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Appendix A: Strategic Plan for Quail Management and Research in the United States: Introduction and Background

Leonard A. Brennan
Mississippi State University

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APPENDIX A. STRATEGIC PLANNING WORKSHOP

STRATEGIC PLAN FOR QUAIL MANAGEMENT AND RESEARCH IN THE UNITED STATES: INTRODUCTION AND BACKGROUND

LEONARD A. BRENNAN,¹ Department of Wildlife and Fisheries, PO Drawer LW, Mississippi State University, Mississippi State, MS 39762

Abstract: I assessed the current, broad-scale status of populations, research, and management for 6 species of quail in the U.S., and used this information as an introduction, background, and justification for a national strategic planning effort for quail management and research. Long-term (1960–89) trends determined from Christmas Bird Count data indicate that California quail (*Callipepla californica*), northern bobwhite (*Colinus virginianus*), and scaled quail (*Callipepla squamata*) populations have undergone ($P < 0.05$) declines. Geographic distribution of mountain quail (*Oreortyx pictus*) has contracted dramatically in the northeastern portion of this quail's range. Neither Gambel's (*C. gambelii*) nor Montezuma quail (*Cyrtonyx montezumae*) showed evidence of long-term increases or decreases. Wildlife professionals have apparently paid scant attention to quail in the U.S. during the past 10 years. A recent survey of *Wildlife Review* indicated <0.2% of the publications pertained to quail. During 1990, <1.0% of Federal Aid in Wildlife Restoration funds were allocated to quail-related projects. Habitat management by the private sector is apparently having little broad-scale impact on bobwhite populations. Contemporary quail management efforts in the U.S. are clearly in the doldrums and in dire need of leadership from professionals with a creative vision for solving problems caused by changing land-use practices. These factors point to a critical need for a national strategic planning effort to develop a comprehensive, coordinated program for quail management and research. An outline of the structure of the Strategic Planning Workshop that was held at Quail III is provided. Specific management and research problems and associated strategies for solving them are available in Issues and Strategies, which follows (page 181).

Key words: California quail, *Callipepla californica*, *C. gambelii*, *C. squamata*, Christmas Bird Counts, *Colinus virginianus*, *Cyrtonyx montezumae*, Federal Aid in Wildlife Restoration, Gambel's quail, literature, management, Montezuma quail, mountain quail, northern bobwhite, *Oreortyx pictus*, population trends, scaled quail.

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Quail that are native to the conterminous 48 states (Table 1, Fig. 1) clearly hold the fascination of hunters and naturalists. Settlers from Europe brought with them a rich tradition of hunting "partridges" and adapted these rituals to the different species and habitats of game birds they encountered in the New World. Quail hunting style reached the highest levels of sophistication in the southeastern United States where vast tracts of land were, and in some places still are, intensively managed for northern bobwhite. There once was a time when good quail hunting was available, virtually free of charge, to anyone who lived within the southern half of North America. Today, unfortunately, this is not the case. Changing patterns of land use have had a dramatic, and mostly negative impact on virtually all species of North American quail. Modern agriculture and forestry practices, and the ever-increasing expansion of suburbanization, have

Table 1. Common and scientific names of quail addressed in this plan.^a

Common name	Scientific name
California quail	<i>Callipepla californica</i>
Gambel's quail	<i>Callipepla gambelii</i>
Masked bobwhite	<i>Colinus virginianus ridgwayi</i>
Montezuma quail	<i>Cyrtonyx montezumae</i>
Mountain quail	<i>Oreortyx pictus</i>
Northern bobwhite	<i>Colinus virginianus</i>
Scaled quail	<i>Callipepla squamata</i>

^aMaps of geographic ranges provided in Fig. 1.

taken a tremendous toll on populations of native quail.

This paper assesses the current status of 6 species of quail in the United States (Table 1, Fig. 1). My objectives are to assess: (1) research trends, (2) effort and funding allocated to quail management by federal and state agencies and the private sector, (3) broad-scale population trends, and (4) the role of quail in the larger scheme of wildlife management and research during the

¹Present address: Tall Timbers Research Station, Route 1, Box 678, Tallahassee, FL 32312–9712.



A. CALIFORNIA QUAIL



B. GAMBEL'S QUAIL



C. MONTEZUMA QUAIL



D. MOUNTAIN QUAIL



E. NORTHERN BOBWHITE



F. SCALED QUAIL

Fig. 1. Current approximate geographic ranges of 6 species of quail in the U.S., modified from Leopold et al. (1981), American Ornithologists' Union (1983), Johnsgard (1988), and Brennan (1990).

1990's. I also provide a background for issues and strategies addressed beginning on page 181.

This paper is dedicated to my mentor, colleague, and friend Stephen E. Wright, who inspired me to pursue a career in the natural resource sciences. Special thanks are extended to K. E. Church, T. V. Dailey, and the Quail III Program and Steering Committees for the opportunity to develop this material. K. E. Church and W. E. Mancini provided key editorial guidance in structuring the content of both this paper, and the companion paper on issues and strategies. Comments by R. W. Dimmick, G. A. Hurst, B. D. Leopold, J. L. Roseberry, and R. J. Gutiérrez were also very helpful. Support was provided jointly by the Department of Wildlife and Fisheries at Mississippi State University; the Mississippi Department of Wildlife, Fisheries and Parks; the Oktibbeha Chapter and the National Office of Quail Unlimited. J. Lowe of the Cornell Laboratory of Ornithology kindly provided the computerized version of Christmas Bird Count (CBC) data. J. Heard of the Department of Information Services at Mississippi State University drew the figures. J. M. Lee, R. S. Fuller, and S. W. Manley assisted in numerous ways. S. J. Stultz compiled the summary of titles on quail research from *Wildlife Review*. C. Wasson and C. Hillhouse provided secretarial support. T. L. Pruden assisted with proof-reading and provided editorial advice.

RESEARCH LITERATURE

Johnson (1983) published a summary of titles on quail listed in *Wildlife Review* from 1935 to 1982. I added to Johnson's summary by compiling an additional 9 years of titles from *Wildlife Review* to determine if there had been any change in (1) the number of papers published on quail, or (2) the percentage of wildlife literature devoted to quail during the past 9 years. Despite an explosion of wildlife-related titles during the 56 years from 1935 to 1991 (Fig. 2A), the number of papers on quail has steadily declined (Fig. 2B). Likewise, the percentage of wildlife literature on quail has undergone a nearly exponential decline from 1935 to 1982. This decline continued during the next 9 years (Fig. 2C).

Additionally, I performed a computer search of the Current Research Information System managed by the USDA Cooperative State Research Service. This data base provides computer access to research projects being conducted by scientists at Land-grant University Agricultural Experiment Stations. I searched for studies relat-

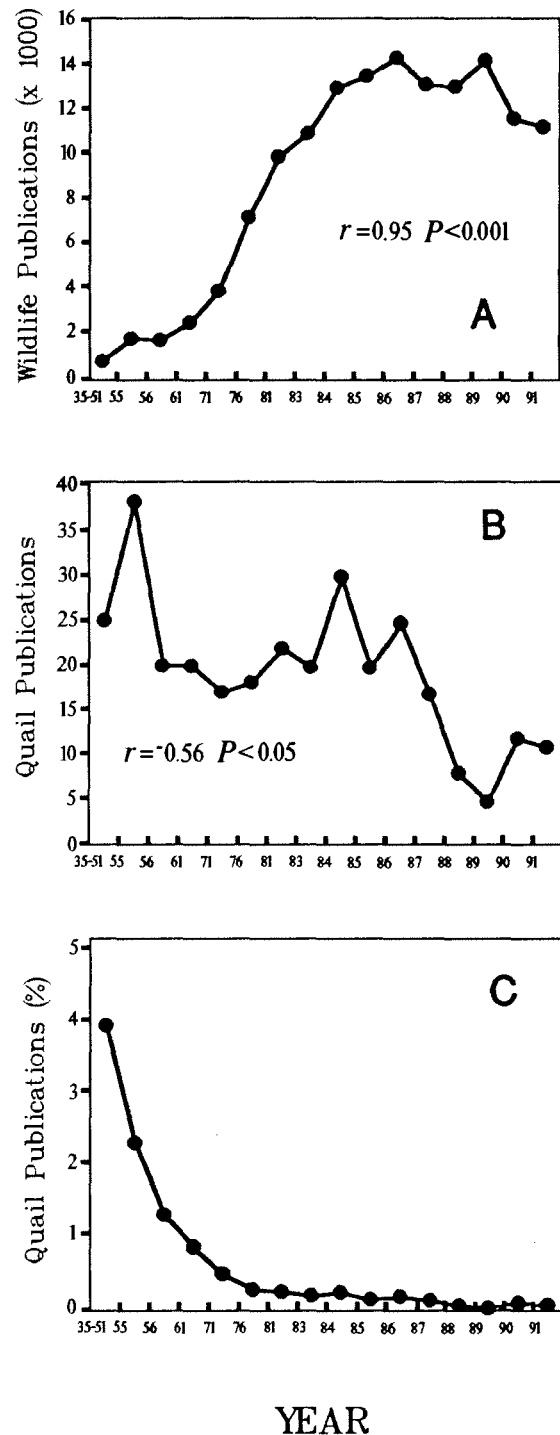


Fig. 2. Trends in publications produced from quail research projects, 1935-91, based on a survey of titles in *Wildlife Review* (WR). (A) number of wildlife publications listed in WR 1935-91, (B) number of publications on quail listed in WR, 1935-91, (C) percentage of total number of publications in WR pertaining to quail, 1935-91. Data for 1935-82 compiled by Johnson (1983), remaining data compiled for this study.

ing to quail and associated farm wildlife research conducted in agricultural environments. Of >30,000 projects, only 5 contained information that was specifically related to quail, or addressed quail-related topics in the larger scheme of farm wildlife.

MANAGEMENT

The recent summary of Federal Aid in Wildlife Restoration Activities compiled by Stephens (1990) provides a convenient window to access information on quail activities on a state-by-state basis. Although some states—such as Mississippi, Missouri, and Kansas—support or supplement quail management activities with state appropriations, Federal Aid summaries provide a good index of where quail-related projects rank in relation to other wildlife projects.

I categorized 770 Federal Aid in Wildlife Restoration projects summarized by Stephens (1990) into 8 groups (Fig. 3). Projects related to quail made up only about 3% of the number of projects supported by Federal Aid monies during 1990 (Fig. 3). Projects related to big game, and nongame and endangered species are receiving the most attention. Additionally, >\$40,000,000 were spent in 1990 for Federal Aid activities, while allocations to quail were <\$500,000, or about 1.25%.

The USDA Forest Service and USDI Bureau of Land Management are developing programs to enhance quail habitat and populations on public lands. For example, USDA Forest Service (1991) lists their "Answer the Call" program of quail habitat management as having a potential of \$2.1 million in FY 92. This 5-year program identifies 18 million ha of quail habitat on National Forest and Grasslands. Whether this program will develop into a broad-scale, cooperative program involving state wildlife agencies and private interest partners such as Quail Unlimited (QU) remains to be seen. The USDI Bureau of Land Management is also taking a serious, comprehensive look at quail and game-bird management. They have produced an impressive document (Sands and Smurthwaite 1992) outlining a program that has planned the distribution of \$45 million in funds for game-bird habitat enhancement between 1992 and 2000.

The QU organization has experienced phenomenal growth in membership and associated monies raised for habitat improvement projects during the past decade. From 1981 to 1991, membership soared from 1,000 to nearly 45,000 (QU National Office, unpublished data,

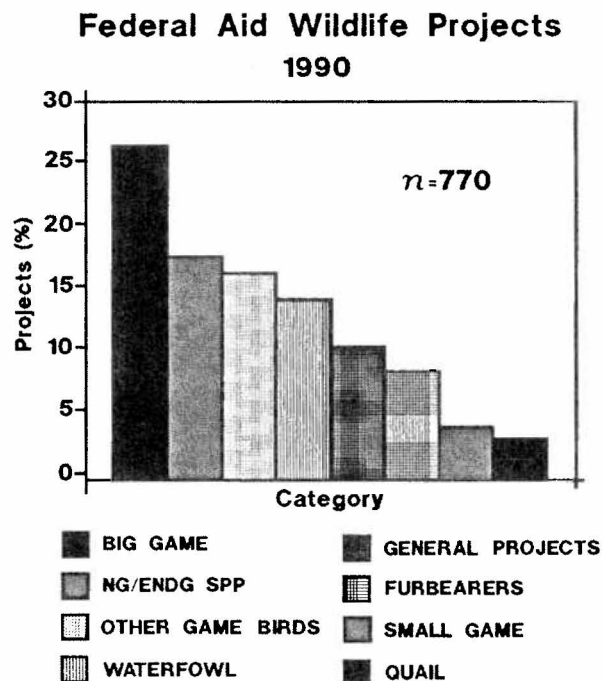


Fig. 3. Categories of Federal Aid in Wildlife Restoration projects funded during 1990. Data compiled from Stephens (1990).

Fig. 4). Evidently, there is a large pool of people in the private sector who are concerned about quail and want to do something positive to enhance this resource. However, the huge growth in QU membership and associated activities of QU chapters have apparently had little or no impact on reversing the broad-scale decline northern bobwhite populations have experienced (Fig. 4). Clearly, efforts of QU have been insufficient to overcome widespread deterioration in bobwhite habitat caused by land-use changes in agriculture and forestry. Despite this, the large and growing QU membership indicates that there is a tremendous amount of interest in quail within the private sector.

POPULATION TRENDS, SPECIES STATUS REPORTS, AND LAND-USE ISSUES

I used Christmas Bird Count (CBC) data from 1960-89 to assess broad-scale trends of quail populations in the U.S. Arbib (1981) provides a description of CBC methodology. These data were standardized by dividing raw counts by the number of terrestrial party-hours. Trends were evaluated using simple linear regression of standardized count data using year as the dependent

QUAIL UNLIMITED AND BOBWHITE TRENDS

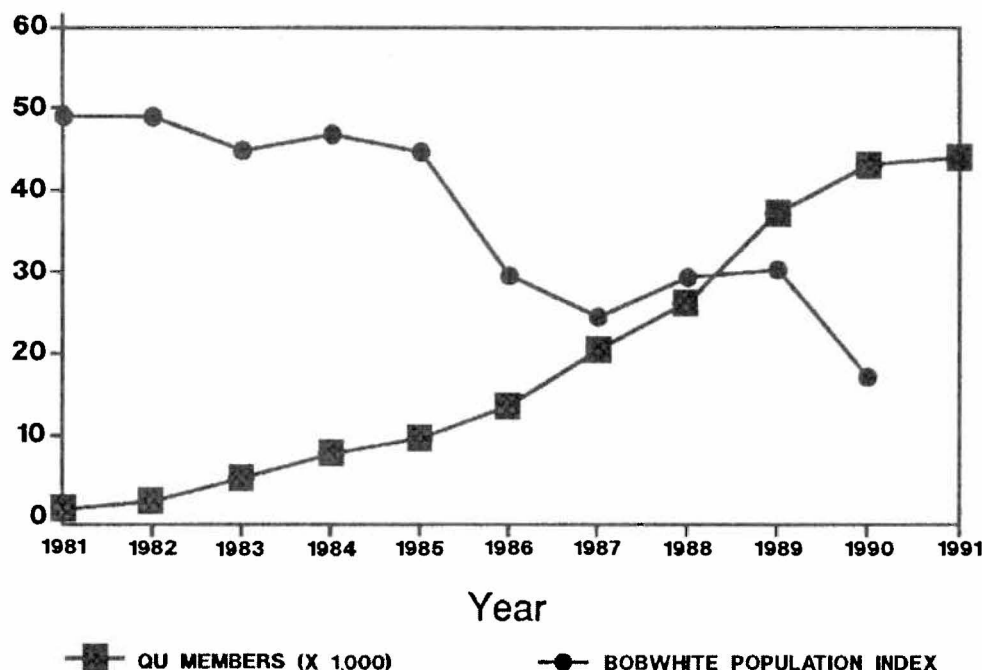


Fig. 4. Comparative trends in Quail Unlimited (QU) membership and northern bobwhite populations, 1981-91. Bobwhite trends based on Christmas Bird Count data from the southeastern region of the U.S. published by Brennan (1991). QU membership data furnished by the QU National Office.

variable. If slopes of the regression analysis had an associated P value <0.05 they were considered different from 0.

California Quail

The California quail is the most widely-distributed of the western quails (Fig. 1A). Its distribution throughout low and mid-elevation habitats in California, Oregon, Idaho, and Washington puts it in the proximity of most avid western quail hunters. Thus, there is probably more demand in the form of hunter days for pursuit of California quail than any other western species. Currently, 1 of the major issues facing California quail populations is the controversy over the status of oak (*Quercus* spp.) woodlands in California. Whether or not oak woodlands in California are classed as commercial forests has great bearing on future management options for this quail. The California quail is clearly the most well-studied of all western quail. Leopold (1977) provides a full account of the biology and ecology of the species. CBC data indicate that California

quail populations have exhibited a significant, long-term population decline since 1960 (Fig. 5A).

Gambel's Quail

The Gambel's quail is a desert-adapted analog of the California quail (Fig. 1B). Unlike California quail, its distribution and movements are not tied to availability of, or access to, free surface water. It is 1 of the primary game birds in the state of Arizona, and is also important in southern California and New Mexico. Population abundance is profoundly influenced by rainfall patterns. Although relationships are not entirely clear, cattle grazing and land-use patterns also play a major role in year-to-year abundance of Gambel's quail and associated hunting opportunities in the arid southwest (Brown 1989). Apparently, ungrazed or lightly-grazed habitats are able to support greater numbers of birds during the winter period than heavily-grazed areas (Brown 1989). Christmas Bird Count data indicate that Gambel's quail populations have apparently remained stable for the past 31 years (Fig. 5B).

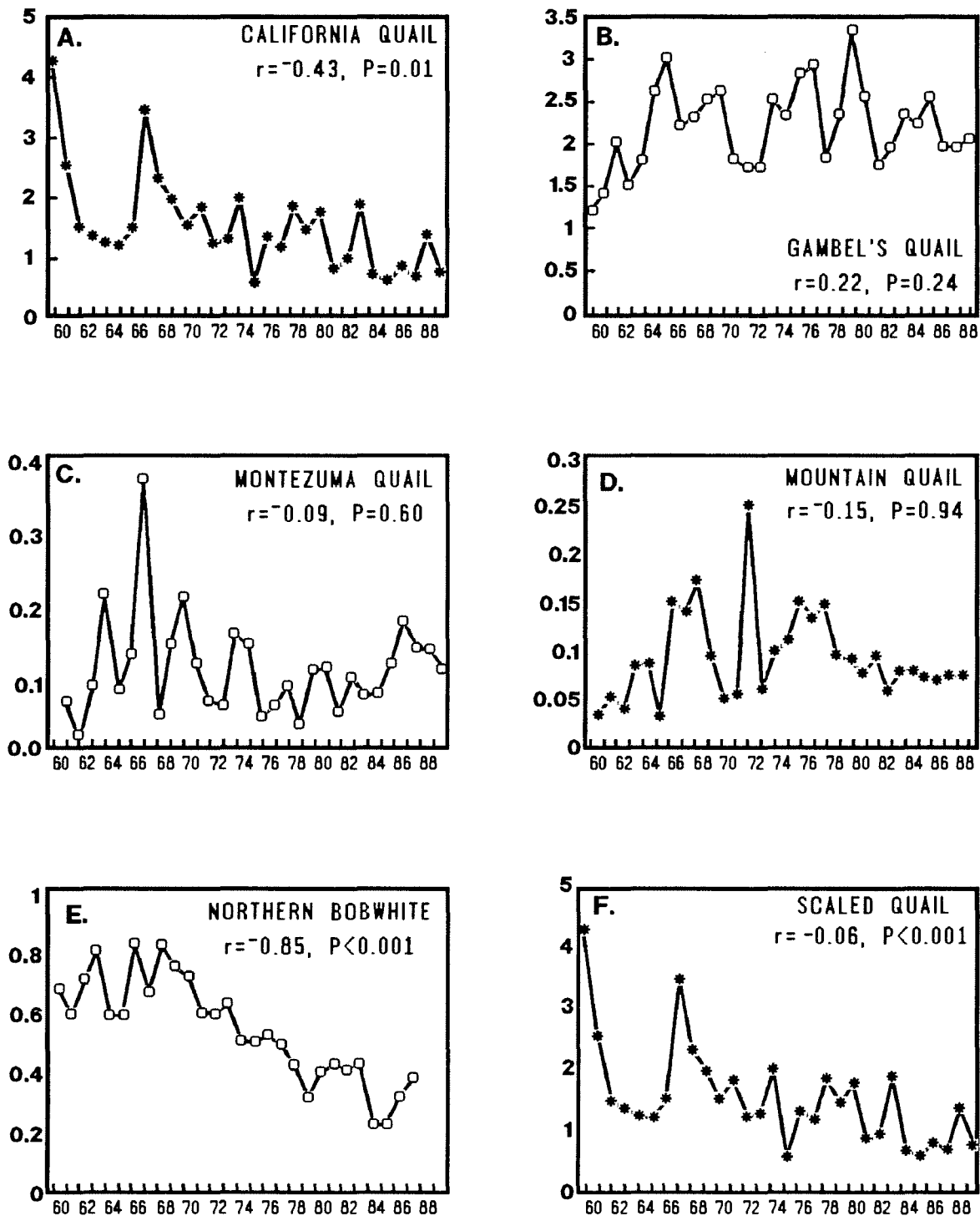


Fig. 5. Quail population trends in the United States based on 31 years of Christmas Bird Count data.

Montezuma Quail

Leopold and McCabe (1957) summarized the natural history of this species. Montezuma quail received very little attention from the research

community until Stromberg (1990) studied movements and quantified habitat structure. This quail is closely associated with the tall grass understory of pine-oak woodlands. The center of its geographic distribution is in Mexico (Fig. 1C).

Excessive grazing has had a long-term, mostly negative, impact on Montezuma quail across much of its range. Brown (1989:116) pointed out that the "effects of grazing on Mearn's [Montezuma] quail populations has long been recognized but not understood." This was apparently because some workers (e.g., Wallmo 1954) observed that there were certain situations where Montezuma quail populations were lower on ungrazed areas than they were on adjacent, grazed areas. Others, however, have concluded that grazing destroys key food sources (e.g., Leopold and McCabe 1957) and has extirpated this species from large regions of its historic range (e.g., Miller, 1943). In the U.S., populations of Montezuma quail have apparently remained stable after reaching a peak of abundance during the mid-1960's (Fig. 5C). Population status of Montezuma quail in Mexico is unknown.

Mountain Quail

The mountain quail remains the least-studied of native North American quail. Basic habitat relationships are known and have been quantified in portions of its geographic range. Brennan and Block (1986) provided the first reliable estimates of population density, and Brennan et al. (1987) quantified the structure of habitats used across northern California. Gutiérrez (1980) provided evidence to eliminate the myth that standard management practices used for California quail were also appropriate for mountain quail. Numerous factors need to be addressed in light of the widespread declines and local extinctions that have been documented on the northeastern edge of this quail's range (Brennan 1990). Formerly distributed throughout much of southern and western Idaho, the species is now largely extinct in that region (Fig. 1D). Despite local extinctions in Idaho, there apparently has not been a long-term decline in mountain quail numbers elsewhere (Fig. 5D). The fact that many populations undergo long (perhaps at times >50 km) altitudinal migrations between breeding and wintering habitats must be considered in management strategies for this quail.

Northern Bobwhite

The northern bobwhite remains the most widely-distributed North American quail (Fig. 1E). Despite this wide distribution, populations have undergone significant declines in >75% of the states within the geographic range of the bobwhite (Droege and Sauer 1990, Brennan 1991). Overall, declines in bobwhite populations

are the most precipitous of the 3 species that are declining in the U.S. (Fig. 5E). On a regional basis, the most precipitous declines have occurred in the southeastern region of the U.S. (Brennan 1991). This is especially disturbing because the southeast has historically been associated with good bobwhite management and abundant populations.

The northern bobwhite is 1 of the most studied game birds in the world; nearly 2,800 titles are cited by Scott (1985). This quail has been the subject of 3 major book-length monographs (Stoddard 1931, Rosene 1969, Roseberry and Klimstra 1984). Brennan (1991) outlined 1 opinion about the northern bobwhite decline and potential solutions.

Masked bobwhite.—Although this quail is a subspecies of the northern bobwhite, it has received an enormous amount of attention because of its limited distribution, highly specialized habitat requirements, and status as an endangered species. Brown (1989) provides a comprehensive review of factors responsible for the decline of populations, and various attempts at population recovery. Curiously, at least 2 attempts at population reestablishment nearly met with success but were thwarted when cattle were allowed to return to and graze in habitats occupied by this quail. A decision by the Fish and Wildlife Service to purchase a parcel of critical habitat and establish a cattle-free refuge in southern Arizona has been central to success of the most recent population recovery efforts. Nevertheless, the masked bobwhite continues to hang by a slender and fraying thread over the abyss of extinction. If there is a single, unifying purpose of this plan, it is to prevent other species of North American quail from meeting a fate similar to the 1 faced by the masked bobwhite.

Scaled Quail

The scaled quail is distributed throughout the western half of Texas; most of New Mexico; and parts of Arizona, Oklahoma, Kansas, Colorado, and central Mexico (Fig. 1F). It has been the subject of 2 monographs that address habitat ecology (Schemnitz 1961), effects of hunting, and other environmental factors (Campbell et al. 1973). Like other members of the genus *Callipepla*, and northern bobwhite in portions of Texas, scaled quail populations undergo dramatic fluctuations in relation to rainfall patterns. Climatic variation and habitat conditions are the 2 primary factors that influence scaled quail numbers (Campbell et al. 1973). Although removal of

dense shrub stands on ridges can be used as a strategy to improve habitat for scaled quail (Brown 1989), homogenous grasslands without a shrub component are usually unsuitable for scaled quail (Schemnitz 1961). Scaled quail numbers have declined significantly since 1960 (Fig. 5F). Reasons for this decline are largely unknown.

SYNTHESIS

Based on the foregoing information, it is clear that quail populations in the United States are facing widespread, serious problems, not the least of which is a lack of attention by the research community. Wildlife professionals have apparently paid scant attention to quail populations during the past 10 years. Efforts from the private sector are clearly having no impact on slowing or reversing a broad-scale long-term decline in bobwhite populations.

Historically, with the exception of traditional quail plantations in the South and scattered efforts in Texas and the Midwest, quail management in the U.S. has been characterized by a *laissez-faire* approach. This worked fine when land uses in agriculture and forestry were compatible with producing abundant, huntable populations of quail. However, now that abundant quail populations are no longer a by-product of land use, 4 species of quail in the U.S. are declining or experiencing range reductions. Although wildlife agencies are beginning to take notice of the problem, much of the quail hunting public seems to be either unable or unwilling to: (1) undertake broad-scale quail habitat enhancement projects, or (2) bring political pressure to bear on state and federal agencies so that they will make quail management and research a priority. Bird watchers and others who value non-consumptive aspects of the quail resource should also get involved in raising awareness about quail problems.

Furthermore, current policy in the agricultural and forestry arenas seems to be exacerbating the problems quail face in many areas. Despite economic incentives within the Conservation Reserve Program (CRP) for taking land out of agricultural production and therefore reducing erosion and pesticide use, criteria for compliance (e.g., noxious weed control, high-density planting of pine) may actually be decreasing quail habitat quality on a broad scale. Landowners who participate in CRP or other set-aside programs have virtually no economic incentive to perform comprehensive quail habitat management actions

such as strip-disking or prescribed burning. Below-market fees for cattle grazing in the arid West is another example of a policy that continues to have devastating effects on quail.

Clearly, contemporary efforts at quail research and management are floundering in the doldrums. Despite localized, isolated case histories of quail management successes such as the recent increase in masked bobwhite on Buenos Aires National Wildlife Refuge, or apparent stabilization of northern bobwhite numbers in Texas and a few Midwest states (Droege and Sauer 1990, Brennan 1991), the outlook for quail is relatively bleak. This prognosis can be reversed if wildlife professionals and natural resource policy-makers do a complete about face and begin to make quail management and research a priority. These problems, and the strategies for their solution identified at this symposium, are examples of efforts to raise awareness of the wildlife profession and natural resource policy-makers about the current quail situation.

Priorities need to be changed, and additional resources must be allocated to enhance quail programs, and ultimately populations. If not, the huge interest in big game, and other wildlife issues, will most likely continue to siphon away resources that might otherwise be allocated to making quail research and management a high priority entering the next century. Perhaps Quail III and the associated Strategic Planning Workshop will inspire more members of the wildlife community to take creative, comprehensive, integrated management actions, and conduct and publish original research on wild quail.

GOALS, PURPOSE, AND OBJECTIVES OF THE WORKSHOP

The main reason for conducting the Strategic Planning Workshop was to establish a national framework for guiding policies that influence quail management and research. The 4 goals of the workshop were to: (1) identify factors responsible for declines in populations of native, wild quail in the U.S.; (2) identify specific solutions, when known, to factors that are either causing quail populations to decline or preventing their increase; (3) identify strategies that can be used to sustain and increase quail populations in the U.S. in light of changing land-use practices; and (4) increase awareness of issues that affect quail with respect to changing land-use practices in agriculture, forestry, and expanding urbanization.

The purpose for conducting this workshop was to provide a forum for people to discuss and help solve problems that affect quail in the U.S. This document should be useful for natural resource managers, biologists, researchers, administrators, and private interest groups, such as Quail Unlimited. It can be used as a basis for prioritizing local and regional efforts to enhance quail populations and habitats. It can also be used as a mechanism for identifying gaps in our basic knowledge about quail population and habitat ecology in the U.S. This plan can be used to provide objective information about quail problems to administrators, policy-makers, and other people who influence resource management decisions.

The objective of the workshop was to produce a document which contains a smorgasbord of major issues and opportunities that pertain to quail management and conservation as we enter the 21st Century. With the exception of identifying major issues that pertain to all species of wild quail, there was no effort to prioritize particular issues or strategies. Prioritization of issues that affect quail, and strategies for implementing specific solutions to these issues, is the domain of the technical staff within each state and federal agency, and nongovernmental organizations that have quail management responsibilities.

STRUCTURE OF THE WORKSHOP

The workshop was organized into groups aligned with 5 broad categories. These groups identified issues and associated management or research strategies that relate to particular species of quail. Information presented in and discussed at the workshop was structured according to the needs of native quail in the U.S. as they relate to broad categories of land use. The 5 categories were: (1) agricultural practices and pesticides, (2) forest practices, (3) grazing and range management, (4) releases of pen-raised quail, and (5) population dynamics and effects of hunting.

These broad categories were chosen because they have profound implications for many species of quail, are aligned with the major land-use practices that influence quail populations, and transcend taxonomic boundaries. Some categories have a strong regional flavor, such as the liberation of pen-raised bobwhite in the Southeast, or effects of cattle grazing on quail in the West. Other categories, such as population

dynamics, clearly pertain to all species. Additionally, a separate section of this document contains a list of general issues applicable to all species of quail in the U.S.

The workshop began with a brief general meeting and overview, and then divided into 5 different sessions. Depending on the category, between 3 and 5 scientists or managers with well-established backgrounds in each particular topic, and familiarity with the species of quail most likely to be impacted, developed a topical outline, chaired each session, and guided discussion. Participation in a particular workshop group was open to any person attending Quail III.

STRUCTURE OF THE PLAN

An issue-strategy structure is used throughout the body of this Strategic Plan. This structure helped identify and explicitly state management issues or information gaps in our knowledge about wild quail in the conterminous 48 states. These issue statements were then followed with strategies that could be used to: (1) solve the problem or (2) collect information required to make informed management decisions about the particular issue. As stated below, specific mechanisms for implementation of solutions will be left to state and federal agencies, and private organizations interested in quail conservation and management.

IMPLEMENTATION OF SOLUTIONS

This plan contains broad, rather than specific, information about how solutions to issues that affect quail should be implemented. When strategies for implementation are mentioned, they are outlined in general terms. This is intentional. There are >40 state and federal resource management agencies that are mandated to conserve and enhance quail resources within their particular jurisdictions. Additionally, there are hundreds of private conservation groups interested in myriad issues relating to quail. Mechanisms for setting policy, establishing budgetary priorities, and responding to political pressure from user-groups vary widely among state and federal resource agencies that have quail management responsibilities. Therefore, it would not be practical, much less possible, within the limited space available, to list specific, localized strategies for implementing solutions to the issues outlined in this document.

Implementation of strategies to quail management issues should be done on national, regional, and local scales by the particular agencies and organizations that have responsibilities and interests in quail conservation and management. Each agency or organization with quail management mandates and responsibilities must tailor specific prioritization of issues and implementation of strategies to political pressure and available resources of the domains within which they operate.

Strategic plans such as this must be recognized as interactive documents. They should be updated and refined according to accomplishments of objectives and new management issues (Goodstein et al. 1992). Keep in mind that each working group was charged with identifying particular issues and associated strategies for solving them. Outlines of specific management objectives, such as attaining a sustained annual harvest of a specific number of quail on a given area or within a given state are not part of this plan. This plan is not intended to represent formal policy *per se*, but to guide development of resource management policies that influence quail populations in North America. Hopefully, it will be updated and amended at the fourth national quail symposium in 1997.

This version represents a comprehensive approximation of issues affecting quail in the U.S. during the 1990's. It reflects editorial scrutiny, input, and professional expertise of 21 workshop group leaders, >250 workshop participants, independent reviewers, and editors of the Quail III

proceedings. It is impossible to produce a strategic plan that will be all things to all quail enthusiasts. To some, this plan may seem unduly long and complex, while others may perceive it as simple-minded and naive. Regardless, my goal was to produce a plan that will influence people who are not quail scientists, but are in a position to have a positive impact on quail resources. There are many cases where we are still uncertain about the correct questions, much less the correct solutions to issues affecting quail. Hopefully, this document will force people to take a hard look at the major issues influencing quail so that we can begin to ask the right questions and develop solutions.

Aggressive management will be necessary on a broad scale if we are to maintain huntable populations of quail throughout North America. Classic notions like "the birds will take care of themselves" and "the more you shoot, the more you'll have" must be replaced by thoughtful, well-planned, proactive management of both quail populations and habitats.

Any attempt at effective management requires a plan, and that plan must be based on a strategy for achieving particular objectives or solving particular problems. This document represents the first, comprehensive attempt to develop a national plan that can be used to maintain and enhance populations of native wild quail in the U.S. No doubt, it is a daunting task. However, continuing the *status quo* and allowing these magnificent game birds to slip through the cracks is, in my opinion, an unacceptable alternative.

