in the Laboratory area. Two broods were seen on July 7, and a brood of two was found on the ground July 24. A brood of three begging fledglings and adults attending young were observed in Garcia Canyon (July 27, 1988, and August 25, 1986, respectively) in lower canyon bottom habitat.

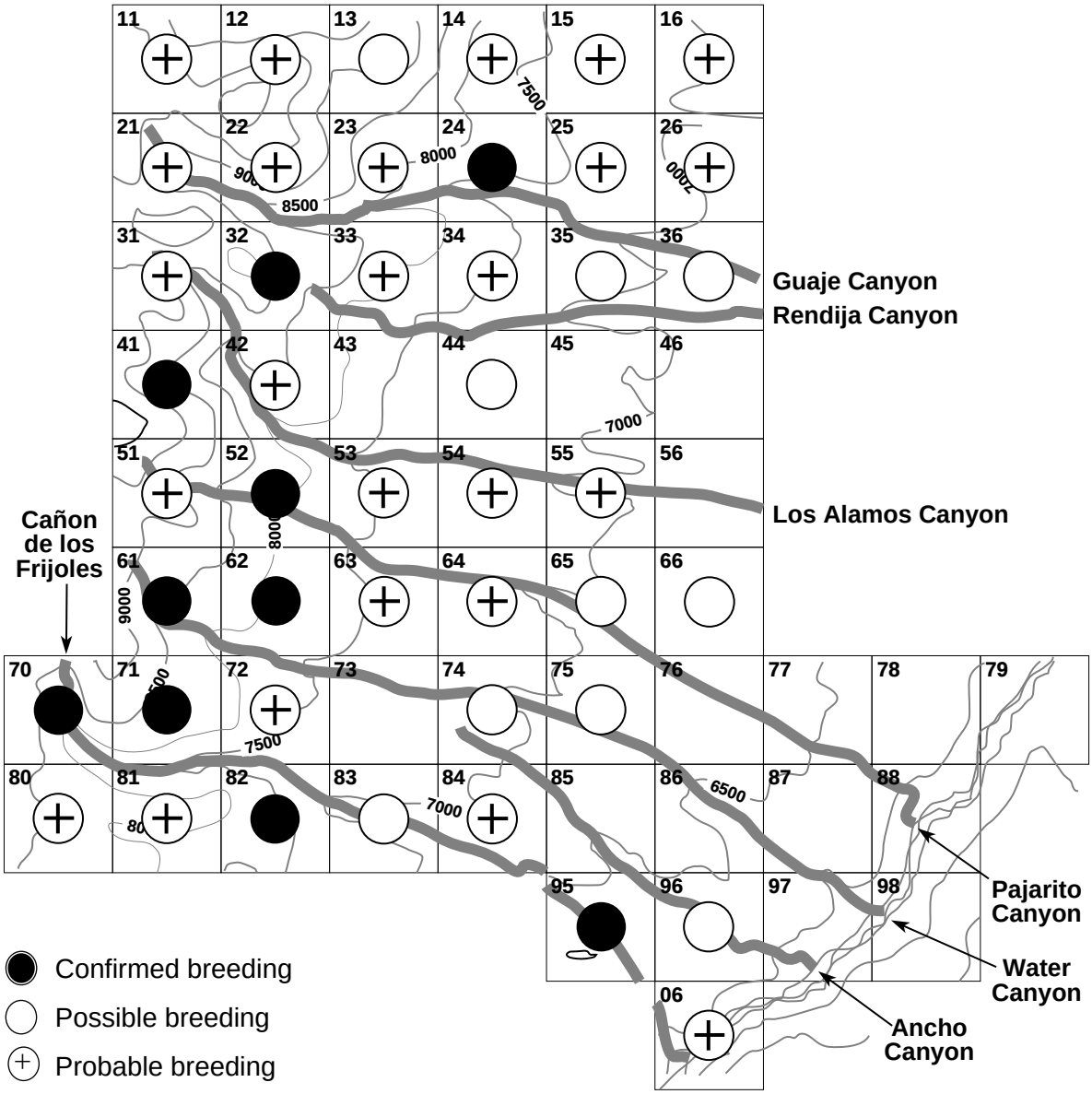
Solitaires move into the piñon/juniper woodland for the winter in Los Alamos, where they feed principally on juniper berries. They are usually first seen there in late September (September 29 median date in 7 years) and leave for their breeding areas in mid-April (April 15 median date in 15 years).

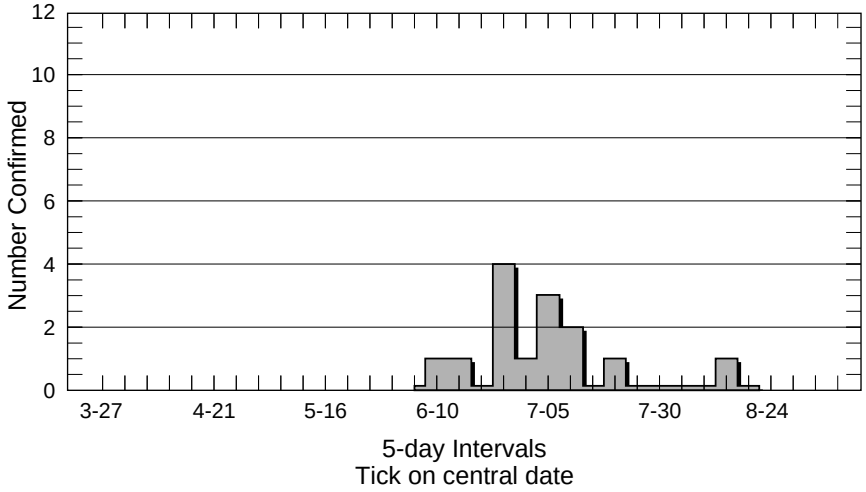
Solitaires may be heard singing any time of year. Song may be used for defense of winter feeding territories, but is at its best in summer on the breeding grounds. The call note, an often monotonously repeated single piping note, is characteristic and identifies the species year-round.

TOSO

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	9	1	4	4
Mixed conifer/ ponderosa pine (5)	5	1	3	1
Ponderosa pine (11)	9	2	2	5
Ponderosa pine/ pinon juniper (21)	8	3	0	5
TOTAL	31	7	9	15

Hermit Thrush





Hermit Thrush

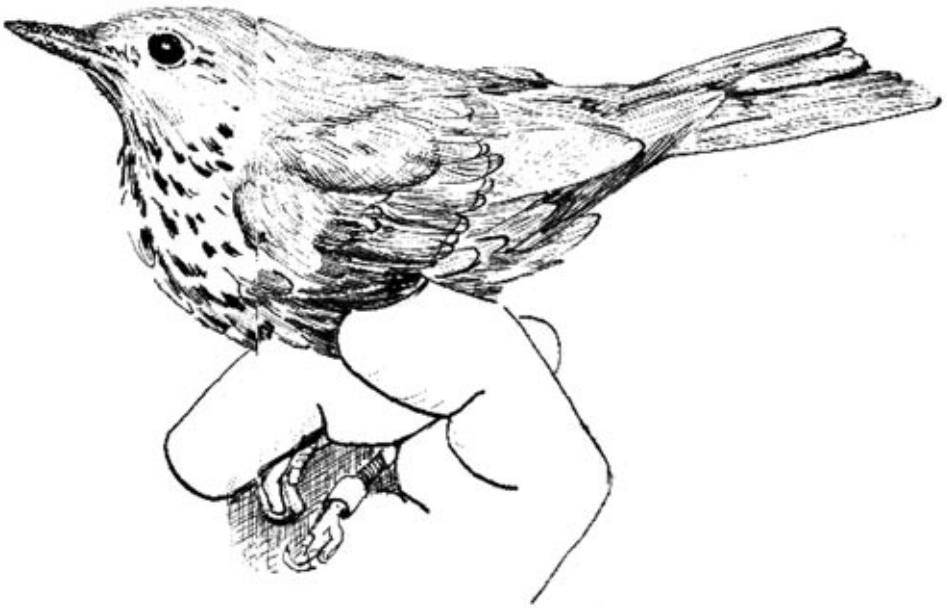
Hermit Thrush
(Catharus guttatus)

The Hermit Thrush summers in montane spruce/fir, fir, and adjacent pine forests and riparian woodlands (Hubbard 1978). It has a wide habitat tolerance: it nests in forest depths, dry hillsides, damp wooded areas, and recently cut forest.

During the atlas project, Hermit Thrushes nested primarily in mixed conifer and ponderosa pine forests above 7000 feet elevation. They occupied 93% of this habitat. Breeding was confirmed in 22% of the blocks in which they were recorded.

Breeding of the Hermit Thrush is relatively difficult to confirm because of its retiring nature. Most confirmations were based on adults feeding young. One nest was discovered, on June 6, 1986, located 2 feet off the ground.

The song, given from first arrival in early May until late in the season, is a good indicator of territory establishment. The song is strongest near dawn, then again at sunset, the latter more common late in the breeding cycle. The large, well-built nest of bark, mosses, and coarse grasses is



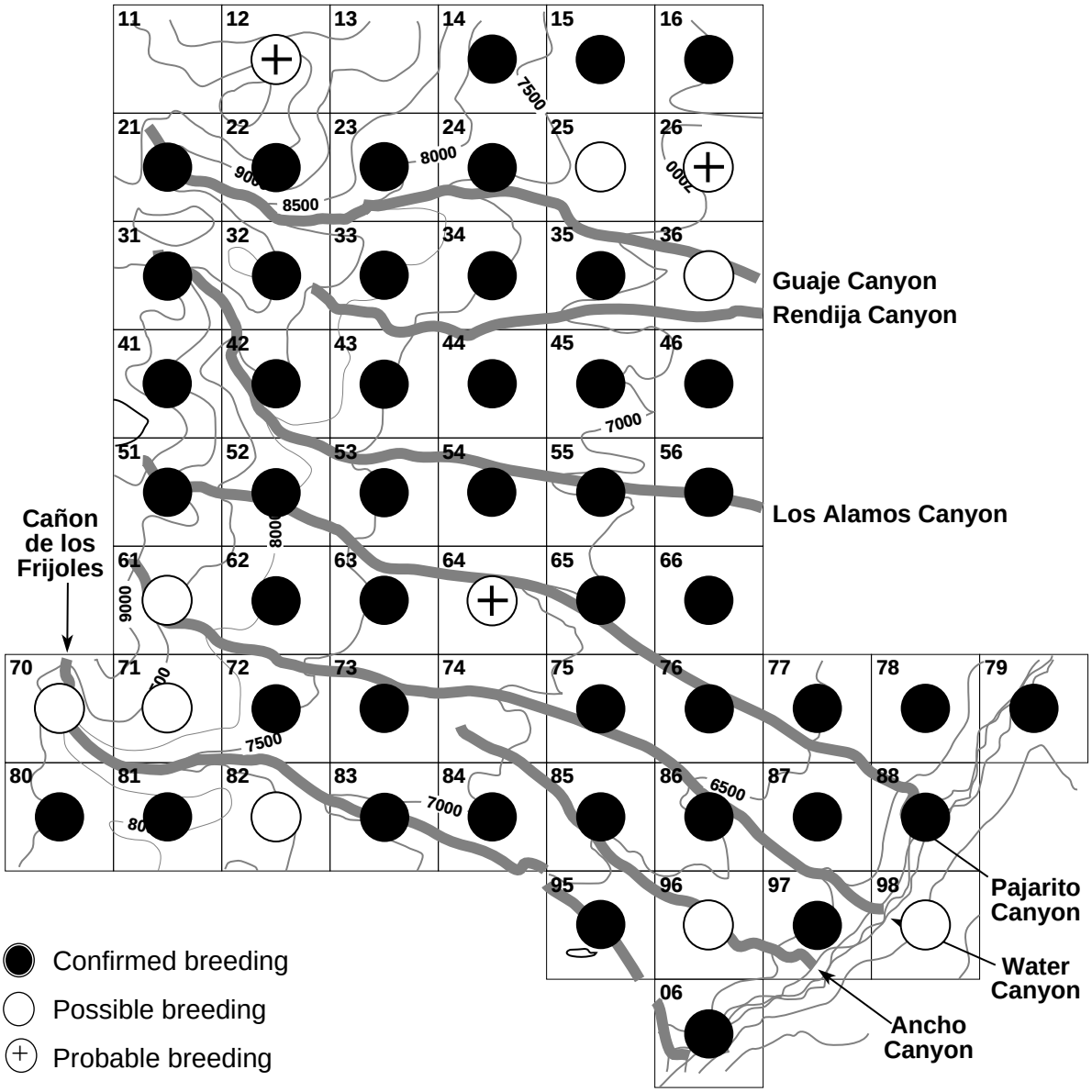
typically placed in low conifers or other bushes a few feet above ground (not on the ground as in the eastern race) (Harrison 1979).

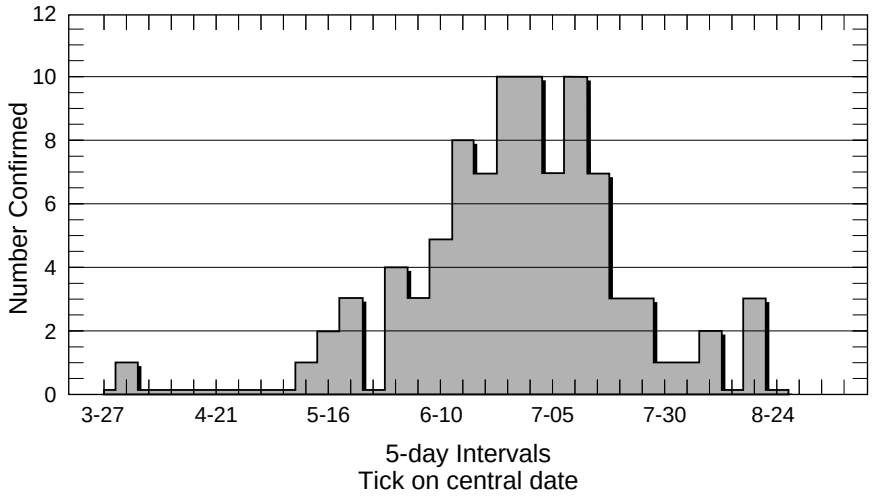
Spring arrival in Los Alamos is in early May (May 4 median date in 18 years). Autumn departure is in mid-October (October 19 median date in 8 years).

HETH

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	17	5	11	1
Mixed conifer/ ponderosa pine (5)	5	3	2	0
Ponderosa pine (11)	9	1	6	2
Ponderosa pine/ pinon juniper (21)	14	1	6	7
TOTAL	45	10	25	10

American Robin





American Robin

American Robin
(Turdus migratorius)

The American Robin summers in montane areas and locally in the lowlands almost statewide, nesting in forest, riparian woodland, residential areas, and adjacent habitats. Robins winter statewide, especially in areas of juniper, Russian olive, and wild fruiting trees (Hubbard 1978). Originally a summering bird of mountane forest parks in the west, the robin has adapted remarkably to the presence of man, residing around human habitation wherever its habitat requirements of moist grassland for feeding and mud for nesting are met.

During the atlas project, American Robins were found throughout the county—in the coniferous forests and wooded canyon bottoms and especially as an abundant nesting species in residential areas. They were found in 95% of the blocks. Breeding was confirmed in 81% of the occupied blocks.

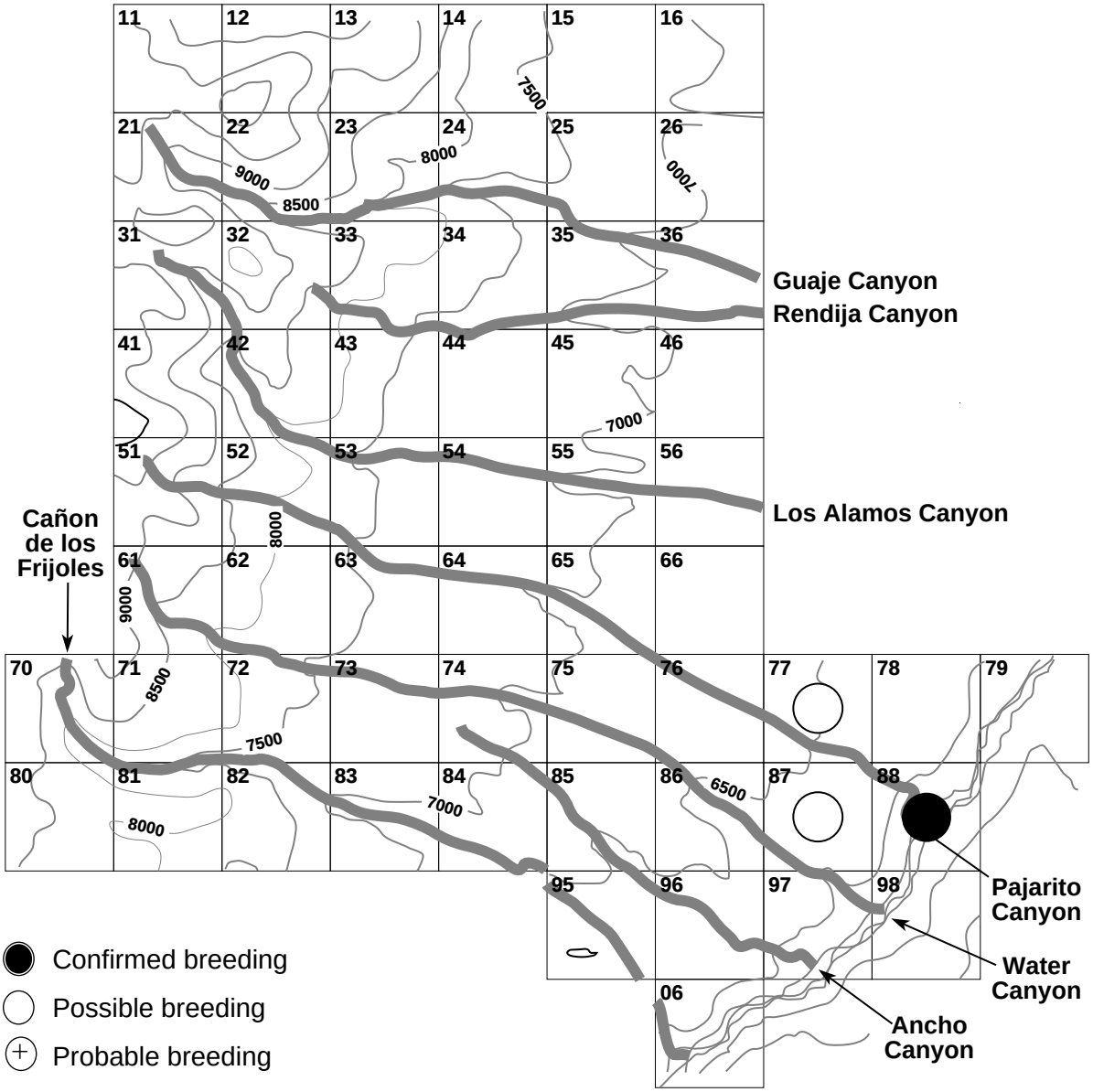
Thirty-one robin nests were found. The dates of nest building range from March 30 to June 1. Nests with eggs were found from May 14 to June 20, and nests with nestlings from May 30 to June 24. Nest sites utilized were various: planted residential conifers (6), planted residential deciduous (4), manmade structures (4), naturally occurring conifers (5), and naturally occurring deciduous growth (4). Nest heights ranged from 3 to 50 feet above the ground, with a 10-foot median height (from 22 reports).

Robins winter in flocks in Los Alamos, the number varying with the season and from year to year. Daily altitude shifts occur with some regularity. The birds feed in the lower juniper woodland and roost at night in the higher mixed coniferous forests.

AMRO

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	15	11	1	3
Mixed conifer/ ponderosa pine (5)	5	5	0	0
Ponderosa pine (11)	11	9	0	2
Ponderosa pine/ piñon/juniper (21)	20	16	2	2
Piñon/juniper (6)	6	5	0	1
TOTAL	57	46	3	8

Northern Mockingbird



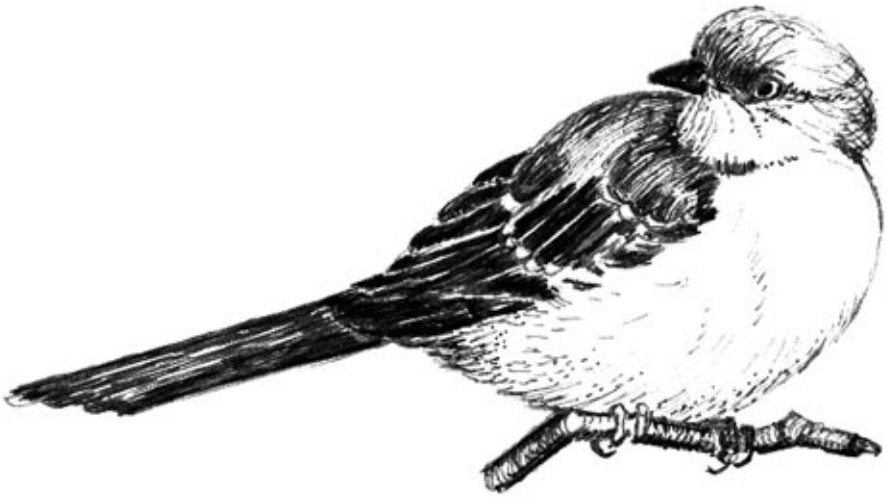
Northern Mockingbird

Northern Mockingbird
(Mimus polyglottos)

The Northern Mockingbird summers statewide in the lowland shrublands and the evergreen woodlands of the foothills. It winters locally in the south and northward occasionally to the Española Valley (Hubbard 1978).

During the atlas project, mockingbirds were found in three residential areas in piñon/juniper woodland near the rim of the Rio Grande gorge. There was only one confirmed breeding record, a nest containing four eggs on June 6, 1984, from which three young fledged.

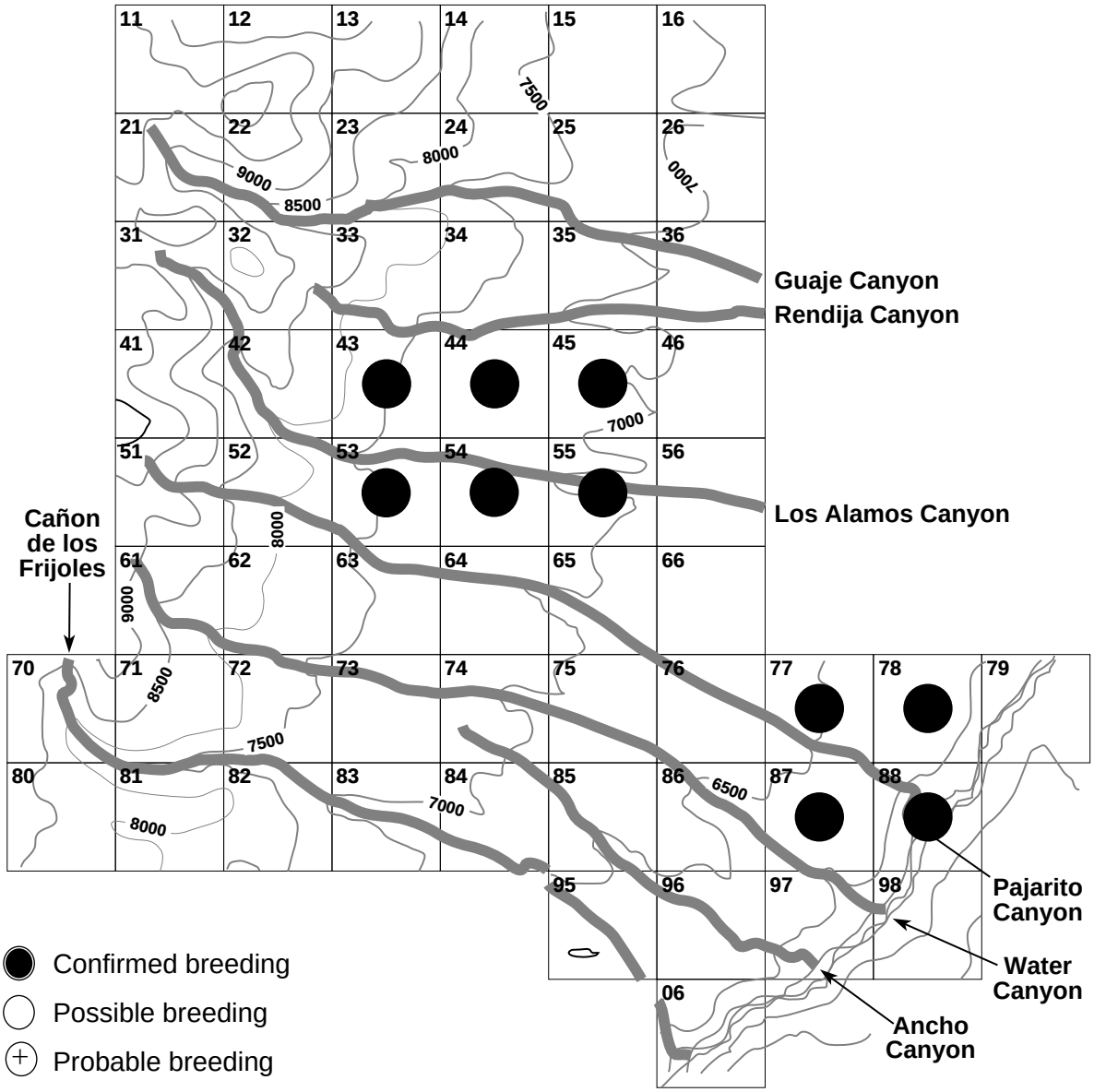
Mockingbirds are irregular summer visitors in Los Alamos. They have been reported in about 50% of the summers of the last 30 years (in 1984 and 1986 during the atlas project). Mockingbirds on breeding territory are easily detected from their remarkable and persistent singing.

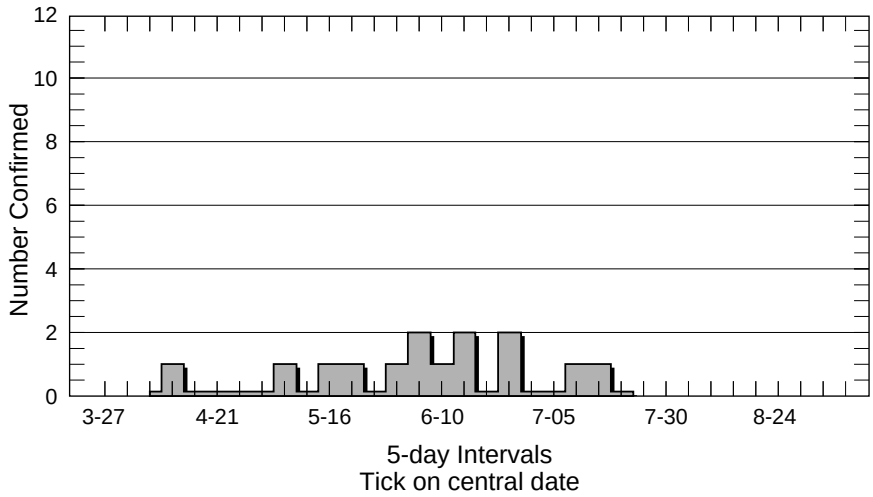


NOMO

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine/ piñon/juniper (21)	1	0	0	1
Piñon/juniper (6)	2	1	0	1
Total	3	1	0	2

European Starling





European Starling

European Starling
(Sturnus vulgaris)

The European Starling is resident in settled areas, including residential and agricultural areas, almost statewide. It nests in holes in structures, cliffs, and trees, and in bird houses (Hubbard 1978).

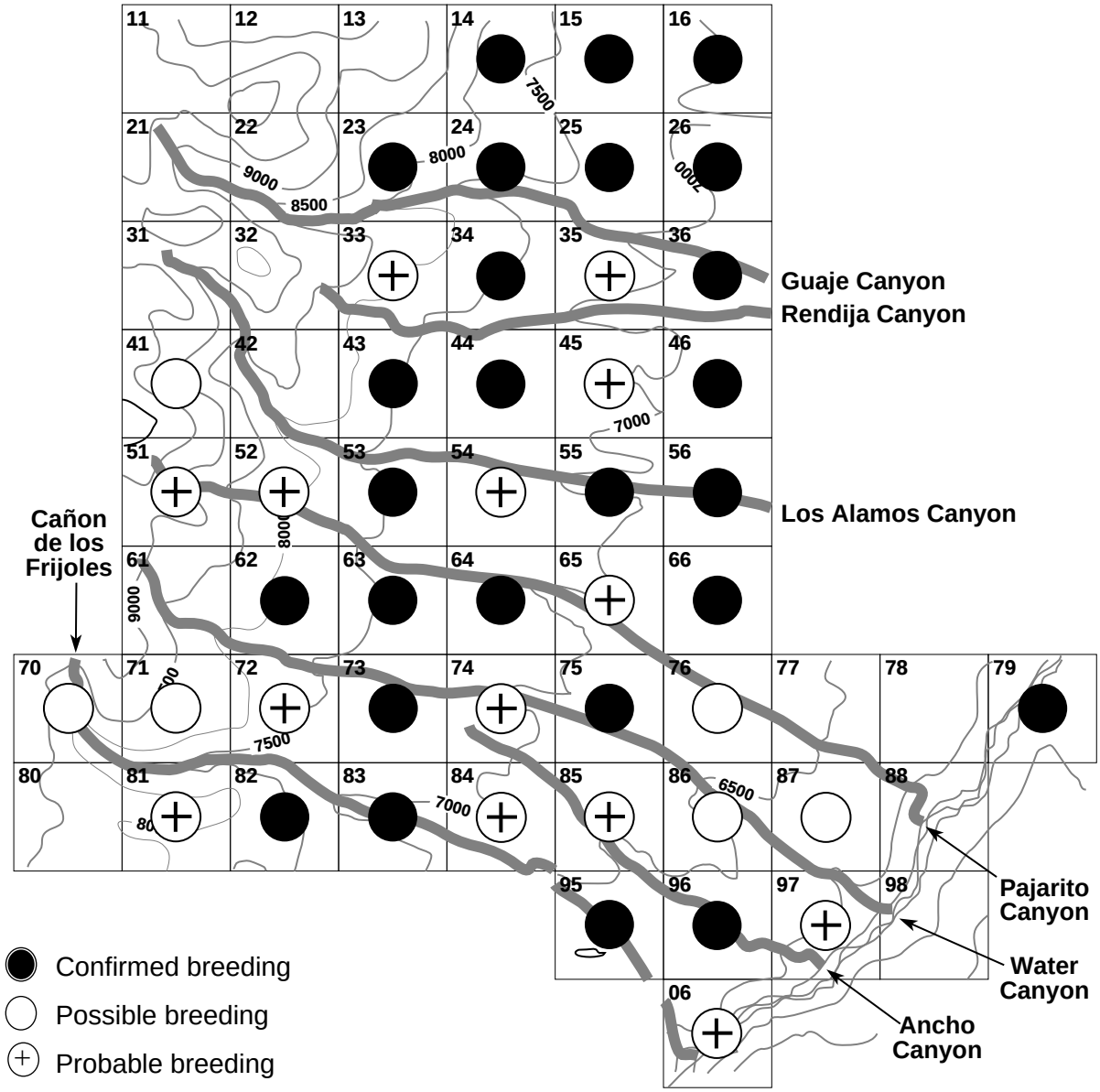
During the atlas project, starlings bred only in the residential areas. They inhabited 100% of the residential blocks and breeding was confirmed in all of them. Nest building was observed from April 10 to May 20.

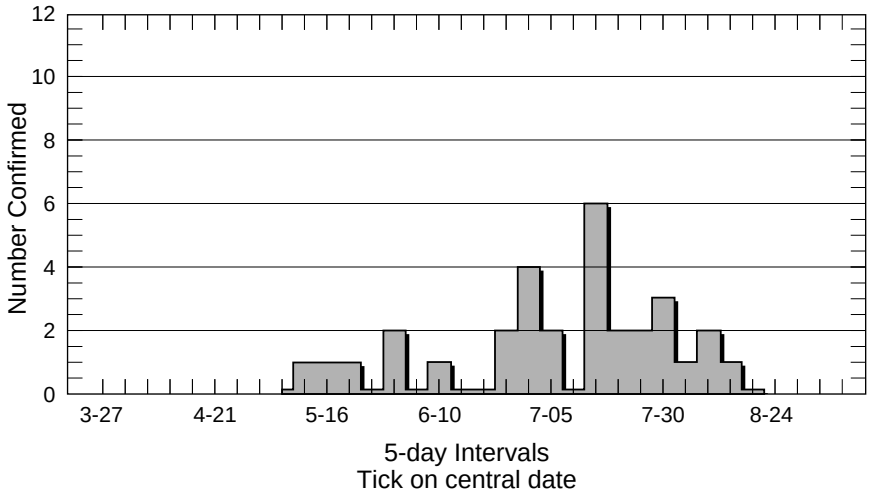
Starlings were first detected in New Mexico in 1935 in the Carlsbad region. By the time period 1959–1962, they were summering in Albuquerque and Santa Fe (Hubbard 1978). Casual sightings have been reported from Los Alamos since 1958, and regular summering of starlings has occurred since 1964. Groups of starlings are seen regularly in the winter; in recent years they sometimes number in the several hundreds.

EUST

Habitat	Occurrence	Conf	Prob	Poss
Residential (10)	10	10	0	0

Solitary Vireo





Solitary Vireo

Solitary Vireo
(Vireo solitarius)

The Solitary Vireo summers in mountainous areas almost statewide. It favors open woodland, especially pine, and adjacent habitats including piñon/juniper and lowland riparian woodland locally (Hubbard 1978).

During the atlas project, Solitary Vireos were found primarily in the ponderosa pine forest, but they occurred up to 8400 feet in the mixed conifer forest. They occupied all the ponderosa pine and lower canyon bottom blocks. Breeding was confirmed in 56% of the occupied blocks.

Within a conifer stand, their territories are usually associated with a deciduous component. They prefer woodlands with openings in the canopy and a dense understory (Andrle and Carroll 1988). Of 10 Solitary Vireo nests found during the atlas fieldwork, 5 were in ponderosa pines, 1 in a piñon pine, 1 in a juniper, and 3 in deciduous trees. Their height above the ground was from 5 to 40 feet. Nest building (5 nests) was observed from May 13 to June 6.

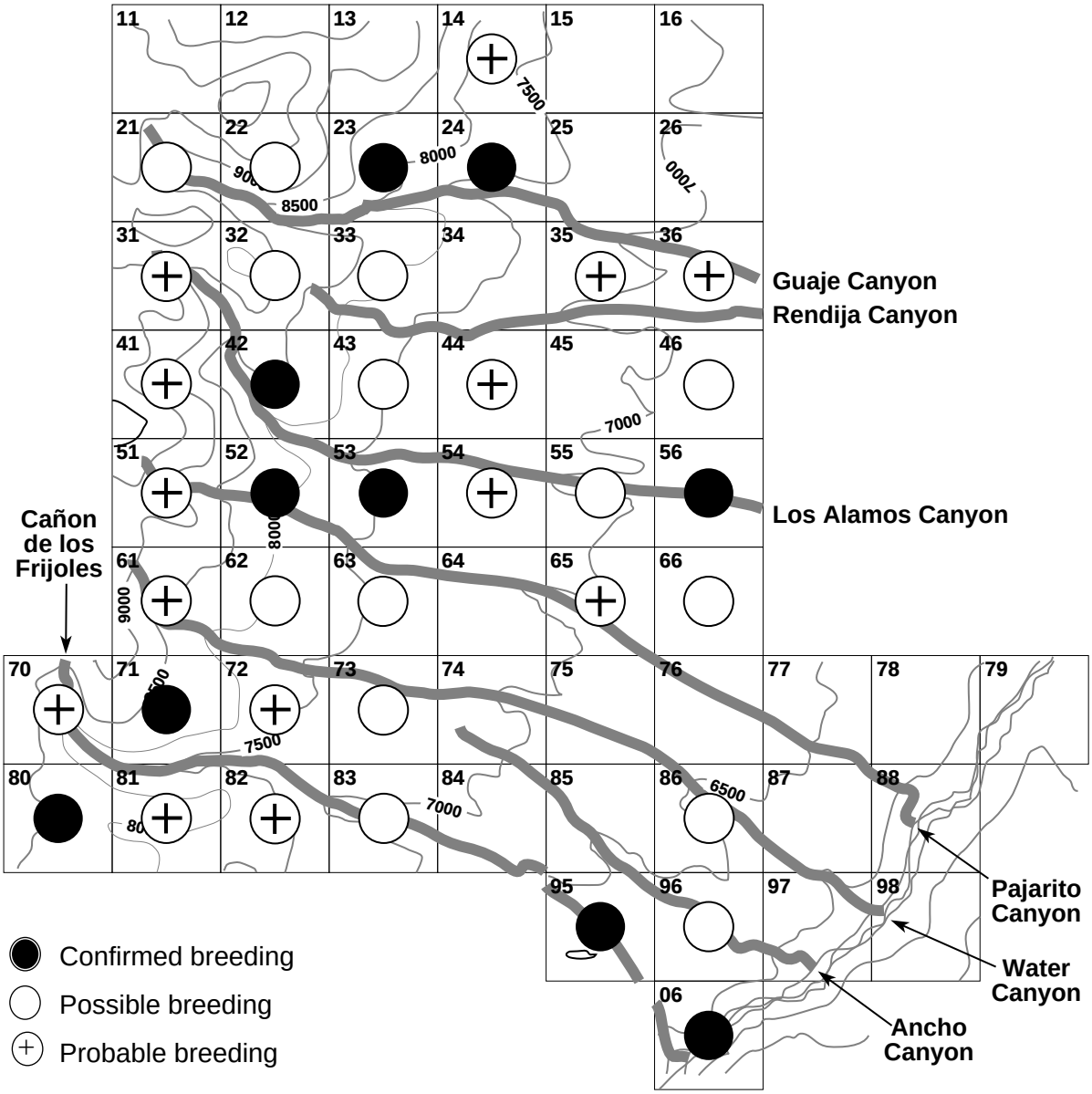
The nest is a semipensile basket suspended by its upper rim from a fork on a horizontal branch. It is bulkier and more loosely constructed than the nest of the Warbling Vireo (Harrison 1979).

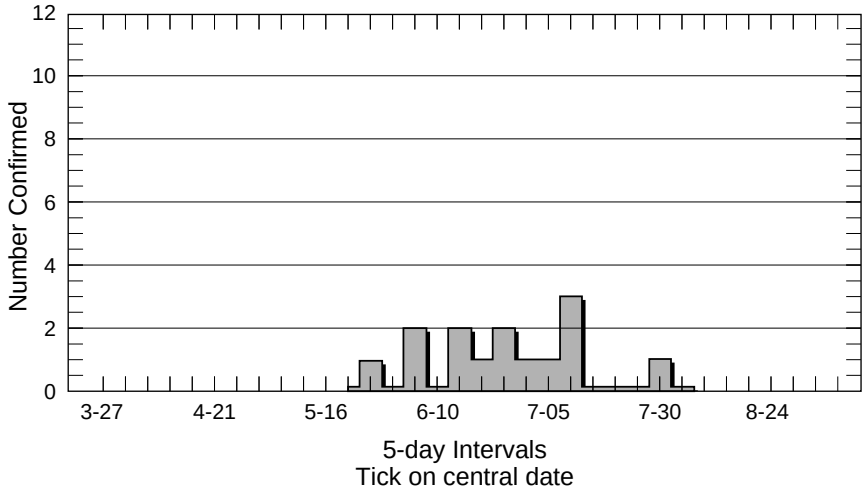
Solitary Vireos arrive in Los Alamos in late April or early May (May 1 median date in 20 years). The median departure date is September 27 in 12 years.

SOVI

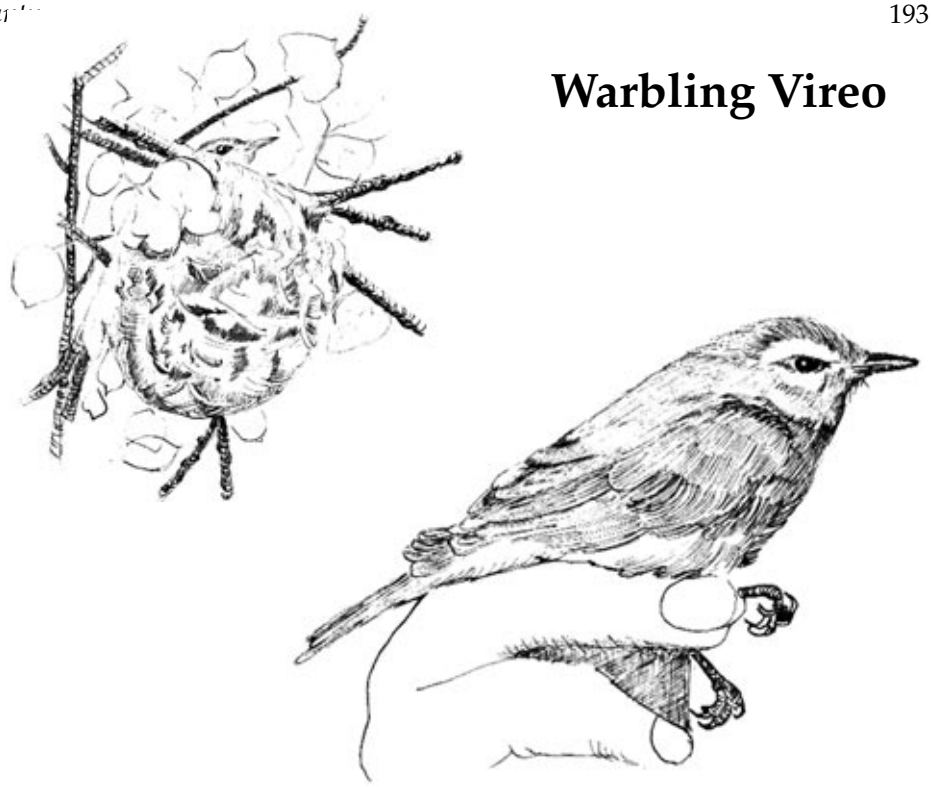
Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	7	1	3	3
Mixed conifer/ ponderosa pine (5)	5	3	2	0
Ponderosa pine (11)	11	10	1	0
Ponderosa pine/ piñon/juniper (21)	21	11	7	3
Piñon/juniper (6)	2	1	1	0
TOTAL	46	26	14	6

Warbling Vireo





Warbling Vireo



Warbling Vireo
(Vireo gilvus)

The Warbling Vireo summers widely in all major montane areas of New Mexico (Hubbard 1978). It is a characteristic breeding bird where aspens are interspersed and dominant in coniferous forests and mountain valleys, and along upper stream borders where conifers and cottonwoods are intermixed. Preferred nesting sites are mature trees in edge and open locations.

During the atlas project, Warbling Vireos were found in 86% of the blocks containing mixed conifer forests, 52% of the mesa ponderosa pine blocks, and 73% of the lower canyon blocks. Breeding was confirmed in 26% of the occupied blocks.

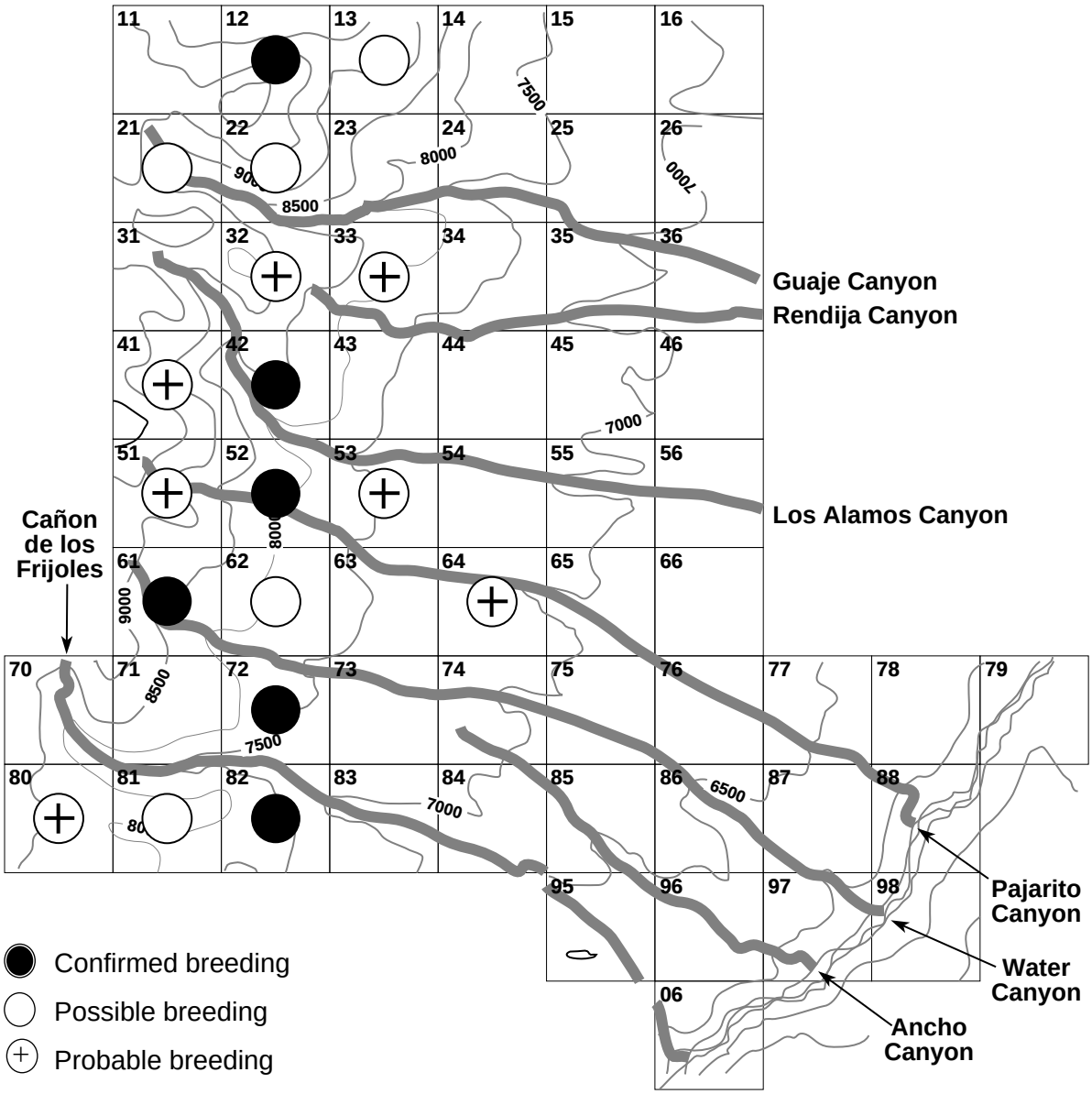
Warbling Vireos sing almost continuously on their territory during the early stages of nesting. They are easy to locate by their song, but are surprisingly difficult to confirm as breeders. Nest building (3) was observed between May 27 and June 15, and occupied nests (7) were found from June 6 to July 9. Nest heights ranged from 2 to 35 feet above the ground. The lowest nest was in a box elder along a trail in Frijoles Canyon, suspended, but well concealed in terminal branchlets. Several others in the lower canyon bottoms were in cottonwood trees.

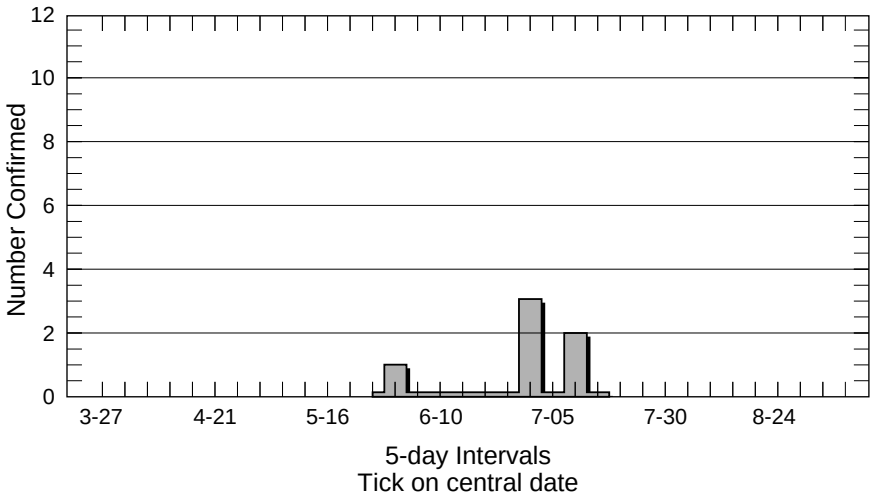
Warbling Vireos arrive in Los Alamos in mid-May (May 10 median date in 20 years) and depart in mid-September (September 14 median date in 10 years).

WAVI

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	14	4	6	4
Mixed conifer/ ponderosa pine (5)	5	2	2	1
Ponderosa pine (11)	8	1	3	4
Ponderosa pine/ piñon/juniper (21)	11	3	3	5
TOTAL	38	10	14	14

Orange-crowned Warbler





Orange-crowned Warbler

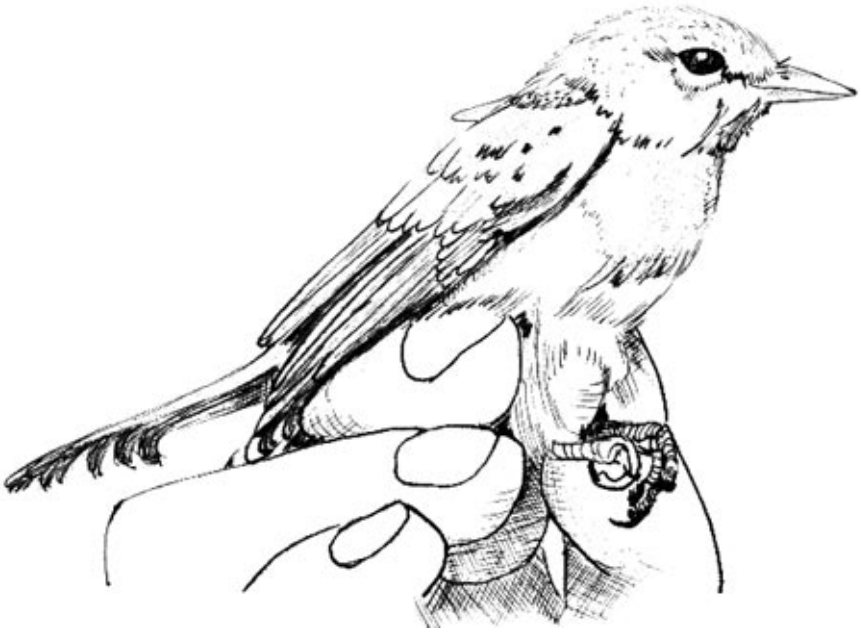
Orange-crowned Warbler
(Vermivora celata)

The Orange-crowned Warbler summers in the New Mexico mountains. It breeds regularly in mixed coniferous/deciduous forest where it is shrubby and open, in clearings, and at forest edges. Porter (1972) found them nesting in mixed growth of Gambel's oaks and ponderosa pines in the Sangre de Cristo Mountains.

During the atlas project, Orange-crowned Warblers inhabited the mixed conifer forests primarily above 7700 feet. They were recorded in 68% of the mixed conifer blocks. Breeding was confirmed in 33% of the occupied blocks. All the confirmations were of adults feeding fledglings.

Their nests are on or near the ground and very difficult to find. They are well hidden and not readily revealed by the actions of the birds; thus, we have a low percentage of confirmations of breeding.

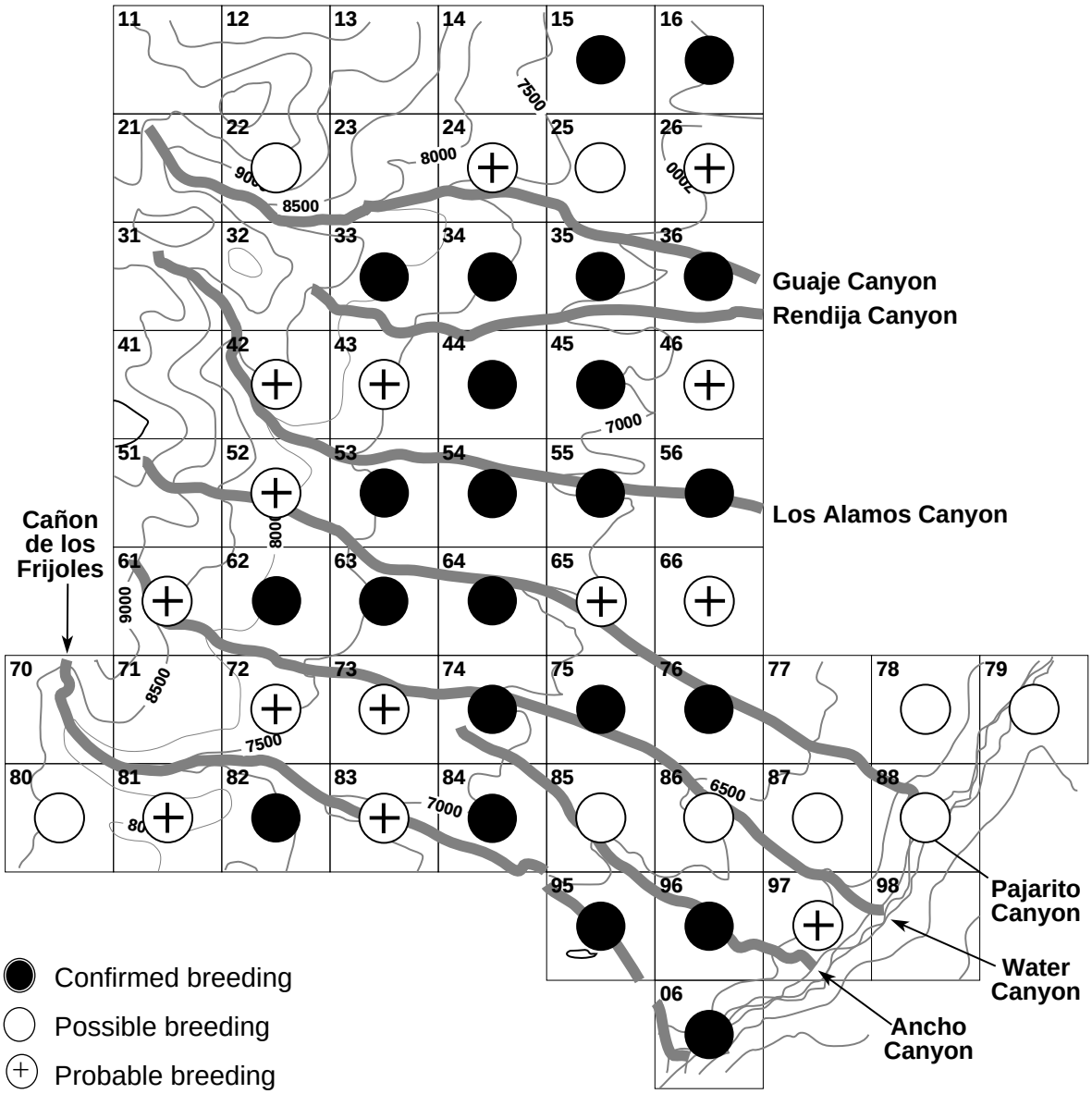
Orange-crowned Warblers arrive in Los Alamos in late April (April 29 median date in 14 years). The last of the fall migrants leave in October (October 1 median date in 14 years).

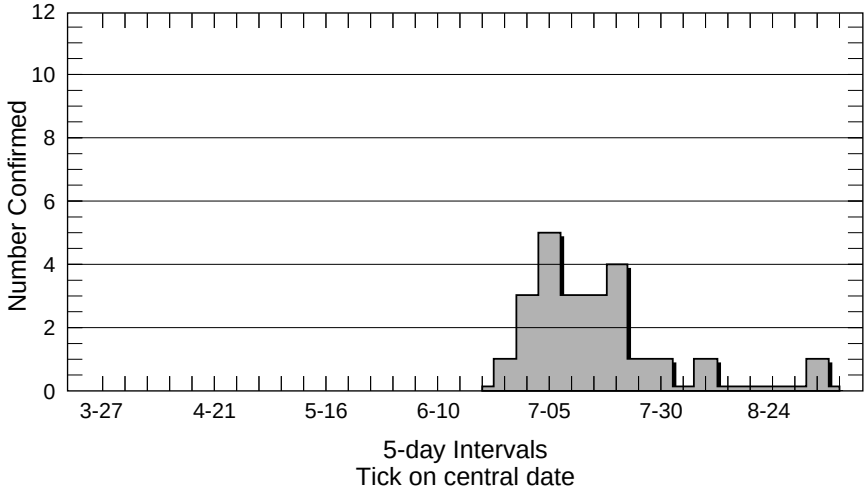


OCWA

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	12	3	5	4
Mixed conifer/ ponderosa pine (5)	3	2	0	1
Ponderosa pine (11)	2	1	1	0
Ponderosa pine/ piñon juniper (21)	1	0	1	0
TOTAL	18	6	7	5

Virginia's Warbler





Virginia's Warbler

Virgina's Warbler
(Vermivora virginiae)

The Virginia's Warbler summers in the mountains almost statewide in shrubby habitats in and near fir and pine forests and in oak and pine/oak woodlands, including riparian shrubland at middle elevations (Hubbard 1978).

During the atlas project, Virginia's Warblers were found throughout the intermingled oak scrub woodland of the plateau and its canyons. They occurred in 93% of the blocks containing this habitat.

Their nests, none of which were found by atlas fieldworkers, are built on the ground and are well concealed in the thickets in which they live. Confirmations, in 50% of the occupied blocks, were mostly of adults carrying food to young.

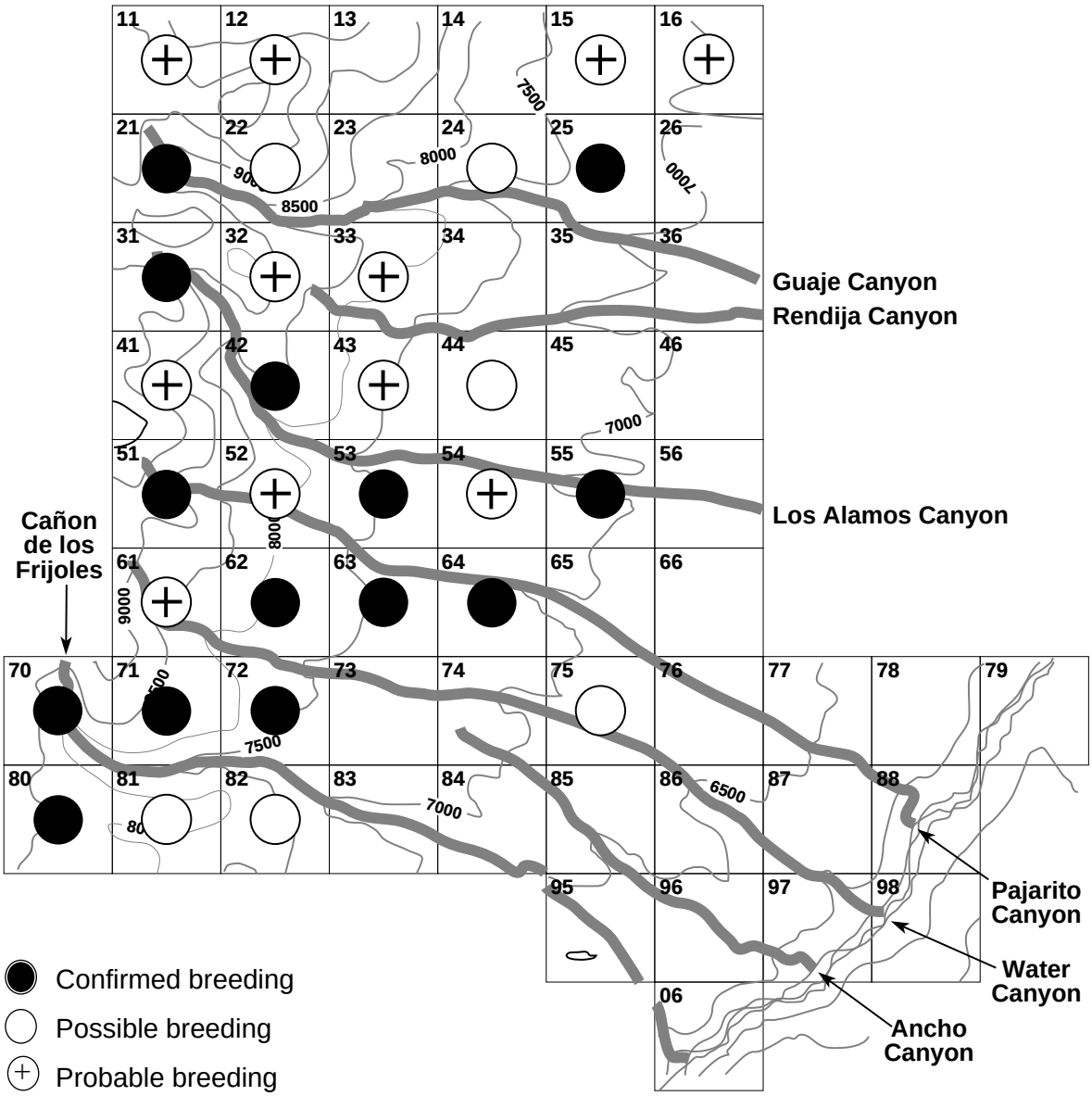
Adults were feeding fledgling Brown-headed Cowbirds in 3 of the 20 broods observed in the atlas fieldwork.

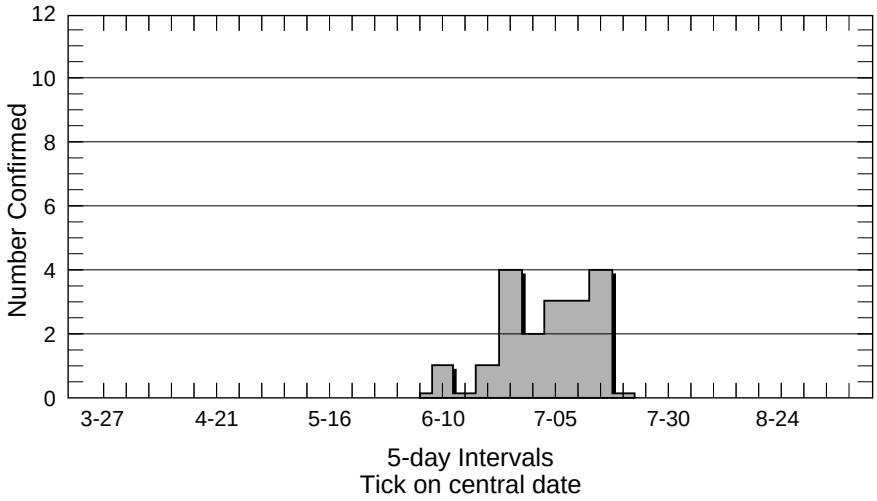
Virginia's Warblers arrive in Los Alamos in late April (April 26 median date in 27 years) and depart in mid-September (September 14 median date in 13 years).

VIWA

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	6	1	3	2
Mixed conifer/ ponderosa pine (5)	4	1	3	0
Ponderosa pine (11)	11	7	3	1
Ponderosa pine/ piñon/juniper (21)	21	14	4	3
Piñon/juniper (6)	4	0	1	3
TOTAL	46	23	14	9

Yellow-rumped Warbler





Yellow-rumped Warbler

Yellow-rumped Warbler
(Dendroica coronata)

The Yellow-rumped Warbler summers in the mountains almost statewide, south to the Mogollon and Sacramento highlands. It nests in spruce/fir, fir, and locally in adjacent pine forests. Yellow-rumped Warblers winter in the south, north locally to the San Juan Valley and to Española in the upper Rio Grande Valley (Hubbard 1978).

In Los Alamos it nests in the highest spruce/fir and intermediate mixed conifer forests down to the ponderosa pine forest of the plateau. During the atlas project, Yellow-rumped Warblers were found in 86% of the mixed conifer blocks and in 57% of the mesa ponderosa pine blocks. Breeding was confirmed in 45% of the occupied blocks.

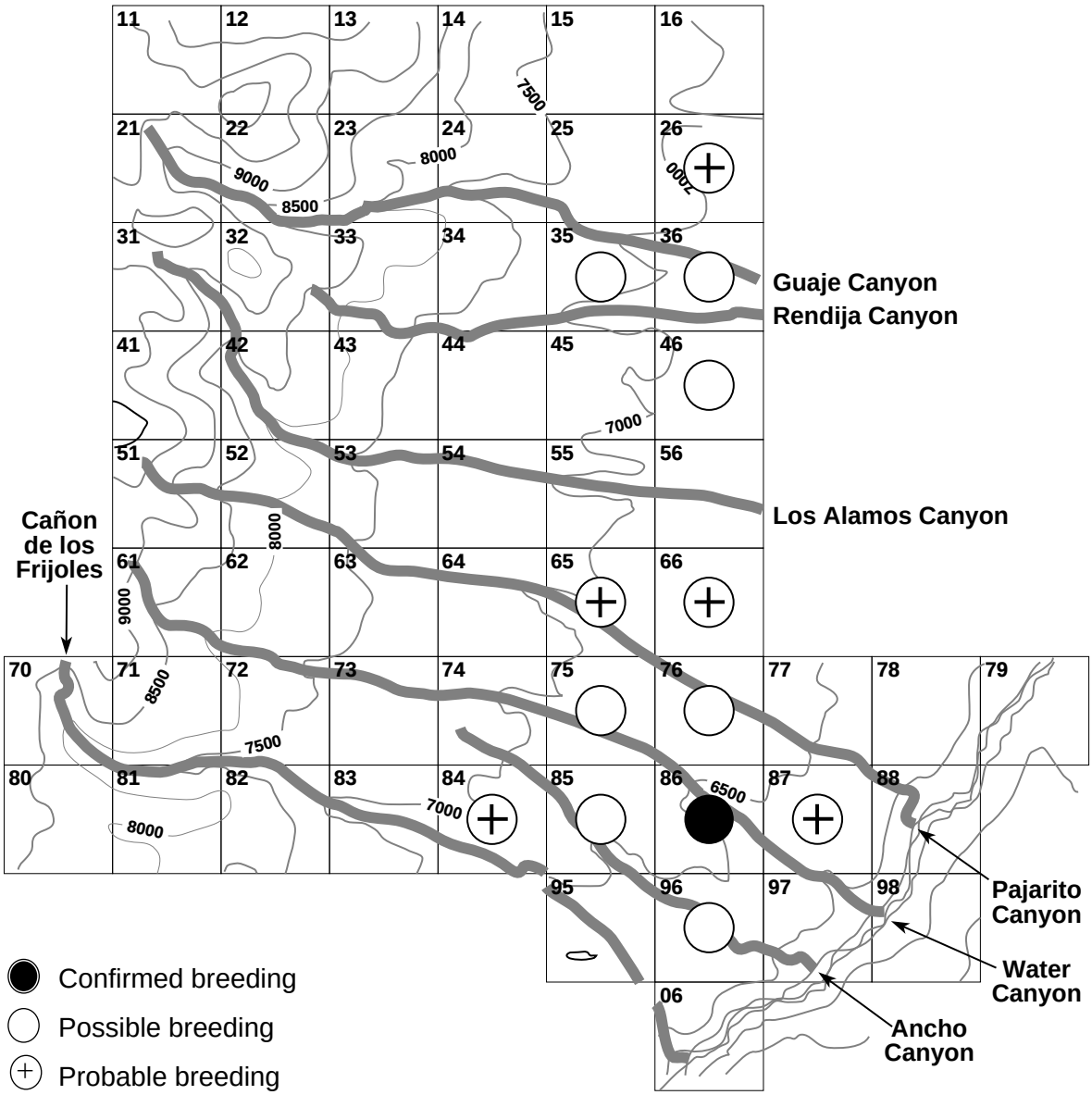
Nest building was observed in the high mixed conifer forest on June 27, active nests on June 12 and July 1, and fledglings and attended young from June 18 to July 13 (eight records). The July 1 records were simulated broken-wing distraction displays from two different areas. Two nests were found in ponderosa pine forest (one on July 13), and adults attending young were reported from June 24 to July 16 (five records).

Yellow-rumped Warblers are seen early in spring in Los Alamos (April 21 median arrival date in 22 years). Fall migration persists usually through October (October 29 median departure date in 18 years). Occasionally a few will linger well into the winter. There are winter sightings in 8 of 22 years of recorded observations.

YRWA

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	15	7	6	2
Mixed conifer/ ponderosa pine (5)	4	2	1	1
Ponderosa pine (11)	8	3	3	2
Ponderosa pine/ piñon/juniper (21)	4	2	1	1
TOTAL	31	14	11	6

Black-throated Gray Warbler



Black-throated Gray Warbler

Black-throated Gray Warbler
(Dendroica nigrescens)

The Black-throated Gray Warbler summers in mountainous areas almost statewide, but it is more local and less numerous in some of the eastern parts of its range. It nests in evergreen and pine/oak woodlands, but is particularly associated with piñon/juniper woodland in the north (Hubbard 1978). In Los Alamos it occurs almost exclusively in the piñon/juniper woodland and is the only warbler to be found there.

During the atlas project, Black-throated Gray Warblers were found in 48% of the piñon/juniper blocks. Breeding was confirmed on June 23, 1986, when adults were observed feeding their young.

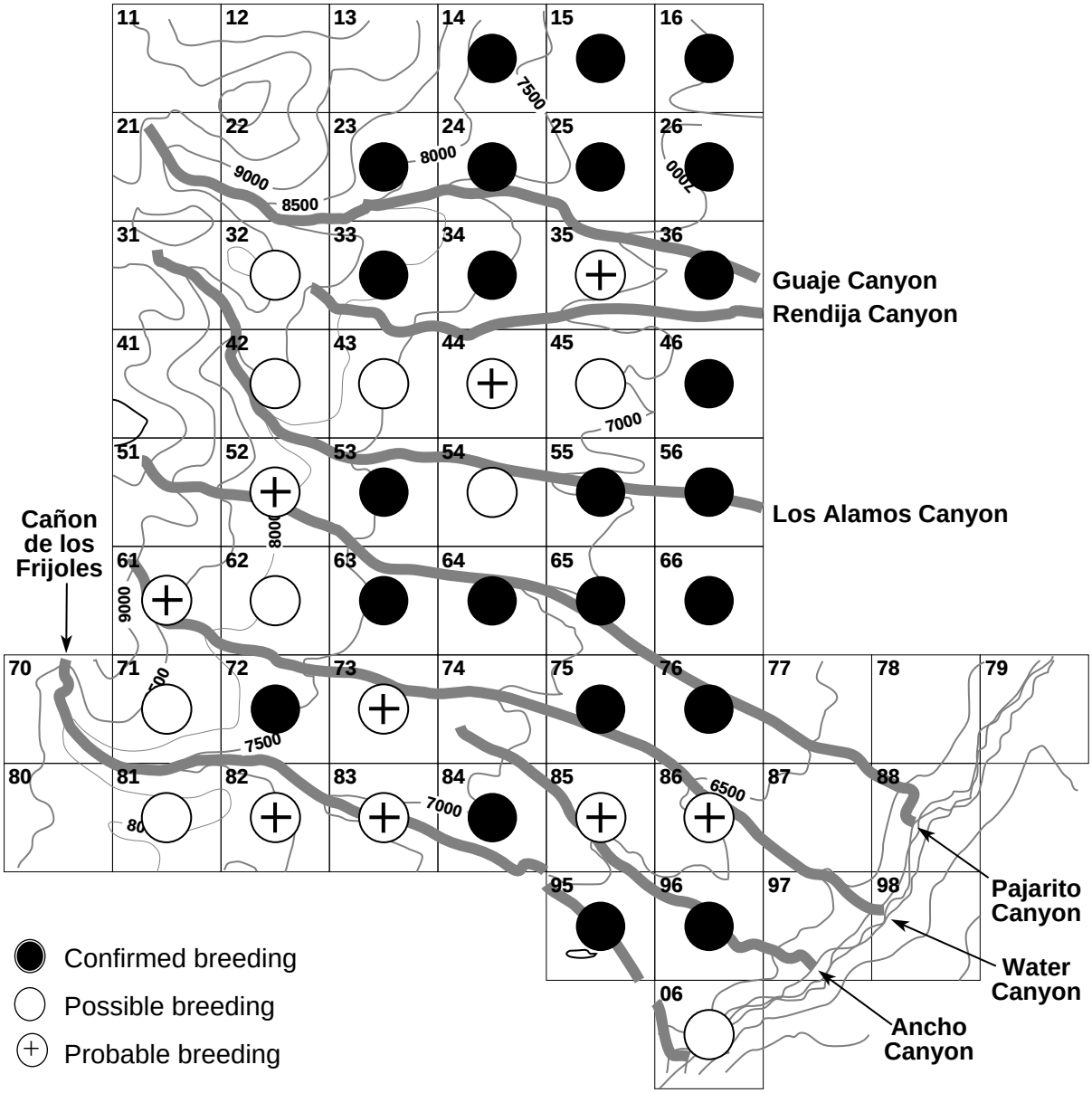
Because these warblers are widely separated in their natural habitat and secretive in their ways, it was difficult to locate them and confirm their breeding.

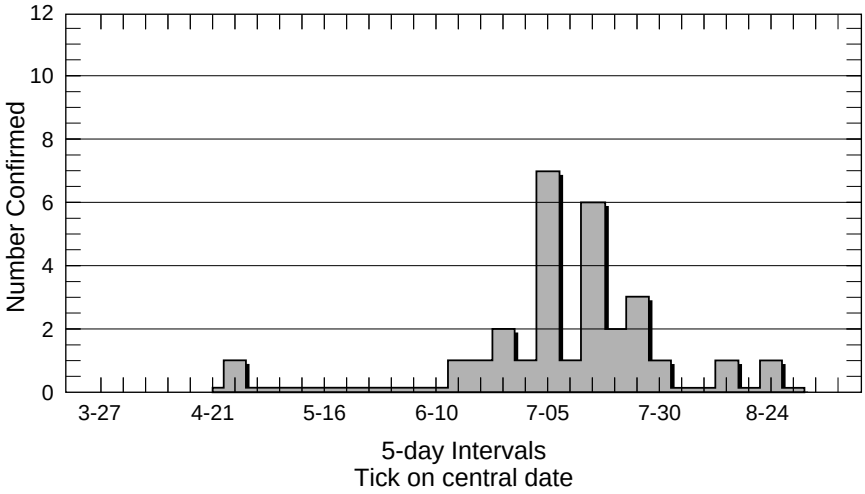
The arrival of the Black-throated Gray Warbler in late April (April 28 median date in 9 years) is indicated by its wheesy song. The song is a variable series of buzzy notes, less stylized than that of its congeners, but recognizable by its quality. It is full of "z" sounds (Peterson 1961). Its dawn song seems not as persistent as that of other warblers, but it sings off and on during the day advertising for a mate while perched high in an evergreen tree. Its favored breeding areas are trees spaced widely with much intervening brush.

BGWA

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine/ piñon/juniper (21)	13	1	5	7

Grace's Warbler





Grace's Warbler

Grace's Warbler
(Dendroica graciae)

The Grace's Warbler summers in the mountainous regions of New Mexico, closely associated with ponderosa pine woodlands.

During the atlas project, Grace's Warblers were found in 96% of the mesa-top blocks containing ponderosa pines and in 100% of the blocks in the ponderosa pine-wooded lower canyon bottoms. Nesting was confirmed in 63% of the occupied blocks. A few records were obtained in blocks at slightly higher elevations to the west where ponderosa pines are intermixed with other conifers.

They arrive in Los Alamos about the third week of April (April 24 median date in 25 years). The birds spend most of their time high in the ponderosa pines. Their nests are difficult to find. Three nests with nestlings were discovered from June 3 to July 5 during the atlas period. Most of the confirmations (21) were of adults attending young, from June 20 to August 23.

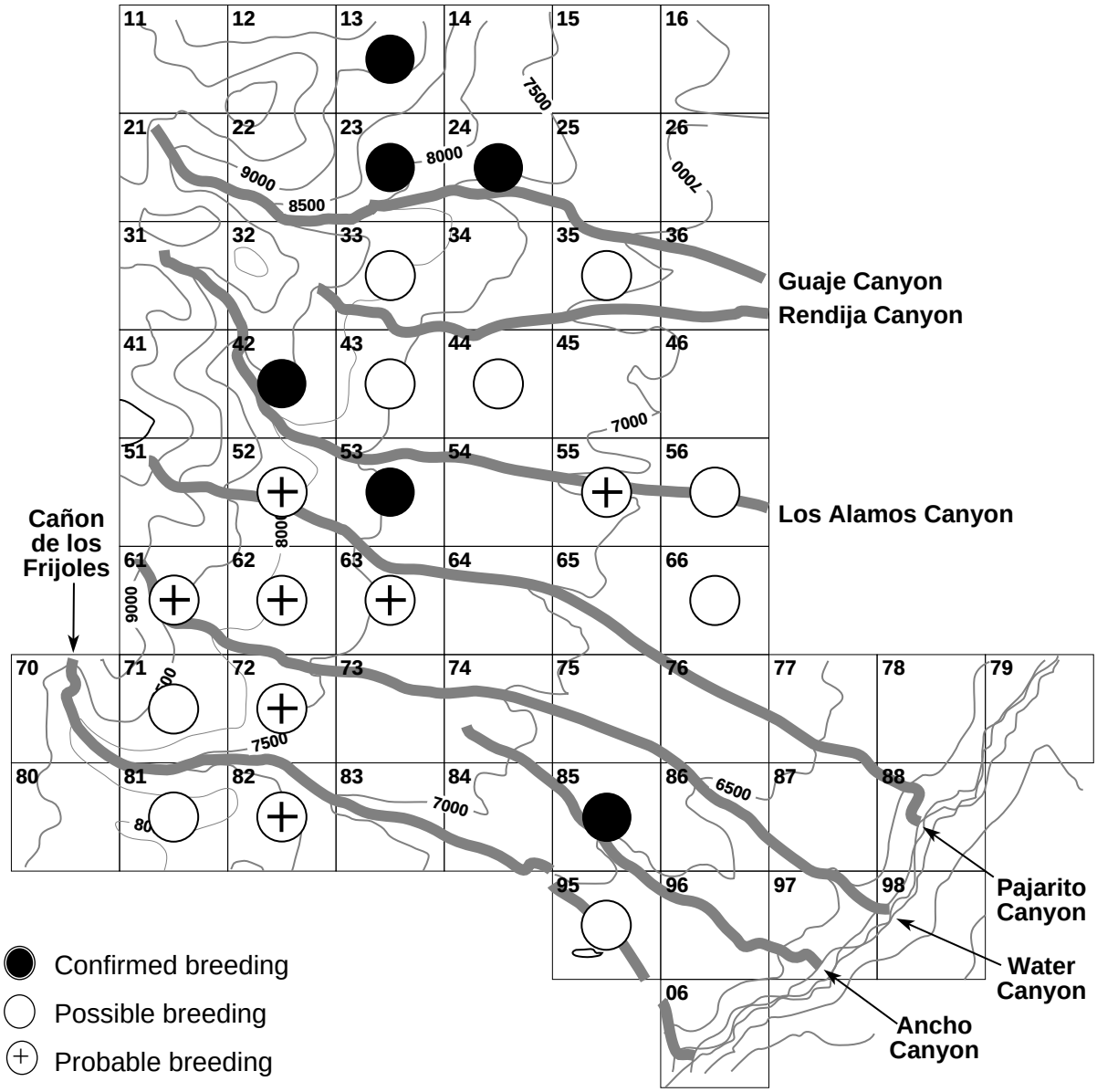
Grace's Warbler was the species most heavily parasitized by Brown-headed Cowbirds in Los Alamos. Of 13 parasitized nests in which the host was identified, 38% were those of Grace's Warblers. Almost half of the Grace's Warblers nests that fledged young had been parasitized by cowbirds.

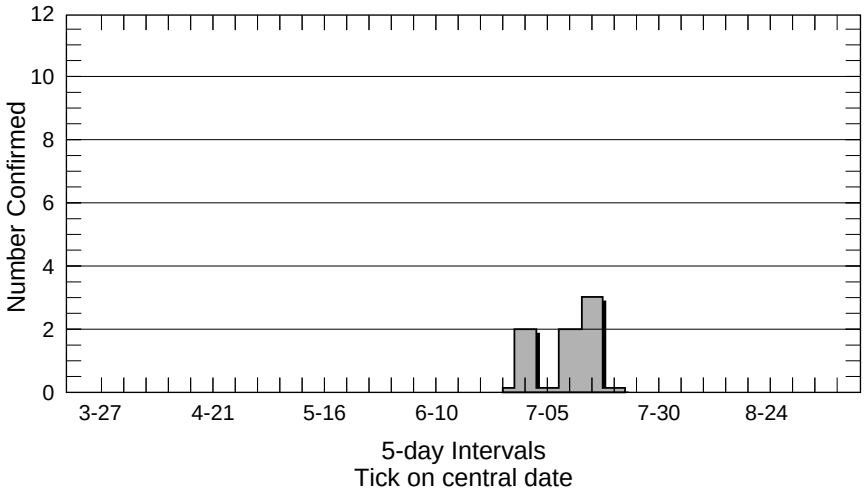
Grace's Warblers leave Los Alamos in late September (September 20 median date in 11 years).

GRWA

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	7	2	1	4
Mixed conifer/ ponderosa pine (5)	5	3	1	1
Ponderosa pine (11)	11	5	4	2
Ponderosa pine/ piñon/juniper (21)	19	14	3	2
TOTAL	42	24	9	9

MacGillivray's Warbler





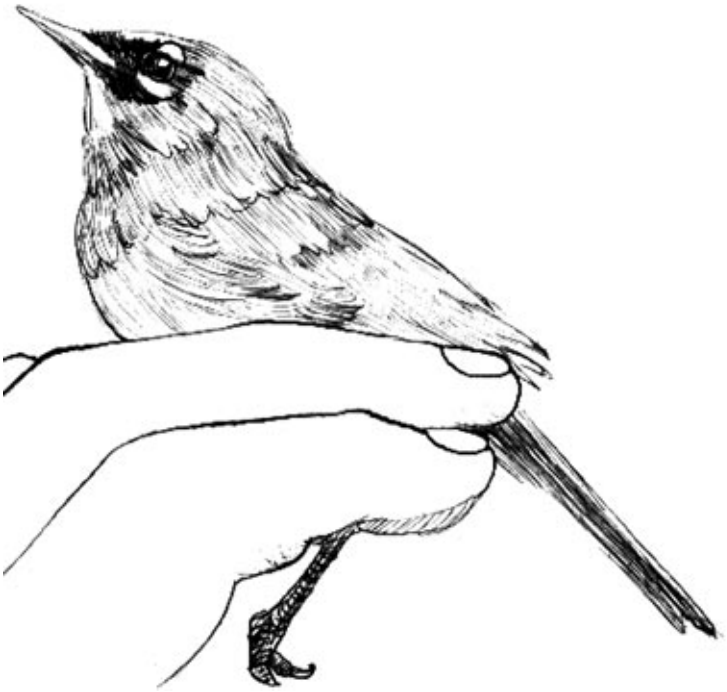
MacGillivray's Warbler

MacGillivray's Warbler
(Oporornis tolmiei)

The MacGillivray's Warbler summers in the mountains from the Mogollon and Sacramento highlands northward. It is found in shrubby habitats in spruce/fir and fir forests including adjacent riparian shrubland (Hubbard 1978). Its nesting habitat is low dense undergrowth, shady damp thickets, and forest edges.

In Los Alamos it nests principally in moist, mixed conifer canyon bottoms. During the atlas project, MacGillivray's Warblers were found in 50% of the blocks containing mixed conifer, 33% of the mesa ponderosa pine blocks, and 36% of the lower canyon blocks. Breeding was confirmed in 27% of the occupied blocks. Six of the seven confirmed breeding records were adults attending fledglings (June 28 to July 17); the other was a distraction display (July 13).

MacGillivray's Warblers are the latest of the warblers to arrive in Los Alamos (May 12 median date in 17 years). They reveal their presence early in the breeding season with loud song from the males and active



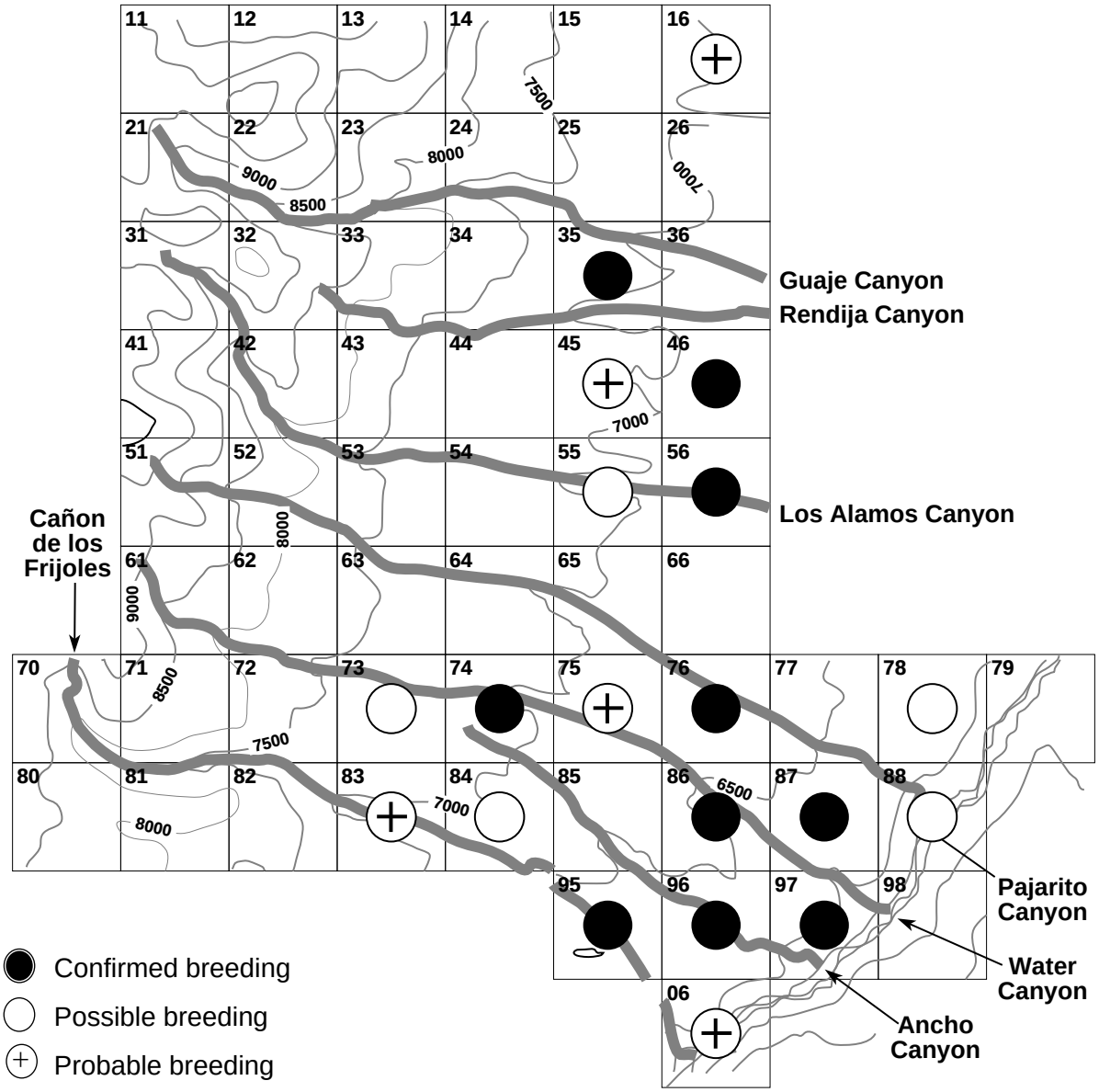
courtship, but thereafter they are shy and secretive. Intrusion on their territory elicits the sharp alarm note repeated frequently by both sexes, but the female is seldom seen.

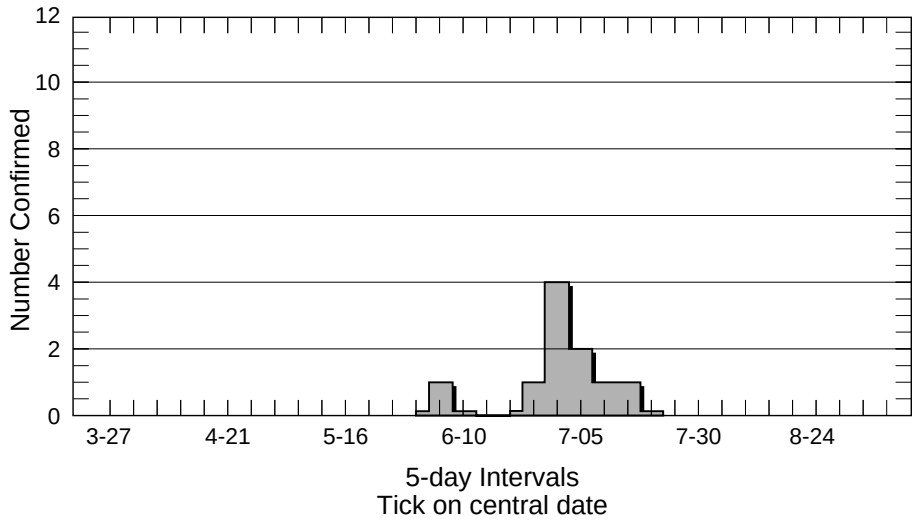
They leave the county in late September (September 22 median date in 16 years).

MGWA

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	7	3	1	3
Mixed conifer/ ponderosa pine (5)	4	1	3	0
Ponderosa pine (11)	5	1	2	2
Ponderosa pine/ piñon/juniper (21)	6	1	1	4
TOTAL	22	6	7	9

Hepatic Tanager





Hepatic Tanager

Hepatic Tanager
(Piranga flava)

The Hepatic Tanager summers in mountainous areas in the south, northward locally to the Zuni, Jemez, southern Sangre de Cristo, and Sierra Grande ranges from pine forest down into evergreen and adjacent woodlands (Hubbard 1978).

During the atlas project, Hepatic Tanagers were found in 67% of the blocks containing piñon/juniper woodland, but breeding was confirmed primarily in the lower canyon bottoms. Breeding was confirmed in 50% of the occupied blocks. Six nests were discovered, all in ponderosa pines and 40–45 feet above the ground. Occupied nests were reported from June 6 to July 7.

Shortly after their arrival in mid-May (May 13 median date in 6 years), they establish territories of a few acres each and begin breeding activities. Although their actions while feeding along branches and in the foliage are slow and deliberate, they are restless birds moving from tree to tree, often traveling distances of several hundred yards at a time.

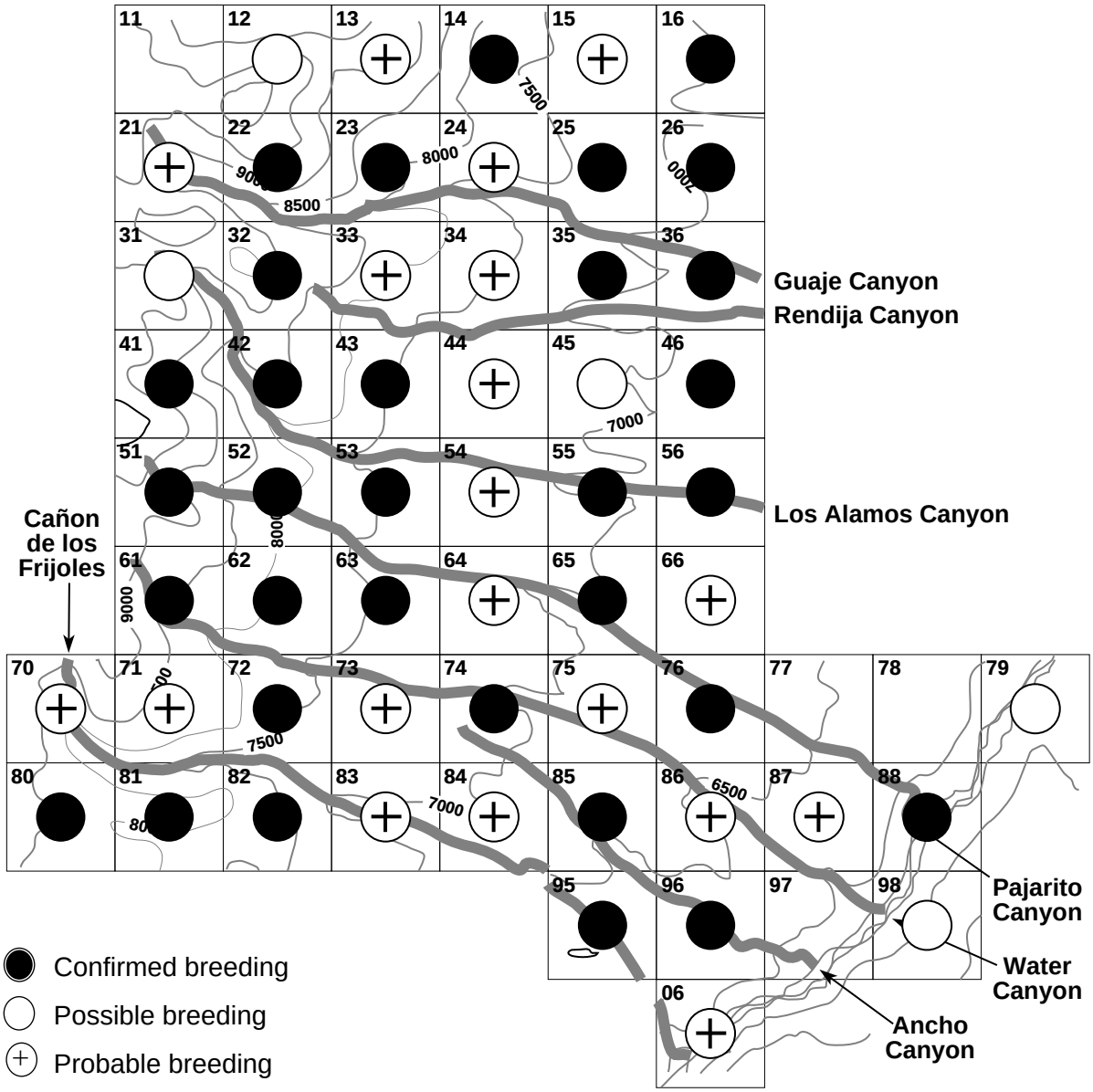
Despite its bright plumage, the male Hepatic Tanager is seldom conspicuous, even while in full-throated advertising song. Its song, a series of clear warblings, is like the song of the Black-headed Grosbeak and resembles the songs of the American Robin and Western Tanager and even versions of the Solitary Vireo song. Thus, to quote Bent (1958) writing about the Scarlet Tanager, "unseen and unheard (or unregarded), it is often considered a rare bird, even in localities where it breeds commonly." The call note—a low, soft "chuck"—distinguishes the Hepatic Tanager from the other species having similar songs.

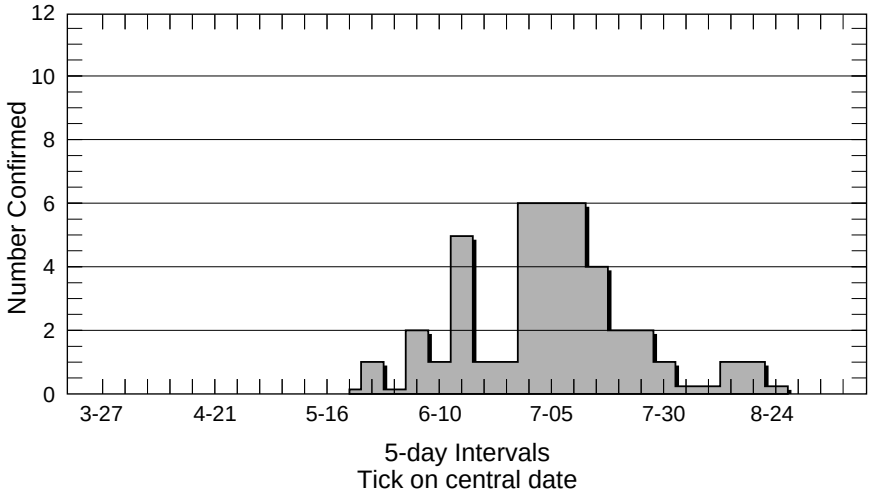
Its fall departure is in mid-September (September 15 median date in 4 years). Because of the scarcity of spring and fall records, we are uncertain of the arrival and departure dates.

HETA

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	2	0	1	1
Ponderosa pine/ piñon/juniper (21)	15	9	4	2
Piñon/juniper (6)	3	1	0	2
TOTAL	20	10	5	5

Western Tanager





Western Tanager

Western Tanager
(Piranga ludoviciana)

The Western Tanager summers in mountainous areas statewide. It is a bird of mature but open woodlands, frequenting the mixed conifer and ponderosa pine forests.

During the atlas project, Western Tanagers were found throughout the forests and woodlands, inhabiting 90% of the blocks. Breeding was confirmed in 57% of the occupied blocks.

Nine nests with either eggs or nestlings were found, mostly in ponderosa pines, at heights of 15 to 30 feet above the ground. Six instances of nest building were observed, from the first gathering of nest material on May 26 to a completed nest on June 28. Typically, nests were near the outer end of a conifer limb, but one nest was placed in the crotch of a 20-foot Gambel's oak.

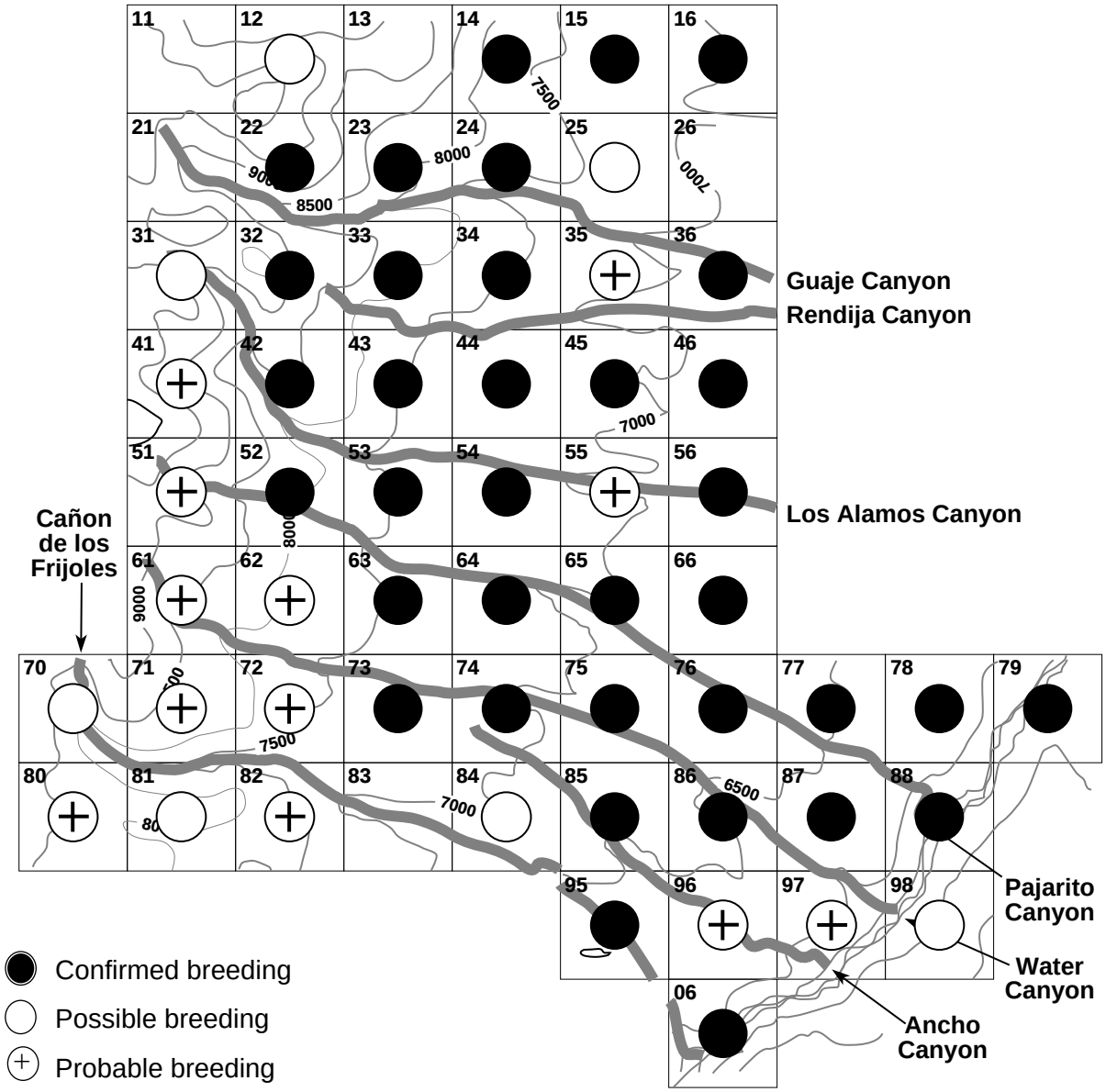
Western Tanagers arrive in Los Alamos within a few days of the same date every spring (May 9 median date in 34 years). The males are strikingly evident around the townsite for a week before they settle on their territories for nesting. Two instances of courtship were noted: a female wing quivering in a begging posture and mate feeding on the nest.

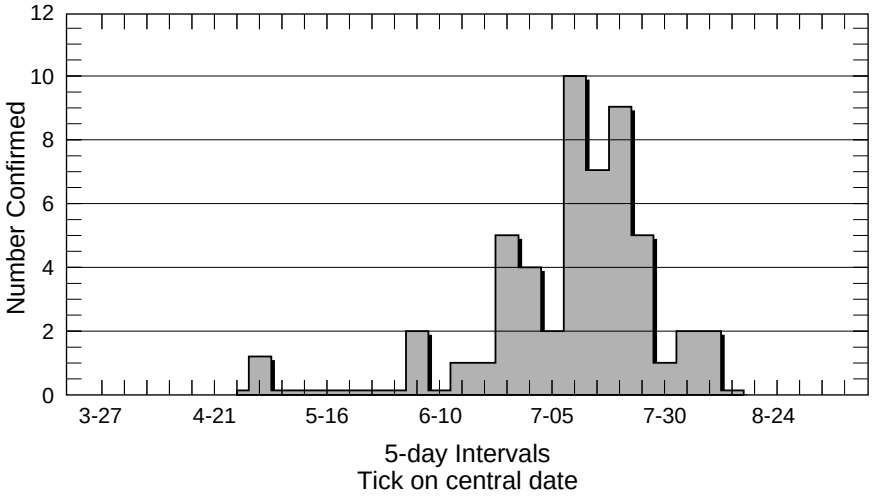
Western Tanagers move away from their nesting areas in midsummer, appearing commonly again around the townsite. They are last seen in the county in late September (September 27 median date in 19 years).

WETA

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	16	9	5	2
Mixed conifer/ ponderosa pine (5)	5	4	1	0
Ponderosa pine (11)	11	5	6	0
Ponderosa pine/ piñon/juniper (21)	21	13	7	1
Piñon/juniper (6)	3	1	0	2
TOTAL	56	32	19	5

Black-headed Grosbeak





Black-headed Grosbeak

Black-headed Grosbeak
(Pheucticus melanocephalus)

The Black-headed Grosbeak summers in the mountains and adjacent river valleys statewide in wooded and forested areas, mainly at middle elevations (Hubbard 1978). Its nesting habitat preferences are open canopy with some admixture of shrubs, edges with deciduous trees, and bushy openings in woods or gardens (Pough 1961). It avoids extensive areas of unbroken coniferous forest.

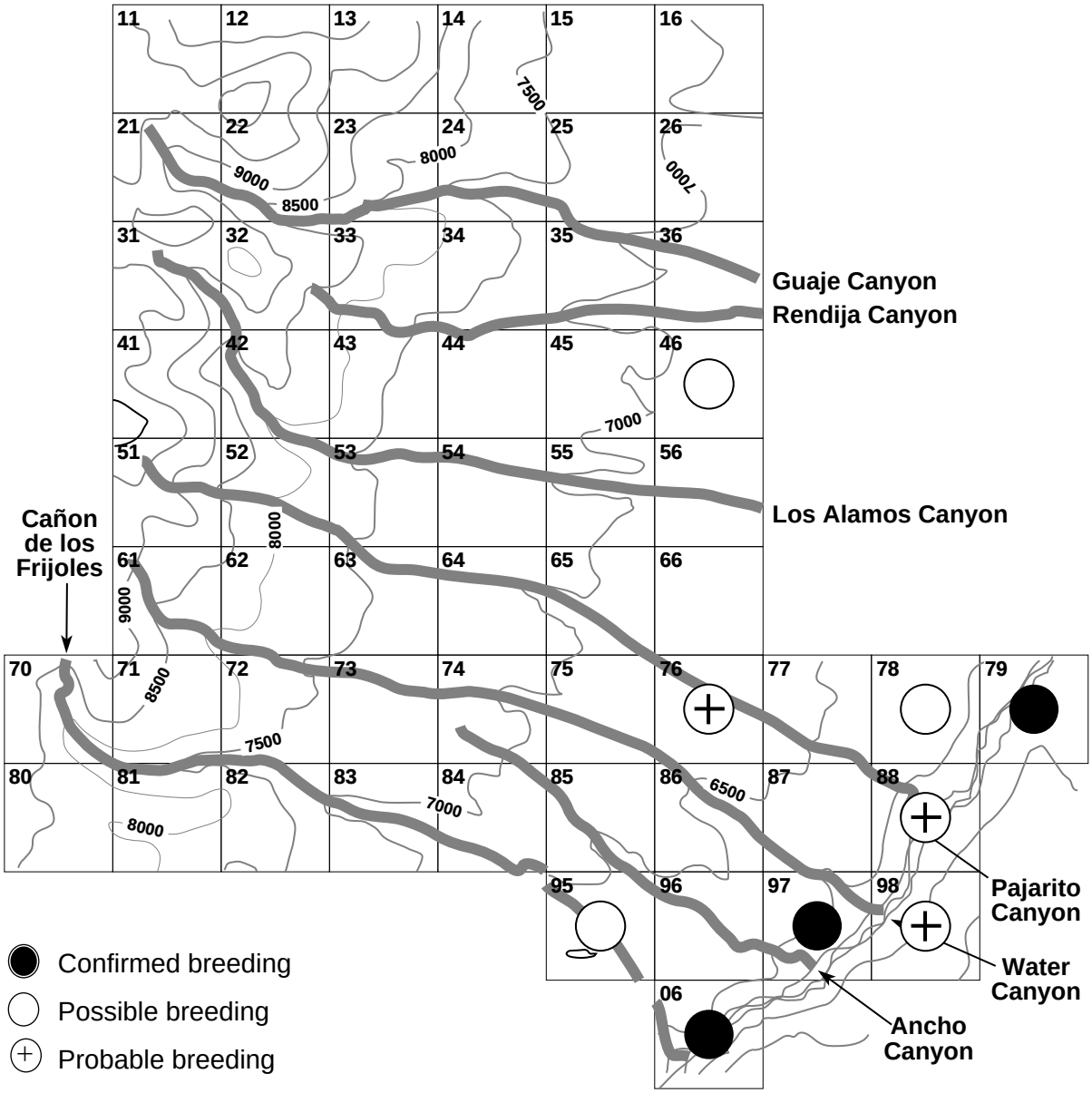
Black-headed Grosbeaks were found in all the forested areas of Los Alamos during the atlas project except for the highest ones in the extreme northwest corner. They occupied 86% of the mixed conifer blocks and 95% of the blocks containing ponderosa pine forest and piñon-juniper woodland of the mesas and lower canyon bottoms. Breeding was confirmed in 82% of the occupied blocks. Nests were placed in scrub oak, Forestiera, mulberry, and ponderosa pine at heights from 5 to 10 feet above the ground. The earliest nest building observed was May 2, 1986. The peak of dependent young feeding was the middle two weeks of July.

Black-headed Grosbeaks arrive in Los Alamos at the beginning of May (May 5 median date in 27 years) and depart in mid-September (median date September 19 in 14 years).

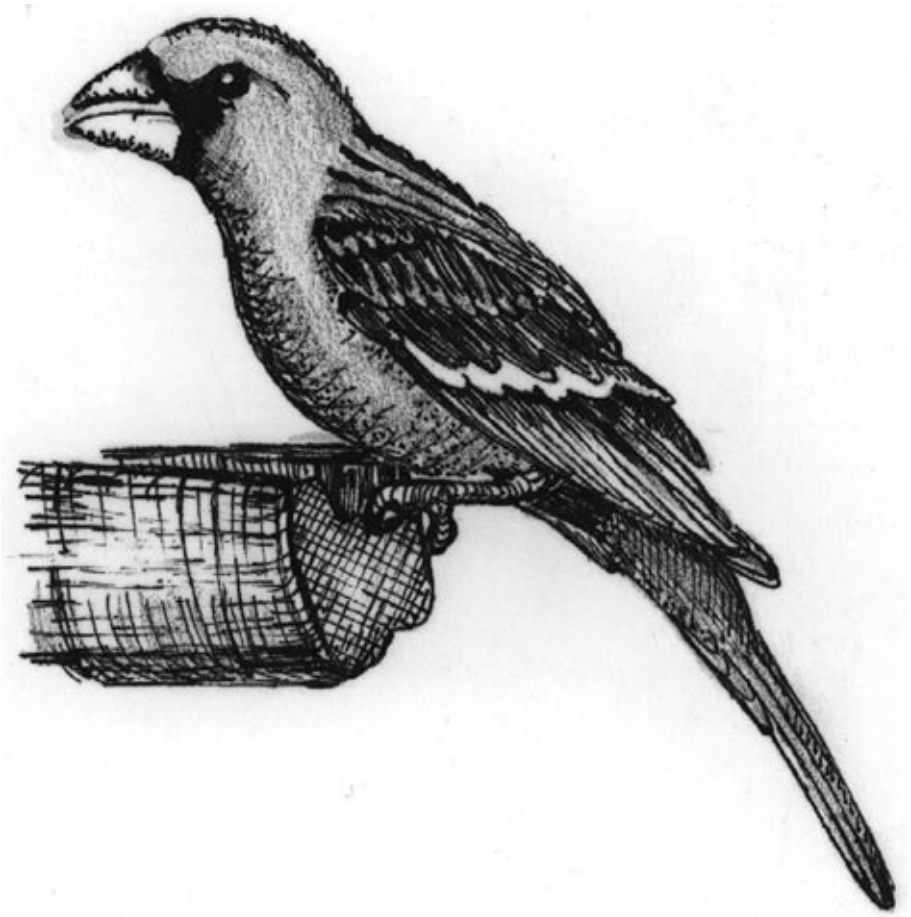
BHGR

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	14	5	5	4
Mixed conifer/ ponderosa pine (5)	5	3	2	0
Ponderosa pine (11)	10	8	1	1
Ponderosa pine/ piñon/juniper (21)	20	16	3	1
Piñon/juniper (6)	6	4	1	1
TOTAL	55	36	12	7

Blue Grosbeak



Blue Grosbeak



Blue Grosbeak
(Guiraca caerulea)

The Blue Grosbeak summers almost statewide in shrublands at lower and middle elevations, but appears to be largely absent in most of the central-western area, including much of the Mogollon Highlands (Hubbard 1978).

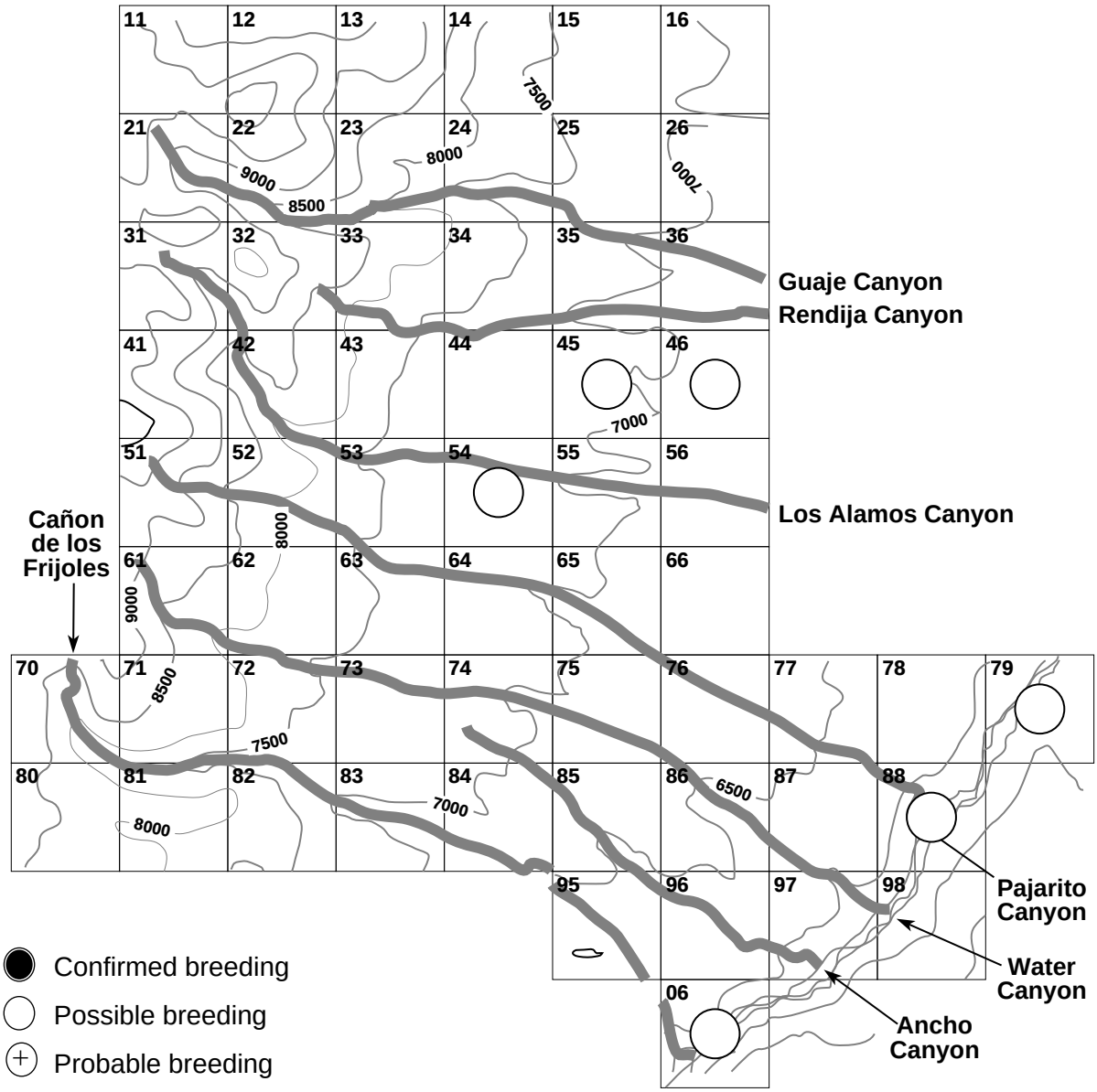
In the Los Alamos area, Blue Grosbeaks are found primarily in the deciduous shrub along the Rio Grande. During the atlas project, they were in 100% of the Rio Grande gorge blocks. In half of these blocks, breeding was confirmed. Nest building was observed on June 6, and a nest with three nestlings and one egg was discovered 4 feet up in a Russian olive tree on July 11.

Blue Grosbeaks are among the latest migrants to appear in the spring in New Mexico. They arrive in mid-May in the Española Valley (May 18 median date in 7 years). The latest sighting in autumn was September 8.

BLGR

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine/ piñon/juniper (21)	3	0	1	2
Rio Grande gorge (6)	6	3	2	1
TOTAL	9	3	3	3

Lazuli Bunting



Lazuli Bunting

Lazuli Bunting
(Passerina amoena)

The Lazuli Bunting summers in the north and casually southward mainly in riparian and adjacent shrublands at lower and middle elevations. It summers regularly in the Northern Highlands and in the Rio Grande Valley south to Albuquerque (Hubbard 1978).

Although appearing fairly regularly in the spring (May 5 median arrival date), it is an elusive summering species in Los Alamos. During the atlas project, Lazuli Buntings were possibly breeding in six blocks. They were seen in the lower canyon bottoms and along the Rio Grande. Breeding was not confirmed in the county, nor are there any breeding records from earlier years.

In Colorado, where they nest regularly, the majority arrive well after the first week of May. The males choose their breeding territories among low shrubs in moist swales, often at the edge of stands of ponderosa pines and in meadows grown with willows and alders. Nest building by the females does not start until well into June (Bailey and Niedrach 1965).

The nest, usually in low shrubby growth, is well concealed and difficult to find. The bright male sings within his territory from a series of conspicuous song perches

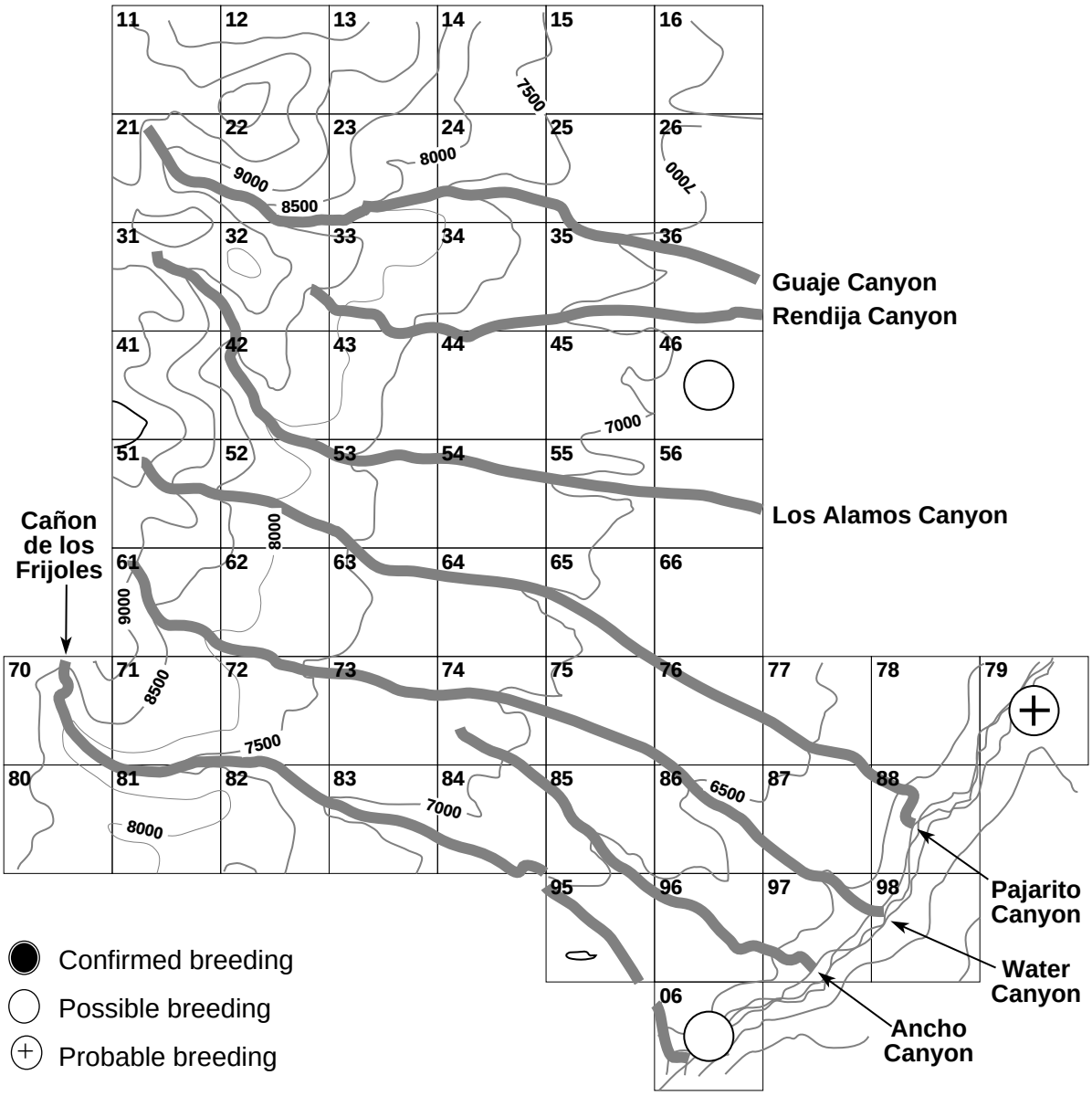
throughout the breeding cycle, but he stays away from the nest site. Singing is most frequent in the early morning and evening, but can be heard throughout the day.

Breeding records from nearby regions include: Jensen's record (1923) of a nest with eggs on June 19 near Santa Fe and Tatchl's record (1967) of a nest with young on July 27 at Cedar Crest.

LABU

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine/ piñon/juniper (21)	3	0	0	3
Rio Grande gorge (6)	3	0	0	3
TOTAL	6	0	0	6

Indigo Bunting



Indigo Bunting

Indigo Bunting
(Passerina cyanea)

Since the 1960s Indigo Buntings have summered almost statewide in riparian habitats of the major river courses. They are found regularly and have nested in the Rio Grande Valley north to Dixon (Hubbard 1978).

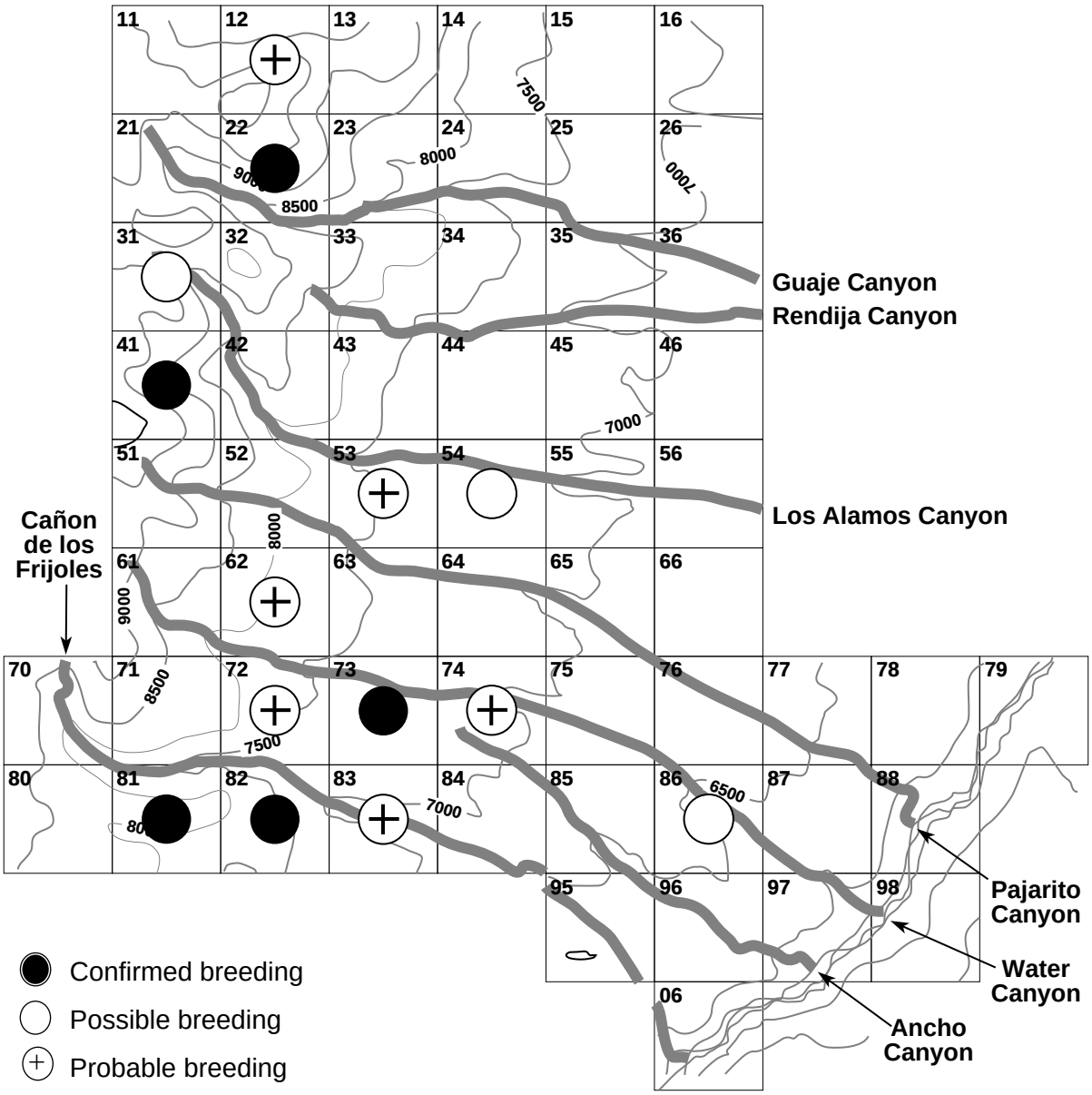
During the atlas project, singing male Indigo Buntings were found in three areas: one in the Bayo Canyon bottom and two along the Rio Grande. Extended territorial song, indicative of probable breeding, was observed in Block 7-9 in June 1988. Breeding was not confirmed.

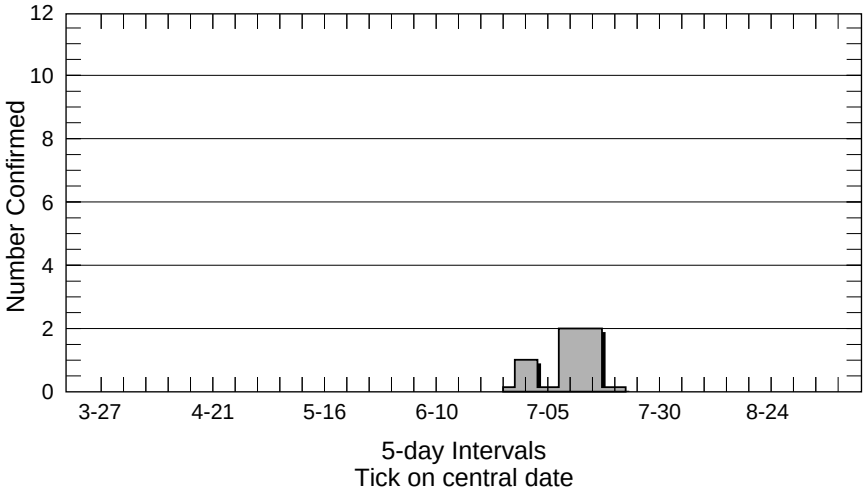
The brilliantly plumaged males are easily located, but the drab, quiet females are difficult to detect. The male and female often lead quite separate lives, so that by following the male often you get no closer to the female. One clue to the location of the nest is that on the approach of an intruder, the male (and sometimes the female) intervenes twitching its tail from side to side and giving sharp "chip" calls (Stokes and Stokes 1983).

INBU

Habitat	Occurrence	Conf	Prob	Poss
Lower canyon (10)	2	0	1	1
Rio Grande gorge (6)	1	0	0	1
TOTAL	3	0	1	2

Green-tailed Towhee





Green-tailed Towhee

Green-tailed Towhee
(Pipilo chlorurus)

The Green-tailed Towhee summers in northern New Mexico, southward locally to the Mogollon and Sacramento highlands. It is found in shrublands from sagebrush-like areas at middle elevations to riparian and copse habitats at higher elevations (Hubbard 1978).

During the atlas project, Green-tailed Towhees were recorded in 32% of the blocks containing mixed conifer forest. They were found breeding locally wherever the appropriate thicket and meadow habitat occurred. They were recorded in 29% of the mesa ponderosa pine blocks, where they were concentrated in disturbed canyon and mesa areas of the southern portion, especially in the shrubby regrowth in the burned-over areas. Breeding was confirmed in 36% of the blocks in which they were recorded. One nest, located in a locust thicket, was found on July 10 in a shrubby area in cleared mixed conifer forest.

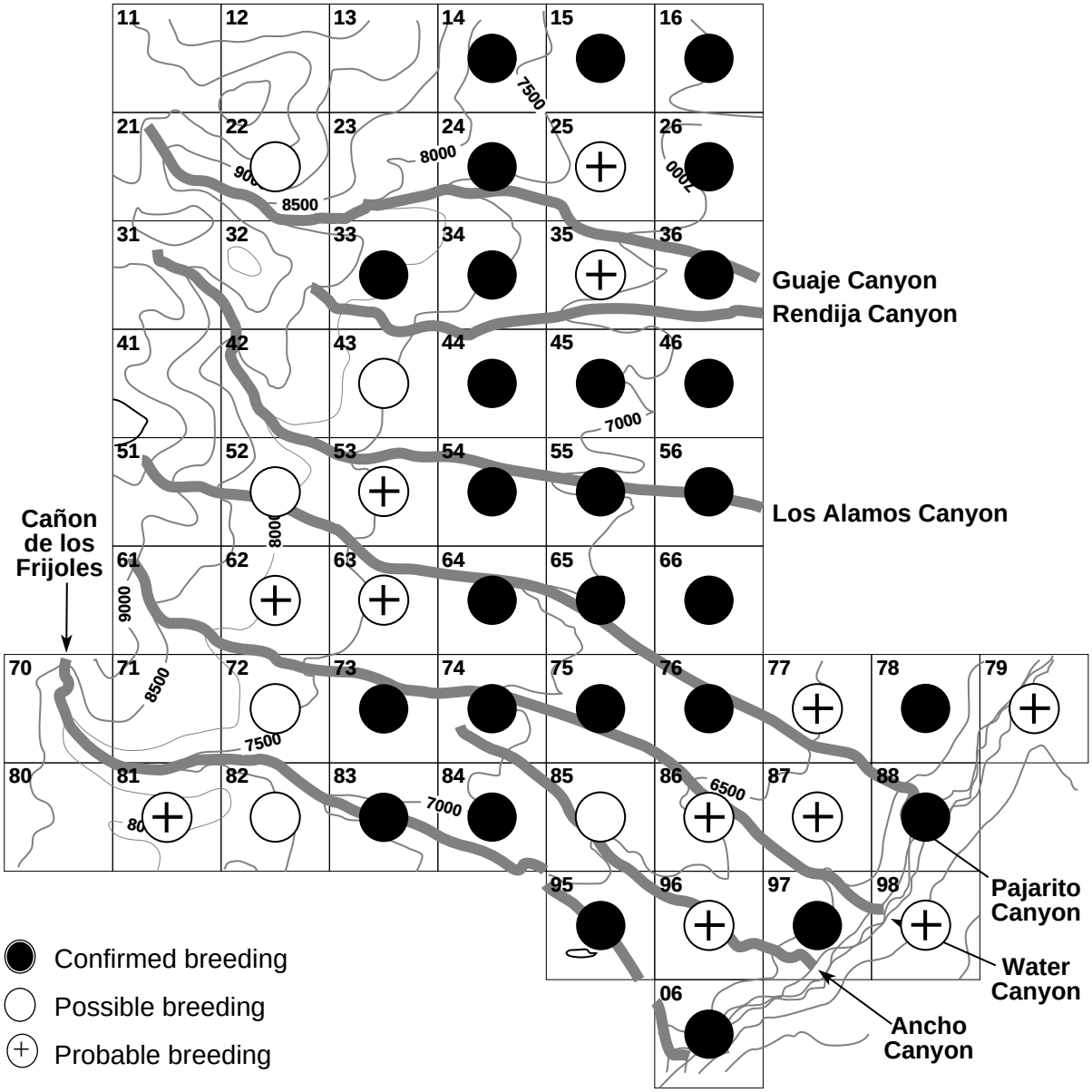
Wauer (Foxx 1984) did not find Green-tailed Towhees in his systematic surveys in the burned-over areas just before La Mesa fire nor in the first 2 years after the fire. Presumably, suitable habitat for this towhee had developed in the 6 years that had elapsed by the time atlas fieldwork began.

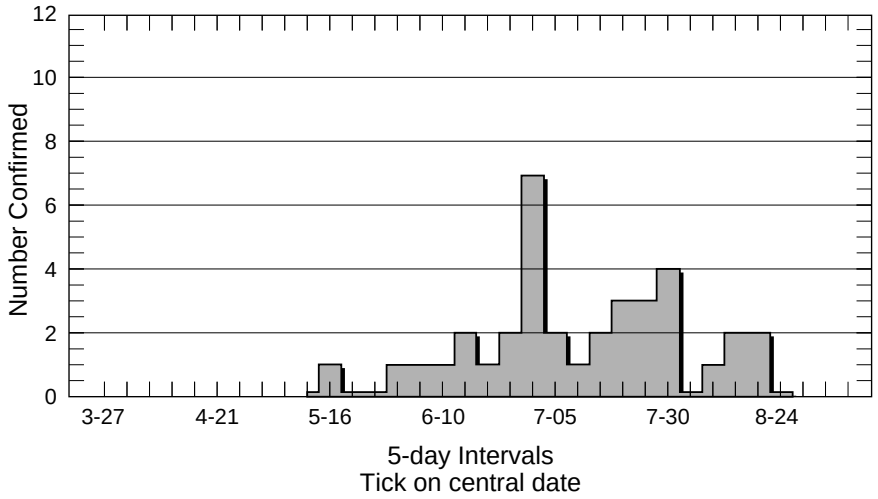
Green-tailed Towhees typically arrive in Los Alamos in late April (April 25 median date in 14 years) and leave by the end of September (September 27 median date in 13 years).

GTTO

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	5	3	1	1
Mixed conifer/ ponderosa pine (5)	2	0	2	0
Ponderosa pine (11)	5	2	2	1
Ponderosa pine/ piñon/juniper (21)	2	0	1	1
TOTAL	14	5	6	3

Rufous-sided Towhee





Rufous-sided Towhee

Rufous-sided Towhee
(Pipilo erythrophthalmus)

The Rufous-sided Towhee is resident in mountainous areas statewide and locally in lowland river valleys. It summers from middle elevation shrubland and woodland locally up into adjacent forests and down into lowland riparian habitats (Hubbard 1978). Its habitat requirements include dense cover where the ground is well carpeted with dead leaves and leaf mold, in which it can forage (Pough 1953). Favored habitats, on hillsides and canyon floors, are brushy openings and undercover in wooded areas, border and streamside thickets, and vine tangles. In Los Alamos it is common in the brushy areas on the mesas and in the canyons.

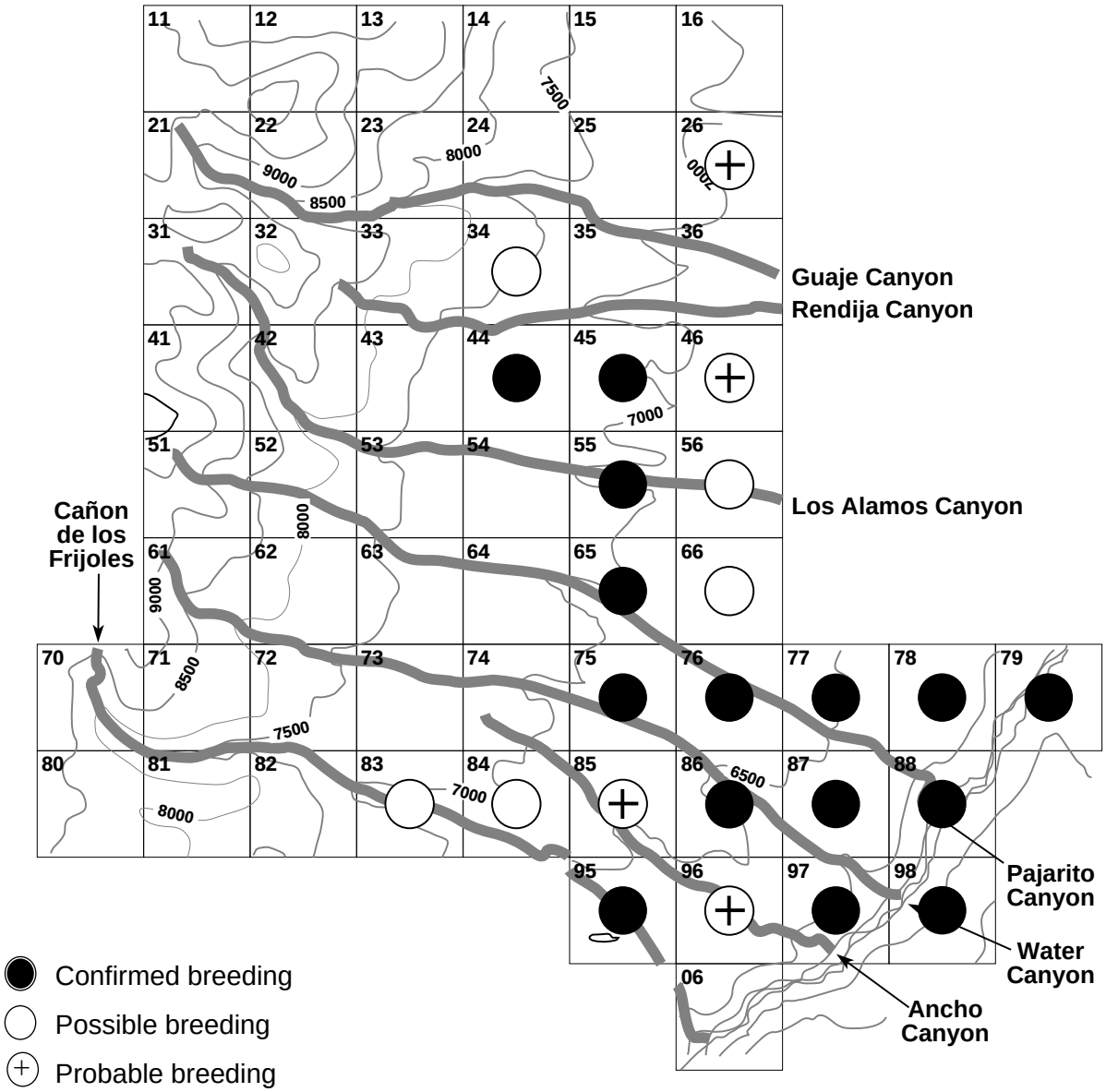
During the atlas period, Rufous-sided Towhees inhabited 100% of the blocks containing the mesa and lower canyon woodlands. Breeding was confirmed in 57% of the occupied blocks. Four nests were reported. Two ground nests, each with three eggs, were found in lower canyon bottoms (April 17 and 29). Of the other two, one containing eggs was in a residential raspberry bush (June 28) and the other was in a low shrub in open ponderosa pine woodland (undated).

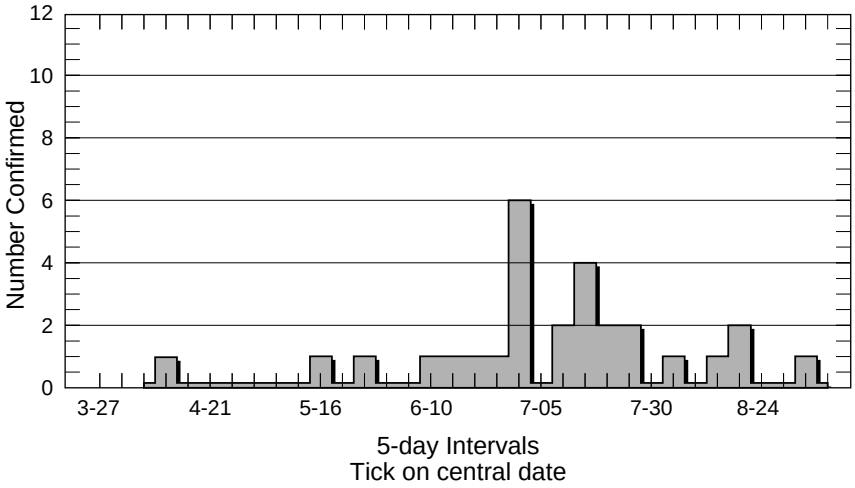
This is one of the first species to sing in spring. Males singing persistently from an exposed perch reveal the location of the territory, but beautiful concealment of the nest and the cryptic coloration of the secretive female thwarts nest detection. Most of the confirmed breeding records were of attended young or recent fledglings.

RSTO

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	3	1	1	1
Mixed conifer/ ponderosa pine (5)	5	2	1	2
Ponderosa pine (11)	11	6	3	2
Ponderosa pine/ piñon/juniper (21)	21	16	4	1
Piñon/juniper (6)	6	3	3	0
TOTAL	46	28	12	6

Canyon Towhee





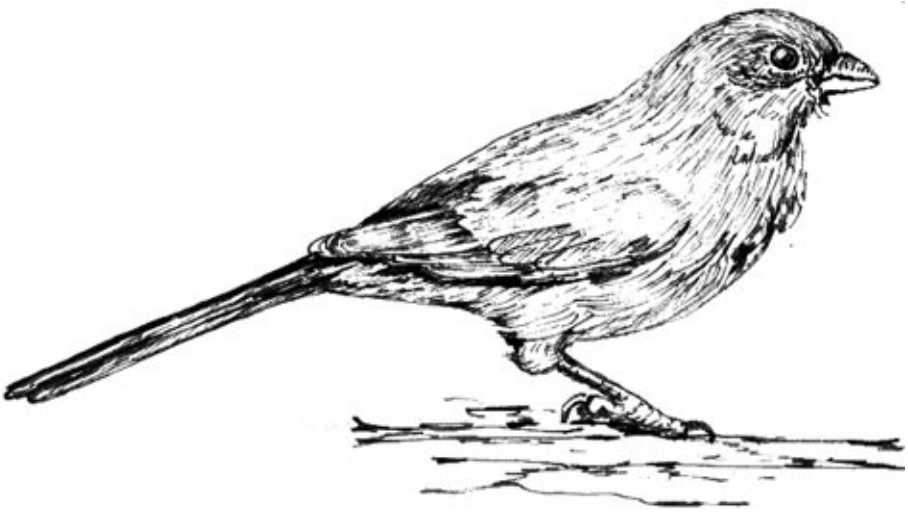
Canyon Towhee

Canyon Towhee
(Pipilo fuscus)

The Canyon Towhee* is resident in mountainous areas almost statewide in shrublands and woodlands at lower and middle elevations (Hubbard 1978).

During the atlas project, Canyon Towhees inhabited 78% of the piñon/juniper blocks. Breeding was confirmed in 63% of the occupied blocks. They nested regularly near human habitation situated in the piñon/juniper woodland. Eight nests (28% of the confirmations) were found. Of five nest sites reported, four were in piñon pines, 4 to 8 feet above the ground, and one was under the roof of a backyard porch.

Canyon Towhees are sedentary, living on their territories all year. Their nesting season is long. It starts early in spring—the earliest occupied nest was April 13, 1988—and runs into the autumn. Nest-building was observed as late as July 26, 1988. The latest confirmed fledgling date was September 28.

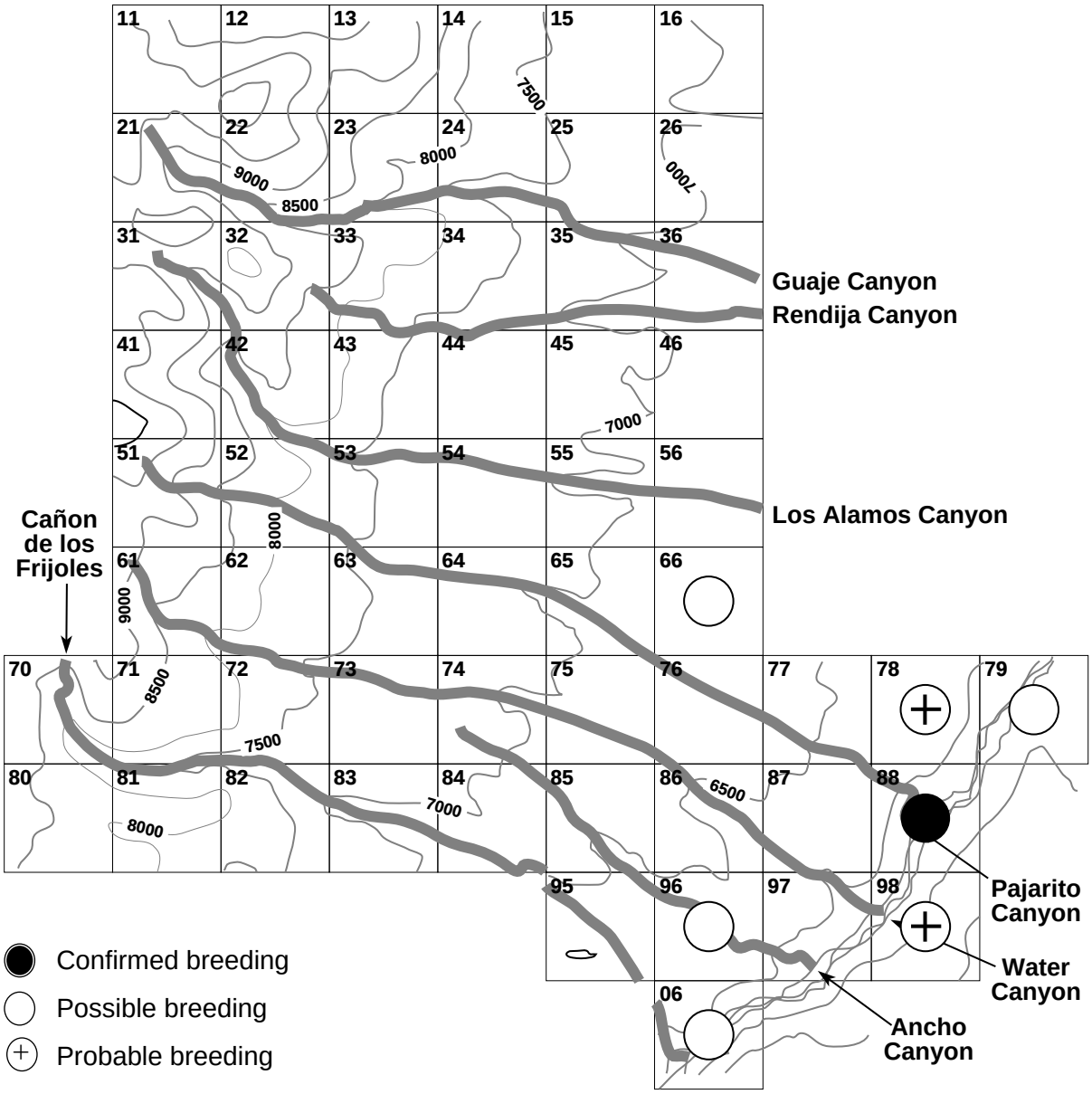


BRTO

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	3	1	0	2
Ponderosa pine/ piñon/juniper (21)	15	8	4	3
Piñon/juniper (6)	6	6	0	0
TOTAL	24	15	4	5

*In a recent revision of the A.O.U Checklist, the Brown Towhee was divided into two species, the Canyon Towhee and the California Towhee (Auk, 106, pp 532-538, 1989, 37th Supplement to the American Ornithologists' Union Check-list of North American Birds). The New Mexico species is the Canyon Towhee.

Rufous-crowned Sparrow



Rufous-crowned Sparrow

Rufous-crowned Sparrow
(Aimophila ruficeps)

The Rufous-crowned Sparrow is resident in mountainous areas of the south, northward locally and disjunctly to the Glenwood area, the Sandia Mountains, and the Dry Cimarron Valley. It is found in grassy shrubland on slopes, mainly at lower and middle elevations (Hubbard 1978).

During the atlas project, we found Rufous-crowned Sparrows in 83% of the Rio Grande gorge blocks on the rocky slopes below the canyon rim. They were also found in dry areas in two lower canyon bottoms. Breeding was confirmed, an adult feeding two young, August 8, 1988, in Block 8-9 in the gorge.

Few birds stick closer to the ground and are harder to flush. They sing, however, from the top of a small bush, but when approached, flush easily and reappear at some distance (Pough 1957). The song is a staccato chittering that usually changes its pitch two or three times. It has been likened to a softened House Wren's song (Bent 1968). Its characteristic location call is a clear descending note, usually given in a series of three (Pough 1957).

The loosely constructed, thick-walled nest is on the ground usually sunk into a small hollow and often under a clump of grass or low shrub.

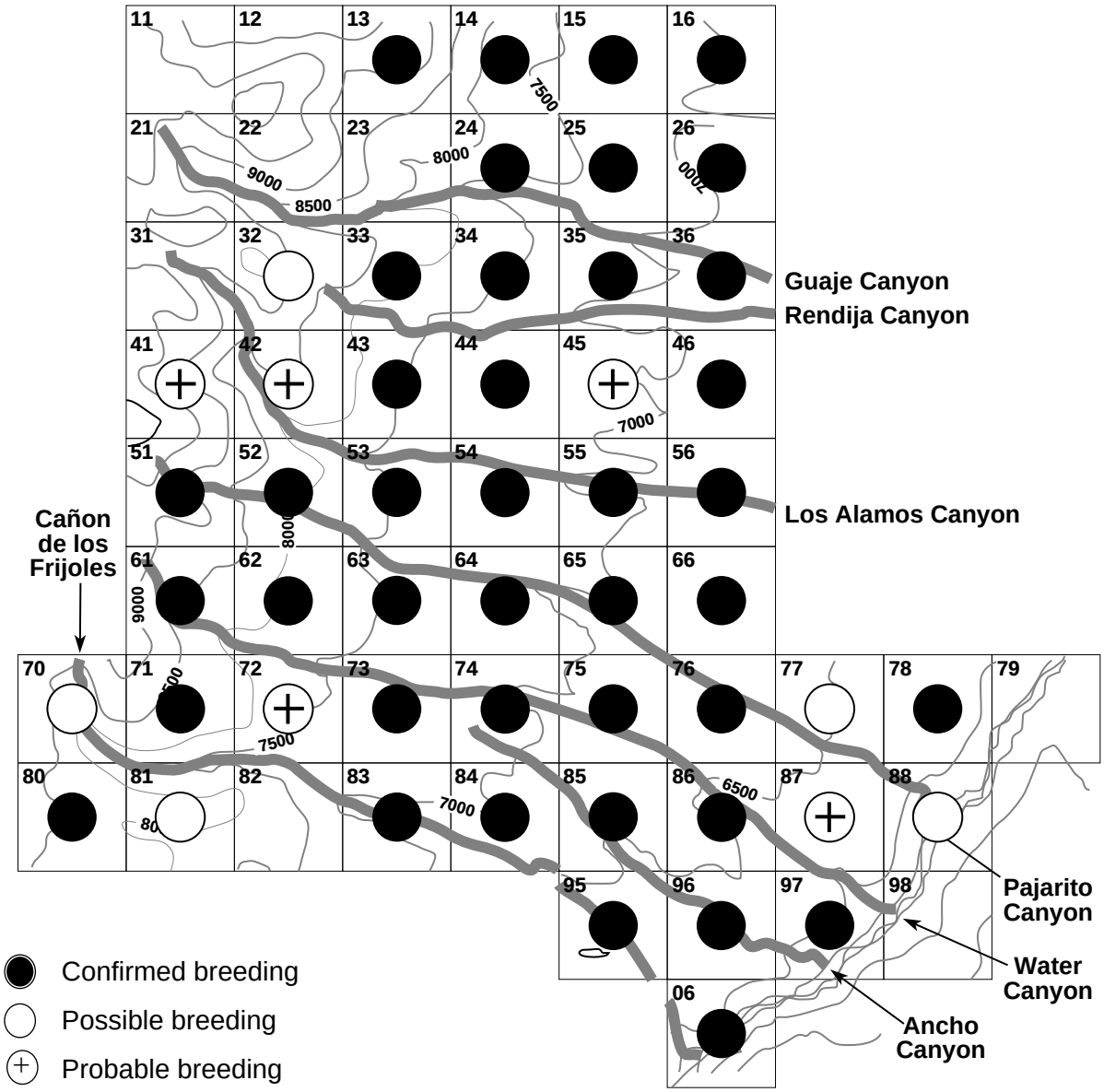
Nesting times may correlate with the amount of rainfall; thus fresh eggs have been found from March until August in its normal range (Harrison 1979). Evidence from Arizona populations suggests that breeding may occur in the fall after the summer rains, if the previous winter and spring have been dry. Tatchl (1967) found a nest with young on September 6 in the Sandia Mountains.

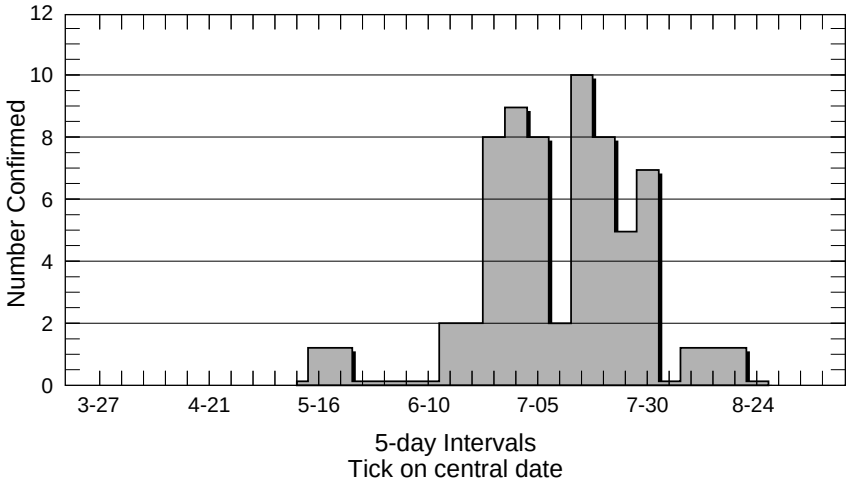
We have no winter records for Los Alamos. They were seen from May 5 through August 26 in the years 1986 through 1988, but the limited fieldwork in their habitat precludes a determination of whether they are resident or not.

RCSP

Habitat	Occurrence	Conf	Prob	Poss
Rio Grande gorge (6)	5	1	2	2
Lower canyon cliffside	2	0	0	2
TOTAL	7	1	2	4

Chipping Sparrow





Chipping Sparrow

Chipping Sparrow
(Spizella passerina)

The Chipping Sparrow summers in mountainous areas almost statewide (Hubbard 1978). It has benefited from human alteration of the natural environment, particularly the opening of the forests and plantings around habitations. It is at home in residential areas, parks, forest edges, and the shrub level of open stands of ponderosa pine and Douglas fir forest.

During the atlas project, Chipping Sparrows were common throughout the county except in the high montane forests in the northwest corner. They inhabited 65% of the mixed conifer blocks and 93% of the blocks containing the mesa and lower canyon forests and woodlands. Breeding was confirmed in 80% of the occupied blocks. Most of the confirmed breeding records were of adults feeding recently fledged young.

Five nests were found. Three were in ponderosa pines at heights of 12 to 30 feet above the ground. Two of these were grass cups near the end of a horizontal branch, one in a needle clump, and the other in a horizontal fork. Another nest was 6 feet up in a Gambel oak. Nest building was observed on May 22 and incubation on May 14. Nests with young were found from June 28 to July 19.

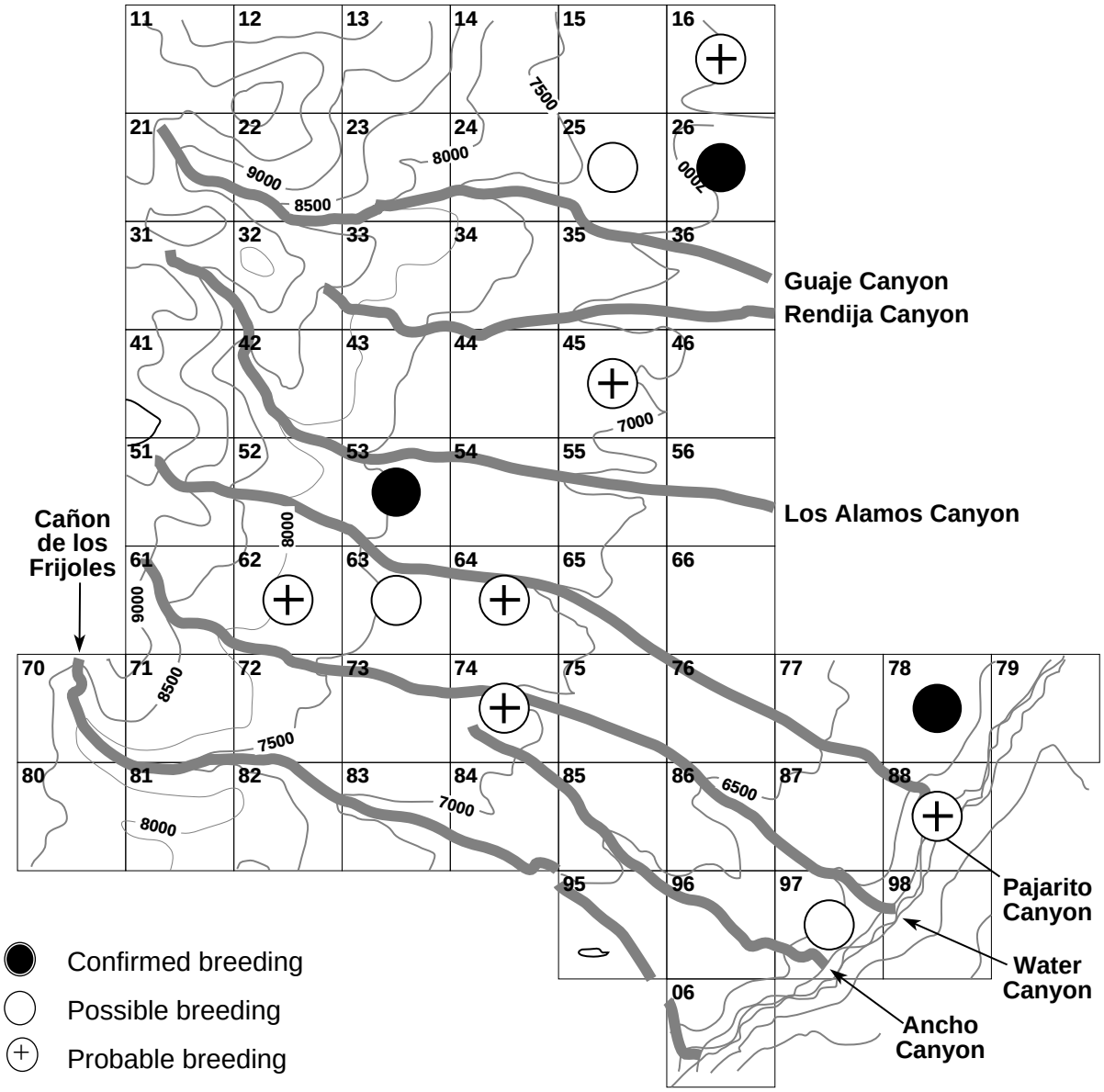
Chipping Sparrows begin migrating in late June or July after breeding, and by mid-August foraging flocks roam the shrubby, grassy areas and roadsides in the county before they depart for the winter (October 16 median departure date in 18 years).

Chipping Sparrows are among the earliest of the spring migrants in Los Alamos (April 13 median date in 24 years).

CHSP

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	11	6	2	3
Mixed conifer/ ponderosa pine (5)	5	4	1	0
Ponderosa pine (11)	10	10	0	0
Ponderosa pine/ piñon/juniper (21)	21	19	2	0
Piñon/juniper (6)	4	2	0	2
TOTAL	51	41	5	5

Vesper Sparrow



Vesper Sparrow

Vesper Sparrow
(Pooecetes gramineus)

The Vesper Sparrow summers in the northern part of New Mexico and southward to the Mogollon Plateau. It is found in sagebrush shrublands and locally in the north up into the drier montane shrublands (Hubbard 1978).

During the atlas project, Vesper Sparrows were found in 61% of the abandoned agricultural blocks. Breeding was confirmed in 25% of the occupied blocks. Feeding of nestlings was observed on July 9, 1987. The nest was located in heavy grass beneath a shrubby juniper in an abandoned agricultural field. The other two confirmations were of fledglings, both on July 16, 1988, in equivalent habitat, but in different areas.

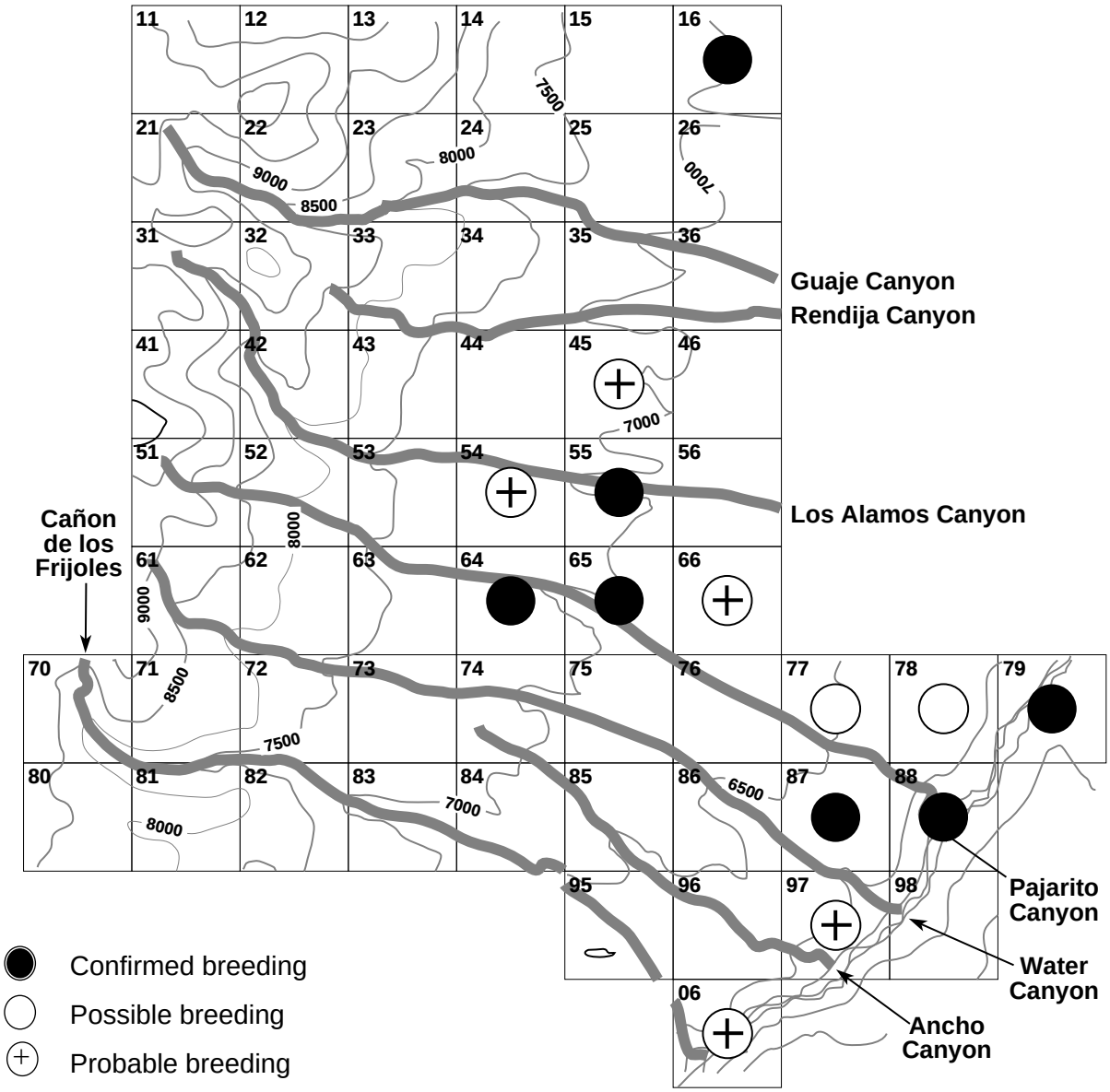
Vesper Sparrows arrive early in spring in Los Alamos (April 9 median date in 10 years) and establish their large territories by early May. Perched conspicuously, singing males are easily detected, but the well-hidden and protected nest is difficult to find.

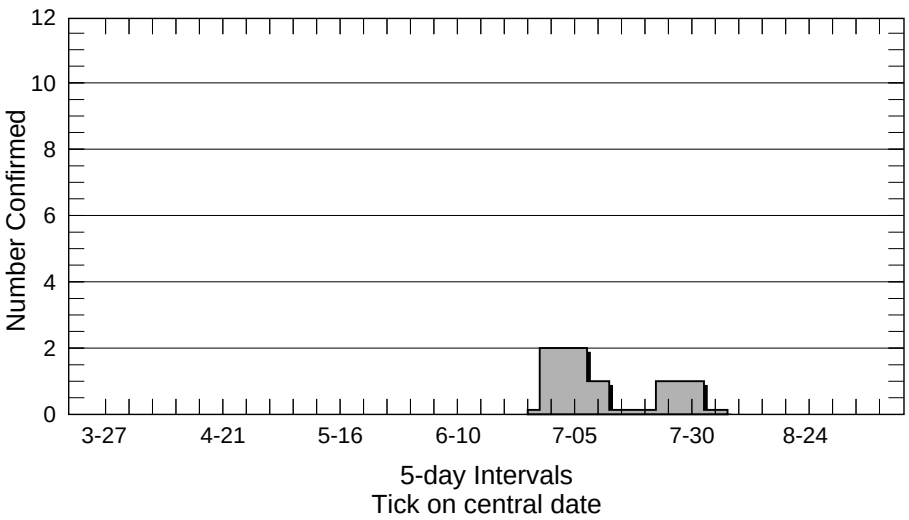
The few recorded late autumn dates indicate that Vesper Sparrows leave the county by mid-October (October 9 median date in 4 years).

VESP

Habitat	Occurrence	Conf	Prob	Poss
Abandoned fields (18)	11	3	6	2
Adjoining	1	0	0	1
TOTAL	12	3	6	3

Lark Sparrow





Lark Sparrow

Lark Sparrow
(Chondestes grammacus)

The Lark Sparrow summers almost statewide, but it occurs only locally in the eastern plains and the extreme south. It is found in shrublands and open woodlands at lower and middle elevations (Hubbard 1978).

During the atlas project, Lark Sparrows were found in brush near open areas, primarily in the piñon/juniper woodland. Breeding was confirmed in 50% of the occupied blocks. All confirmations were adults feeding young (June 28 to July 29).

Male Lark Sparrows arrive in Los Alamos in early May (May 9 median date in 11 years) and defend territories vigorously—singing from a variety of perches within their territories, posturing, and chasing. The song consists of clear notes, buzzes, and trills. As Ridgway described the song (Bailey 1928): it "begins with a chant of clear ringing notes . . . then follows a silvery trill . . . and a succession of sprightly, sparkling notes, varied by rising and falling cadences, finally dying away until scarcely audible . . . ."

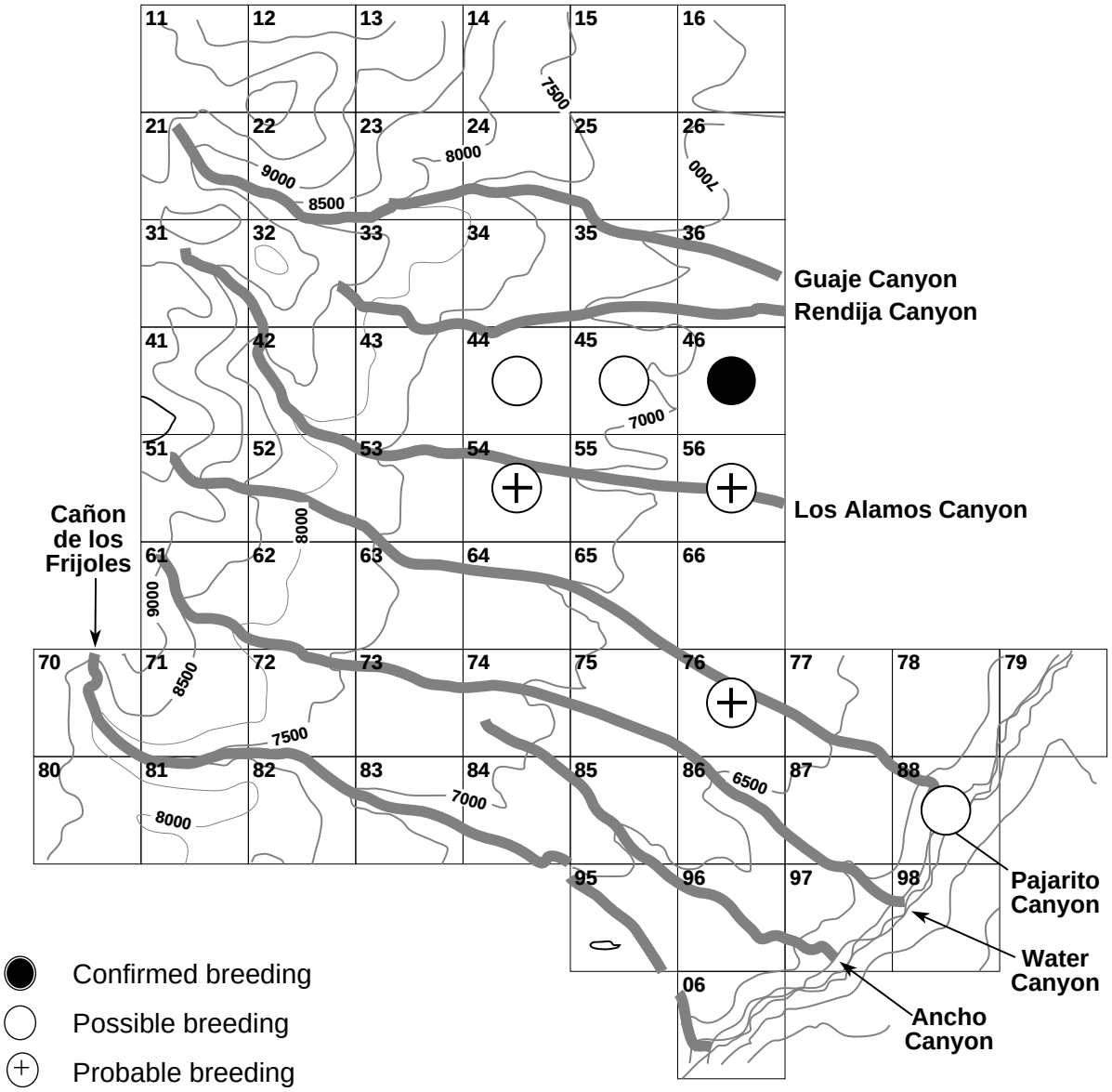
The nest is usually a grass-filled depression in the ground. The presence of nestlings is revealed by the soft trilling note they use when begging for food.

Lark Sparrows leave Los Alamos by the middle of September (September 12 median date in 8 years).

LASP

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	1	0	1	0
Ponderosa pine/ piñon-juniper (21)	8	5	3	0
Piñon-juniper (6)	5	2	1	2
TOTAL	14	7	5	2

Song Sparrow



Song Sparrow

Song Sparrow
(Melospiza melodia)

The Song Sparrow is resident in the Northern Highlands in riparian shrubland and marshland (Hubbard 1978). Its principal habitat is brushy cover near water.

During the atlas project, Song Sparrows were found in or near the few marshy areas of the county. They occurred in 77% of the marsh-containing blocks. Breeding was confirmed in one: nesting in the marsh east of the sewage plant in lower Pueblo Canyon (Block 4-6). Nests were discovered in 1984 and 1985 in shrubbery beside cattails. Nest building was observed July 5, 1984, and recent fledglings were seen from the second nest on June 6, 1985. Song Sparrows established territories in three additional blocks in later years.

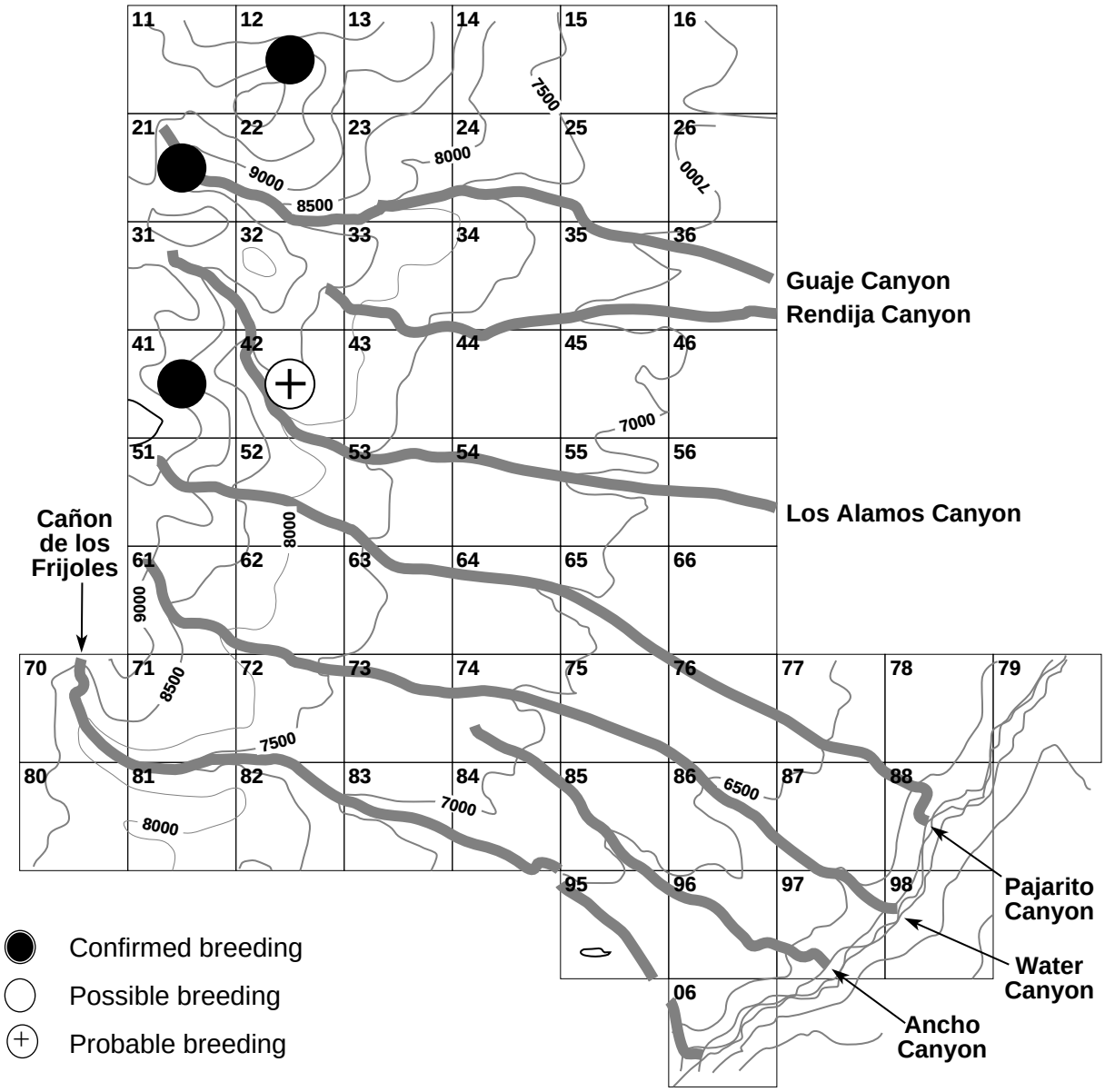
Because of the scarcity of suitable habitat, Song Sparrows are uncommon in the summer in Los Alamos. The atlas records are the first confirmation of breeding in the county.

The earliest recorded spring sighting is March 10, 1986; the latest fall record is November 10, 1976. Song Sparrows have not been recorded here in the winter, but a large population winters in the cattail marshes in the Española Valley.

SOSP

Habitat	Occurrence	Conf	Prob	Poss
Marsh (9)	7	1	3	3

Lincoln's Sparrow



Lincoln's Sparrow

Lincoln's Sparrow
(Melospiza lincolnii)

At the southern tip of its vast range, the Lincoln's Sparrow summers in high-elevation riparian shrubland in the San Juan, Jemez, and Sangre de Cristo mountains (Hubbard 1978). Lincoln's Sparrows are primarily edge-dwelling birds and are found in open areas interspersed with thick, low cover. Mountain meadows are favored summer haunts.

During the atlas project, they were found in grassy meadows in the midst of aspen/conifer stands near the mountain tops. They inhabited 24% of the blocks containing the mixed conifer forest. Breeding was confirmed in 75% of these blocks. On three occassions between June 28 and July 17, we observed broods being fed. A fourth brood of four recent fledglings was seen on August 10.

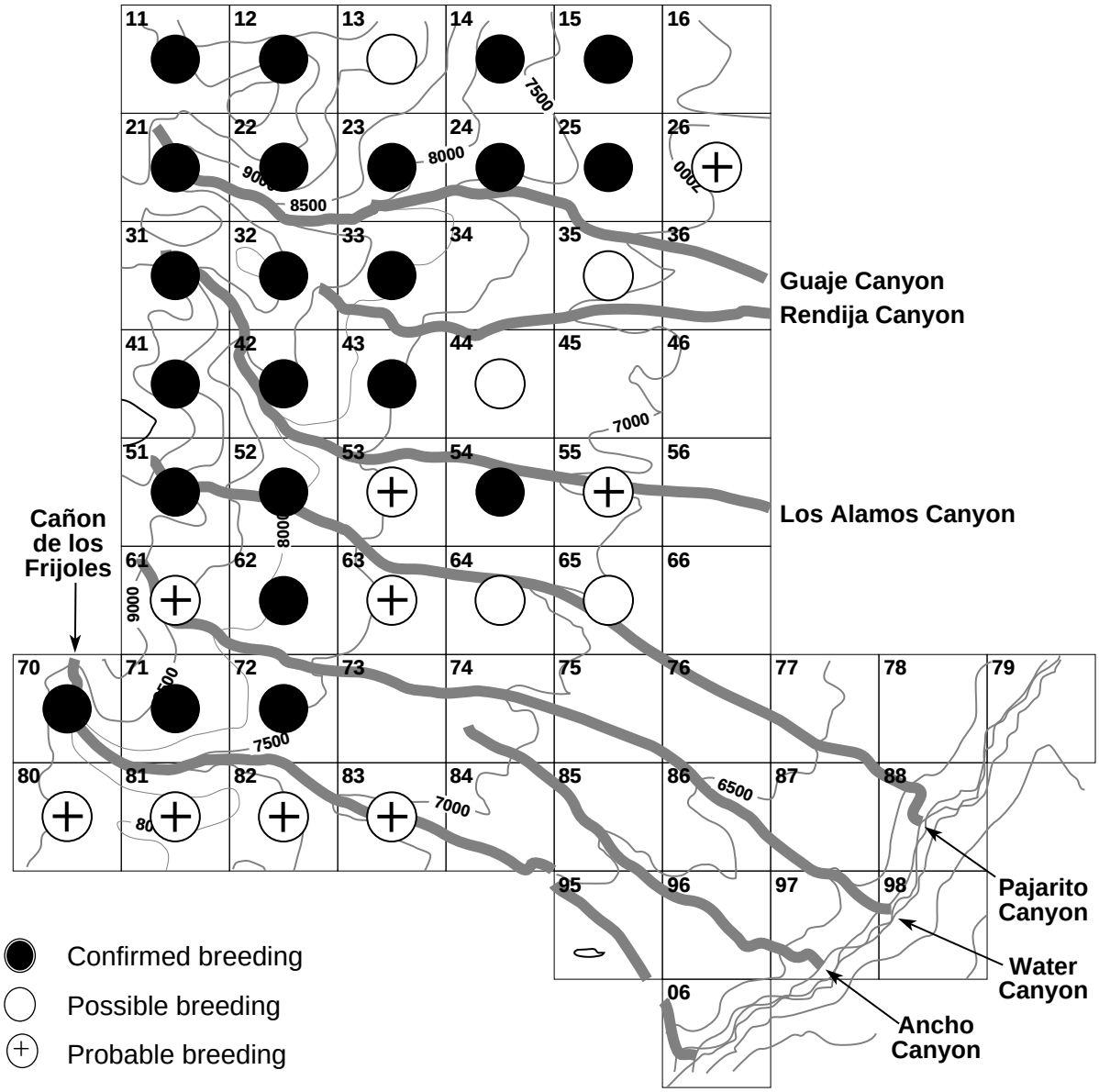
Although rather conspicuous while singing, they are wary and secretive. The easiest way to confirm breeding is to watch for parents carrying food.

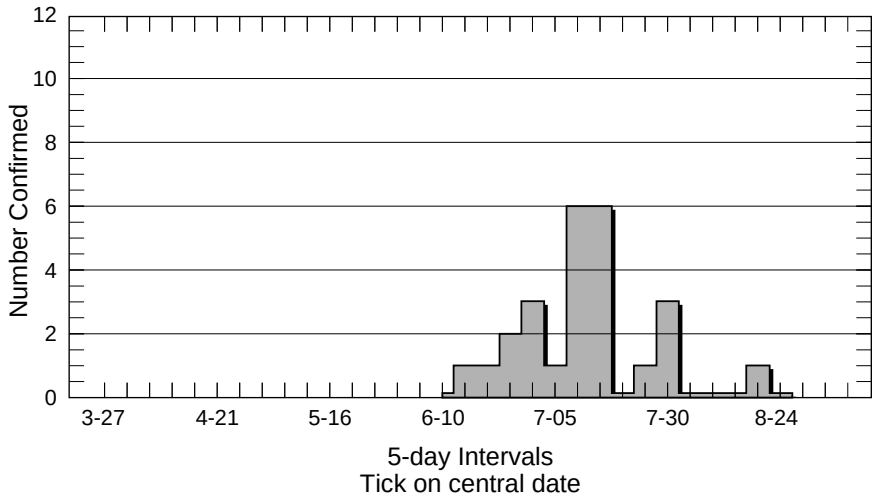
Arrival dates for spring migrants in Los Alamos have been reported for only 4 years with a median date of April 3. The last fall migrants are out of the county by October (September 28 median date in 10 years).

LISP

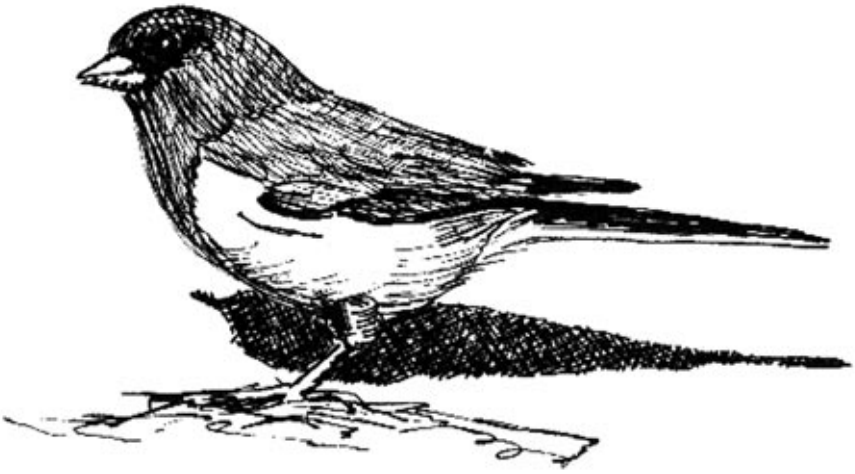
Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17) (in mountain meadows only)	4	3	1	0

Dark-eyed Junco





Dark-eyed Junco



Dark-eyed Junco
(Junco hyemalis)

The Gray-headed Junco is the resident form of the Dark-eyed Junco in mountainous areas of northern New Mexico. It is a characteristic breeding bird of the mixed coniferous forests. Banding studies indicate that most of the summering Gray-headed Juncos leave Los Alamos in the winter and are replaced by others, which presumably are migrants from farther north.

During the atlas project, Gray-headed Juncos inhabited 100% of the mixed conifer blocks and 73% of the predominantly ponderosa pine-forested blocks. Breeding was confirmed in 61% of the occupied blocks. Of the 25 records of confirmed breeding, only 3 were of nests. The nests contained eggs and the dates of the records were from mid-June to mid-July. Two nests were in hollows in the ground, well hidden under bunches of grass; the other was in a cavity in a cut along a forest road.

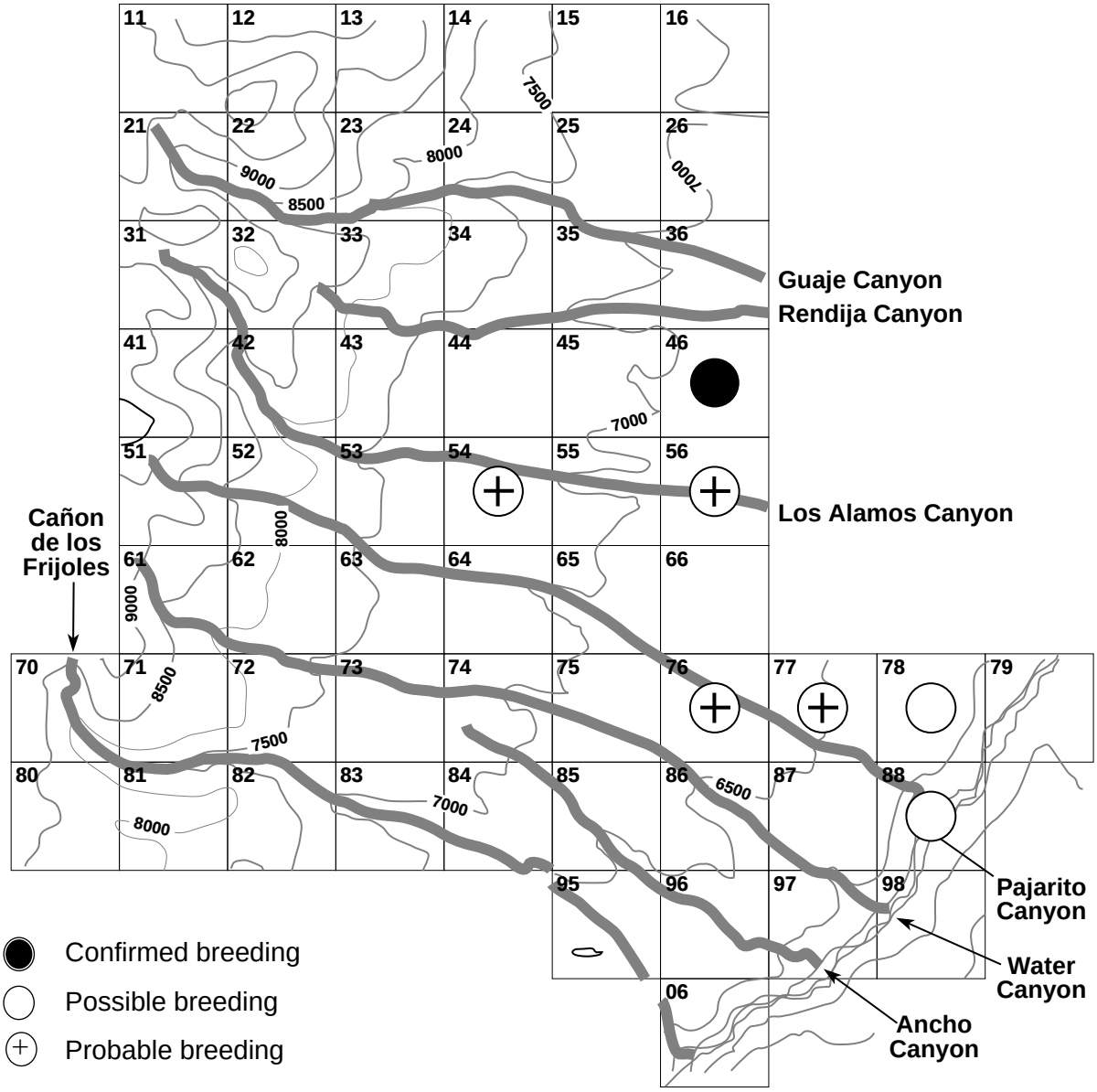
In a typical year, Gray-headed Juncos leave their wintering range at the lower elevations of Los Alamos by early May (May 5 median date in 6 years in Pajarito Acres; May 9 median date in 11 years in the Western Area of the Los Alamos townsite), and others appear at about the same time at the higher elevations where they nest.

Adults reappear in the Western Area of the Los Alamos townsite in early September (September 1 median date in 14 years) preceded by immatures presumed to have fledged nearby (August 18 median date in 7 years). These results were obtained from banding studies done on the rim of Los Alamos Canyon near the western edge of Los Alamos townsite.

DEJU

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	17	13	3	1
Mixed conifer/ ponderosa pine (5)	5	5	0	0
Ponderosa pine (11)	9	4	4	1
Ponderosa pine/ piñon/juniper (21)	5	0	2	3
TOTAL	36	22	9	5

Red-winged Blackbird



Red-winged Blackbird

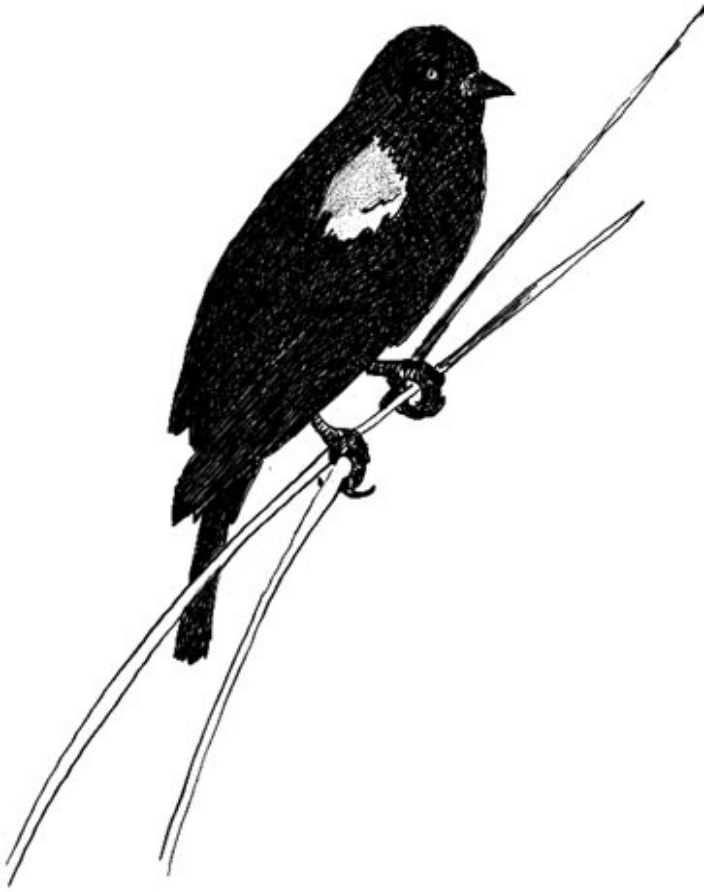
Red-winged Blackbird
(Agelaius phoeniceus)

Red-winged Blackbirds summer statewide but only locally at higher altitudes in the San Juan and Sangre de Cristo mountains (Hubbard 1978). At nesting time they are found about marshes or ponds bordered with rushes or other aquatic vegetation up to 8000 feet elevation.

During the atlas period, Red-winged Blackbirds were found in the several small marshes scattered about the county. Breeding was confirmed in one block—in the cattail marsh below the sewage lagoon in Pueblo Canyon (Block 4-6). Nest building was observed June 27, 1984, and fledglings were seen being fed on July 1. A male-attended young Red-winged Blackbird was seen in late June of the following year as well.

Territorial males were observed in live marshes in Los Alamos Canyon (Block 5-4), alongside the road in Pajarito Canyon (Block 7-6), and on the western bank of the Rio Grande (Blocks 7-7 and 7-8).

Male Red-winged Blackbirds appear in Los Alamos in early spring or late winter (April 2 median date in 12 years) and are singing and displaying vigorously near their home

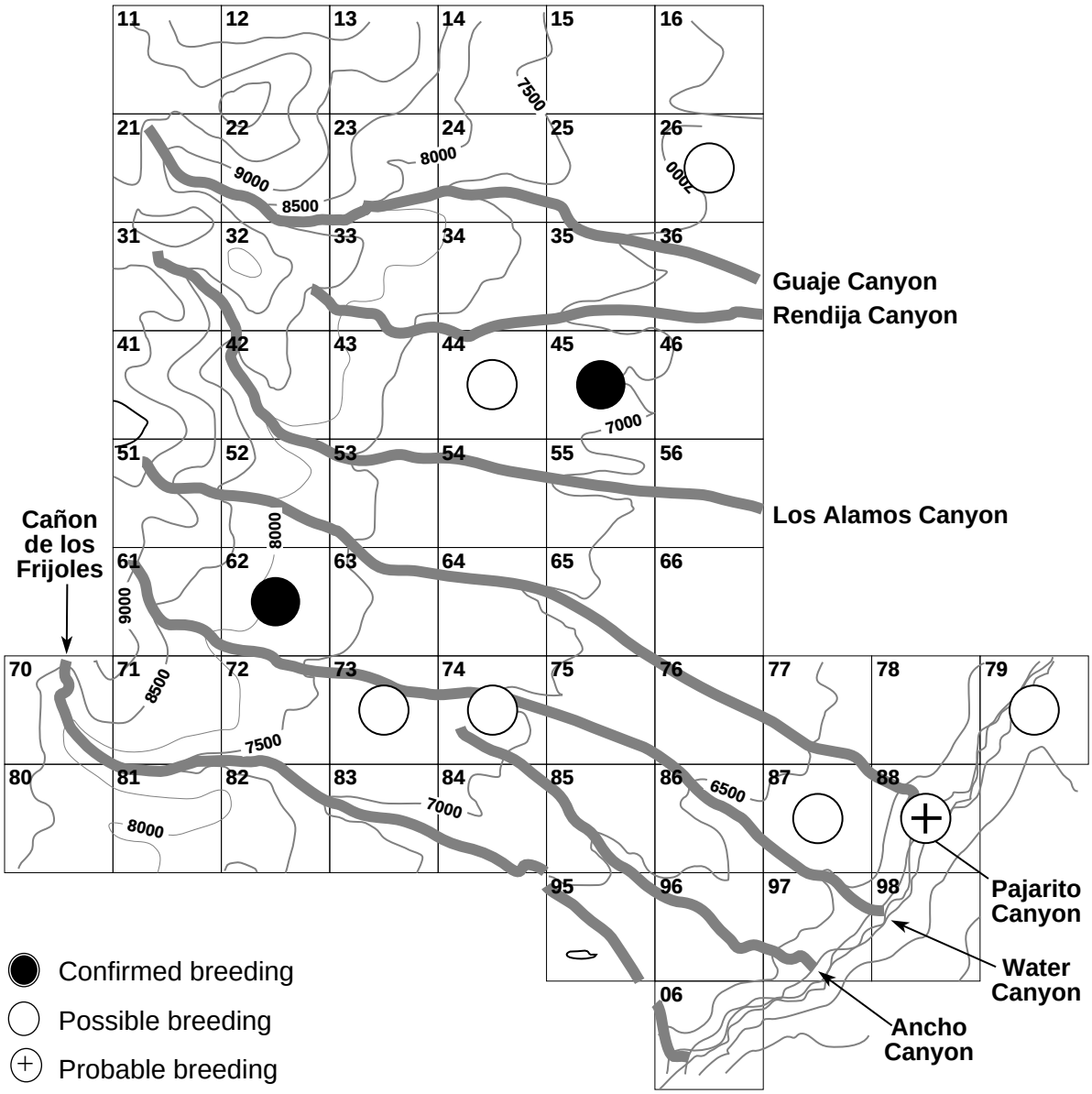


marshes by late April. Females arrive later and settle on the males' territories for the nesting season. Nesting Red-winged Blackbirds leave their breeding areas by early autumn. In some winters, Red-winged Blackbirds appear variably around the townsite and in the marsh in Sandia Canyon (Block 5-4).

RWBL

Habitat	Occurrence	Conf	Prob	Poss
Marsh (9)	7	1	4	2

Western Meadowlark



Western Meadowlark

Western Meadowlark
(Sturnella neglecta)

The Western Meadowlark is resident in northern New Mexico, southward locally to the Gila, lower Rio Grande, and lower Pecos valleys in grasslands and agricultural fields at lower and middle elevations (Hubbard 1978). At least in the last few years, meadowlarks have occurred regularly in Los Alamos in the summer.

During the atlas project, Western Meadowlarks were found in 50% of the blocks containing abandoned agricultural fields. In two of these blocks breeding was confirmed with the discovery of recently fledged young. Both were found July 22, 1988, by different observers in different blocks.

Males arrive in Los Alamos in mid-April, a few weeks before the females, and immediately begin to establish their territories with song. The flutelike, gurgling territorial song is most frequently heard early in the breeding season before incubation. Song followed immediately by the chatter-call from another bird (the female) is indicative of a mated pair (Lanyon 1957). Because there is reduction in song as breeding progresses, detection of meadowlarks becomes more difficult. A distinctive identifying call is the throaty, emphatic "chuck," given when an intruder enters the territory.

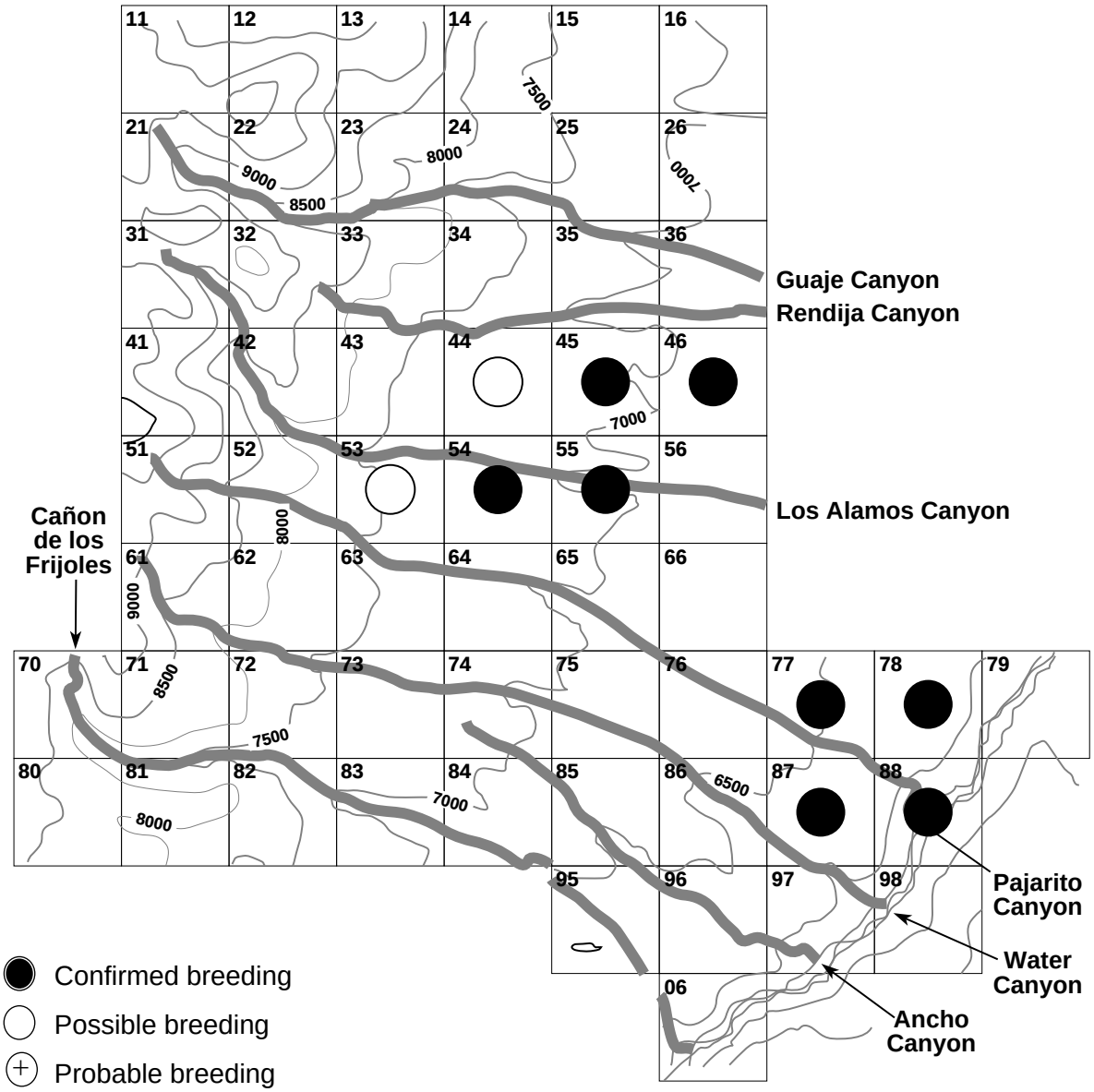
The nest is a loosely built structure of grass and plant stems hidden on the ground in dense grassy or weedy cover (Pough 1953). Nests are difficult to find. None have been reported from Los Alamos.

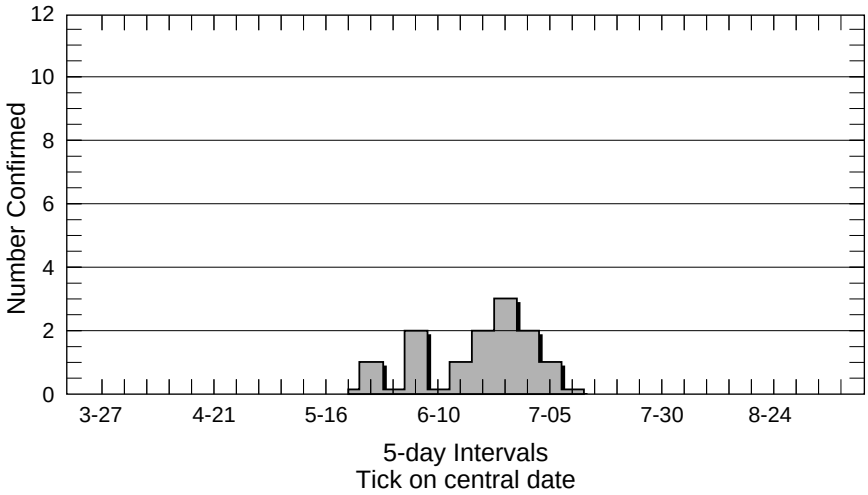
The earliest spring records during the atlas period were April 10, 1986, and April 22, 1987. No fall dates were reported.

WEME

Habitat	Occurrence	Conf	Prob	Poss
Abandoned fields (18)	9	2	1	6

Brewer's Blackbird





Brewer's Blackbird

Brewer's Blackbird
(Euphagus cyanocephalus)

The Brewer's Blackbird summers in the north and locally in the Mogollon Highlands, nesting from lower to middle elevations in marshes, shrubland, and wooded areas, typically near water. In the north it breeds south to the San Juan Valley, the Jicarilla Reservation, Santa Fe, and the Maxwell National Wildlife Refuge (Hubbard 1978).

During the atlas project, Brewer's Blackbirds frequented residential areas exclusively. They were found breeding in 90% of the residential blocks. Breeding was confirmed in 80% of the occupied blocks.

Courtship behavior was reported in early May (May 4, 1985, and May 6, 1987). Nestlings were found on June 6 and June 25 and a sitting female on June 23. Two nests were reported: one was in residential shrubbery, the other, with four nestlings, was 4 feet above ground in a planted urban piñon pine. Adults attending fledged young were reported from May 25 to July 3.

This is a gregarious species. Brewer's Blackbirds winter in flocks associating with other blackbirds. Flocks arrive in Los Alamos every spring during April (April 24 median date in 18 years). As described by Laidlaw (Bent 1958) in his

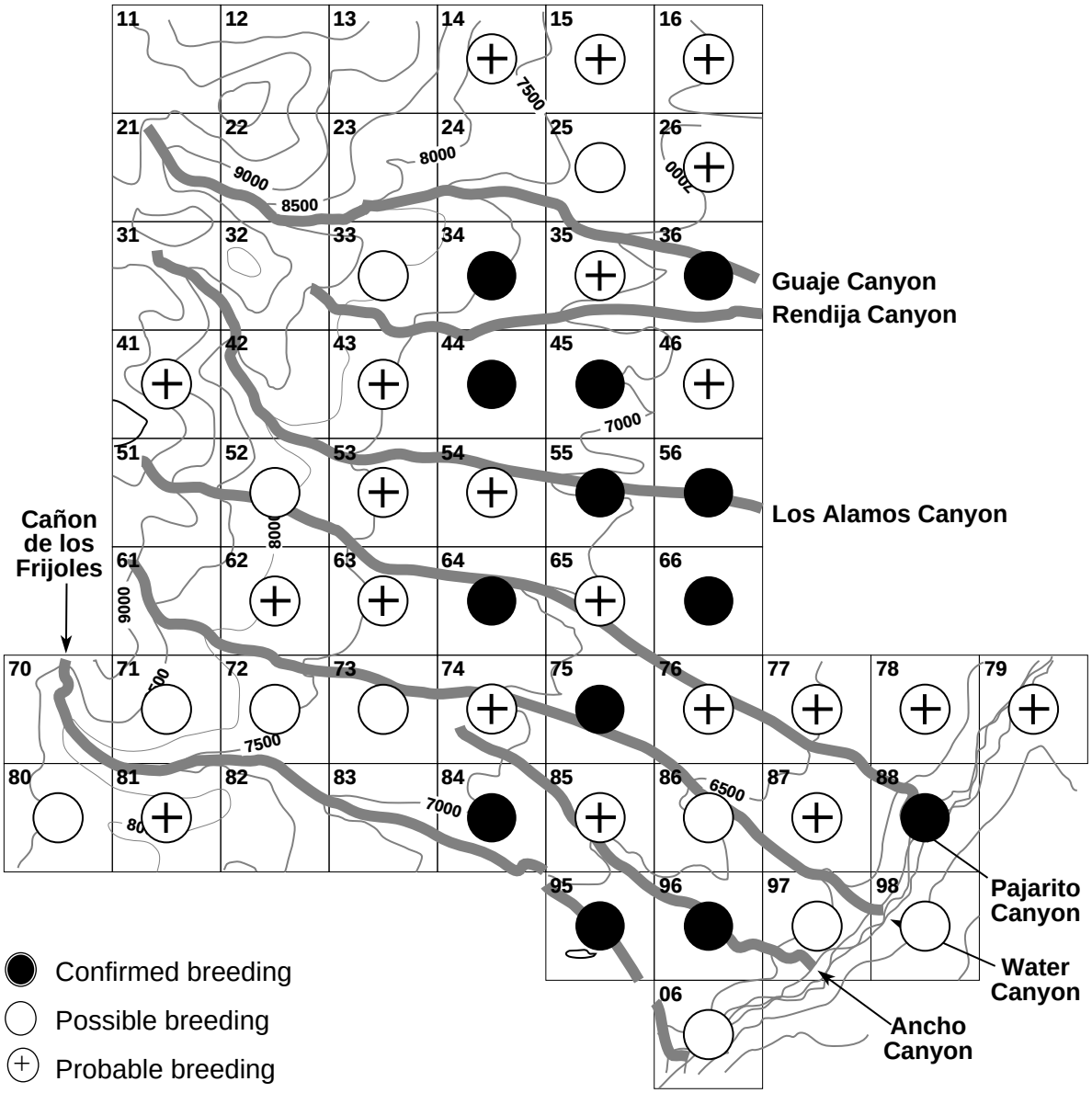
study of this species, flocking behavior gradually gives way as the birds associate more and more in pairs. After the pair is formed, the members are almost always together. Their activities are not confined to any territory, but there is a focus of attention at the nest site, which is defended. After incubation has begun, the male guards his female against approaches of other males but does not defend a territory.

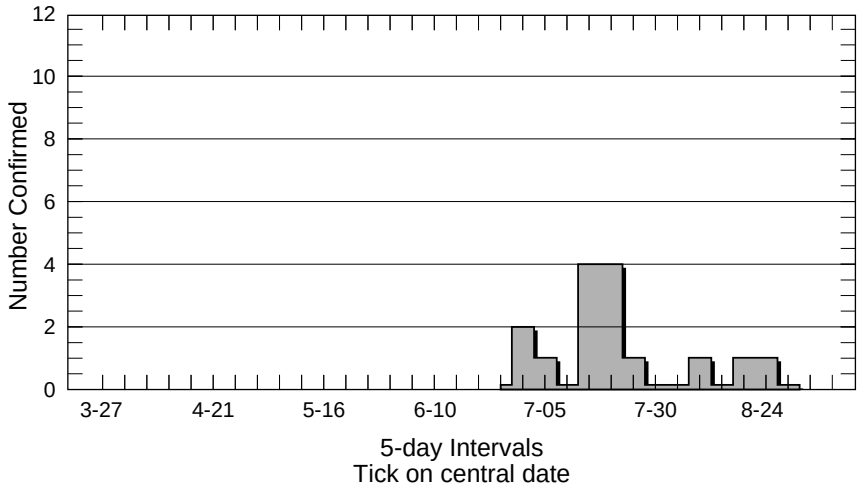
Brewer's Blackbirds typically leave Los Alamos for the winter in early October (October 9 median date in 9 years).

BRBL

Habitat	Occurrence	Conf	Prob	Poss
Residential (10)	9	7	0	2
Adjoining	1	1	0	0
TOTAL	10	8	0	2

Brown-headed Cowbird





Brown-headed Cowbird

Brown-headed Cowbird
(Molothrus ater)

The Brown-headed Cowbird summers statewide, breeding at lower and middle elevations in varied habitats including pine forest locally (Hubbard 1978). It occurs most frequently in fields and pastures, open woodlands, forest edges, and residential areas, avoiding heavy forest and desert. Increased fragmentation of the forest provides increased habitat favorable to the cowbird.

In Los Alamos, the cowbird occupies primarily the ponderosa pine forest and piñon/juniper woodland. During the atlas project, cowbirds were found in 93% of the lower woodland blocks with confirmed breeding in one-third of these. Only 11% of the blocks with cowbirds were in forests at higher elevations (above 8000 feet); in none of these blocks was breeding confirmed.

The Brown-headed Cowbird is a brood parasite. It builds no nest but instead lays its eggs in the nests of other birds, relying on the host to hatch and raise the young. Of 13 nests parasitized by cowbirds in Los Alamos, 5 were Grace's Warbler nests in ponderosa pine forest, 3 were Virginia's Warbler nests in oak scrub, 2 were Solitary Vireo nests, and there was 1 nest each of the Western Wood-Pewee, Chipping Sparrow, and Rufous-sided Towhee.

From their arrival in late April (April 28 median date in 17 years) until midsummer, males are in frequent display as they court the females or vie with other males. Such displays provided evidence for the probable atlas breeding records. Courtship was reported from May 7 to June 30. Breeding was confirmed by observation of a host adult feeding a single young cowbird or of a noisy fledgling calling to be fed. Dates reported were June 28 to July 25 for Grace's Warbler, July 15 to August 7 for Virginia's Warbler, August 26 for the Western Wood Pewee, July 18 for the Chipping Sparrow, and July 16 for the Solitary Vireo.

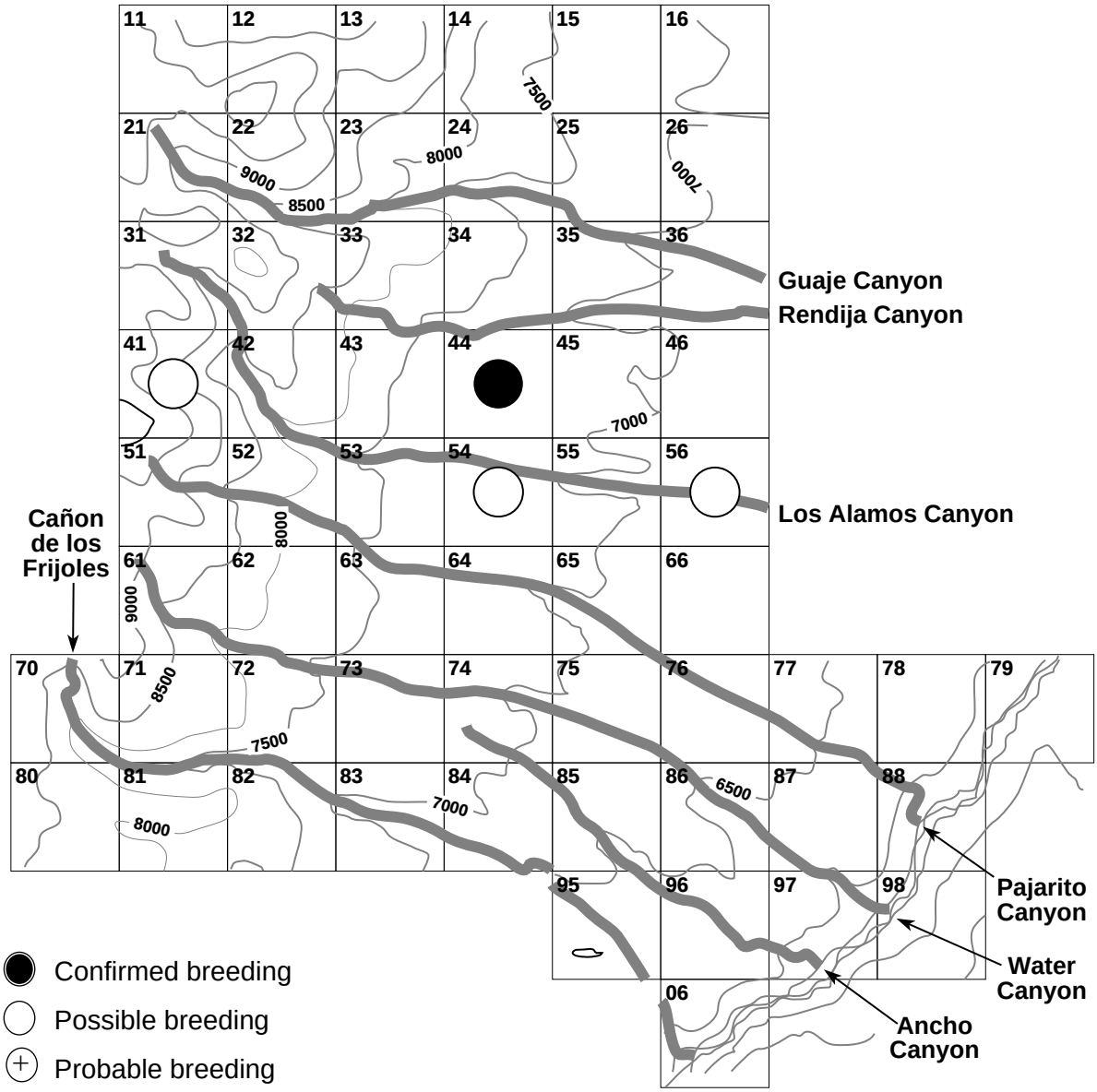
In mixed habitat areas like those utilized in Los Alamos where host species are numerous and dispersed, female cowbirds are territorial—defending a breeding area of 10 to 50 acres. Males may defend a mate from other males but do not defend a territory (Stokes and Stokes 1983).

Cowbirds disappear in July from many or most of the localities in which they breed, evidently for concealment during the molting season (Bent 1958). The latest autumn date on record in Los Alamos is August 31.

BHCO

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	5	0	2	3
Mixed conifer/ ponderosa pine (5)	4	0	2	2
Ponderosa pine (11)	9	2	5	2
Ponderosa pine/ piñon/juniper (21)	21	10	9	2
Piñon/juniper (6)	6	1	3	2
TOTAL	45	13	21	11

Northern Oriole



Northern Oriole

Northern Oriole
(Icterus galbula)

The Northern Oriole* summers statewide, nesting in wooded areas at lower and middle elevations. It especially favors riparian woodland and planted trees (Hubbard 1978).

One nest was found in Los Alamos during the atlas project. It was the typical pendant nest made of grass and fibers, 20 feet above the ground in a large cottonwood tree in a residential area. The nest, defended by a scolding male, was found on June 25, 1985. Possible breeding was reported from three other blocks.

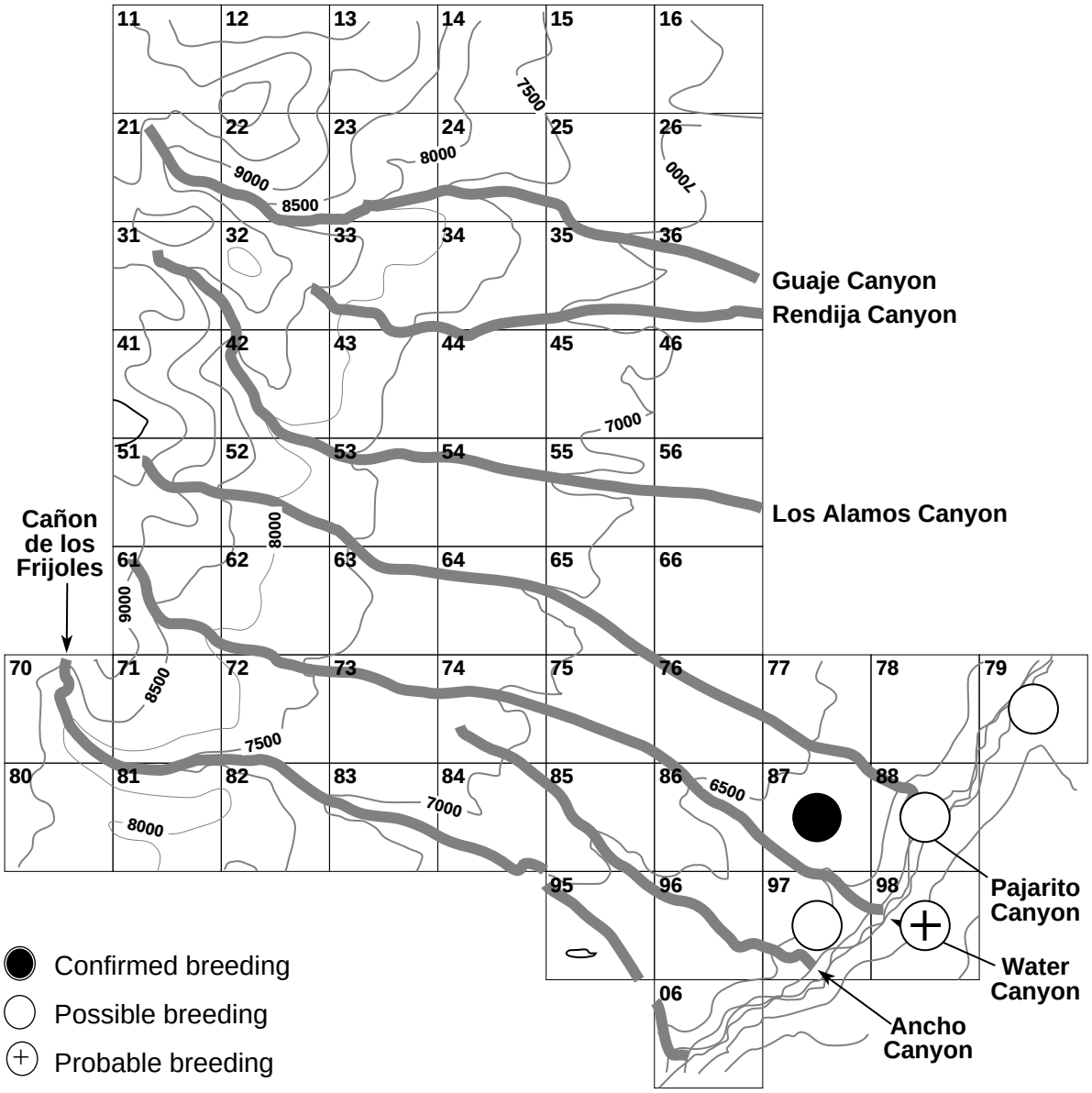
Few spring sightings of Northern Orioles in Los Alamos have been reported. The earliest is May 12 (May 15 median arrival date in 4 years). They regularly migrate through the eastern edge of Los Alamos in the fall (August 8 median date of appearance; September 5 median departure date in 5 years).

NOOR

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	1	0	0	1
Mixed conifer/ ponderosa pine (5)	0	0	0	0
Ponderosa pine (11)	2	1	0	1
Ponderosa pine/ piñon/juniper (21)	1	0	0	1
TOTAL	4	1	0	3

*Both forms of the Northern Oriole occur in New Mexico. The form found in Los Alamos is the Bullock's Oriole, a regular breeder and migrant in the state. The Baltimore Oriole is an occasional migrant in the state.

Scott's Oriole



Scott's Oriole

Scott's Oriole
(Icterus parisorum)

Scott's Oriole summers in the south, northward locally to the vicinity of the San Juan Valley, Sandia Mountains, and the Canadian Basin, nesting from lowland tree, yucca/grasslands up into piñon/juniper and oak woodlands (Hubbard 1978).

During the atlas project, Scott's Orioles were found along the canyon rim in 82% of the blocks containing the Rio Grande gorge. These records are the first for Scott's Orioles in Los Alamos. One nest was found on July 7, 1984. It was built of plant fibers in Virginia creeper alongside a dwelling near the cliffside in residential piñon-juniper woodland. The nest height was 7 feet.

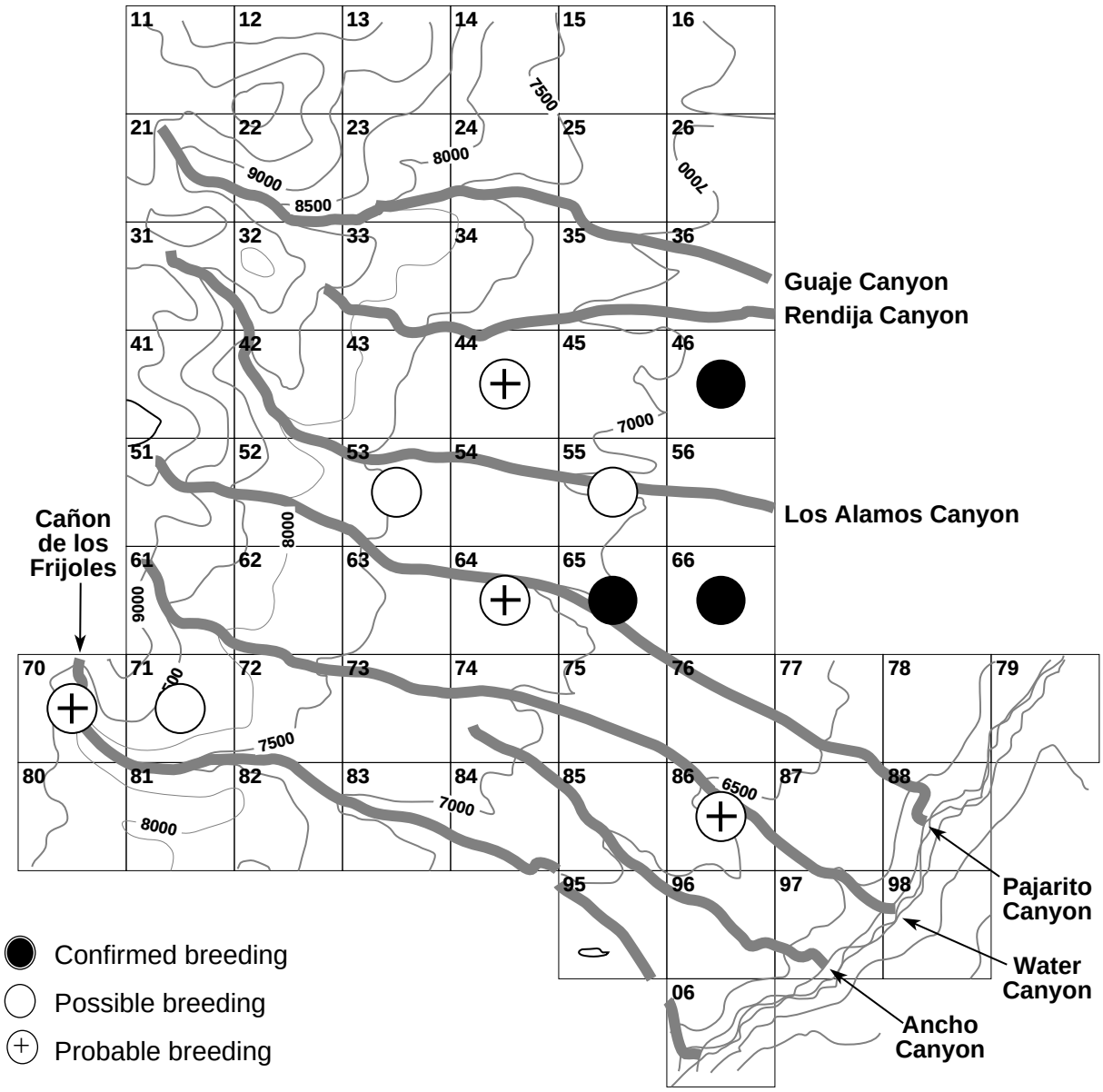
Although uncommon where found, the Oriole's far-carrying, clear whistling song—a golden song comprised of molten notes (Bent 1958)—reveals its presence.

The earliest spring date noted for this oriole was April 26; no fall dates were reported.

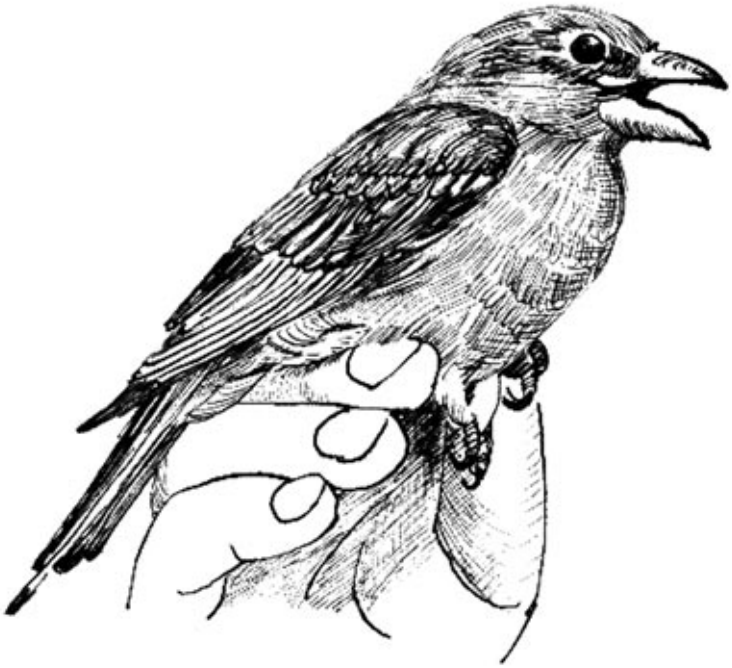
SCOR

Habitat	Occurrence	Conf	Prob	Poss
Rio Grande gorge (6)	4	0	1	3
Adjoining	1	1	0	0
TOTAL	5	1	1	3

Cassin's Finch



Cassin's Finch



Cassin's Finch
(Carpodacus cassinii)

The Cassin's Finch is resident in the San Juan, Jemez, and Sangre de Cristo mountains, but its numbers fluctuate from year to year. In some areas the species occurs most regularly during seasonal migration (Hubbard 1978). Its habitat is the open, more arid stands of mixed conifer and ponderosa pine.

Uncommon in the summer in Los Alamos, Cassin's Finches were found in 19% of the blocks containing mixed conifer and ponderosa pine habitat during the atlas fieldwork. Breeding was confirmed in 30% of these blocks. These finches were not found in the higher (above 8700 feet), more dense forests of the northwest third of the county.

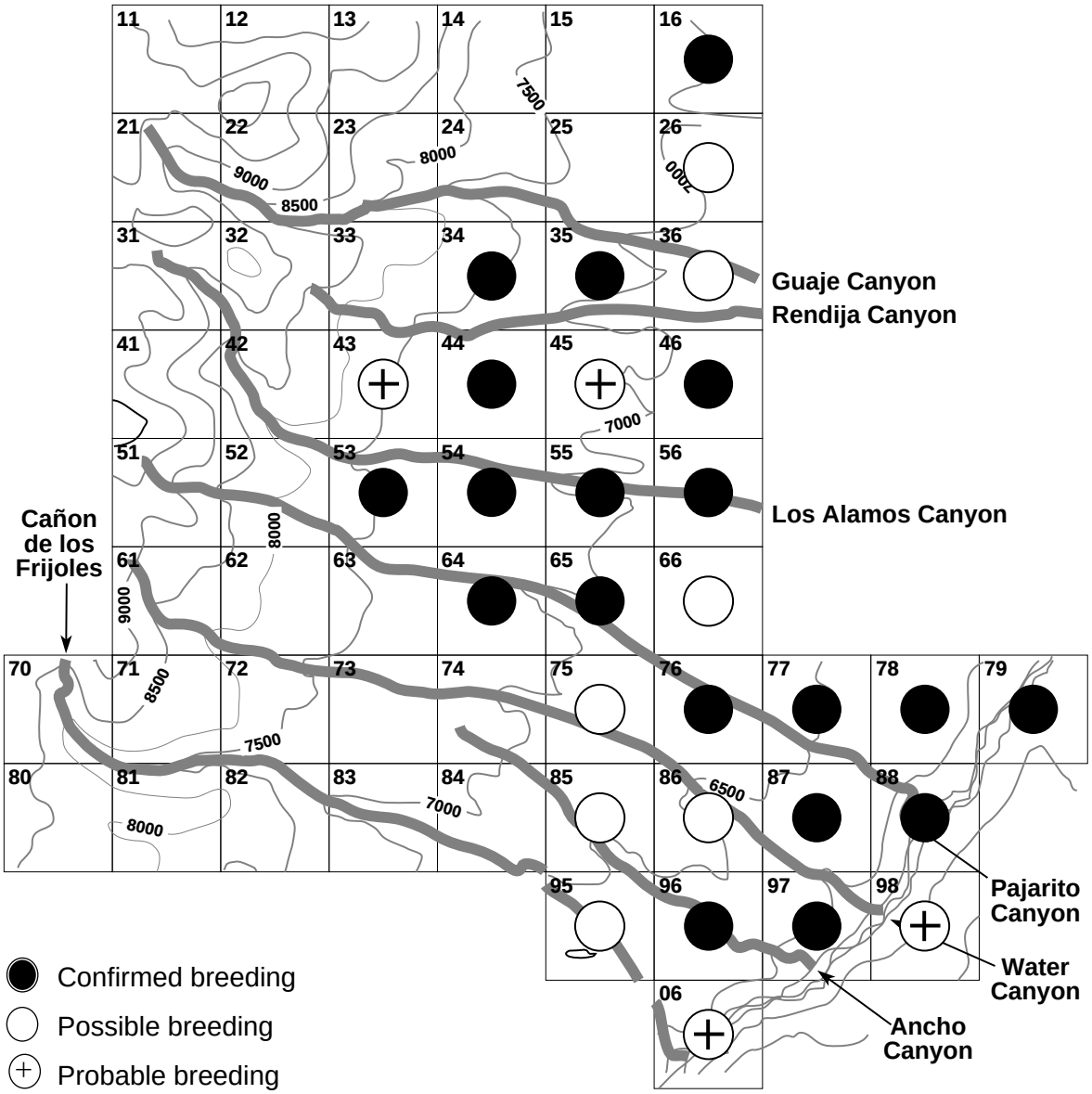
One of the confirmed breeding records was a damaged nest containing one egg, which was found on the ground in Bayo Canyon (Block 4-6) on June 6, 1985. Another used nest with a broken egg was found May 27, 1987. Adults were feeding young in June 1985 and 1986. These are the first reported breeding records for Los Alamos.

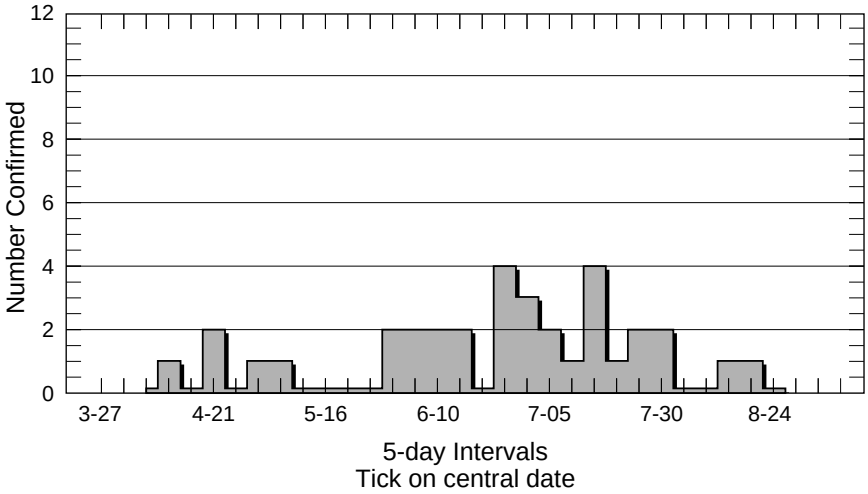
Cassin's Finches were present in Los Alamos throughout the winter-spring seasons in 6 of 12 years of systematic reporting, although an occasional bird was reported in the winter in every year but one. Spring flocks typically appear in Los Alamos in late winter (February 9 median date in 19 years) and, except for the few that remain to nest, depart by the end of April (May 4 median date in 19 years). The nesting season begins in May and extends into July. Only during these few months are Cassin's Finches not found in flocks. Nests are almost invariably situated in large conifers and usually near the terminal ends of limbs at a considerable height above the ground (Bent 1968).

CAFI

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	2	0	1	1
Mixed conifer/ ponderosa pine (5)	0	0	0	0
Ponderosa pine (11)	2	0	1	1
Ponderosa pine/ piñon/juniper (21)	6	3	2	1
TOTAL	10	3	4	3

House Finch


Guaje Canyon
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding


Number Confirmed
5-day Intervals
Tick on central date
3-27
4-21
5-16
6-10
7-05
7-30
8-24

House Finch

House Finch
(Carpodacus mexicanus)

The House Finch is resident statewide except in mountain forests and alpine meadows. Everywhere else—deserts, scrublands, and open woods, particularly around human habitation—anyplace with a clump of trees or a patch of brushy growth at low to moderate elevation is likely to be populated by House Finches (Collins 1965).

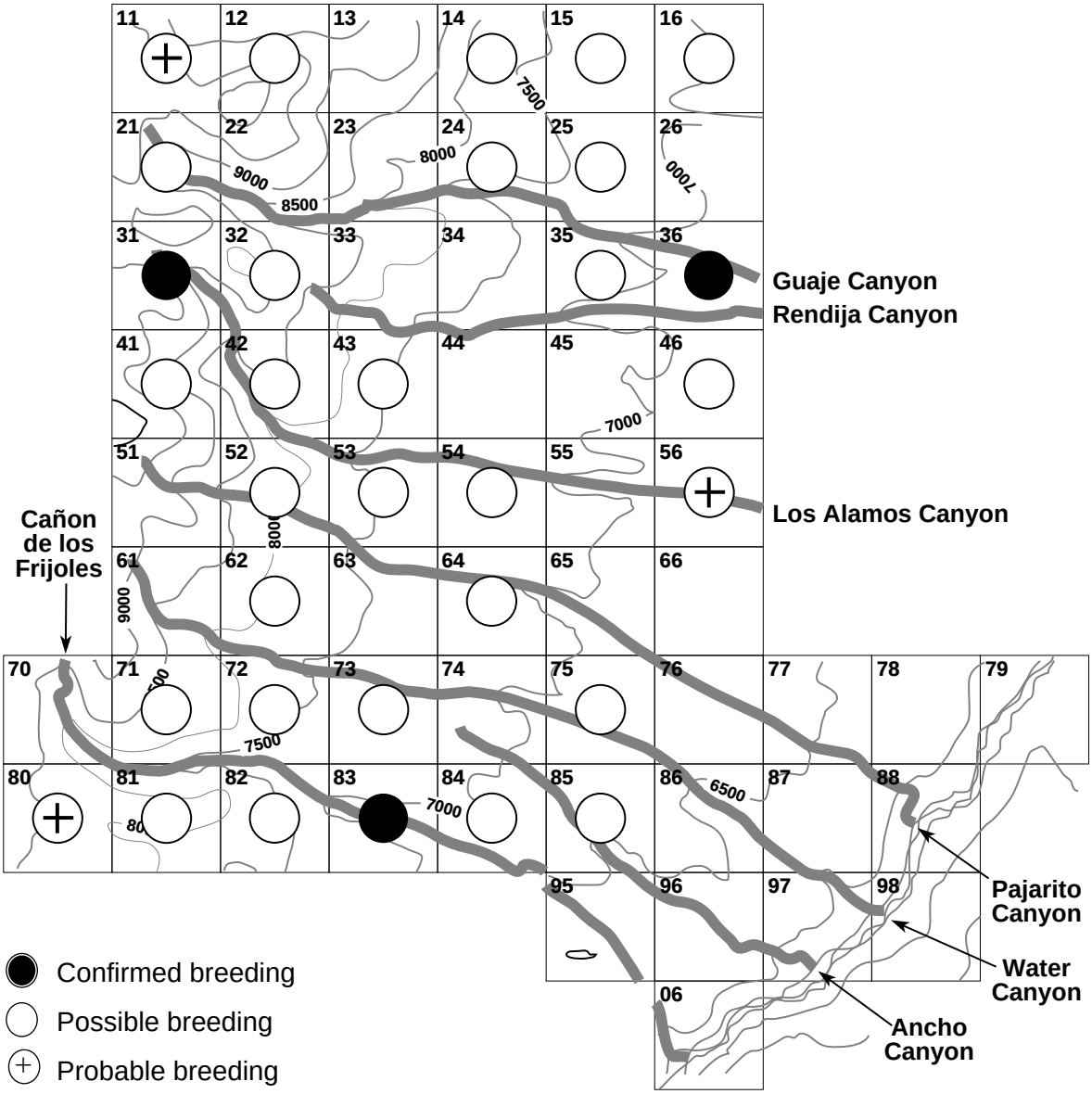
During the atlas project, House Finches inhabited 93% of the piñon/juniper blocks. The attraction of residential habitat has extended their breeding range locally into ponderosa pine forest west of the piñon/juniper woodland as well. Breeding was confirmed in 63% of the occupied blocks. Twelve nests were reported, including some being built and the rest with either eggs or nestlings. Nest building was noted between April 10 and April 28 and then again between June 1 and June 5. Nests with eggs were found from May 1 to May 14 and again from June 23 to July 10. The later dates for the two breeding phases are likely to be for second broods.

House Finches occur in small flocks in winter, frequenting feeders at the lower elevations. In early March, with the approach of spring, House Finches begin to sing in earnest and to investigate their favorite nesting sites. By mid-April nesting is well underway. Nest sites in Los Alamos included a crotch in an apple tree, a residential cholla, under a porch roof, a rafter in an open storage building, a ventilator fan housing, an exterior switch box, and several rural mail boxes.

HOFI

Habitat	Occurrence	Conf	Prob	Poss
Ponderosa pine (11)	5	4	1	0
Ponderosa pine/ piñon/juniper (21)	19	10	2	7
Piñon/juniper (6)	6	5	1	0
TOTAL	30	19	4	7

Red Crossbill



Red Crossbill

Red Crossbill
(Loxia curvirostra)

The Red Crossbill is resident in mountainous areas almost statewide, but there was no actual breeding record for New Mexico up to the publication of Hubbard's 1978 Check list, although grown juveniles had been recorded in the Jemez Mountains and in most of the state's major ranges.

In Los Alamos during the atlas fieldwork, Red Crossbills were found throughout the high spruce/fir forest, the ponderosa pine forest of the mesas, and the mixed conifer woodlands of the canyon bottoms (in 60% of the appropriate blocks). Three records of confirmed breeding were obtained. All of these were of adults feeding young in the period from July 12 to July 22 (one in 1986 and two in 1987). Determining the crossbill's local breeding distribution is problematic. Because they forage widely—flying some distance from one area to another—we probably have sightings from all forested blocks. Observations of crossbills flying overhead were not accepted as possible breeding records.

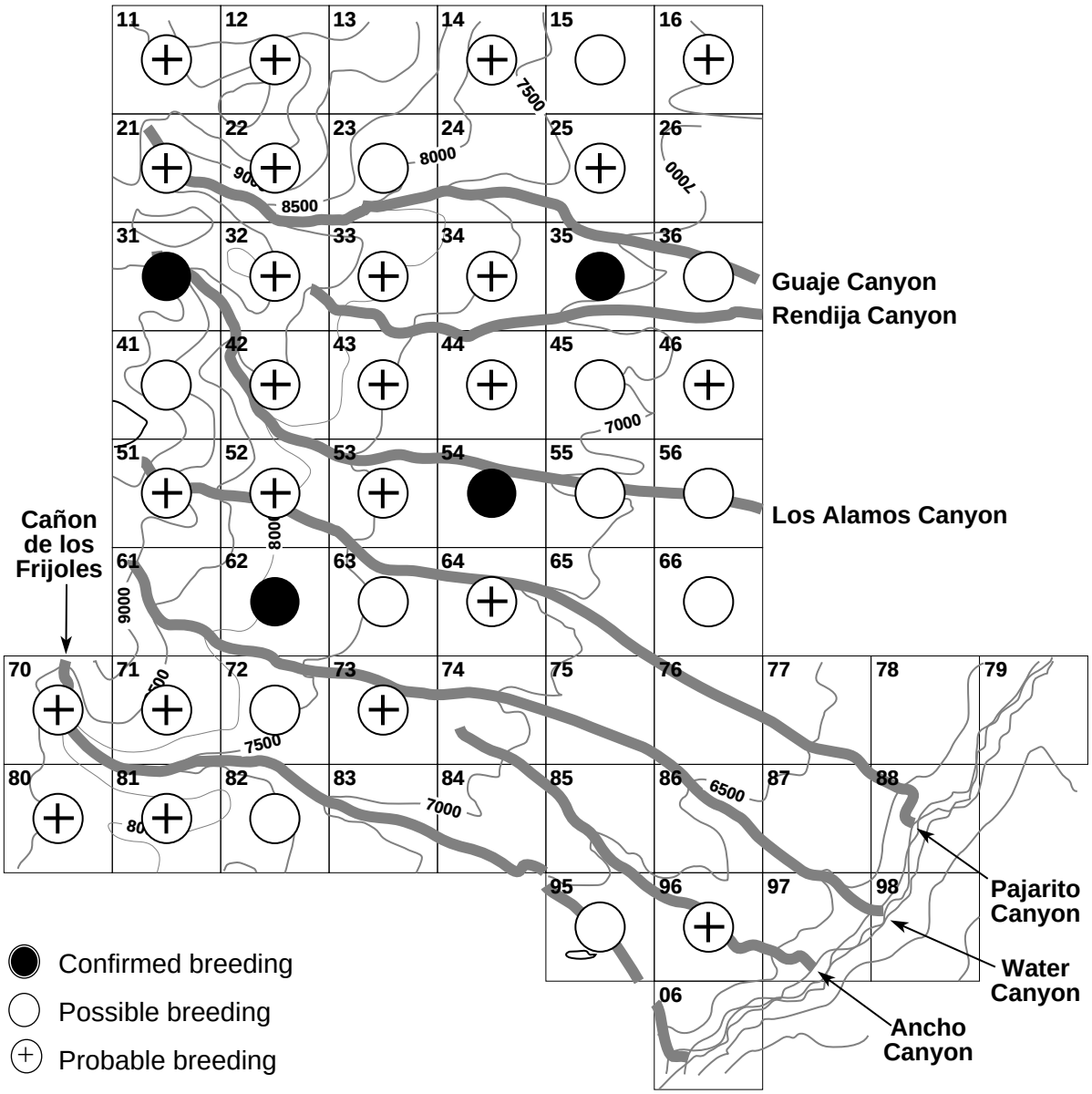
Red Crossbills in New Mexico feed on cones of blue and Engelmann spruce as well as pines (Hubbard, January 31, 1990). They are nomadic, following the cone crop; they may occur commonly one season, following which they may be scarce for several years. In the Rocky Mountain region, dates of nesting are very irregular, usually in late winter or early spring, but breeding activity may occur at almost anytime. In Colorado, nests have been found every month of the year. The nest is typically placed high in a pine tree, concealed among twigs and foliage well out on a branch.

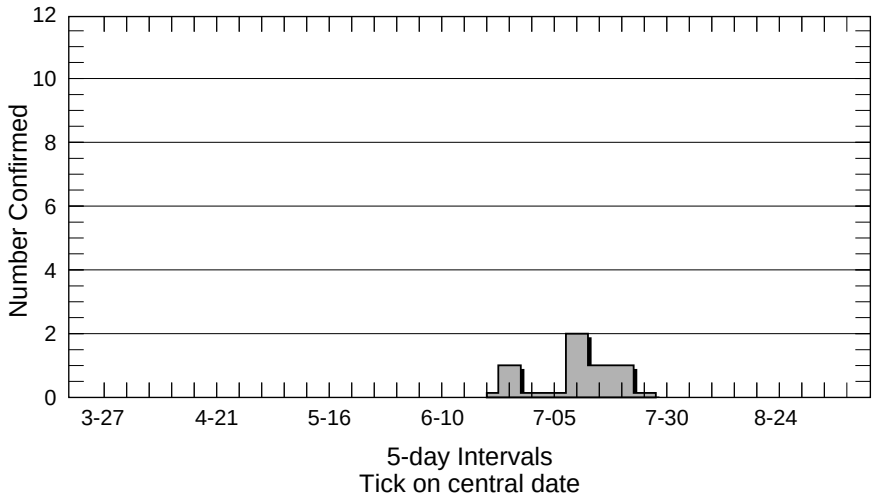
The birds associate closely when not occupied with activities at the nest. Fluctuating foraging flocks may include unmated birds, males feeding incubating females, pairs feeding nestlings, and birds with fledglings in tow (Bailey *et al.* 1953). Red Crossbills can be easily identified by the loud "kip-kip-kip" call notes uttered just before and during their undulating flight. Their song begins with several two- or three-note phrases followed by warbled trills. It may be heard anytime of year. The most likely opportunity for confirmation of breeding is the 3-week period when adults are feeding fledglings. The fledgling crossbill looks like a female Cassin's Finch—streaked brown and white. Its bill is not fully grown and is not crossed. Juvenile plumage is worn in some Red Crossbills until the bill crosses.

RECR

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	10	1	2	7
Mixed conifer/ ponderosa pine (5)	5	0	0	5
Ponderosa pine (11)	8	1	0	7
Ponderosa pine/ piñon/juniper (21)	9	1	1	7
TOTAL	32	3	3	26

Pine Siskin


Guaje Canyon
Rendija Canyon
Los Alamos Canyon
Cañon de los Frijoles
Pajarito Canyon
Water Canyon
Ancho Canyon
Confirmed breeding
Possible breeding
Probable breeding


Number Confirmed
0
2
4
6
8
10
12
3-27
4-21
5-16
6-10
7-05
7-30
8-24
5-day Intervals
Tick on central date

Pine Siskin

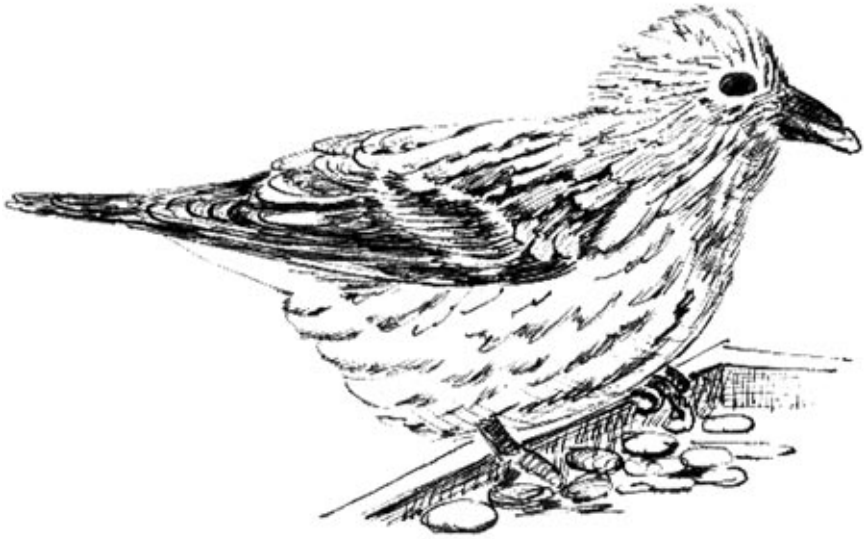
Pine Siskin
(Carduelis pinus)

The Pine Siskin is resident in mountainous areas almost statewide. It summers in forests and adjacent habitats (Hubbard 1978).

The distribution of Pine Siskins in Los Alamos was rather uniform throughout the mixed conifer, ponderosa pine, and lower canyon woodlands during the atlas project. They were recorded in 77% of the blocks containing these habitats. Confirmed breeding—in only 10% of the occupied blocks—was difficult to obtain for this species. Confirmations were fledglings or adults feeding young, reported from late June to late July.

Siskins have been seen in Los Alamos every month of the year, but are irregularly found in winter. In 16 years of systematic observation, they were recorded in 6 winter seasons (December through February). Annually flocks of siskins appear in March (March 22 median date in 16 years) and then disperse to nest in May.

Pine Siskins are much in evidence early in the nesting season. While within flocks and then as they disperse, they engage in territorial chases, courtship flights, song, and mate feeding. All of these



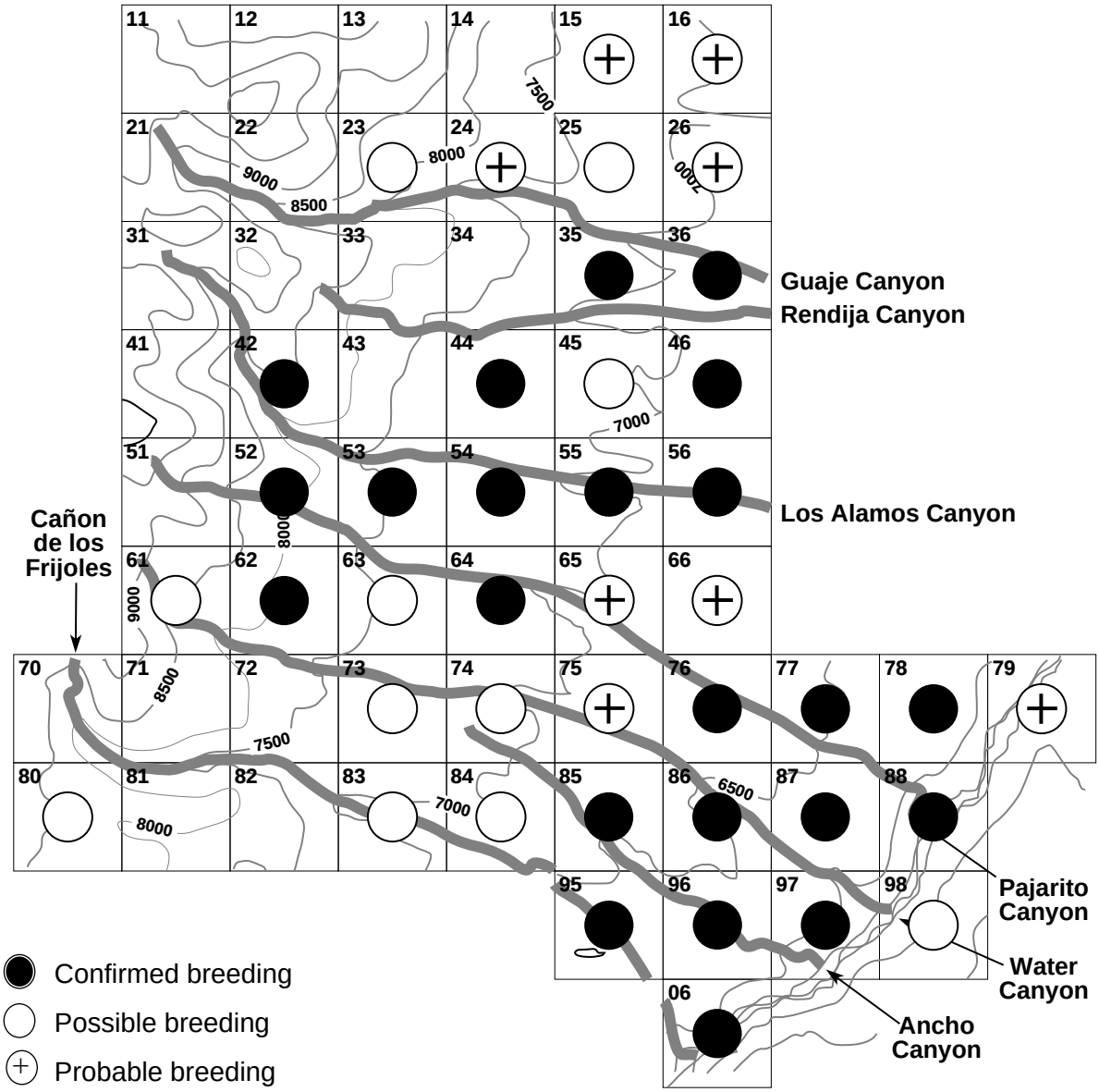
activities indicate probable breeding, which was recorded for 56% of the occupied blocks. Courtship activities, including flight song, took place from mid-May to mid-July.

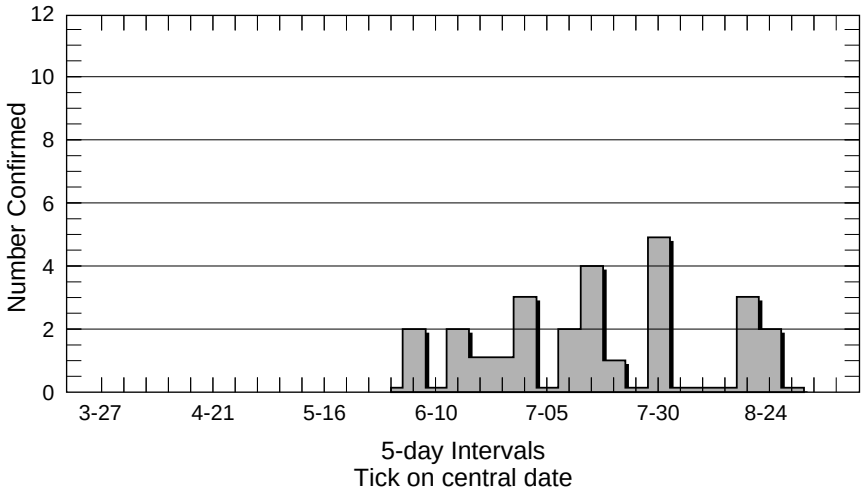
Where the density of siskins is high, breeding individuals join in small, social flocks away from the nesting territory. A foraging male may be accompanied by other siskins as he returns to the nest. Only a small nesting territory is defended (Bent 1968). Because of all the group activity, it is difficult to recognize a breeding territory and find the nest.

PISI

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	15	1	12	2
Mixed conifer/ ponderosa pine (5)	4	1	2	1
Ponderosa pine (11)	10	1	6	3
Ponderosa pine/ piñon/juniper (21)	11	1	4	6
TOTAL	40	4	24	12

Lesser Goldfinch





Lesser Goldfinch

Lesser Goldfinch
(Carduelis psaltria)

The Lesser Goldfinch summers almost statewide from lowland riparian woodland up into the ponderosa pine forests (Hubbard 1978). Its habitat is partly open situations with scattered trees, woodland edge, second growth, open fields, pastures, and around human habitation (American Ornithologist's Union 1983).

During the atlas project, Lesser Goldfinches were found in 88% of the blocks containing mesa and lower-canyon woodlands. Breeding was confirmed in 55% of the occupied blocks. Their breeding range extended from the Rio Grande riverside up into the mixed conifer forest. Almost one-third of the confirmed and probable breeding records were at elevations greater than 7000 feet.

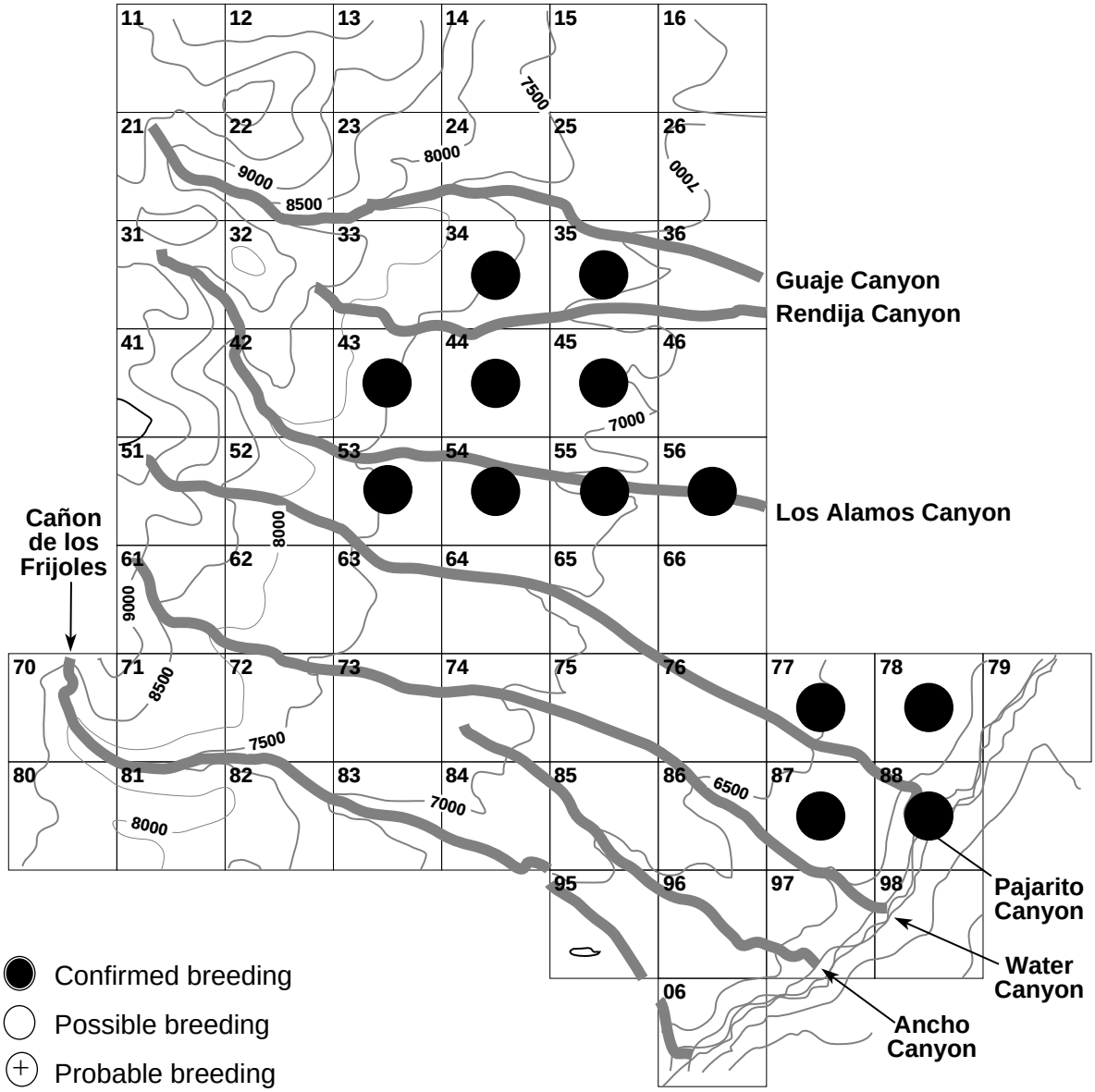
The Lesser Goldfinch is a late nester. Goldfinches arrive in Los Alamos in mid-May (May 13 median date in 13 years). Nest building was observed by atlas fieldworkers from June 17 to July 10. Of five identified nesting trees, four were ponderosa pines, the other a backyard deciduous tree. Probable breeding was indicated by the presence of pairs and song-flight displays of the male, wherein, with wings and tail spread widely, he flaps his wings rapidly as he flies above the treetops, singing all the while.

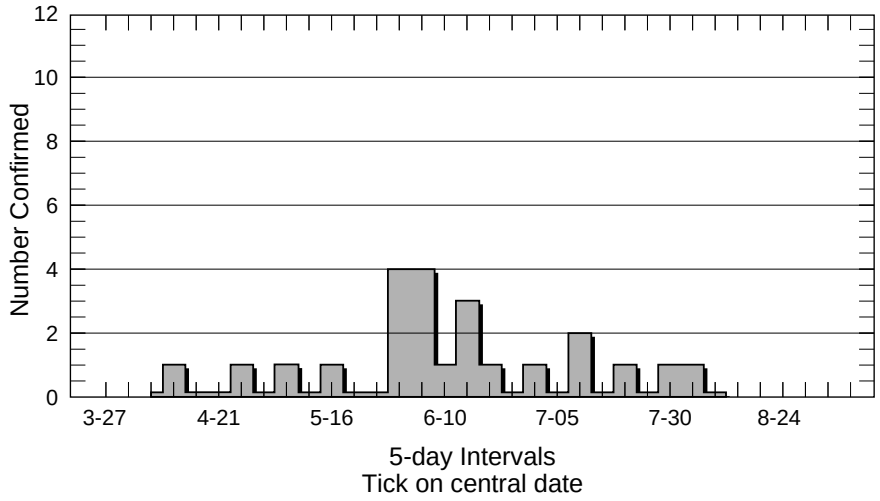
Lesser Goldfinches depart in early October (October 8 median date in 14 years).

LEGO

Habitat	Occurrence	Conf	Prob	Poss
Mixed conifer (17)	4	1	0	3
Mixed conifer/ ponderosa pine (5)	3	2	1	0
Ponderosa pine (11)	8	3	1	4
Ponderosa pine/ piñon/juniper (21)	21	13	5	3
Piñon/juniper (6)	6	4	1	1
TOTAL	42	23	8	11

House Sparrow





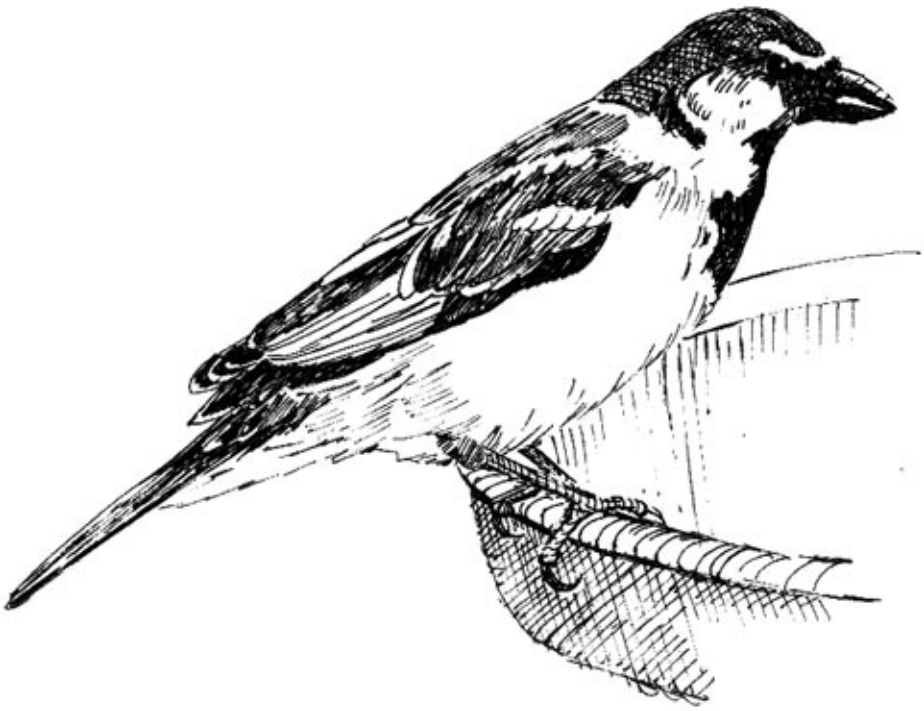
House Sparrow

House Sparrow
(Passer domesticus)

The House Sparrow is resident statewide mainly in residential and agricultural areas. It nests at lower and middle elevations and locally into the pine forest where there are settlements. Los Alamos is at its upper elevational limit (Hubbard 1978).

During the atlas project, House Sparrows were confirmed as breeding birds in all the residential blocks.

The House Sparrow has a prolonged breeding season. Nest building (or repair) was observed from April 10 to August 2. Ten nests with eggs or nestlings were found from April 25 to July 28. Almost all nesting was on or in manmade structures, typically from 7 to 20 feet above the ground (9 reports). Seven reports gave specific nest sites: four were cavities under eaves, two were birdhouses, and one was the top of a porch light fixture.



HOSP

Habitat	Occurrence	Conf	Prob	Poss
Residential (10)	10	10	0	0
Adjoining	3	3	0	0
TOTAL	13	13	0	0

Additional Species Reported as Probable Breeders

Besides the five species described in the Species Accounts section as either probable or possible breeders, namely the Band-tailed Pigeon, Ladder-backed Woodpecker, Black Phoebe, Lazuli Bunting, and Indigo Bunting, there are another four species reported as probably breeding. These species are outside their normal breeding range or at the extreme edge of suitable habitat and, therefore, without further verification, are not included among the breeding species of the county. These are Virginia Rail (*Rallus limicola*), Winter Wren (*Troglodytes troglodytes*), Crissal Thrasher (*Toxostoma dorsale*), and Black-throated Sparrow (*Amphispiza bilineata*).

On June 27, 1984, in the cattail marsh east of the Bayo Canyon sewage plant in Block 4-6, an adult Virginia Rail was heard calling. It was answered by "shrieking" calls from another adult. The activity persisted for 15 minutes and both birds were seen. Although this behavior suggests probable breeding, later visits to the area failed to reveal any further rail activity. Virginia Rails are resident in marshes near Española; they have been found, but rarely, in migration in Los Alamos.

A male Winter Wren set up a streamside territory in mixed conifer forest in Block 5-2. He sang persistently and engaged in nest building during a 2-week period in early June 1987. In subsequent visits, no further breeding activity was observed. The breeding range of the Winter Wren extends south in the Rocky Mountain region only to central Idaho and western Montana.

Two Crissal Thrashers were seen together on June 24, 1988, in riparian habitat on the east bank of the Rio Grande in Block 7-9. The range of the Crissal Thrasher extends northward from southern New Mexico, where it is resident, disjunctively to the Sandia Mountains (Hubbard 1978). This is the only record of this thrasher in the Los Alamos area.

Two Black-throated Sparrows were seen together on July 6, 1988, in piñon/juniper habitat east of the Rio Grande in Block 7-9. Black-throated Sparrows are resident in southern New Mexico, summering locally to the San Juan and upper Rio Grande valleys in microphyll and other shrubland habitats. Occasional sightings of this sparrow have been made in Los Alamos in earlier summers, but there are no other breeding records.

Appendix A: Atlas Data

A matrix of the complete geographical data for the atlas is displayed in Table 4. Abbreviations of the species names are listed alphabetically. These abbreviations, adopted by the US Fish and Wildlife Service for bird-banding records, were used for data input in the atlas project. This list of names follows the matrix directly. Note that we have retained the abbreviations for the old names of three species that were redefined by the AOU near the end of the atlas period: YBSA (for Yellow-bellied Sapsucker) represents the Red-naped Sapsucker, WEFL (for the Western Flycatcher) represents the Cordilleran Flycatcher, and BRTO (for Brown Towhee) represents the Canyon Towhee.

The Block numbers head the columns in order from Block 1-1 on the left to Block 10-6 on the right. Each numerical entry gives the breeding status for a given species in a particular block, where 4 indicates confirmed breeding, 3 probable breeding, 2 possible breeding, and 1 indicates that the species was observed but was not breeding. Thus, for example, for the first species, the Acorn Woodpecker (ACWO), breeding was confirmed in Block 4-3 among others, was probably breeding in Block 9-6 and possibly breeding in Blocks 4-6, 7-3, and 7-4.

By reading down a column, one can find all the breeding species in a block. By reading across a row, one can find all the blocks in which a particular species bred during the atlas project.

This matrix was laid out early in the project, brought up to date frequently, and used as a Scorecard during the field work.

```
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ACWO    ......  ......  ......  ..4444  ...44.  ...244  ..422.....  ..4......  .3..  .
AMCR    ......  ......  ......  ......  ...1..  ......  .........4  .........  ....  .
AMDI    ......  ......  ......  ......  ......  ......  ..........  ........4  ....  3
AMKE    .....4  ......  ....1.  ...244  ..3444  .32334  ..34434222  2.4444242  443.  .
AMRO    .3.444  444423  444442  444444  444444  244344  2244.44444  442444444  4242  4
ATFL    ....34  ...423  ....42  ...434  ...334  .2.344  ..44342334  .2.433344  4443  4
BBMA    ......  ......  ......  ...14.  ......  ......  .........2  .......11  ....  .
BCHU    ......  ......  ......  ......  .....4  .....3  .......233  ......433  4.4.  3
BEWR    ......  .....3  ......  .....3  .....2  ....44  ...4233342  1..24.233  .433  4
BGGN    ......  .....3  .....4  ....33  ....23  ...232  ..2.3.223.  ...232232  4.32  3

BGWA    ......  .....3  ....22  .....2  ......  ....33  .....22...  ....3243.  .2..  .
BHCO    ...333  ....23  ..2434  3.3443  .23344  .33434  .222343333  23..43234  4422  3
BHGR    .2.444  .4442.  244434  344444  344434  334444  2334444444  323.24444  4332  4
BLGR    ......  ......  ......  .....2  ......  ......  ......3.24  ........3  2.43  4
BLPH    ......  ......  ......  ......  ......  ....1.  .........2  ........3  ..32  2
BRBL    ......  ......  ......  ...244  ..244.  ......  .......44.  .......44  ....  .
BRCR    4..43.  22232.  .43.32  222232  444432  32....  424.......  4........  4...  .
BRTO    ......  .....3  ...2..  1..443  ....42  ....42  .....44444  ...223444  4344  .
BTHU    234444  224344  224444  434444  324444  232233  3233344222  334322223  442.  3
BTPI    ......  .2....  ......  2.2331  ..3...  1.....  1..2......  .........  ....  .

BTSP    ......  ......  ......  ......  ......  ......  .........3  .........  ....  .
BUGR    24....  44..2.  42....  ......  2.....  4.....  ..........  .........  ....  .
BUSH    .....4  .....4  ......  ....24  ....24  ...444  .....34442  ....22423  2..2  2
CAFI    ......  ......  ......  ...3.4  ..2.2.  ...344  32........  ......3..  ....  .
CAKI    .....3  ....2.  ....41  ....34  ..3344  ....34  ...4334443  ....4.444  .433  3
CAWR    ....33  ....2.  ....22  ...243  ...344  ....33  ....343233  .....2424  3333  4
CHSP    ..4444  ...444  .24444  334434  444444  444444  243444424.  42.444432  444.  4
CLNU    1.1111  1..11.  31..1.  311133  .2.112  1244..  31132.1.1.  4233111..  31..  1
CLSW    ......  ......  ......  ......  ......  ......  ...1....42  ......3.4  ...2  .
COHA    ....44  ....44  ..444.  ...224  .24444  .....4  .4...4.222  2.2.22..2  24.2  2

CONI    ...344  ...333  ....33  ..22..  .33233  ..4.43  .233222.33  2.4.33333  323.  3
COPO    ...3.3  .....2  ....33  ....23  ..2.23  ..333.  ..333.....  ..4.33..2  ....  .
CORA    121224  232233  344423  344444  144444  24.443  4....33343  324434444  4442  2
CRTH    ......  .....2  ......  ......  ......  ......  .........3  .........  ....  .
DEJU    44244.  444443  444.2.  444211  443431  34322.  444....1..  3333.....  1...  1
DOWO    ......  ......  3.....  4.42.2  .2....  42...3  .442......  2...2...1  2...  .
DUFL    ......  4.....  .....3  ......  ..3...  .32...  .3.332....  .34.3....  2...  2
EUST    ......  ......  ......  ..444.  ..444.  ......  ...1...44.  .......44  ....  .
EVGR    ....1.  22221.  .....2  134441  .224.1  3..3..  ..4....14.  2...21.3.  1.1.  1
FLOW    ......  ......  ......  .334..  ...4..  3.....  .33.......  ......2..  4...  .

GAQU    ......  ......  ......  ......  ......  ......  ..........  .......42  ....  .
GCKI    44....  22....  23....  3..1..  4.....  ......  2.........  2......1.  1...  .
GHOW    ......  ..2.22  ......  ....23  ..2342  2.3342  ..322..22.  3...4.423  .4..  .
GRFL    ...433  ....33  ....33  .....3  ....33  ...443  .....2232.  ...23432.  334.  3
GRJA    24....  ......  ......  ......  ......  ......  ..........  .........  ....  .
GRWA    ...444  ..4444  .24434  .22324  .34244  324444  .243.44...  .233433..  44..  2
GTTO    .3....  .4....  2.....  4..1.2  ..32..  .3....  ..343..11.  .443..2..  1...  .
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HAWO	.24444	234343	.43323	.22424	343444	324233	424443....	34344224.	34..	4
HETA	3	.....	....4.	34	24	.....	...2434.2.	...32.442	444.	3
HETH	332333	333433	343322	43.2..	34333.	443322	443.22....	33423....	42..	3
HOFI	4	2	...442	..3434	..4444	...442	34444	2244	2443	3
HOSP	.....	.....	...44.	..444.	..4444	.....	.....44.	44	....	.
HOWR	.44344	44442.	443422	444444	443344	442344	44444423..	44444..4.	42..	3
INBU	.....	.....	.....	2	.....	.....	3	.....	....	2
LABU	.....	.....	.....	22	...2..	.....	2	12	....	2
LASP	4	.....	....1.	....3.	...34.	...443	224	44	..3.	3
LBWO	.....	.....	.....	.....	.....	.....	.....	.....	.22.	2
LEGO	33	..2323	44	.4.424	.44444	242433	...2234443	2..224444	4442	4
LEWO	.....	.....	.....	.....	.....	.....	...4.....	..444....	....	.
LISP	.4....	4.....	.....	43....	.1....	.....	.....	.....	....	.
MALL	.....	.....	.....	.....	.....	.....	3	4	...2	1
MGWA	..4...	..44..	..2.2.	.42211	.34.32	333.12	.23....1..	.23..4...	2...	.
MOBL	33	4	2...1.	4..442	..4444	.4.423	..244.444.	.4.32.444	344.	3
MOCH	443444	324444	444444	442423	443434	324344	443.24311.	33224422.	33..	2
MODO	..2334	...343	..3344	..3433	..3334	...333	...2333333	.32332234	4443	4
NOFL	244443	234423	244433	443444	443444	434244	234443443.	424444444	4322	2
NOGO	.....	..2.2.	.....	.....	.....	.....	...2.....	.....2.	....	.
NOMO	.....	.....	.....	.....	.....	.....	.....2..	24	....	.
NOOR	.....	.....	.....	2..4..	...2.2	.....	.....	.....	1...	.
NPOW	.....	..4...	.....	..3...	.2....	2.....	.....	.....	4...	.
NSWO	.....	.....	...4..	.....	.....	.....	.....	.....	....	.
OCWA	.42...	22....	.33...	34.1.1	3431.1	42.3..	..4..1....	324..1...	1...	.
OSFL	.....	42....	.2....	...1.1	.....	42....	223.....	332.....	1...	.
PIJA	....1.	1	11	2	2	.....	4444	11244	..21	3
PISI	33.323	332.3.	433342	233323	333422	.423.2	3323.....	3321.11..	231.	1
PLTI	3	...424	22	33	...234	...343	...2333433	42444	4443	4
PYNU	..2444	..4444	.44442	.44444	444444	444444	4444444...	424444.2.	44..	4
RBNU	32411.	343...	243...	33.1.1	421..1	3.....	32.....1.	3.2....1.	....	.
RCKI	24....	43....	22....	32..11	33..1.	3.....	332.....	3.....1	1...	.
RCSP	.....	.....	.....	.....	.....	2	32	4	.2.3	2
RECR	32.222	2..22.	421.24	2221.2	.222.3	.2.2..	.222.2....	322422...	....	.
ROWR	32	.....	..2.22	23	...223	4	...3434444	.2.43.244	4443	4
RSTO	...444	.2.434	..4434	..2444	.23444	.33444	..24444343	.32442334	4343	4
RTHA	44	....4.	2...12	1...24	..2444	24.3.2	2...244222	..244.422	2423	2
RWBL	.....	.....	.....	14	...3.3	.1....	.....332.	2	....	.
SAPH	.....	.....	...43.	..344.	..4444	.44442	444344	44	4.44	4
SCJA	44	...4.3	32	...444	...444	..3444	...2444444	...422344	4444	4
SCOR	.....	.....	.....	.....	.....	.....	2	42	..23	.
SOSP	.....	.....	.....	...224	...3.3	.....	.....3...	2	....	.
SOVI	...444	..4444	..3434	2.4434	334344	.44434	2234342..4	.3443322.	443.	3
SPOW	.....	...4..	.....	.....	.....	.....	..2.....	.....	....	.
SPSA	.....	.....	.....	.2....	.....	.....	2	4	..23	.
SSHA	....4.	.....	.....	.2.12.	.4.11.	1	3.....	2.....	1...	.

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STJA	242444	324422	444332	444444	444444	433242	334434211.	432332411	4...	2
TOSO	3..344	2.343.	.33.2.	.22212	23424.	432242	..2....111	2.231.2.1	1111	1
TTWO	.....	.....	..1...	.....	.4....	.....	..4.....	3.....	....	.
TUVU	.1.112	..1...	.1..12	1.1.24	..1141	11	1..1.11111	111211121	2111	2
VESP	3	24	.....	....3.	..4...	.323..	....3...4.	3	..2.	.
VGSW	432444	233424	444443	444444	324444	424344	4434334.32	433434443	4422	4
VIRA	.....	.....	.....	3	.....	.....	.....	.....	....	.
VIWA	44	.2.323	..4444	.33443	.34444	344433	..33444.22	234342222	443.	4
WAVI	...3..	2244..	322.33	3423.2	344324	322.32	3432.....	4332..2..	422.	4
WBNU	2.4444	224433	224234	243444	4.4444	323444	4344234...	32244224.	432.	2
WEBL	...444	...444	..4443	42.444	.44444	.44444	4444444443	444444344	442.	4
WEFL	2.444.	24433.	.33...	444423	444332	332.4.	3432.....	323324...	4...	3
WEME	.....	2	.....	...24.	.....	.4....	...22....2	23	....	.
WETA	.23434	344344	243444	444324	444344	444343	3343434..2	444334334	44.2	3
WISA	2	44444.	443.2.	34....	433.22	42...4	442..2....	4.2....2.	4...	1
WITU	...344	.....	.....	43....	33....	.....	2.....	.....	....	2
WIWR	.....	.....	.....	.....	.3....	.....	.....	.....	....	.
WTSW	.1.3.3	.1...3	..1.1.	1..224	.1.234	...232	...2.2..42	2233444.4	4433	2
WWPE	.2.444	22.334	4..343	4.2244	443334	443334	4443344.22	232443444	4432	3
YBSA	..3.1.	.2....	.....	44....	.2..1.	.....	.....1.	4.....	....	.
YRWA	33..33	42.24.	433...	343211	434341	3444.1	444..2.1..	422.11111	1...	1
ZTHA	....2.	.....	.....	...142	13	....2.	...2.1..3.	....11..3	24..	.

Species Abbreviations

ACWO	Acorn Woodpecker
AMCR	American Crow
AMDI	American Dipper
AMKE	American Kestrel
AMRO	American Robin
ATFL	Ash-throated Flycatcher
BBMA	Black-billed Magpie
BCHU	Black-chinned Hummingbird
BEWR	Bewick's Wren
BGGN	Blue-gray Gnatcatcher
BGWA	Black-throated Gray Warbler
BHCO	Brown-headed Cowbird
BHGR	Black-headed Grosbeak
BLGR	Blue Grosbeak
BLPH	Black Phoebe
BRBL	Brewer's Blackbird
BRCR	Brown Creeper
BRTO	Canyon Towhee
BTHU	Broad-tailed Hummingbird
BTPI	Band-tailed Pigeon
BTSP	Black-throated Sparrow
BUGR	Blue Grouse
BUSH	Bushtit
CAFI	Cassin's Finch
CAKI	Cassin's Kingbird
CAWR	Canyon Wren
CHSP	Chipping Sparrow
CLNU	Clark's Nutcracker
CLSW	Cliff Swallow
COHA	Cooper's Hawk
CONI	Common Nighthawk
COPO	Common Poorwill
CORA	Common Raven
CRTH	Crissal Thrasher
DEJU	Dark-eyed Junco
DOWO	Downy Woodpecker
DUFL	Dusky Flycatcher
EUST	European Starling
EVGR	Evening Grosbeak
FLOW	Flammulated Owl
GAQU	Gambel's Quail
GCKI	Golden-crowned Kinglet
GHOW	Great Horned Owl
GRFL	Gray Flycatcher
GRJA	Gray Jay
GRWA	Grace's Warbler
GTTO	Green-tailed Towhee
HAFL	Hammond's Flycatcher
HAWO	Hairy Woodpecker
HETA	Hepatic Tanager
HETH	Hermit Thrush
HOFI	House Finch
HOSP	House Sparrow
HOWR	House Wren
INBU	Indigo Bunting
LABU	Lazuli Bunting
LASP	Lark Sparrow
LBWO	Ladder-backed Woodpecker
LEGO	Lesser Goldfinch
LEWO	Lewis' Woodpecker
LISP	Lincoln's Sparrow
MALL	Mallard
MGWA	MacGillivray's Warbler
MOBL	Mountain Bluebird
MOCH	Mountain Chickadee
MODO	Mourning Dove
NOFL	Northern Flicker
NOGO	Northern Goshawk
NOMO	Northern Mockingbird
NOOR	Northern Oriole
NPOW	Northern Pygmy-Owl
NSOW	Northern Saw-whet Owl
OCWA	Orange-crowned Warbler
OSFL	Olive-sided Flycatcher
PIJA	Pinyon Jay
PISI	Pine Siskin
PLTI	Plain Titmouse
PYNU	Pygmy Nuthatch
RBNU	Red-breasted Nuthatch
RCKI	Ruby-crowned Kinglet
RCSP	Rufous-crowned Sparrow
RECR	Red Crossbill
ROWR	Rock Wren
RSTO	Rufous-sided Towhee
RTHA	Red-tailed Hawk
RWBL	Red-winged Blackbird
SAPH	Say's Phoebe
SCJA	Scrub Jay
SCOR	Scott's Oriole
SOSP	Song Sparrow
SOVI	Solitary Vireo
SPOW	Spotted Owl
SPSA	Spotted Sandpiper
SSHA	Sharp-shinned Hawk
STJA	Steller's Jay
TOSO	Townsend's Solitaire
TTWO	Three-toed Woodpecker
TUVU	Turkey Vulture
VESP	Vesper Sparrow
VGSW	Violet-green Swallow
VIRA	Virginia Rail
VIWA	Virginia's Warbler
WAVI	Warbling Vireo
WBNU	White-breasted Nuthatch
WEBL	Western Bluebird
WEFL	Cordilleran Flycatcher
WEME	Western Meadowlark
WETA	Western Tanager
WISA	Williamson's Sapsucker
WITU	Wild Turkey
WIWR	Winter Wren
WTSW	White-throated Swift
WWPE	Western Wood-Pewee
YBSA	Red-naped Sapsucker
YRWA	Yellow-rumped Warbler
ZTHA	Zone-tailed Hawk

Appendix B: Statistical Modeling

To facilitate analysis and comparison, a numerical score, designated S, has been defined to provide a single measure of breeding likelihood that quantifies the difference in probability of breeding indicated by the three breeding criteria. The weighting formula used is one, one-half, and one-quarter for confirmed, probable, and possible breeding, respectively. Thus, a breeding record in a block has a value of 1, 1/2, or 1/4. The weighting formula emphasizes confirmed breeding; the higher the score, the greater is the probability of confirmed breeding. The aim of the atlas fieldwork was to confirm breeding, and most of the effort was concentrated on doing this. When only probable or possible breeding was reported, there is genuine uncertainty whether breeding actually occurred. The weighting formula is arbitrary, but it is my estimate of the degree of this uncertainty. The score for a species for the entire county is the sum of the values for all blocks. The score for a block is the sum of the values for all the species in that block. For example, Block 5-3 with 54 species of which 29 were confirmed, 19 were probable, and 6 were possible breeders, has a score of 40 ($S = 1 \times 29 + 0.5 \times 19 + 0.25 \times 6$). If breeding had been confirmed for all the species found in Block 5-3, S would have been 54. The score for a member of an association (Table 1) is the sum of the values for the species in the blocks in which the association is found.

A simple model (Campbell 1991) for the observed score, S, in a block is

$$S = B(p,N).$$

B is a binomial distribution of p and N, where p is the probability of confirming breeding of a species in the block, and N is the number of species actually breeding. The actual number of breeding species is what we would like to estimate.

Uncertainty in the number of confirmed species found in a block results from several factors. Among these are observer ability, accessibility to the various habitats, and differences in species detectability and population density, but the principal ones are the amount of habitat variety and the time spent in the field. All of these factors affect the probability of confirming breeding, but we treat only those with the largest expected effect, time in the field and the number of habitats in the block, with this model. With the assumption that the

probability of discovering a new species is proportional to the number of undiscovered species remaining, we assume an exponential growth function for p,

$$p(t) = 1 - \exp(-t/a)$$

where t is time in the field in units of field days. A field day is taken as a day for which there are atlas records. The variance of B(p,N) is equal to NP(1-p), so for p = p(t) close to one, that is when sufficient time has been spent in the field to find and confirm breeding in nearly all the species, this component of the variance vanishes. The parameter a is determined from analyzing cumulative score as a function of the time in the field.

The maximum number (R) of species that are likely to nest in a block is the number of species expected for the combination of habitats in the block, which ranges from one to five. N is generally less than R, and N does not increase as fast as R as the number of habitats available in a block increases. This is what we would expect from the species/area effect, in which the number of species in an area increases as the area investigated increases (Wiens 1989). Examination of the data fitted by the exponential growth function for blocks with different R, suggests a form bR^c for the expected number of species in a block. The final values for the parameters a, b, and c are 7.007, 7.232, and 0.396, respectively, from fitting the data with this functional form. Given the components of variance due to the time and number of habitats, a statistical procedure (BLUP) was applied that gives the "best linear unbiased prediction" of the expected number of species. The estimated number of species that actually bred in each block, N, is the weighted average of the number estimated from the growth curve and the estimated number of expected species. N for each block is shown in Fig. 6.

Because in a very well covered block nearly all the species that could be expected to breed there were found and confirmed, S is very nearly equal to the number of species actually breeding (estimated by N) in that block, but for a less well-covered block, S is less than N. Comparison of S and N thus gives a means of evaluating the adequacy of coverage as described in the Survey Results section. Evidence for the equality statement is that the number of breeding birds in a very well covered block is very close to that expected from

the species richness found for the habitats found in the block.

The model could be improved in several ways. The probability of confirming breeding is not the same for each species. For a second cut we could estimate different p functions for different levels of detectability. Also, the quality of the time in the field varied among blocks. Block-busting, for example, was more efficient at confirming breeding, because the days chosen were at the peak of the breeding season. A more general exponential form for the p(t) function with a shape parameter could be used to qualify time in the field appropriately for the different blocks.

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