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Managing Quail in Arizona: Meeting New Challenges with Old Techniques

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I present an overview of past quail management in Arizona and the current direction of Arizona's Quail Program. Since the inception of Arizona's quail management program, management activities progressed from an era of intensive population and habitat data collection and habitat improvements, to one of more passive management. I explore the reasons for the de-emphasis of field activities and active management, and will discuss the changing face of quail habitat and quail hunters in Arizona. I will also discuss quail management issues related to hunter recruitment and retention, and the current social climate that makes annual population data collection and more active habitat management activities both desirable and necessary.

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Key words: active management, Arizona, *Colinus virginianus*, data collection, habitat loss, hunter recruitment, hunter retention, passive management, quail, research, urbanization

Introduction

Quail research and management in Arizona progressed from an era of active, field oriented activities (Brown 1989), to more passive management and research initiated only in response to controversy. Since the mid 1970s, hunter numbers have declined in Arizona as a percentage of the population, which is consistent with national trends (United States Department of Interior and Fish & Wildlife Service and United States Department of Commerce, Bureau of Census 2001). Arizona quail hunter numbers have also been trending downward, due to loss of access to hunting land, drought, and in some cases lack of information (Arizona Game and Fish Department 2006). The satisfaction of avid quail hunters with the Arizona Game and Fish Department's (the Department) quail management program also declined in response to more passive management (C.J. Biller, J. Levy, D. Lukens, T. Pfister, M. Rabe, personal communications). Their decreased willingness to work with the Department helped set the stage for what has been coined the "Arizona Quail Wars" (ca. 1995-

2002).

Like many portions of the United States, Arizona is increasingly urbanized, with a human population growth rate twice the national average (United States Department of Commerce 2000). Sprawl surrounding urban centers results in fewer local places to hunt, and also contributes to problems of hunter retention (Schulz et al. 2003). More importantly declines in small game hunting participation have exceeded those for big game (United States Department of Interior and Fish & Wildlife Service and United States Department of Commerce, Bureau of Census 2001). The lack of local places to hunt has impacted urban hunter participation, and those available habitats adjacent to urban centers cannot meet the needs of all urban hunters (Schulz et al. 2003). This results in declining participation and license sales (Schulz et al. 2003), then ultimately reducing funding for conservation programs. Since local small game hunting represented the traditional recruitment mechanism for most youth hunters in the past (Adams et al. 2004), loss of local hunting areas not only impacts retention of existing hunters, but

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recruitment, as well.

Today's hunters require more information in order to be successful in a shorter period of time due to competing interests and a desire to maximize opportunity for success during their increasingly limited free time. While some level of success is important for hunters to continue hunting (Ortega y Gasset 1985), early and consistent hunter success may be more important to today's hunter, particularly those new to the activity (Duda et al. 2003). Survey results continue to show that being outdoors and sharing the experience with family or friends are key reasons they choose to hunt, as well (United States Department of Interior and Fish & Wildlife Service and United States Department of Commerce, Bureau of Census 2001, Arizona Game and Fish Department 2005).

Like many other state wildlife agencies and non-governmental organizations (NGOs), the Arizona Game and Fish Department is increasing its efforts regarding recruitment and retention of hunters, both to maintain and increase funding for conservation and to preserve America's hunting heritage. Declining participation, reduced free time among potential hunters, increasingly sophisticated dedicated quail hunters, habitat degradation, and declining habitat connectivity have led to a time when a more active management program is again called for in Arizona. This paper documents past quail management efforts, and current efforts aimed at positively influencing quail conservation, management, and recruitment and retention of hunters.

Arizona quail management history 1940-1987

Habitat management

The Arizona Game and Fish Department was actively protecting and enhancing quail habitats throughout the state as early as 1939. Prior to this, quail (primarily Gambel's quail, *Callipepla gambeli*) were considered to be unimaginably abundant, and management efforts often involved removals of "nuisance" quail from agricultural areas (Griner 1940a). These animals were often used in transloca-

tions to other parts of the state throughout the 1930s and 1940s. Concerns did exist, however, and Gorsuch (1934) was warning about the effects of overgrazing and declining quail as early as the late 1920s and early 1930s. Initial habitat protection and enhancements by the Arizona Game and Fish Department began in Cochise County in 1939, including inventories of existing habitats, roadside surveys of quail populations, and annual production surveys (Griner 1940e). Areas identified as key habitats were fenced (4-45 ha, 10-110 acres), and data were collected annually in these "Quail Restoration Plots" from 1940-1945. Extensive inventories of quail habitats and quail populations throughout the state followed initial efforts in Cochise County, but restoration plots were installed only sporadically (Griner 1940c,g,f,b,d). The post-war era led to shifting priorities and increased workloads for Arizona Game and Fish Department personnel that resulted in abandonment of these restoration plots, although it was recommended that a portion of those be retained in Cochise County (Wright 1951). Additional quail habitat protection efforts resulted in the purchase of tax delinquent properties along the Gila River between Phoenix and Yuma (Brown 1989). These properties remain a portion of the Arizona Game and Fish Department's Wildlife Management Area system and remain important habitats for Gambel's quail.

Given the arid nature of much of Arizona, early managers believed the addition of free water would increase quail abundance, a question that lingers through today. Construction of artificial water sources for quail began in 1946 in central Arizona (Kimball 1946). Experimental research on water requirements and the influence of artificial waters on quail abundance began in 1957 and continued through 1963. Through experimental water closures, Smith and Gallizioli (1963a) determined the addition of free water did not increase hunter success or Gambel's quail abundance. This research suggested providing additional waters through guzzler development may actually be detrimental to quail populations since they artificially concentrate quail,

making them more vulnerable to harvest and disease. Following these findings, "gallinaceous guzzler" construction was discontinued although the Department continues to actively provide artificial water catchments for big game. Active manipulation of habitat ceased for Gambel's quail following discontinuation of guzzlers, as it was determined the protection of large blocks of unaltered native habitats would have a more positive impact on populations.

Little habitat effort was directed at Arizona's other quail species from 1940-1987. The work of Griner (1940e) in Cochise County benefited scaled quail (*Callipepla squamata*) more than Gambel's quail, since retention and enhancement of desert grassland habitats was a primary goal of these restoration plots. Efforts began to evaluate habitat requirements of scaled quail of southeastern Arizona in 1967 and plans were made to translocate this species to grassland habitats in other parts of Arizona. However, following an analysis of habitat conditions, life history, and precipitation patterns, Brown (1970) recommended that this program be terminated.

Montezuma or Mearns' quail (*Cyrtonyx montezumae mearnsi*) were considered to be rare following the intense period of livestock grazing and drought from the 1880s to after World War II. Rangelands recovered somewhat during the post-war years and Mearns' quail populations responded favorably (Brown 1989). Efforts to gather more habitat and distribution data followed a request to open a season for this species in 1960 (Yeager 1967). No active habitat work was conducted for this species beyond making recommendations to the USDA Forest Service concerning livestock grazing management.

Quail population survey

A variety of techniques were tested and employed in Arizona to determine annual quail populations and to create an index of fall hunt success. Gambel's quail summer roadside and brood counts were conducted annually (2,200-3,200 km, 1,400-2,000 miles, annually) from 1941-1963 to assess statewide populations prior to the hunting sea-

sons (Smith and Gallizioli 1963b). Scaled quail data were collected incidentally along these routes, but did not represent a serious effort for this species. Total number of quail observed on summer routes was slightly correlated with the percentage of juveniles in the harvest ($r^2 = 0.22$) and was a poor predictor of hunt success. Links between winter precipitation and juvenile production were suspected, but had not been thoroughly evaluated. Using data from 1941 - 1961, winter precipitation showed a high correlation with percentage of juvenile Gambel's quail in the harvest ($r^2 = 0.70$), but, again, was not a good predictor of overall hunt success, since hunter success also depended on population carryover and local cover conditions (Smith and Gallizioli 1963b). However, in the 1940s, hunting seasons were closed if the observed juvenile per adult ratio fell below 2.1:1 (Brown 1989).

Gullion (1954) in Nevada, and Hungerford (1960, 1964) in Arizona conducted analysis linking winter precipitation and growth of green forbs rich in Vitamin A. In 1960, the link between calling intensity, young produced, and winter rainfall was firmly established (Hungerford 1960), further bolstered by Hungerford (1964) that linked winter precipitation with green forb production and corresponding gonadal development and reproduction. Following an 7-year period of analysis (Kufeld 1964), spring Gambel's quail call count surveys replaced summer roadside surveys in 1964, and were conducted statewide until 1987 (L. Ordway personal communication). Research (Smith and Gallizioli 1965) suggested the number of calls recorded at 0.5 mi intervals along a 20 mi route proved a good predictor of nearby hunter success. However, these routes were discontinued throughout much of the state in response to increased field personnel workload, shifting priorities, and the relationship between precipitation and quail production, despite recommendations from earlier research that precipitation data alone was a poor predictor of hunter success (Smith and Gallizioli 1963b).

Outside of attempts to gather limited population data, fewer research and management actions were

directed at the other hunted quail species in Arizona, scaled quail and Mearns' quail, since they represent a relatively low percentage of annual quail harvest in Arizona. D. E. Brown did the first serious population survey work with scaled quail in Arizona (Brown et al. 1978). Effects of precipitation on nesting success were poorly correlated, and nesting success for this species was found to be fairly consistent, suggesting variation in hunt success was more dependent on population carryover.

Mearns' quail population surveys began in response to the first open the season (2 days) in 1960. Roadside and pointing dog surveys were conducted sporadically to assess sex and age ratios, numbers, life history and general distribution. Serious work to develop a survey technique for Mearns' quail did not occur until the late 1990s (Bristow and Ockenfels 2000).

Quail harvest survey

Indices or estimates of population and determination of harvest levels for game species continues to remain an annual data need for state wildlife agencies, and are increasingly expensive and/or difficult to obtain (A. Munig, B. Wakeling, M. Rabe personal communication). Efforts to gather quail harvest data in Arizona began in 1940, using check stations in a few local, popular hunting areas (Eicher 1943).

Prior to standardized Arizona quail seasons in 1979 (Brown 1989), quail season length and bag limits were adjusted annually in response to quail abundance indices and political considerations.

Consistent collection of harvest data at check stations did not begin until 1951 (Gallizioli 1955), although these efforts were typically tied to a research project and were not conducted solely for management purposes. Check stations operated from 1951-1960 were used primarily to assess harvest impacts on quail populations, results of which suggested regulated harvest had little impact on quail abundance (Gallizioli and Webb 1961). Two check stations for Gambel's quail, both in the Department's Southeast Region (Region 5) have been conducted

annually from 1980 to present (J. Heffelfinger, personal communication). Other harvest survey methods employed during this period included daily hunter report cards, and wing barrels. Wing barrels to collect Mearns' quail harvest data were initiated in the 1960s and continue through the present. The Department's mailed hunt questionnaire system was initiated in 1961 (Arizona Game and Fish Department unpublished data), began providing reliable estimates of hunter statistics and harvest by 1965 (Brown 1989), and continues to be in use today.

Arizona quail management history 1988 - 2002

Passive management

By 1988, Arizona's quail management program could best be described as passive, although a few annual active programs continued. Because of competing priorities, conflicting opinions on importance of field data, declining revenues for game management, and increasingly diversified workloads, statewide field data collection was discontinued. Seasons and bag limits were standardized in 1979 and hunters were informed that precipitation dictated quail abundance, seemingly negating the need for other sources of information. This began to set the stage for controversy. Standardized seasons and bag limits, an over-reliance on annual precipitation data as the main index for season forecasting, less contact with constituents in the field, and the appearance of doing little to protect or enhance quail habitats created a rift between the Department and our core support group, namely the "dedicated quail hunter." Indices of Gambel's quail population were discontinued entirely throughout much of the state, with the exception of 3-5 annual Gambel's quail routes run only in southeast Arizona, which is not representative of the state. Little or no data were collected for scaled quail. Controversy in the late 1990s and early 2000s surrounding harvest impacts to Mearns' quail instigated the creation of a coalition of hunters and guides that acted as a "watchdog" to Department's quail management actions. In an effort to reengage these constituents volunteers from a

variety of NGOs and local Mearns' quail guide services were employed to collect pre- and post-season Mearns' quail data. However, these efforts were discontinued after a few years due to variability between observer and dog abilities.

The Department also did little in the way of quail research during this time period. Most research initiated as a result of the controversy, such as the research of Bristow and Ockenfels (2000, 2002, 2004), and Bristow et al. (2005).

Conflicts Created

During this era, several issues arose that created problems for the Department, alienated some constituents, and reduced program effectiveness. Quail hunter opinion of the Department's standing as a leader in quail conservation and management declined. A large portion of the quail hunting public believed the Department had lost touch with local quail abundance, impacts of harvest, and habitat condition. Worse still, the Department was looked at as doing little actual work to protect and enhance quail habitats (J. Levy personal communication). While these issues were being actively worked on by Department employees, information regarding efforts was not well coordinated and was slow to be disseminated to constituents. The controversy culminated in the Department hosting a Quail Symposium in 2002. Efforts were made to include as many constituents as possible, and quail management experts from around the country were invited to assist the Department in assessing and potentially making recommendations for improvement of quail management. The symposium pacified some constituents, further alienated others, and ultimately changed little regarding management activities.

Arizona quail management history 2003 - present

Current challenges

Arizona quail species and quail hunters are facing enormous and seemingly insurmountable challenges. Arizona has one of the fastest growing human populations in the nation (e.g. Phoenix is the

6th largest city in the US and its growth rate is twice the national average), and growth will likely continue at a high rate, with a current population of >5 million more than doubling by 2030 (United States Department of Commerce 2000). Illegal immigration (conservatively estimated currently at over 0.5 million) from Mexico and other Latin American countries is accelerating, and habitat impacts in rural southern AZ are increasing dramatically due to this and other cross-border activity. Residential development is rampant, seemingly with little or no planning, and quail habitats and habitat connectivity are being lost permanently throughout Arizona, particularly in core Gambel's quail range of central Arizona. Grazing management continues to represent a significant habitat concern throughout much of Arizona, but cannot match the threat of residential development. Mearns' quail habitats are relatively secure from development due to their federal land status, but isolation of "sky island" populations will increase as low elevation habitats between mountain ranges fill with houses. Scaled quail are also being impacted by increased development, as well as habitat conversion and range management practices. Maintaining wildlife habitats in Arizona for all species will require increased political clout and support for wildlife managers and management activities.

Hunter recruitment, hunter retention, and Arizona quail management

In Arizona, declines of upland game hunters is greater than that for big game (Arizona Game and Fish Department 2006). However, Arizona has a limited big game resource. Big game licenses are issued through a competitive draw, and applicants far outweigh available permits (Arizona Game and Fish Department 2006). To retain unsuccessful hunters, the Department is exploring ways to increase interest in upland game hunting since: 1) upland game opportunities are more consistent, 2) these species represent the traditional recruitment point for youth hunters, and 3) upland opportunities may serve as a bridge during years hunters are unsuccessful during

the big game permit drawing (Arizona Game and Fish Department 2005).

Since Gambel's quail and mourning doves (*Zenaida macroura*) are the most widespread and abundant upland species in Arizona, the Department's Hunter and Shooting Sports Recruitment and Retention Team (HRRT) recommended that significant effort be placed on increasing the popularity of quail and dove hunting for both recruitment and retention efforts. Much of the emphasis will be placed on increasing the interest, knowledge, and abilities of potential and existing quail hunters, as well as their active involvement in conservation efforts.

Current direction

The Department's quail management program is in the process of returning to an era of more active field activities, including increased collection of population, harvest, and habitat condition data. These efforts place our personnel in the position of specific evaluations regarding quail species, versus the more casual approach of gathering these data incidental to other activities. Increased field presence during hunting seasons, opening weekend check stations, and survey efforts allow for increased contact with customers during critical time periods, and can improve relations with the customer even during years of lower quail abundance. Our current efforts have two ultimate objectives: 1) increase available funding for quail conservation, and 2) increase political clout by increasing constituent base. Both objectives are intimately associated with the Department's efforts regarding retention and recruitment of hunters.

The following assumptions apply to current and future activities: 1) increased customer service equals increased constituent loyalty, 2) increased constituent loyalty will translate into more political, financial, and involved support for conservation, and 3) increased field contact elevates Department's position as the state's quail management authority.

Our efforts are gradually increasing as funding allows. Increased efficiency is a key to increased data collection and information dissemination, and

we are exploring increased use of citizen scientists to meet data needs. Increased use of citizen science can increase our support for conservation, and offers unique opportunities for increased conservation education, and an opportunity to foster public ownership of Arizona's quail management program.

The quail program continues to monitor and provide local precipitation information to hunters. We are now bolstering these data with local population data, including more call-count information, regional brood observations, and other relevant information. Efforts are underway to provide user-friendly local scale quail forecasts, improving our opportunities for successful hunts by our constituents. In 2003, we began increasing the number of check stations we operate during the opening weekend. These serve not only as a source of harvest and hunter demographics data, but also represent an excellent opportunity to increase constituent contact in field settings. Efforts to increase other data collection, including the increased use of wing envelopes, wing barrels, and information dissemination have all been met with positive feedback.

We are also increasing our efforts to enhance and protect quail habitats. Current activities involve working with municipal and county zoning boards in an attempt to ensure the needs of quail, other wildlife, and hunters are considered in community development. We also work closely with state and federal land management agencies in an effort to apply management prescriptions that benefit quail species. Active habitat manipulations are increasing, as funding sources can be located. As recommended by the HRRT, intensive manipulations (including farming practices) on Arizona Game and Fish Commission Wildlife Management Areas near urban centers designed to enhance dove and quail populations are increasing. These areas will serve a vital role in upcoming recruitment and retention efforts, including Department hosted small game hunting workshops and youth small game hunts. While competition for habitat funds is increasing, we are currently achieving success in desert grassland habitat enhancements for scaled quail at a landscape scale

by pursuing partnership opportunities that leverage additional monies, including those destined for other grassland obligates.

Further application of more active management in Arizona will require a significant paradigm shift among agency leaders and wildlife administrators regarding the need for field data and increased priority placed on habitat enhancements for upland game. Habitat funds in western states have traditionally been spent primarily for big game projects, particularly during the past thirty years. While population data are not a necessity for establishment of annual statewide seasons for quail species (Guthery et al. 2004), and precipitation ultimately determines quail abundance (Brown 1989, Engel-Wilson and Kuvlesky 2002), the data do have significant value to our hunting customers, and to the Department for relationship building and maintenance. Positive relationships with all quail hunters, and increasing the number of hunters will increase the conservation community's ability to positively influence the political system regarding wildlife and open space conservation.

Potential concerns and solutions

Increased hunter recruitment efforts in Arizona are being met with some resistance among Arizona's more "avid" or "greedy" hunters (Engel-Wilson and Kuvlesky 2002). Concerns exist regarding providing enough information to new or occasional hunters for success, and the potential for further alienation of more dedicated and actively engaged ones (e.g. by giving out "favorite spots"). The Department will also be viewed as a glorified guide service if very specific hunting locations are provided. All our efforts should encourage field skills, educate, build conservation coalitions, and minimize divisiveness. Offering opportunities for involvement in data collection and program implementation to all Arizona quail hunters may provide the cohesiveness necessary to be ultimately successful in Arizona quail conservation. Increased customer loyalty will ultimately pay dividends in increased financial and political support for quail conservation programs.

Rapidly increasing urbanization in AZ makes public support and corresponding political clout increasingly important to maintain open space, quail habitats and areas that can be hunted.

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