

STRATEGIC PLAN
for
WILD TURKEY MANAGEMENT

State of California
The Resources Agency
Department of Fish and Game

November 2004

Original approved and signed by,

L. Ryan Broddrick, Director

ACKNOWLEDGEMENTS

AUTHORS

This plan was prepared by:
Scott Gardner
Environmental Scientist

Under the direction of:
Tom Blankinship
Senior Wildlife Biologist

With the assistance of:
Julie Decker
Scientific Aid

Wildlife Programs Branch
1812 9th St.
Sacramento, CA 95814

PLAN DEVELOPMENT

This plan was developed under the advise of representatives from each of the six Regional Offices of the Department of Fish and Game, including: David Walker, Richard Shinn, Terri Weist, Terry Palmisano, Douglas Bowman, Randy Botta, and James Davis. This plan was also developed in collaboration with the USDA Forest Service, Pacific Southwest Region, under the lead of Karen Hayden and Diana Craig. We also thank the several field biologists from both the Department of Fish and Game and Forest Service, who provided information in the development of the range map presented in this document.

FUNDING

Funding was provided, in part, by:

Federal Aid in Wildlife Restoration (excise taxes on sporting arms and ammunition)
The Department's Game Bird Heritage Program (funds from upland game bird stamp sales)
The National Wild Turkey Federation

TABLE OF CONTENTS

LIST OF FIGURESiii

1.0 INTRODUCTION1

 1.1 Laws, Regulations, and Policies1

 1.2 Plan Purpose.....2

2.0 BIOLOGY.....2

 2.1 Distribution of Subspecies2

 2.2 Life History3

 2.3 Habitat Requirements.....4

 2.4 Foraging Ecology and Food Habits4

3.0 POPULATIONS7

 3.1 Historical Perspective7

 3.2 Population Distribution and Size12

 3.3 Hunting15

4.0 GOALS AND STRATEGIES.....17

 4.1 Controversial Issues19

 4.1.1 Conflicts between turkeys and people in residential settings19

 4.1.2 Agricultural depredation by turkeys21

 4.1.3 Conflicts between turkeys and public land management policies23

 4.1.4 Potential conflicts between turkeys and native species24

 4.2 Recreational Opportunities25

 4.2.1 Recreational opportunities on public lands.....25

 4.2.2 Recreational opportunities on private lands.....28

 4.3 Population Monitoring and Harvest Management.....29

 4.3.1 Population monitoring29

 4.3.2 Harvest management.....31

 4.4 Long-Term Management of Turkey Populations34

5.0 CALIFORNIA ENVIRONMENTAL QUALITY ACT COMPLIANCE36

6.0 LITERATURE CITED39

LIST OF FIGURES

Figure 3.1 Distribution of wild turkey release sites 1928-1951.....9

Figure 3.2 Successful and unsuccessful wild turkey release sites 195110

Figure 3.3 Wild turkey release sites 1959-198811

Figure 3.4 Wild turkey release sites 1989-199913

Figure 3.5 Wild turkey range 200314

Figure 3.6 Wild turkey harvest and hunter trends, spring and fall seasons combined,
1968-1991.16

Figure 3.7 Wild turkey harvest and hunter trends, fall season, 1992-2003.16

Figure 3.8 Wild turkey harvest and hunter trends, spring season, 1992-2003.....17

Figure 3.9 Average wild turkey harvest by county 1999-200318

1.0 INTRODUCTION

Wild turkey (*Meleagris gallopavo*) populations have grown to become an established part of much of California's mixed pine-oak woodlands resulting from numerous introductions, the first of which was reported in 1877. Turkey populations have grown tremendously in recent years in certain parts of the state. The popularity of turkeys as a game species versus concerns about overpopulation of turkeys in some areas of the state have brought about new challenges for their management. This plan seeks to address those issues and outline strategies for wild turkey management that balance the multi-jurisdictional resource and land management policies of local, state, and federal governments, under the lead of the Department of Fish and Game.

1.1 Laws, Regulations, and Policies

State laws regarding fish and wildlife are enacted by the state legislature and listed in Fish and Game Code (FGC). Regulations are established by the Fish and Game Commission (Commission), and listed in Title 14 of the California Code of Regulations. The Commission consists of 5 members, who are appointed by the Governor for 6 year terms, and in addition to regulations, they are also responsible for general policy formation for the Department of Fish and Game (Department; FGC Section 703). The Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (FGC Section 1802).

Fish and Game Code Section 1801 establishes state policies for the conservation of wildlife resources. The goal of these policies is to maintain sufficient populations of all wildlife and the habitat necessary to achieve the following objectives:

- (a) To provide for the beneficial use and enjoyment of wildlife by all citizens of the state;
- (b) To perpetuate all species of wildlife for their intrinsic and ecological values;
- (c) To provide for aesthetic, educational, and nonappropriative uses;
- (d) To maintain diversified recreational uses of wildlife, including the sport of hunting;
- (e) To provide for economic contributions to the citizens of the state, through the recognition that wildlife is a renewable resource, and;
- (f) To alleviate economic losses or public health or safety problems caused by wildlife.

The Upland Game Policy of the Commission is as follows: "It is the policy of the Fish and Game Commission to: Conserve, restore, maintain and enhance upland game habitat and to maintain upland game populations at optimum levels on public and private lands within California. The Department's upland game program shall be aggressively carried out in a manner that is consistent with Section 1801 of the Fish and Game Code and in accordance with the objectives and elements stated in each Upland Game Species Management Plan..."

“The Mission of the Department of Fish and Game is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public.”

These laws, regulations, and policies of the state provide a framework of philosophies under which this plan has been developed. Laws supercede regulations, which supercede policies.

Turkeys appeal to a variety of people for their recreational value, including wildlife viewing and hunting, which provides significant economic contributions to the citizens of the state. However, growing numbers of turkeys in certain parts of the state have brought about conflicts and, in some cases, economic losses. The strategies in this plan seek to resolve these conflicts, while optimizing the value of wild turkeys.

1.2 Plan Purpose

The purpose of this plan is to: 1) identify current wild turkey management issues, 2) establish long-term management goals, and 3) outline strategies to achieve those goals. This is a strategic plan, which suggests management strategies based on the best information currently available. Turkey management is a learning process, commonly referred to as adaptive management in the management of natural resources (Holling 1978, Walters 1986). The Department has provided the following definition: “Adaptive Management means a flexible approach to the long-term management of fish, wildlife and habitat resources that is directed over time by the results of ongoing monitoring activities and other information. If the conservation goals and objectives of the program are not being achieved, the activities or strategies shall be refined and improved in order to achieve those goals and objectives.” This document is intended to develop a vision for the direction of the Department’s turkey management program, including goals and a range of strategies to meet those goals.

This plan does not outline specific projects, rather it provides a framework under which actions should be developed. The detail at which projects are designed and carried out is not included in this type of plan. Implementation of actions taken by the Department and/or other entities should be prioritized by needs, with clear objectives to meet the goals of this plan. Objectives should contain measurable parameters and monitoring programs to evaluate the success of those objectives. If objectives are not met, then management strategies are adapted or changed, thereby completing the adaptive management process.

2.0 BIOLOGY

2.1 Distribution of Subspecies

The wild turkey belongs to the order Galliformes (ground-nesting fowl), family Phasianidae (pheasants and turkeys), subfamily Meleagridinae (Stangel et. al., 1992, Rea 1980, Steadman 1980). There are two species in the genus *Meleagris*, the wild turkey (*M. gallopavo*) and the ocellated turkey (*M. ocellata*). The wild turkey is native only to North America and occurs widely in the United States and northern Mexico (Tapley et al. 2001). The ocellated

turkey occupies the Yucatan region of Mexico, Belize, and northern Guatemala (Stangel et al. 1992).

The wild turkey species (*M. gallopavo*) has been split into six recognized subspecies distinguished by geography, habitat, morphology, and plumage. The eastern subspecies (*M. g. silvestris*) is the most widespread and best studied subspecies. It ranges in deciduous forests primarily east of the Mississippi River, but it also extends to Missouri and the Dakotas (Lewis 1973). The smallest subspecies is the Florida turkey (*M. g. osceola*), which is found only in Florida. The Gould's turkey (*M. g. mexicana*) is the largest in size of the subspecies and is found predominantly in Mexico, but small populations exist in Arizona and New Mexico (Lewis 1973), with efforts currently underway to reintroduce extirpated populations in these areas (Wakeling et al. 2001). The Rio Grande turkey (*M. g. intermedia*) is a native of the arid region of the Rio Grande, ranging from southern Kansas through Texas to New Mexico and Mexico. This subspecies has also been introduced successfully throughout the western United States. The fifth existing subspecies is the Merriam's turkey (*M. g. merriami*), which is native to the semi-arid mid and southwestern United States, including Colorado, New Mexico and Arizona. This subspecies has also expanded its range throughout the western United States by introductions into central-northern Nebraska, western South Dakota, southwestern North Dakota, Wyoming, Montana, Idaho, Nevada, Washington, Oregon, and California (Lewis 1973). The Mexican turkey (*M. g. gallopavo*) is the sixth subspecies that once inhabited the region of southern Mexico. Domestic turkeys probably originated from this subspecies, which is now considered extinct (Pelham et al. 1992).

Besides geographic locations, turkey subspecies can be distinguished morphologically by comparative measurements of external characters and feather color patterns. Overall, the Gould's is the largest and the Florida is the smallest of the subspecies, with the Merriam's, eastern, and Rio Grande intermediate in size. The eastern and Florida subspecies have tail feather that are darker brown, whereas the western subspecies have whiter tail tips and rump feathers (Lewis 1973).

2.2 Life History

The wild turkey is a highly social flocking bird that maintains a hierarchy or pecking order. They form large flocks in the winter and disperse into sexually segregated flocks in spring and summer. Turkeys are polygamous and breeding behavior begins in late winter as daylight increases. Toms or gobblers (males) call (gobble) and display for hens (females), who choose their mates. Turkeys are ground nesting birds. Hens become solitary as they begin nesting, laying about one egg per day until a clutch of about 10-12 eggs is laid. During laying, hens generally spend less than one hour per day on the nest, foraging much of the rest of the time. They begin continuous incubation, which lasts 25-29 days, after the entire clutch is laid. They often leave the nest for brief periods to feed during this time. Turkey poults (chicks) are precocial (capable of moving about) shortly after hatching, and imprint immediately to the hen, from which they learn behaviors. Poults leave the nest with the hen within two days following hatching to forage and grow. By about 2 weeks of age, poults can fly and begin roosting in trees with the hen. They grow to adult size within 12-16 weeks and are sexually mature in their first year, although young hens do not always nest (Healy 1992).

2.3 Habitat Requirements

Throughout the wild turkey's range, suitable habitat contains a combination of two key components: trees and open grasslands. Trees provide food, escape cover, and most important, nighttime roost sites, where turkeys can avoid predators and adverse weather conditions. Except for roosting, the wild turkey is largely a ground dwelling and feeding bird. Open grasslands are the other key component to suitable wild turkey habitats, providing food for adults, insect production for poults, and open areas where turkeys can efficiently forage while avoiding predation. Ultimately, moisture sufficient to produce suitable habitat conditions seems key in determining the range of wild turkeys, but moisture also limits turkey range. The wild turkey is not adapted well for marsh environments or persistent deep snow that exceeds 25 cm (10 inches; Porter 1992).

The ratio of forested and open grasslands varies throughout wild turkey range, from as little as 15% to as high as 90% forested habitat. However, the quality and interspersion of these habitats are probably most important. The annual home range of wild turkeys varies from 150 to 550 hectares (370 to 1,350 acres; Brown 1980) and contains a mixture of roosting habitat, nesting habitat, brood-rearing habitat, and fall and winter habitats. Turkeys often roost in the largest trees within a stand that provide easiest access (Rumble 1992), but also presumably to see their surrounding environment well. Physiographic characteristics of slope, aspect, and distance to water and clearings are also important for roost site selection (Porter 1992).

The characteristic most associated with nest site selection is lateral cover, which obscures detection by predators. Lateral cover is most commonly provided by shrubs, herbaceous vegetation and woody debris. An overhead canopy provided by shrubs and trees is also associated with successful nest sites. Proper conditions for nesting are best produced in woodlands. However, forest openings with herbaceous vegetation (grasses and forbs) are particularly important during brood rearing. These openings provide areas where poults can easily move around and frequently forage, while remaining concealed from predators. Nest sites that are in close proximity to good brood rearing habitats typically result in higher chick survival, further demonstrating the importance of well interspersed forested and open areas within suitable turkey habitat (Porter 1992).

The five subspecies of wild turkey occupy a range of habitat conditions, from eastern oak-hickory forest to mesquite-brush land of Texas, and they have also been successfully introduced to all of the western states and Hawaii, demonstrating the species' ability to adapt well to different environments.

2.4 Foraging Ecology and Food Habits

Numerous studies have been conducted on wild turkey foraging ecology and food habits throughout their range, using crop and stomach contents and analysis of fecal material. Comprehensive reviews of wild turkey feeding ecology may be found in Hurst (1992), Korschgen (1967), and Schorger (1966).

Digestive System Physiology

Wild turkeys are omnivores that can consume a wide variety of plant and animal foods (Schorger 1966, Hurst 1992). Like other gallinaceous birds, wild turkeys have among the longest intestines and ceca of all birds, capable of extracting nutrition from numerous food sources, including coarse vegetation low in nutritional value (Schorger 1966, Blankenship 1992). Nutritional requirements of wild turkeys vary with age and by season, with a combination of acceptable foods needed to satisfy nutritional requirements (Beck and Beck 1955). Wild turkeys ingest food items through the esophagus and store them temporarily in their crop, which is an expandable organ reported to contain about 178 cubic centimeters on average when full (Schemnitz 1956, Mosby and Handley 1943). Food items then pass into the gizzard, which is a powerful organ that grinds foods for digestion, capable of crushing very hard items, including large seeds and fibrous vegetation that is usually well fragmented when excreted in fecal material. However, smaller hard seeds may sometimes pass through the digestive system intact (Schorger 1966, Blankenship 1992).

Diet

Wild turkeys are reported as opportunistic omnivores in the scientific literature (Hurst 1992). The crop and stomach contents of 524 wild turkeys in Virginia contained 354 different plant species (representing 80 families) and 313 different invertebrate species (Dalke et al. 1942, Mosby and Handley 1943). As part of their generalist feeding behavior, wild turkeys are consistently reported to forage from acceptable food items most available in their environment seasonally (Garver 1987, Hurst 1992). When examining any turkey food habits studies, the majority of the diet at any particular time is comprised of a few food items widely available in the environment at the time, accompanied by many incidental food items that are much less frequently consumed.

More recent literature, particularly addressing Merriam's turkeys, has demonstrated that they are probably more selective foragers than has been assumed. When food items eaten by wild turkeys were compared with food item availability in the environment, Rumble and Anderson (1996) concluded that contrary to the reported literature Merriam's turkeys were not opportunistic foragers, rather that they actually exhibited high selectivity for certain types of foods given seasonal availability (Hoffman et al. 1993, Rumble and Anderson 1996). Hurst (1992) concluded that, "A review of the literature, makes apparent that, from Maine to Mexico, in a variety of different habitats, all turkeys eat a great variety of foods, but from the same general types: hard and soft mast, green forage, seeds, agricultural crops, and animal matter."

Plants

In a review of wild turkey food habits, Schorger (1966) said that, "The turkey consumes a great variety of animal and plant foods. By far, the greater part is from plants. Mast is consumed in the largest quantity when procurable, but some succulent plant material is essential. The food eaten depends largely on what is available." Plant materials consistently comprise the majority of the annual turkey diet throughout its range, with estimates as high as 95% of the total diet (Mosby and Handly 1943). Grasses and other green herbaceous plant leaves and seeds are

the most utilized turkey foods throughout the year. Soft mast (fruits and berries) and hard mast (acorns and pine seeds) are important fall and winter foods. To a lesser extent, roots and tubers may also be utilized.

Animals

Invertebrates are the most reported animal foods consumed by wild turkeys. Insects are of particular importance to poults. Demands for protein are greatest during the first four weeks of life, and this demand continues through the juvenile stage to a lesser extent. During this time, insects also become widely available in the environment. Similar to plants, the most widely available invertebrates in the environment are generally consumed most. Vertebrates have rarely been reported as food items in the literature. In a comprehensive review of the food habits literature, fragments of amphibians and reptiles occurred in 15 of 45,363 food habits samples between 1941 and 1996. As poults age, they shift food habits from animals to plants, which also reflects changes in availability of food items (Hurst and Stringer 1975, Healy 1985, Hurst 1992, Rumble and Anderson 1996).

Agricultural Crops

Wild turkeys are known to utilize agricultural crops, such as corn, wheat, oats, alfalfa, nuts, and fruits (Hurst 1992). Corn and grain crops in the Midwest have an important role in supporting turkey populations (Little 1980). Turkeys are often attracted to agricultural and orchard areas for a variety of reasons, including water and insects, and for the crops themselves.

Foraging Behavior

Wild turkeys feed almost exclusively from the ground or within the herbaceous vegetation layer. They do not usually feed in trees, except during periods of heavy snowfall when other food items are unavailable. Feeding behavior generally involves a combination of scratching at the ground and pecking at food items. Scratching behavior is most common when feeding on items on or beneath the surface of the ground, such as fallen mast and seeds or tubers, and is most prevalent during fall and winter. During spring and summer, turkeys tend to feed more in the herbaceous vegetation layer and will tend to pick or strip food items from vegetation (Hurst 1992). "Feeding movements are best described as nomadic within limits, seemingly aimless, yet purposeful in search for food" (Korschgen 1967). Turkeys tend to feed in flocks and rarely remain still, moving at an estimated 3.2 km (2 miles) an hour as measured in some studies (Mosby and Handley 1943, Lewis 1973). Turkeys may feed any time of day, but generally have two periods where feeding is heaviest, in the morning after leaving the roost and in the late afternoon (Hurst 1992).

Hens with broods feed as a unit almost constantly. After poults reach one or two weeks of age, two or more successful hens often join together while feeding. Poults exhibit predatory feeding behavior early in life while feeding by pecking at food items that move away from them, mostly insects. They also exhibit behavior where they stalk, chase, jump, and tug at potential prey (Stringer 1977, Healy 1985). As they age, poults shift from exhibiting largely insectivorous to herbivorous behavior (Hurst 1992).

California Research

Wild turkey food habits were studied in San Luis Obispo County in 1966 (Smith and Browning 1967). The staple food item through the year was wild oats (*Avena barbata*), supplemented by green grass and forb leafage in the spring and acorns in the fall. Wild turkey foraging ecology and food habits were studied more recently in San Diego County during 1999 and 2000 (Delgado 2004, California Department of Fish and Game unpublished data). Similarly, the staple food item was wild oats and annual grasses (*Bromus spp.*), constituting about one-third of the annual diet. Acorns were the most important fall and winter food items, constituting close to one-fifth of the diet. Turkeys selected herbaceous grassland/meadow most frequently (41.9%) and mixed conifer/hardwood was the most used forest cover type. Similarly, 70% of the feeding sites were in herbaceous grasslands/meadows with 15% in mixed conifer/hardwoods. Micro-site feeding selection was influenced mostly by structural habitat variables, including sites closer to forest edge, with less rock cover, with less visual obstruction, and larger trees than random sites. Feeding sites were not substantially influenced by species composition, except for selection of acorns seasonally. This study is currently being drafted for publication.

3.0 POPULATIONS

3.1 Historical Perspective

Although turkeys were native to the southwestern United States, including Mexico, Arizona, and New Mexico, they were not found in California at the time of European settlement (Burger 1954a, Rea 1980). Prehistoric specimens of a closely related species now considered to be the California turkey (*M. californica*) have been found at Rancho LaBrea (Miller 1925) and other locations in southern California, including Los Angeles, Orange, and Santa Barbara counties (Steadman 1980). Numerous specimens at Rancho LaBrea suggest that this species was abundant in southern California during the late Pleistocene Epoch, but they became extinct about 10,000 to 12,000 years ago, presumably as the result of dramatic climatic change making the habitat no longer suitable. Specimens of *Meleagris* spp. from unknown origins and inseparable from either the California turkey or the modern wild turkey have also been found in a cave in Shasta County, with reports of specimens from a cave in El Dorado County (Steadman 1980). Currently, the prehistoric distribution of the California turkey is not considered to have extended into northern California (Rea 1980).

The first record of modern wild turkey introduction into California was in 1877, when birds from Mexico were released on Santa Cruz Island by private ranchers (Caton 1877). Records of releases by the Department began in 1908, when 22 turkeys from Mexico were released in the San Bernardino Mountains (Schorger 1966). Later that year, 26 turkeys from the same region were retained by the Department as breeding stock (Harper and Smith 1973). Birds raised from that stock were also released in the lower Yosemite Valley, Sequoia National Park, and Tulare County (Schorger 1966). By 1913, the Department had continued developing breeding stock, primarily from Mexican turkeys, but also including 5 birds from Virginia, and reported additional releases in a number of locations from Humboldt and Shasta counties south to San Diego County, with some emphasis in the lower Sierra Nevada (Grinnell and Miller

1944). An outbreak of blackhead wiped out the breeding stock in 1913 and the program terminated (Schorger 1966). The population at Sequoia National Park grew in the initial years, but the last birds from those releases were seen around 1918 (Grinnell and Miller 1944). About 1,240 turkeys were released throughout the state during the period 1908 - 1913 (Harper and Smith 1973).

The Department continued to breed turkeys in captivity, and in 1928, turkeys from Arizona were brought into the state for breeding and release (Grinnell 1928). The stock developed by the Department by that time was mostly from Mexican, Merriam's and domestic stock (Harper and Smith 1973). In 1928, the Department began aggressively releasing these game farm turkeys, later referred to as "California hybrids." Under this program, about 3,350 game farm turkeys were released in 23 counties throughout the state (Fig 3.1; taken from Burger 1954a). Only three populations were successfully established as a result of these stocking efforts, in San Luis Obispo, Sonoma, and Santa Clara counties (Burger 1954a, Burger 1954b, Slossen et al. 1970). Because of the poor success of game farm releases, the program was terminated in 1951.

The Department continued to experiment with releasing wild stock in 1949 and 1950, with Merriam's turkeys translocated from Arizona to Tulare County. In just two years, 23 translocated birds had grown to an estimated population of about 200 birds (Fig. 3.2; taken from Burger 1954a). However, no known wild populations still exist from those releases. By the early 1950's, domestically propagated birds were considered inferior for establishment in the wild, because they did not have the learned characteristics required to survive and reproduce. With the invention of techniques that allowed for the capture of large numbers of wild birds, translocation of wild stock was preferred for establishing wild populations. In 1959, the Department released the first Rio Grande turkeys in California. Sixty-two birds from Texas released in San Diego County were successful in establishing wild populations (Burger 1954a, Graves 1975).

Following these initial successes, the Department continued releasing wild-trapped turkeys from other states to establish wild California populations. Rio Grande turkeys were the most popular subspecies because they were more available than Merriam's stock and were highly successful in the seasonally-arid conditions of much of California's oak woodlands. Rio Grande turkeys have become the dominant subspecies established in most of the lower elevation oak woodlands as the result of numerous releases statewide, and they are locally abundant in many areas of the state. Rio Grande turkey populations have probably replaced most of the game farm birds that had historically become established along the central coast. From 1959 to 1988, 2,924 turkeys were released under this program (Fig. 3.3).

More recent efforts to establish turkeys in higher elevation coniferous habitats have been attempted with Merriam's turkeys. This subspecies is native to ponderosa pine (*Pinus* spp.) dominated habitats of the mid and southwest, including New Mexico, Colorado, and Arizona. Merriam's turkeys are thought to have originated from turkeys domesticated by native American cultures, which became feral as these civilizations broke down (Rea 1980). Merriam's turkeys have been released in the higher elevations of northern Coast Range, throughout northern

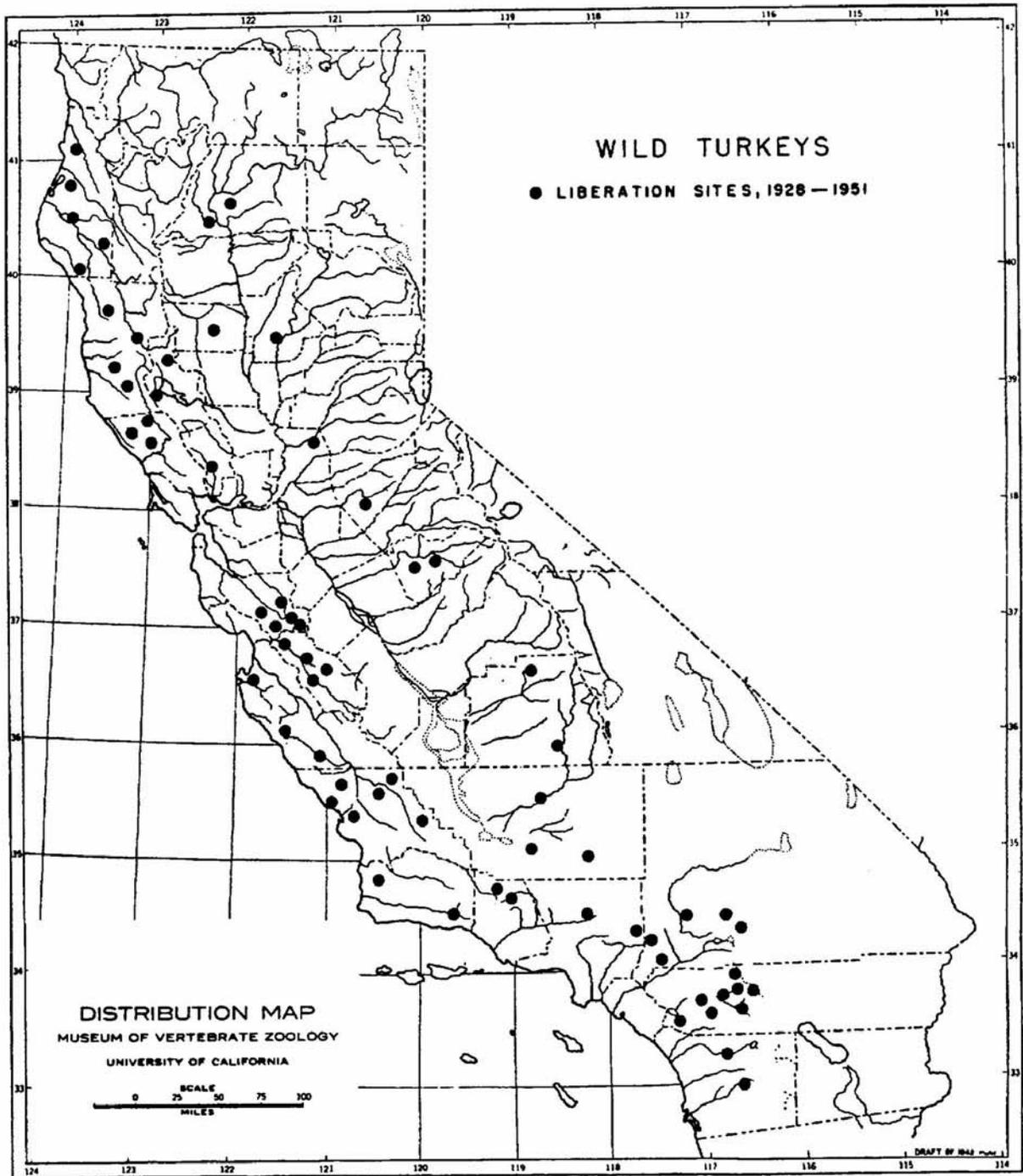


Figure 3.1 Distribution of the 71 sites where wild turkeys have been released in California since 1928 (Taken from Burger 1954a).

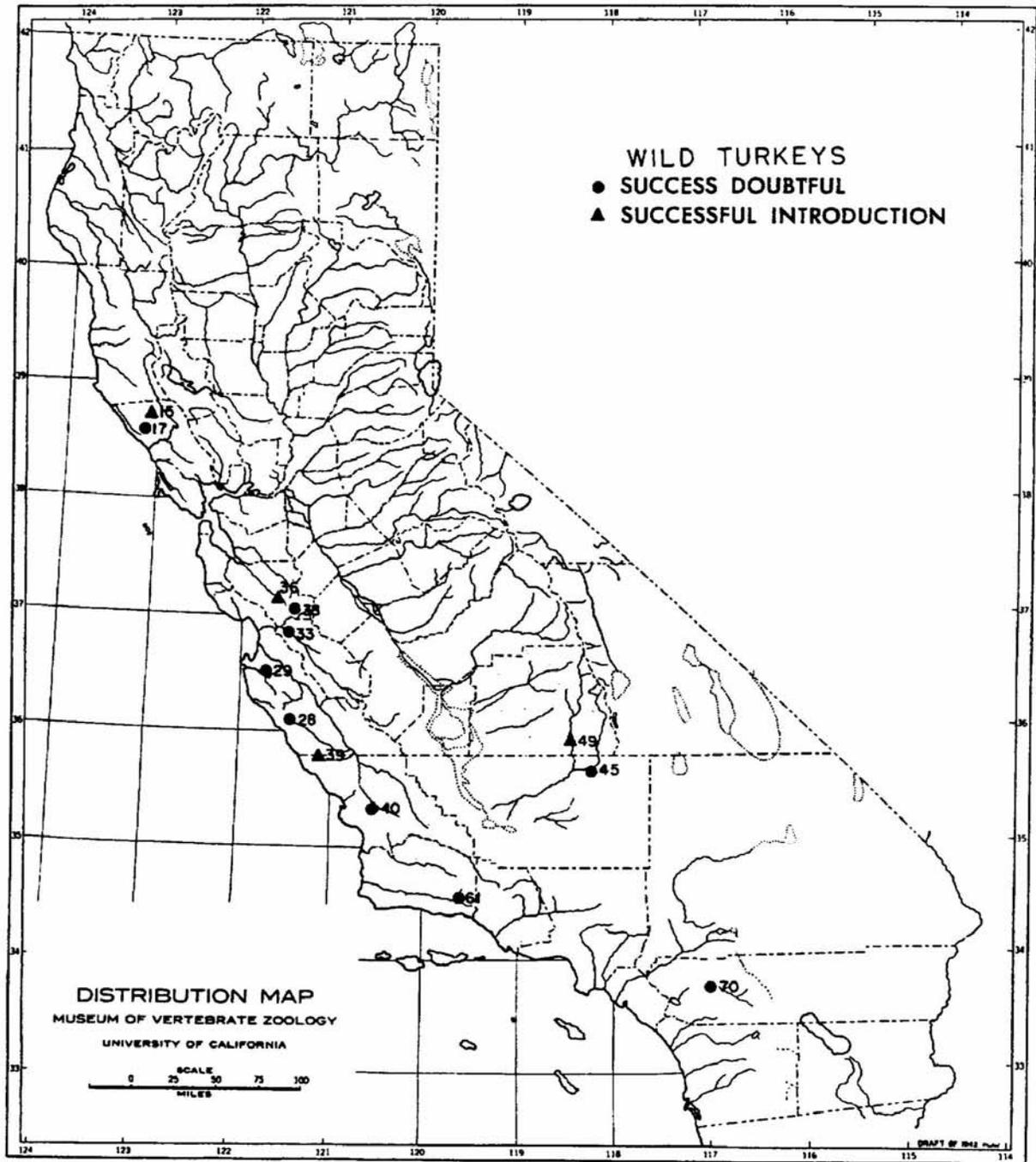
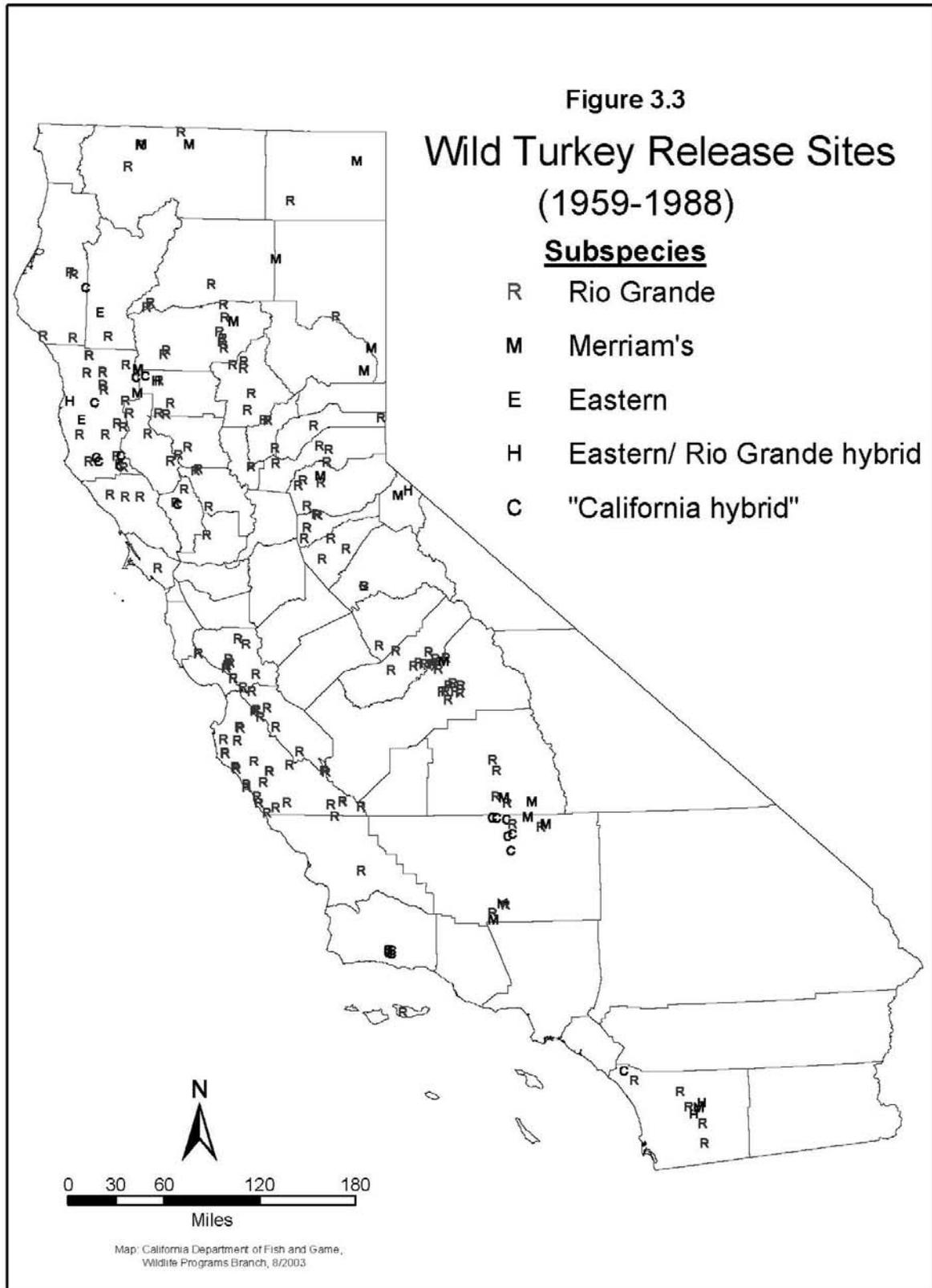


Figure 3.2 Locations of four wild turkey introductions judged “successful” in 1951, and nine introductions where turkeys still persist but where ultimate success is in doubt (Taken from Burger 1954a).



California, the Sierra Nevada, and south to the San Bernardino Mountains, which have resulted in the establishment of local populations. Initially, releases of Merriam's turkeys did not appear to be as successful as Rio Grande turkeys, which may be attributable to numerous factors that are not clear, including habitat suitability, release methodology, and hunting pressure. However, more recent information suggests that these releases may be growing, particularly in northern California.

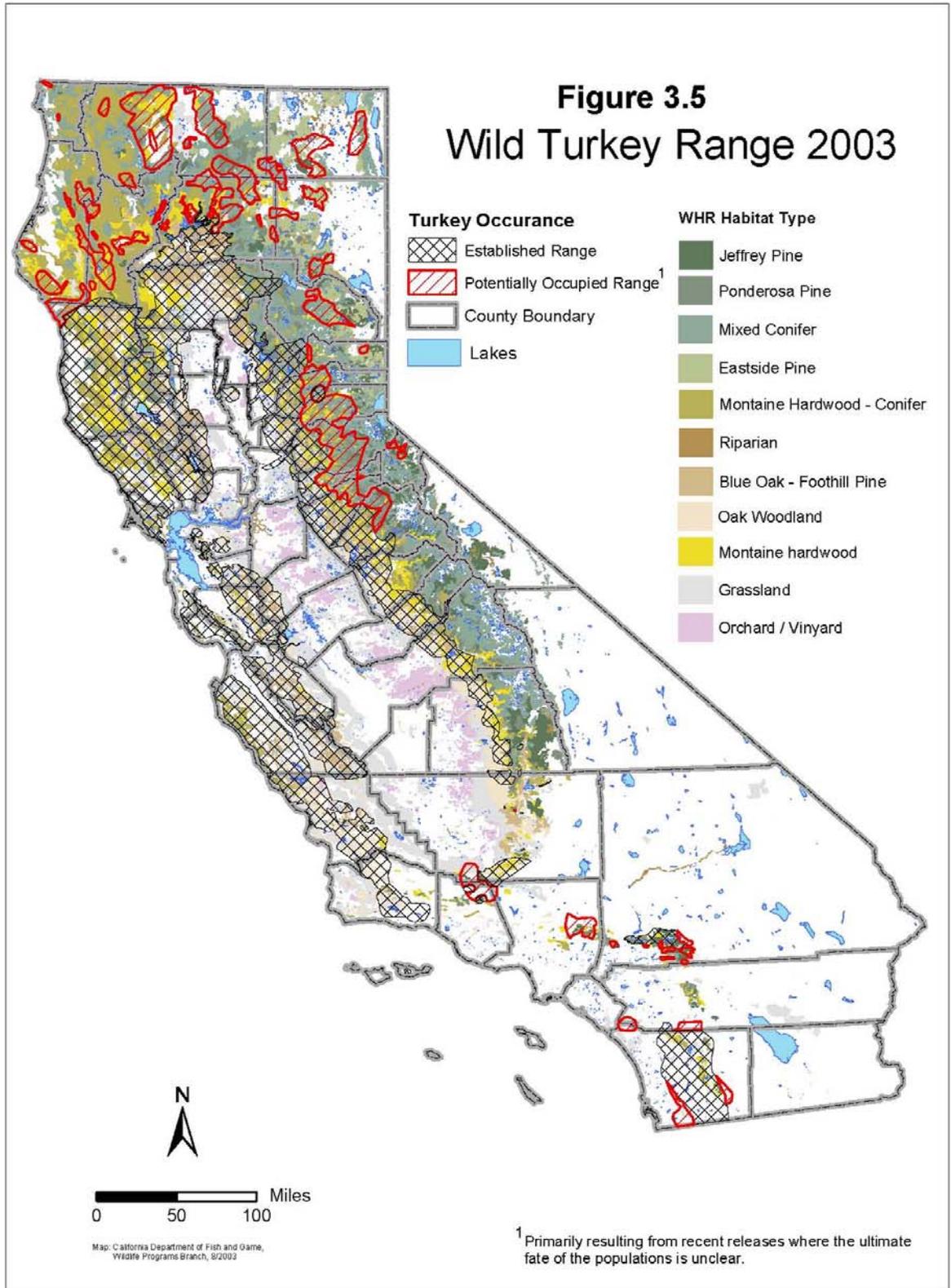
Eastern wild turkeys have also been released in Trinity County, but no pure strains of eastern turkeys are considered established in California. Eastern-Rio Grande hybrids from Kansas have also been released in the state along with Rio Grande turkeys, and these have resulted in the expansion of ranges in San Diego County and along the northern coast. Between 1989 and 1999, 943 turkeys were released with emphasis on higher elevation public lands (Fig. 3.4).

3.2 Population Distribution and Size

Delineation of the range or distribution of wildlife species is not an exact science. An animal's range is continuously changing; populations go through contractions and expansions regularly for any number of reasons. Typically, biologists start mapping range by delineating locations that animals are known to inhabit, then gaps are then filled in by assuming that all suitable habitat between known occupied areas is also occupied. Mapping the range of an introduced species is even more complicated, because their populations are typically changing at a faster rate and habitat suitability is often not clearly understood.

Figure 3.5 presents wild turkey range in California in 2003. This map was created by a collaborative process primarily between the Department and the U.S. Forest Service (USFS). Field biologists in each agency mapped turkey range on 1:100,000 scale maps including Wildlife Habitat Relationships (WHR; Mayer and Laudenslayer 1988) habitat types that are potentially suitable for wild turkeys and physiographic features. Turkey range is presented in two categories. The first category includes range where turkeys are thought to have established populations that are likely to remain over the long term, typically resulting from releases decades ago (prior to 1988), in habitats that are clearly suitable for turkeys based on previous population success. The second category represents range potentially occupied by turkeys, typically resulting from recent releases (since 1988), where the ultimate fate of these populations is uncertain and habitat suitability remains unclear (e.g. Merriam's turkeys in higher elevation habitats). All suitable habitat between gaps in known populations are assumed to be occupied as well in the established range category; however, this assumption was not always applied to the second category.

Wild turkeys are currently established in much of the lower elevation oak woodlands of the Sierra Nevada foothills and Coast Ranges, including the central coast, north coast through Mendocino County, south coast in San Diego County, and the foothills of the Klamath and Cascade mountain ranges of northern California. These turkeys are probably mostly of Rio Grande descent, but may contain genetics of "California hybrids" released by the Department up to 1951. Isolated populations of Rio Grande, Eastern, and Eastern-Rio Grande hybrid turkeys may also be found along the north coast in Humboldt and Trinity counties.



More recent efforts to establish wild turkey populations in higher elevation coniferous habitats with Merriam's turkeys have occurred throughout the state in potentially suitable habitat, including northern California, the Sierra Nevada, and San Bernardino Mountains. These efforts have resulted in the establishment of local populations in areas of the Tehachapi Mountains in Kern County, the San Bernardino National Forest, and isolated populations in northern California. The current extent of established Merriam's populations in northern California is not clear, but they appear to be expanding. Isolated populations of Merriam's turkeys are known to exist in Modoc, Siskiyou, Lassen, and Plumas counties.

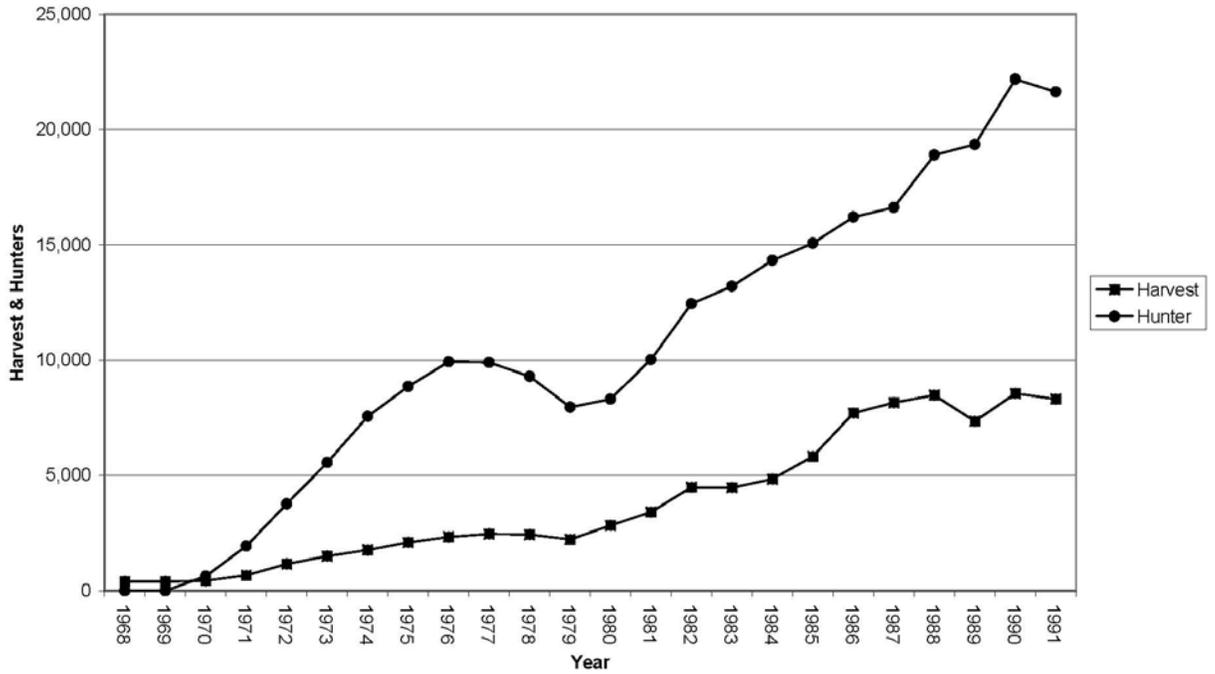
In total, wild turkeys are established in an area estimated to comprise 29,168 square miles (18.5 %) of California. This does not include the potentially occupied range where turkeys may exist, but at very low population densities. Density estimates for turkeys based on empirical data are not available for California. Therefore, the estimated area of occupied range was combined with average density information from other states to estimate population size in California. An average density of 8.3 ± 1.3 turkeys per square mile, calculated from the 10 states with the largest turkey populations (Tapley et al. 2001) was used assuming that turkey populations occur at similar densities in California. The resulting population estimate is about 242,000 turkeys in California.

3.3 Hunting

The first hunting season for wild turkeys in California was a two-day fall hunt in San Luis Obispo County in 1968. As turkey populations continued to grow, other counties were gradually opened to hunting, and by 1979 both spring and fall seasons were opened statewide, with the exception of San Diego County in the fall. Figure 3.6 presents wild turkey harvest trends between 1968 and 1991 from the Department's annual Game Take Hunter Survey, during which time harvest information was collected for both seasons combined. Tremendous growth occurred in wild turkey harvest during those years, presumably reflecting growth in both the turkey population and hunter numbers.

In recent years, the spring gobbler season has become more popular with hunters than the fall season. Of the two seasons, spring hunting is considered more biologically sustainable, allowing for harvest of up to 30% of the male population annually with no effects to population growth (Vanguilder 1992). However, studies in the Midwest have shown that harvest of more than 10% of the fall population will usually result in population declines, primarily because females are also harvested (Vanguilder and Kurzejeski 1995, Little et al. 1990). Some states have eliminated fall hunting entirely, in favor of the spring season. Regulations were changed in California in 1998, reducing the fall season from 30 to 16 days with a one bird season limit, and increasing the spring season limit from two to three bearded turkeys. The goal of this change was to shift the focus of the harvest from the fall season to the spring, primarily in an effort to protect populations on public lands. Figures 3.7 and 3.8 illustrate harvest trends since 1992, when the Department began collecting harvest information for the spring and fall seasons separately. Harvest leveled off in the early 1990's. A decrease in fall harvest and increase in spring harvest followed the regulation changes in 1998.

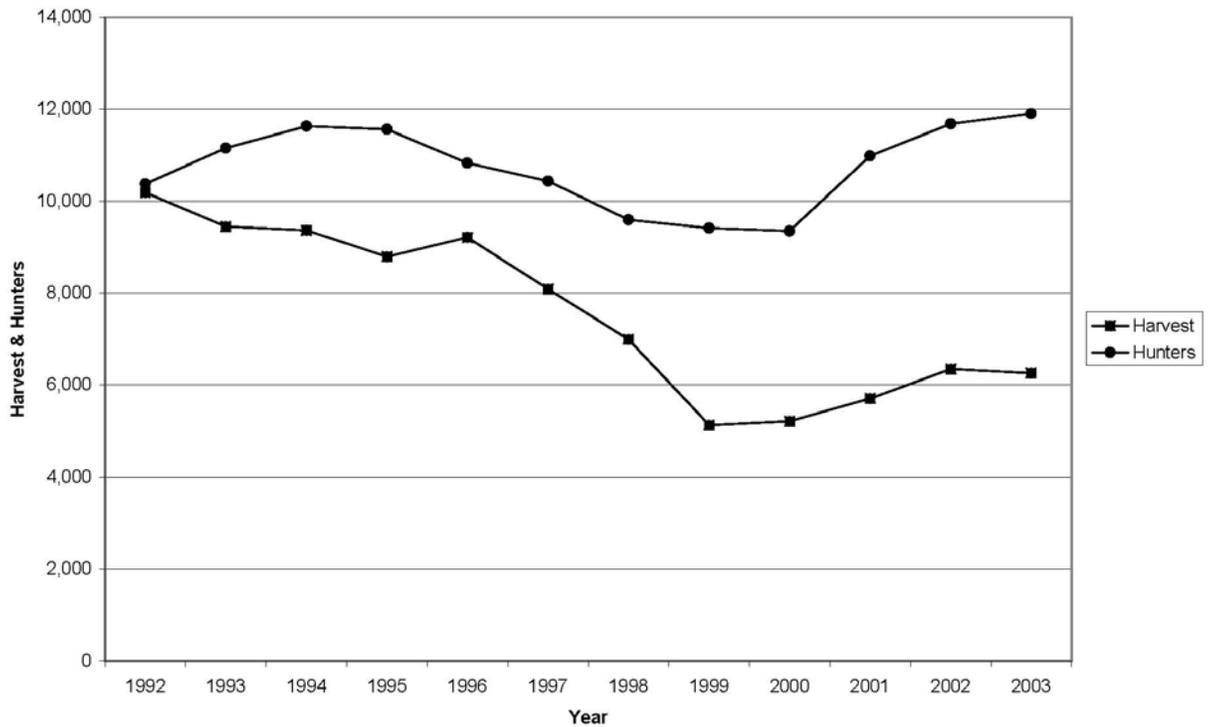
Figure 3.6 Wild Turkey Harvest & Hunter Trends¹, Spring & Fall Season Combined, 1968-1991.²



¹ 3 year running average.

² Taken from CDFG Report of the Game Take Hunter Survey, 1968-1991.

Figure 3.7 Wild Turkey Harvest & Hunter Trends¹, Fall Season², 1992-2003³.



¹ 3 year running avg.

² Fall season regulation changes in 1998: Season reduced from 31 to 16 days and bag and possession reduced from 1 per day, 1 in possession to 1 per season.

³ Taken from CDFG Report of the Game Take Hunter Survey, 1994-2003.

Figure 3.8 Wild Turkey Harvest & Hunter Trends¹, Spring Season², 1992-2003.³

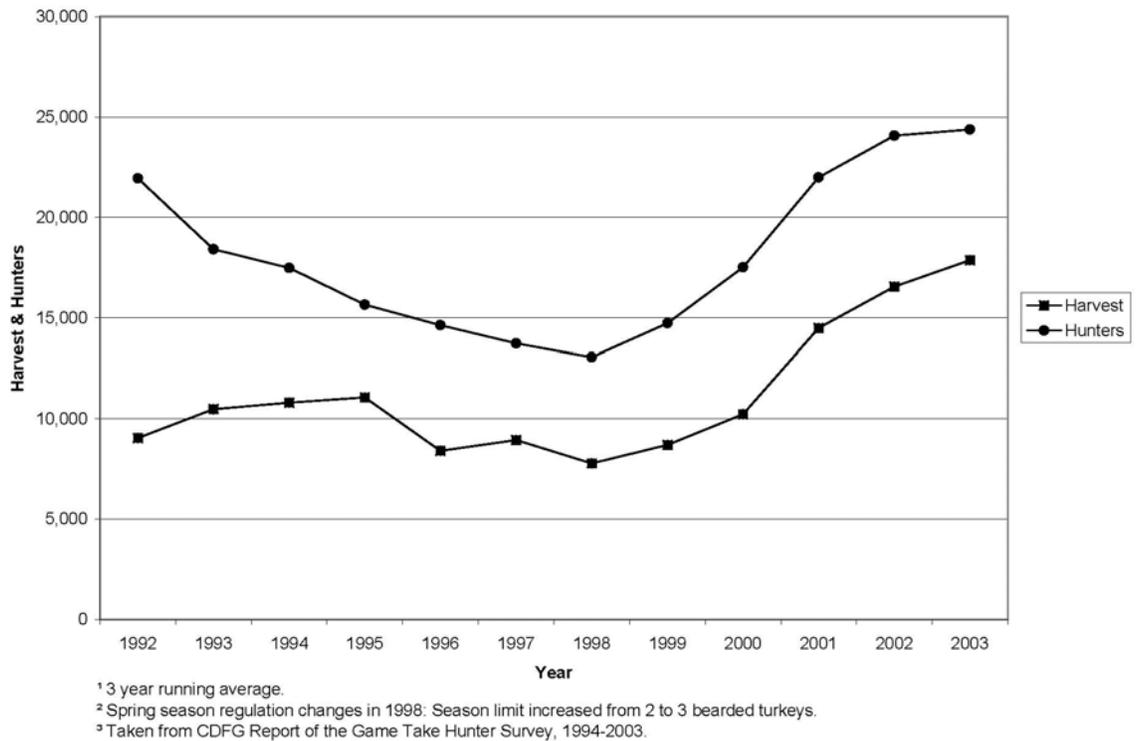


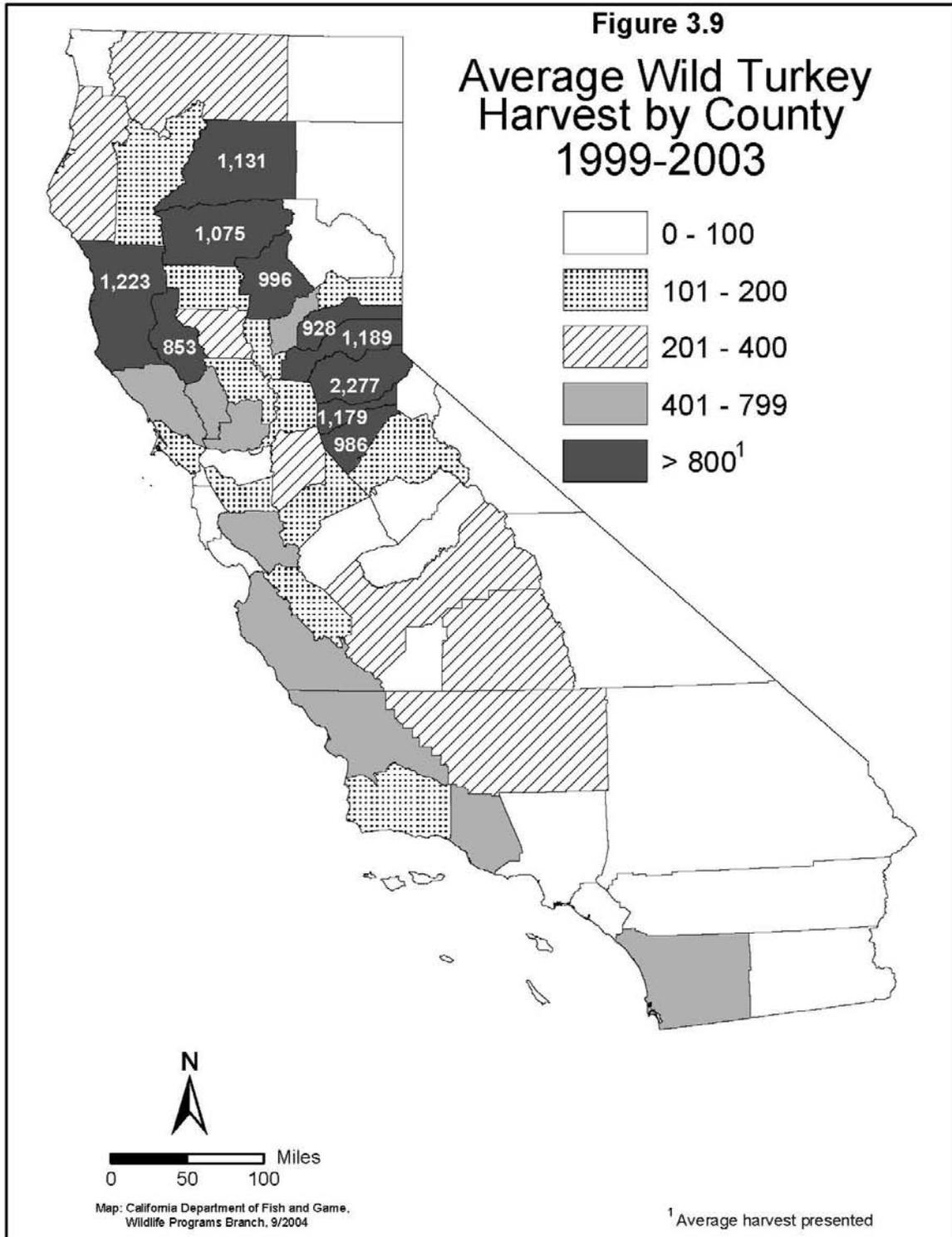
Figure 3.9 presents average annual wild turkey harvest by county over the five most recent years of available harvest survey data. These data illustrate those areas of the state where the turkey population and hunting pressure are highest.

Currently, the spring season is open statewide for bearded turkeys, with a one bird per day, 3 per season limit, starting the last Saturday in March and extending for 37 days, with an additional 14 days available for archers. The fall season is open in all counties except San Diego, with a one either-sex bird per season limit, starting the second Saturday in November and extending for 16 consecutive days.

4.0 GOALS AND STRATEGIES

The following chapter presents management goals, strategies, and recommendations in four sections: 1) controversial issues, 2) educational and recreational opportunities, 3) population monitoring and harvest management, and 4) long-term management of turkey populations. Controversial issues are presented initially, so that they may be considered throughout the plan and built upon in subsequent sections which share common themes. The goals, strategies, and recommendations in this plan consider numerous factors, including the laws, regulations, policies, and management goals of other agencies and private entities. This plan describes policies of the Department and provides recommendations to other entities.

Turkeys are a valued resource by hunters and other wildlife enthusiasts. However, concerns about impacts of turkeys in residential areas, agricultural areas, and on some park lands have been expressed to the Department by other agencies and the public. This plan is



intended to fully support Commission policy to “conserve, restore, and maintain upland game populations at optimum levels.” “Optimum” in this context concerns both the interest in providing hunting and wildlife observation in appropriate areas; as well as the need to minimize adverse impacts of turkeys on other land uses, including residential, agricultural, and lands managed primarily for native species conservation. The overarching goal of this plan, listed below, is intended to address those impacts while valuing turkeys where they are appropriate, based on current management needs discussed below.

Overarching Goal: Manage California’s wild turkey populations to balance the interests of hunters and other wildlife enthusiasts with the need to minimize the negative impacts that turkeys have in some areas of the state.

4.1 Controversial Issues

The following controversial issues all address turkey populations located in areas where they are considered undesirable. However, subsequent sections discuss management of desired turkey populations, primarily for hunting. Turkey populations occur across the landscape in various types of lands where they are both desired and undesired. Strategies to address these divergent issues are discussed in section 4.4. (Long-term management of turkey populations).

4.1.1: Conflicts between turkeys and people in residential settings

A variety of complaints are received by the Department regarding turkeys causing a nuisance in residential areas, including damage to gardens and landscaping, excessive defecation on walkways, and relatively minor damage to structures. These types of problems have grown from rare to common in the past five years, primarily in the areas east and north of San Francisco Bay and in the Sierra Nevada foothills. Turkeys that live in residential areas learn to have no reason to fear people and over time they will often interact closely with people. These problems are often caused and/or exacerbated by people feeding turkeys.

Occasional issues of public safety have been reported when turkeys are behaving aggressively towards people, primarily associated with males during the breeding season and with people feeding turkeys. Turkeys that are being fed by people may approach them aggressively, associating them with food. In these cases, turkeys may appear to behave aggressively, but they generally pose little threat to public safety. Although turkeys are not considered a high public safety threat, they should be managed to minimize their interactions with people.

The Department will assist the public in resolving conflicts with wild turkeys that are causing a nuisance. The Department will advise the public on ways to prevent or minimize nuisance-related problems for routine complaints, and it will investigate those that are chronic and persistent. Turkeys that are acting aggressively toward people may be destroyed at the discretion of the Department or any law enforcement agency. Through this process, the Department will seek to better understand the types of nuisances turkeys are causing and efficacy of preventative measures recommended to the public.

Goal: Minimize turkey-related nuisances

Strategies:

a. Discourage feeding of turkeys.

Turkeys that are fed by people become habituated to those food sources and may become a nuisance. Feeding turkeys often creates conflicts between them and people and alters their behavior, preventing young birds from learning some of the skills they need to survive in the wild. Turkeys are generally not limited by food in California and they don't need to be fed to survive. The Department commonly receives nuisance complaints from individuals that may be attributed to their neighbors feeding turkeys. To date, the Department has tried to discourage feeding of turkeys in these situations. However, in some cases people have refused to cease feeding turkeys when asked. Managing residential nuisance turkeys is difficult, because in any given area, some individuals like the turkeys around and others want them removed. The Department will try to address residential turkey management by working with homeowners associations or equivalents.

The Department is considering a recommendation to the Commission to adopt a regulation prohibiting the feeding of wild turkeys, similar to existing regulations prohibiting the feeding of big game (CCR, Title 14, Section 251.3).

b. Discourage the release of domestic stock by private citizens.

Although illegal (CCR, Title 14, Section 671.6), private citizens have been known to release turkeys on their own in hopes of establishing wild populations. In one case, it was reported that more than 1,600 turkeys had been released by an individual on his property. Domestic birds are imprinted to humans, therefore they may seek out people for food and shelter, potentially becoming a nuisance. Most domestic birds will not survive to become established, but they may interbreed with wild birds, which reduces the quality of the gene pool. The Department will educate people about the law and enforce the previously stated regulation when it is aware of violations.

c. Reduce turkey populations in areas of chronic nuisances.

In cases where turkeys are causing a significant chronic nuisance and attempts to prevent or alleviate the problem are unsuccessful, the Department will consider removal of the birds at its discretion. The Department will always promote hunting to help control populations and encourage wild behavior in turkeys, but hunting will not be an option in all locations where turkeys exist in California. Nuisance turkey populations are also a growing concern in other states, and trapping and relocation is the preferred method used by a number of states for addressing the issue, when hazing attempts are not successful.

Relocation of turkeys is expensive and not likely to be effective unless conducted persistently. Generally, the Department does not support the relocation of nuisance animals such as bears and mountain lions because these animals often acquire behavioral traits that remain

with them after relocation, potentially affecting public safety. Experience with turkeys suggests that their behavior can be reversed when they are released in appropriate locations. Furthermore, recent experience by the Department in relocating nuisance turkeys to Department Wildlife Areas has indicated that relocated turkeys generally remain within the release area, some are harvested by hunters, and the relocated birds did not generate subsequent nuisance complaints in the release area.

The Department will consider relocation of turkeys in these situations on an experimental basis. Turkeys will only be removed from areas where they are a chronic and/or significant problem. Turkeys will be released in areas where turkey populations are already established and where public hunting is allowed, such as Department Wildlife Areas. The intent of these translocations is to relocate nuisance turkeys, not to expand range. Post-release monitoring will be conducted in both the removal and release areas to determine the effectiveness of relocation in resolving the most serious problems and to help guide future management objectives.

4.1.2: Agricultural depredation by turkeys

Complaints of agricultural depredation by turkeys have increased in recent years, particularly regarding wine grapes. In 2000 and 2001, the National Wild Turkey Federation (NWTF) investigated reports of damage by turkeys at 28 vineyards. Remote cameras were also set up in four study vineyards to document species causing damage, both during the day and at night. Several species of wildlife were documented consuming grapes. Although turkeys were among the most reported causes of damage by vineyard owners, information collected in these investigations suggests that turkeys are blamed for more damage than they actually cause. In these investigations, several other species were also documented consuming grapes, including deer, raccoons, ground squirrels, song birds, and jays. Turkey damage was higher in the vineyards adjacent to turkey habitat, but damage from these other species was more widespread. These preliminary findings regarding turkey depredation are consistent with reports in other states to other crops (Tefft et al. 2001), whereby turkeys are blamed for damage largely because they are the most visible diurnal animals.

In 2004, the legislature adopted changes to FGC sections 4181 and 4188 as discussed below, which will go into effect January 1, 2005. These changes provide for the issuance of permits to landowners to allow them to kill turkeys damaging crops or other property.

Fish and Game Code Section 4181 states, in part, “any owner or tenant of land or property that is being damaged or destroyed or is in danger of being damaged or destroyed by elk, bear, beaver, wild pig, wild turkeys, or gray squirrels, may apply to the department for a permit to kill the animals...the department, upon satisfactory evidence of the damage or destruction, actual or immediately threatened, shall issue a revocable permit for the taking and disposition of the animals under regulations adopted by the commission.

Fish and Game Code Section 4188 states, in part, “ (a) If a landowner or tenant applies for a permit under Section 4181 for wild pigs or wild turkeys, or under Section 4181.5 for deer, the department shall notify the landowner or tenant about available options for allowing access by licensed hunters...in lieu of a permit as described in subdivision (a), and with the consent of,

or upon the request of, the landowner or tenant, under appropriate regulations, may authorize the issuance of permits to persons holding valid hunting licenses to take wild pigs, wild turkeys, or deer in sufficient numbers to stop the damage or threatened damage. Before issuing permits to licensed hunters, the department shall investigate and determine the number of permits necessary, the territory involved, the dates of the proposed hunt, the manner of issuing the permits, and the fee for the permit.”

Goal: Minimize agricultural depredations by turkeys.

Strategies:

a. Issue depredation permits as required by FGC Sections 4181 and 4188.

Generally, landowners cannot physically prevent turkeys from entering their vineyards with fences and methods of hazing turkeys over a large area also do not tend to be very effective. Grapes are ripe for harvest for a short period from late-August through early October, depending on variety. In many cases, issuance of depredation permits may be the only feasible option to immediately reduce depredation problems during the relatively short period in which they occur. However, relocation may be an option to reduce chronic depredation problems over the long-term (see below).

Fish and Game Code Section 4181 requires the Department to issue permits to landowners to destroy the animals that are actually causing the damage. Concerns have been expressed to the Department that depredation permits could be over-utilized because of landowner perceptions versus actual damage caused by turkeys. The Department will investigate each complaint, determine the actual causes of damage, and issue permits for turkeys accordingly. The Department does not foresee the killing of a large number of turkeys under the authority of depredation permits, and will not allow the indiscriminant elimination of local turkey populations through the implementation of this code section.

b. Population control in areas of chronic depredation problems.

Turkey population trends have grown dramatically in recent years particularly in some of the largest grape producing areas of the state, including Napa, Sonoma, and Mendocino counties. As previously discussed, depredation permits would provide immediate relief for ongoing problems. However, longer-term population control may be warranted in areas where turkeys are causing chronic depredation problems. The Department may consider a recommendation to the Commission for a special hunt to reduce populations as stipulated in FGC Section 4188.

The Department will encourage hunting as the preferred option for reducing unwanted turkey populations, but agricultural lands are privately-owned and may have limited hunting opportunities. Trapping and relocation may be considered as an option by the Department to manage these populations. However, this probably would not be effective in substantially reducing depredation during the grape harvest because it would not be feasible to trap at a number of locations where depredation is occurring simultaneously. Because turkeys are so well established in much of the habitats where grapes are grown, broad scale relocation programs are unlikely to significantly reduce populations. The Department will approach translocation

cautiously, moving birds to areas that can be monitored to determine efficacy and help guide future management objectives.

4.1.3: Conflicts between turkeys and public land management policies

State and national parks are mandated by law and policy to manage their lands, in part, for native flora and fauna. State and national park managers have expressed concerns about growing turkey populations on park lands because they are not indigenous animals. A major goal of California State Parks is to preserve and make available to the public representative examples of all ecological regions in the state and to protect indigenous plants and animals. The National Park Service has similar policies and is required to remove non-native species where feasible. More recently, similar concerns have been expressed by municipalities and other private lands. Wild turkeys have not been released in any parks, although they have moved into some parks as the result of stocking programs.

The Department has worked with state park managers to remove undesired turkeys from some state parks in recent years. These efforts have resulted in some success in reducing the number of turkeys in these parks. However, all birds have not been removed from any of these parks and long-term success of these removal programs is unclear. The Department will continue to work with land managers to find management solutions for undesired turkeys on park lands.

Goal: Minimize unwanted turkey populations on public and semi-private lands where they are a conflict with the management goals of those lands.

Strategies:

a. Identify public lands where turkeys are a conflict.

The Department will work with public land management agencies to identify where turkeys exist on their lands and where they are considered a conflict with land management goals. The agencies will collectively prioritize areas most in need of population management, based on the size and trend of the turkey population.

b. Remove turkeys from selected lands.

The Department will work with public land management agencies to remove turkeys from areas as discussed above, emphasizing areas where populations are increasing and turkeys primarily occupy lands where they are not desired. State and national parks, as well as private organizations, have expressed a desire to experiment with lethal removal and relocation. There is public opposition to both lethal removal and relocation, based on differing values. The Department will continue to work with these agencies and entities to identify the best method of removal. Relocated turkeys will be released on selected lands and monitored post release as discussed in Section 4.1.1.

4.1.4: Potential conflicts between turkeys and native species

The species of wild turkey that now exists in California is not native to the state. Concerns about their potential impacts to native plants and animals have been raised by both government agencies and the public since the early 1990's, when the Department was still actively releasing wild turkeys to expand their range and provide new hunting opportunities. Public comments on this issue are quite divergent and largely speculative. One segment of the public argues that turkeys are not native to California, and their effects to native species are not known. These comments suggest that the Department should conduct studies to determine the effects of turkeys to native species, conservatively assume that turkeys will have impacts to native species, and aggressively eradicate turkeys from much, if not all, of the state. Another segment argues that the California turkey is in the same genus as the wild turkey; co-evolved in California with many native species that currently exist in California; and that no evidence that turkeys impact native species exists.

More recently, concerns have been raised about turkey populations in areas where sustaining native species are a primary management goal. Wild turkeys are opportunistic omnivores that consume a wide range of plants and primarily invertebrate animal foods. To date, there have not been any demonstrated negative effects of wild turkeys on any sensitive organisms in or outside their native range, including California. However, such effects may be subtle and difficult to detect in the short term.

Goal: Manage turkey populations to minimize potential impacts to sensitive, native species, based on land management goals.

Strategies:

a. Improve understanding of potential effects of turkeys to native species in California.

Various agency and public comments to the Department suggest that the answer to whether wild turkeys have impacts to the environment can be found through scientific study. Research to date regarding turkey feeding ecology can only help develop potential risk assessment. Turkeys are generalists that are distributed across much of the state, and definitive studies to address the effects of turkeys to a broad range of organisms would be difficult. If possible, such experiments would be very expensive and likely still inconclusive. Certainly, the Department is interested in knowing what, if any, effects turkeys have to native species, but to fund projects of the kind described above, with no confidence that they would reveal any definitive information, is not a high priority for the Department given current budgetary limitations. Any information presented to the Department demonstrating effects of turkeys to native species will be addressed appropriately, including possible changes in policies presented in this document, in keeping with the primary mission of the Department.

The Department will opportunistically gather pertinent information regarding turkey ecology from studies within California over time to better understand potential interactions between turkeys and native species. The Department will encourage monitoring and research

projects in California in conjunction with interested universities, government agencies, and non-profit organizations, to improve its understanding of turkey ecology in California.

b. Manage turkey populations based on land management goals.

The Department will manage for sustainable turkey populations in areas where they already exist and hunting is allowed, while working with land managers to find management solutions to remove them from areas where native species are a primary management goal and hunting is not allowed.

c. Range expansion.

Considerable public opposition to the release of turkeys by the Department to expand their range on higher elevation public lands has developed in recent years. These concerns have focused primarily on potential impacts to the environment, but more recent concerns about nuisance issues have also been expressed.

The hunting segment of the public wants turkey releases to provide additional hunting opportunities, particularly on public lands. However, additional turkey releases are not likely to significantly improve hunting opportunities in much of the state. Turkeys have been released in virtually all suitable parts of the state over the years, with emphasis on public lands. Because much of the best turkey habitat in the state is privately owned, turkeys will likely always occupy private lands disproportionately to public lands.

The Department will not release turkeys into new parts of the state to expand turkey range, unless significant information demonstrating negligible or beneficial ecological effects is documented. However, turkey populations, particularly those in northern California, are continuing to expand their range on their own, and the Department will not actively prevent turkeys from becoming established in these areas, unless they are a conflict with land management as described previously, or unless significant ecological effects are documented.

4.2 Recreational Opportunities

4.2.1: Recreational opportunities on public lands

Wild turkeys offer valued recreational opportunities for the public, including hunting and viewing. This section focuses on improving hunting and viewing opportunities for turkeys on public lands. Much of the following two sections will focus on hunting because access to property for hunting is considerably more restrictive than viewing. However, the Department recognizes desires for both consumptive (hunting) and non-consumptive (viewing) recreational opportunities for wild turkeys.

Turkey hunting is a growing hunting sport in California. Recent surveys conducted by the Department suggest that at least 50% of the people that purchase a hunting license have interest in hunting turkeys, whereas only about 10% of license holders actually report hunting turkeys. The primary reason that up to 40% of interested license holders do not report hunting

turkeys is lack of access to or adequate knowledge of locations to hunt them. Most of these prospective turkey hunters do not have access to private lands and must therefore hunt public lands. Although private lands generally offer some of the best hunting opportunities in the state, public lands also offer good turkey hunting opportunities. This section focuses on improving hunting and viewing opportunities for turkeys on public lands.

Goal 1: Improve public knowledge of recreational opportunities on public lands.

Strategies:

a. Identify recreational opportunities, with emphasis on public lands.

Turkey recreational opportunities exist on various public lands statewide. The Department will work with state, federal, and local governments to identify those opportunities. The Department will also inform the public of unique viewing opportunities in areas where hunting is not permitted, but viewing is allowed.

b. Develop communication outlets to inform the public about recreational opportunities.

The Department will continue to develop various communication outlets to inform the public of recreational opportunities for turkeys. The range map printed in this document will be incorporated into informational outlets. The Department will also provide information through articles in publications such as *Tracks*, the Department's website, seminars that also include instruction on hunting, press releases and interviews, meetings of conservation organizations like the National Wild Turkey Federation, and day to day public phone calls and emails.

Goal 2: Maximize recreational opportunities on appropriate Department lands.

Commission policy states that, "The Department shall continue the process of reviewing current upland game management opportunities on lands under its control. The management of the Department's lands should be an example and a model for what can be done to maximize habitat development opportunities and upland game populations. Where and when feasible, habitat on Department-controlled lands shall be managed for upland game species to maximize upland game hunting opportunities. This shall include the use of "put and take hunting programs" where feasible, as well as the prudent use of naturally produced birds."

Strategies:

a. Identify lands under the Department's control for turkey management and public use opportunities.

The Department will continuously identify and evaluate lands under its control for turkey recreational opportunities. Department Wildlife Areas that contain turkey populations will be considered prime Department lands for turkey management and public use opportunities. Some Department Ecological Reserves also contain turkey populations. These areas are established for the protection of rare, threatened, and endangered species. Hunting will only be allowed on

Ecological Reserves when it is not a conflict with the primary management goals of the specific reserve. Wildlife viewing is always an option on Ecological Reserves.

b. Acquire lands for turkey recreational opportunities.

The Department will encourage the Wildlife Conservation Board to purchase lands containing turkey populations to increase public recreational opportunities.

c. Manage habitats to maximize turkey populations on appropriate Department lands.

Habitat management for turkeys on Department lands in California typically consists of water development, noxious weed control, and fencing of riparian areas to exclude grazing. The Department will identify, prioritize, and conduct habitat improvement projects to best benefit turkey populations on appropriate Department lands as identified above, provided such management does not conflict with other stated goals of the property.

d. Translocate turkeys to appropriate Department lands.

The Department will release turkeys trapped in residential areas, agricultural areas, and parks, on appropriate Department lands as discussed previously. The primary purpose of this program is to resolve conflicts, not to stock lands for the purpose of turkey range expansion. Therefore, turkeys will only be released on Wildlife Areas that already contain established turkey populations. The Department will monitor the success of this program through band returns and selected radio-telemetry projects.

Goal 3: Develop recreational opportunities on other public lands.

The Department has worked closely with the USFS in developing turkey recreational opportunities on National Forest lands for many years. Turkeys also occupy various other public lands, such as those administered by the Bureau of Land Management (BLM), Bureau of Reclamation, Department of Parks and Recreation (DPR), and local county and city agencies. In some cases, barriers exist that may prevent turkey hunting, such as access to public lands or restrictions against hunting.

Strategies:

a. Work with other agencies to identify turkey recreational opportunities on their lands.

The Department will work with public land management agencies to identify turkey recreational opportunities on their lands and encourage hunting on public lands not currently open to hunting.

b. Improve access to “landlocked” public lands.

In some cases, public lands open to hunting are not accessible to the public because the only available access to them is through private lands that are closed. These “landlocked” public

lands are particularly a problem on many small BLM and some USFS parcels that have good turkey populations. The Department will work with public land management agencies to identify these areas and improve public access. The Department will also encourage the Wildlife Conservation Board and other entities to purchase easements or ownership of rights of way when necessary.

c. Identify unique non-consumptive wild turkey recreational opportunities.

Wild turkeys are a popular species for wildlife viewing, especially in the springtime when they are displaying. The Department will help identify areas where hunting is not allowed, but viewing is an option.

4.2.2: Recreational opportunities on private lands

Private lands offer some of the best turkey recreational opportunities in the state. Although private lands are usually not open to public hunting, many people do have access to private lands for hunting. Private lands often have differing management issues than public lands. Furthermore, private lands often contain healthy turkey populations that are not hunted for various reasons. Private lands come in various forms with differing land management goals, such as those owned by private businesses versus individuals, or lands owned by conservation organizations and those set aside as conservation easements.

Goal: Develop turkey hunting opportunities on private lands.

Strategies:

a. Encourage recreational opportunities for public hunting.

The Department will work with private landowners to encourage public access to private lands for hunting and other recreational activities. The Department's Game Bird Heritage Program has conducted special hunts for individuals, juniors, and families in areas of private lands where hunting is not open to the public. The Department will seek to expand these types of programs when possible. As previously discussed, when the Department receives complaints about damage by turkeys, it will also encourage hunting as the primary method of population control in these areas as stipulated in FGC Section 4188.

b. Private Lands Management Program.

The Department's Private Lands Management (PLM) Program is a program that benefits wildlife habitat by providing incentives for private landowners to manage their lands for wildlife. Landowners often receive extended hunting seasons and tags for particular wildlife as identified in a management plan for those lands, which they may in turn use to generate revenue. Although these programs are aimed at game species, conservation of habitat for those species also provides habitat for non-game species. Turkey management opportunities on private lands are abundant; however, few lands are currently enrolled in the PLM program where turkeys are included. Although these lands are not typically open to public hunting, they offer high quality experiences

for individuals who do have access to them. The Department will encourage management opportunities on private lands for turkeys through this and other similar types of programs.

c. Develop hunting opportunities in areas not traditionally open to hunting.

Many municipal areas of the state are not open to shooting because of firearms restrictions. At the Department's request, the Commission allowed the use of air rifles as a legal method of take for upland game birds in 2000, partly to open up some of these areas for turkey hunting, although air rifles may also be restricted in some. Archery may be another option to increase hunting opportunity in these areas. The Department will continue to seek potential options to address this issue.

4.3 Population Monitoring and Harvest Management

4.3.1: Population monitoring

Wild turkey management starts with a basic understanding of population dynamics, including distribution, abundance, and movements over time. The range map (Fig. 3.5) provides a foundation in understanding of the distribution of turkeys in the state. The abundance or size of a turkey population is more difficult to estimate, and a good estimate usually requires a large investment of time and money. Population models are utilized by managers to predict changes in populations, often as the result of management actions. However, such models are only as reliable as the information used to set parameters. California is a large state, with local populations of turkeys potentially undergoing different population dynamics. Each of these populations should be managed based on a better understanding of local population dynamics.

Strategies:

a. Establish turkey management units.

Turkey Management Units (TMUs) are commonly used in other states as a foundation for population and harvest management, based on a combination of biological, ecological, physiographic, and socio-political factors. These units serve as areas to collect information about the turkey populations, set regulations based on that information, and collect information about harvest (see below). They need to be based on subpopulations of turkeys occupying larger ecosystems combined with socio-political factors discussed earlier. These areas should not be any more complicated than they need to be considering the above factors, so that regulations can be based on areas that are easily discernable by the public. For example, boundaries of hunting zones regulations traditionally include counties or groups of counties in California.

There are five major areas within the state that contain unique sets of biological and socio-political factors for potential TMU's. The Central Coast Ranges are areas of dense turkey populations, primarily privately-owned, where nuisance and depredation issues are highest. The Sierra Nevada foothills are similar to the Central Coast, with some higher elevation populations on more public lands and fewer conflicts with people. The North Coast inland through the greater area around Lake Shasta have smaller turkey populations, with a larger amount of public

lands and little to no conflicts with people. North-central and Northeastern California contain struggling populations of primarily Merriam's turkeys and a large amount of public lands, where they are highly desired by the public at large. Southern California, from San Bernardino County south to San Diego County is drier habitat with smaller turkey populations on a combination of public and private lands where conflicts with people are minimal. The Department will consider establishment of TMU's as a foundation for population and harvest management.

b. Periodically update statewide range map and population estimates.

Because turkey populations are dynamic, the Department will periodically incorporate monitoring information into updating the range map presented earlier. The Department will also gather information within local populations to better understand their dynamics. Information needs should be prioritized in each area, and techniques that will provide the most reliable information should be used to collect data. The Department will consider using information collected from other sources, such as the Breeding Bird Survey and hunters, for efficiency.

c. Monitor translocations.

The Department will approach all translocations of turkeys with caution considering many of the factors discussed in this document. Translocations will be conducted on an experimental basis, primarily as a last resort in an attempt to resolve nuisance-related issues. The Department will monitor the effectiveness of these efforts in both the removal and release areas. The Department will follow-up with landowners to evaluate the effectiveness of removal. Leg bands will be put on all translocated birds, and the Department will cooperate with volunteers to conduct selected radio-telemetry investigations to more closely track the movements of relocated birds. Information collected from these investigations will be used to evaluate translocation as a management option in the future.

d. Monitor population genetics.

As discussed earlier in this document, California's wild turkey population is the result of numerous releases of various stock over the years. Over time, the Department will seek to partner with appropriate universities and organizations to collect information to better understand the genetics of turkeys statewide.

e. Animal care and disease monitoring.

The Department will typically translocate turkeys between November and March, when birds are older, may be more easily caught, and the weather is cooler. Birds will be held in captivity for no more than 4 days and all will be tested for disease prior to release according to the Department's disease testing protocol for turkey relocations (Gonzales 1997).

The Department has a long history of monitoring turkey diseases. Nearly all turkeys translocated in California have been tested for diseases prior to release, including avian influenza, Newcastle's disease, avian hemorrhagic enteritis, *Salmonella typhimurium*, *Mycoplasma synoviae*, and *M. meleagridis*. Prevalence of antibodies to these diseases has been

very low in California (0-4.2%, $n=715$; Charlton 1999). All birds testing positive for antibodies to any of these diseases have been destroyed. A recent outbreak of Exotic Newcastle's Disease (END) in other domestic birds has resulted in a quarantine for all birds in southern California. Although wild turkeys are not known to have the disease, END is a highly virulent and deadly disease in all birds. The Department will not move any turkeys suspected to contain any diseases as judged by the Department's veterinarians.

4.3.2: Harvest Management

Hunting regulations are currently consistent statewide, with the exception of San Diego County which is closed to fall turkey hunting. The turkey population has continued to grow in California, suggesting that these regulations have been sustainable over time. However, managing harvest from a statewide perspective may not allow for adaptability of regulations to unique conditions in different parts of the state. Wild turkey harvest is driven by the biology of the turkey populations and socio-political factors, both of which are taken into account when setting regulations.

The growth of a turkey population is a function of its size, survival, and productivity. Hunting can influence each of these parameters. Regulations are typically set to maximize hunting opportunity while minimizing potential impacts to any of these variables, such that the population maintains a desired population level and sustained harvest. As discussed earlier, a fundamental principle of turkey harvest management is that spring gobbler harvest is more sustainable than fall either-sex harvest. Over-harvest of hens in the fall can reduce populations below the desired level. Overharvest in the fall affects survival of hens, which thereby also affects potential reproduction. Therefore, fall hunting has the largest effect on the growth rate of turkey populations.

As discussed throughout this document, turkey hunting pressure can be quite different between public and private lands. Hunting pressure is highest on public lands, where turkey populations are often relatively low in abundance and hunter numbers are restricted. Hunting pressure is often considerably lower on private lands where turkey populations are moderate to high in abundance. Harvest on these private lands is often controlled by the landowner, by limiting access. Harvest in some areas of the state that contain abundant turkey populations is also highly limited by restricted hunting on private lands, restricted hunting on designated public lands, and/or prohibited use of firearms in municipal areas. Furthermore, many of the areas where turkey nuisance complaints are highest in the state receive little hunting pressure due to their proximity to residential areas.

Generally, it is not practical to set regulations for public versus private lands. The problem is primarily a matter of scale, in that turkey populations cover a broad area where they may occupy both types of lands. It may be practical to base regulations on a combination of variables that also consider socio-political issues, such as the relative amount of private versus public lands and land use activities in particular areas of the state. Local land-use regulations may further help to regulate harvest within these broader areas, such as private lands enrolled in the PLM program with extended hunting seasons, or some public Wildlife Areas where access is controlled through permits during certain portions of the season.

Goal: Recommend regulations to the Commission that maximize sustainable hunting opportunities statewide, considering both biological and socio-political issues.

Strategies:

a. Use an adaptive harvest approach.

Development of hunting regulations should come from an adaptive harvest process, whereby harvest objectives are established, monitored, and adjusted when objectives are not met, based on the following procedures as described by Healy and Powell (1999):

1) Obtain population estimates by TMU

Population estimates are critical in regulating harvest, but they can be difficult to obtain reliably because turkeys tend to be clumped in distribution across the landscape. Population estimates tend to be expressed in density (i.e. the number of birds per square mile). The choice of a particular technique for estimating population density should be set for each area, based on unique issues for that area, independent of techniques used to gather harvest data (see below). The quality of these data can have a considerable effect on setting and evaluating harvest management goals.

2) Monitor populations and harvest trends

Long-term harvest goals should be set for each TMU, based on information regarding population density estimates, past harvest data, and program goals. The standard for harvest goals should be based on trends in spring gobbler kill. Remedial actions should then be specified when these goals are not met. Short-term responses to significantly changing trends in spring harvest should focus on changes in fall harvest. If such fall season changes are not effective over time, changes in spring harvest should also be considered.

3) Measure harvest

Turkey harvest has been estimated by a mail in survey of approximately 4% of hunting license buyers since the first hunting season in 1968, although spring and fall harvest was not reported separately until 1991. Harvest is depicted by county, and general trends appear to be reliable. Specific surveys by TMU should also be considered for comparative purposes to current techniques.

b. Recommend regulations to the Commission that maximize sustainable spring gobbler harvest with limited either-sex fall harvest.

Hunting regulations should be as uncomplicated as possible. An overall framework for turkey regulations should be set statewide, similar to existing regulations. Although information collection and harvest management are based on TMU's, deviation from that framework should only occur if harvest management goals require a change. Healy and Powell (1999) outline basic harvest strategies for wild turkeys, based on years of harvest management from 13 states in the

northeast. The strategy that most suits the needs of California is to maximize sustainable spring gobbler harvest with limited either-sex fall harvest. Managers have the following three basic variables that can be used in setting regulations to achieve harvest goals:

1) Season timing and length

Season timing and length are most important for the spring, considering that turkeys are being hunted during their breeding season. The goal is to remove a portion of the male segment of the population when it has the least potential impact to breeding, yet comes at a time when hunters have a good chance to hear and harvest gobblers. In California, only bearded turkeys may be taken during spring. A small percentage of females will grow beards as well, and they are legal to take in spring based on current regulations. Some states require that only males be harvested, but because turkey hunting is a relatively new sport in California, bearded turkeys provide an easy discernable characteristic for turkey hunters.

Spring hunting seasons set early in the breeding season provide good hunter opportunity, but have the greatest risk of overharvest of both males and females (legal and illegal harvest), the latter of which will become less vulnerable as they begin nesting. Season length will have the greatest impact on the amount of male harvest, which become more vulnerable later in the season when the majority of hens are nesting. Hunting hours are currently set from one-half hour before sunrise to 4 PM, to reduce potential take of females that leave their nests in the afternoon to feed, and to allow gobblers to find roosts undisturbed. The fall season tends to be set based on tradition, particularly surrounding Thanksgiving. Fall harvest is better controlled through season limits and hunter numbers discussed below.

2) Bag, possession, and season limits

Limits in the number of turkeys that may be taken during the season provides more control over harvest than timing and length, particularly during the fall. However, such control is obviously limited by the number of hunters in an area, as discussed below. Currently, hunters can only harvest one bird of either-sex in the fall statewide. Fall season limits should especially be based on harvest goals as previously discussed. Male harvest in the fall primarily affects the quality of hunt in the spring, by removing jakes and gobblers from the population.

3) Control of hunter numbers

Restricting the number of hunters that can hunt a particular area is the strongest means of controlling harvest while maintaining a quality outdoor experience. Many states use a limited number of permits to control harvest of turkey populations. Hunter numbers are not controlled in California by regulations; anyone can hunt turkeys with a hunting license and upland game bird stamp. Hunter numbers are essentially controlled on private lands by the landowners by limiting access to their property. Public lands open to hunting are available to anyone, with the exception of some Department-owned Wildlife Areas and other lands where permits are required for part or all of the season. In these cases, hunter access is limited primarily for quality of experience, not necessarily based on harvest goals.

c. Periodically conduct surveys to better understand public desires for turkey hunting management.

Regulations can be set in various combinations to achieve the same harvest goals. Although the Department recommends maximizing spring gobbler harvest and limited either-sex fall harvest, other options are available depending on public desires. One common issue is the balance between maximizing hunting opportunity for the public with quality of experience, which is a common concern on public lands. Therefore, the Department should conduct periodic surveys of the hunting public to better understand their desires and adjust management and recommendations accordingly.

4.4 Long-Term Management of Turkey Populations

Turkey populations occur across the landscape, occupying lands under various ownerships and land uses. This management plan calls for a balance that reduces unwanted turkey populations in certain areas, yet protects and enhances them in others, based primarily on land uses. Obviously, such a divergent approach to management will require some compromise and flexibility. The state can not contain abundant turkey populations, yet avoid all negative impacts from turkeys. This section outlines strategies designed to address these difficulties consistent with overarching goal of this plan statewide.

Goal: Manage turkey populations across the landscape in ways that best suit predominant land uses and public interests.

Strategies:

a. Develop partnerships with other agencies, non-governmental organizations, and the public, for effective turkey management based on mutually desired goals and objectives.

The Department is the primary agency responsible for the management of turkeys in the state, but it manages a relatively small amount of land. The philosophical approach of this management plan is to align turkey management closely with land management goals. Effective turkey management needs to be a partnership between various regulatory and land-management agencies, non-governmental organizations, and the public. The Department has worked closely with the USFS for many years in establishing mutual turkey management goals on USFS lands, which represent the largest amount of public lands in the state with suitable turkey habitat. The Department has also worked closely with the National Wild Turkey Federation over the past 15 years, which has developed a large state chapter in California, and contributed significant funds to turkey management. More recently, the Department, NWTF, and State Parks have worked together to relocate turkeys from some parks in northern California. The Department welcomes the involvement of other organizations to work together and carry out mutually developed management goals, including those that have provided comments on this plan. The Department currently has significant budget limitations, further requiring the need to expand these partnerships for more effective turkey management statewide.

The Department will work with land managers to develop management goals based on environmental resources, public land management policies, and public input. Public input is an important element in developing turkey management goals. However, public desires for turkey management are quite divergent, ranging from complete eradication to expansion of turkey populations. The Department will seek to provide a range of turkey management that meets the desires of the public statewide, but it can not accommodate all of these views in a single location.

b. Establish management goals and objectives, based on land ownership and management.

Management issues for turkeys on public lands vary from desires to improve hunting opportunity on huntable public lands to controlling turkey populations on certain national and state park lands. The Department will work with these agencies and entities to encourage the development of objectives that meet long-term management goals, environmental concerns, and desires of the public. The Department has received a considerable number of requests to completely remove turkeys from areas where they are considered a conflict with public land management, causing a nuisance in residential areas, and damaging grapes. In areas where turkeys are primarily considered a conflict and they provide little to no hunting opportunity, the Department will consider approval of systematic removal, working towards the long-term eradication or near eradication of the population. In areas that provide turkey hunting and problems are not as widespread, the Department will work towards maintaining turkey populations, but will assist landowners in reducing impacts.

c. Implement and evaluate methods to achieve desired population goals.

Identification of the areas and turkey populations described above and development of management goals will require a long-term adaptive management process, by setting objectives, monitoring progress, and adjusting objectives to meet goals as needed. Turkey Management Units as previously described may form a basis for management goals. Desired population levels will need to be set for broad areas based on predominant land uses as previously described. In areas where hunting is a predominant land use, desired population levels should be developed primarily through hunting management as previously described. Some population control may be warranted near residential areas and parks. To date, population control has primarily been a reactionary process by the Department. Such efforts to control turkey populations on the local scale will not likely accomplish long-term population goals. In areas where population control is desired and hunting is not a predominant activity, desired population levels will need to be achieved with a combination of methods, including hunting as described in FGC Section 4188, relocation, and perhaps methodical lethal removal. Considerable public debate exists regarding use of any of these techniques. The Department will help public agencies, non-governmental agencies, and the public work through this process to develop and evaluate methods to achieve management objectives.

5.0 CALIFORNIA ENVIRONMENTAL QUALITY ACT COMPLIANCE

The basic goal of the California Environmental Quality Act (CEQA) (Pub. Res. Code §21000 *et seq.*) is to develop and maintain a high-quality environment now and in the future, while the specific goals of CEQA are for California's public agencies to: 1) identify the significant environmental effects of their actions; and, either 2) avoid those significant environmental effects, where feasible; or 3) mitigate those significant environmental effects, where feasible. CEQA applies to "projects" proposed to be undertaken or requiring approval by State and local government agencies. "Projects" are activities which have the potential to have a physical impact on the environment.

A "lead agency" must complete the environmental review process required by CEQA. The most basic steps of the environmental review process are: 1) Determine if the activity is a "project" subject to CEQA; 2) Determine if the "project" is exempt from CEQA; 3) Perform an Initial Study to identify the environmental impacts of the project and determine whether the identified impacts are "significant". Based on its findings of "significance", the lead agency prepares one of the following environmental review documents: a) Negative Declaration if it finds no "significant" impacts; b) Mitigated Negative Declaration if it finds "significant" impacts but revises the project to avoid or mitigate those significant impacts; c) Environmental Impact Report (EIR) if it finds "significant" impacts.

The Department is the lead agency for wild turkey management. By the mid-1990s, the public was expressing concerns regarding the Department's program of expanding wild turkey range on public lands to increase hunting opportunity and their potential impacts to native species. In 1995, the Department prepared a Mitigated Negative Declaration for the proposed release of wild turkeys on the Cleveland National Forest in San Diego County. In 1996, the Department was sued by the California Native Plant Society and Save Our Ranchlands and Forests regarding the Department's decision that the release of turkeys would not have a significant impact to native plants in the area. The San Diego County Superior Court determined that the project could have a significant impact to the environment and ordered the Department to set aside its decision to release turkeys and prepare an Environmental Impact Report before approving the project.

In 1999, the Department set aside all proposals to release turkeys to expand their range statewide while it prepared a draft EIR. The draft EIR was released for agency and public comment in February, 2002. The proposed project was to release turkeys at one to six sites in habitats similar to proposed range expansion sites where turkeys had been released in the past, but where it was not clear that populations were established. The Department proposed to monitor released turkeys to assess their potential impacts to native species at these sites before proposing any release locations where turkeys had not been previously released. The draft EIR was opposed by several agencies and non-governmental agencies because turkeys are not native to California and their potential impacts to native species are not well understood. The Department had indicated in the EIR that such impacts could not be determined with certainty, which was the basis for a more conservative approach in the proposed project. During review of the draft EIR, nuisance issues with turkeys began to escalate which were not addressed in the draft EIR. Subsequently, the Department decided to set aside any plans to release turkeys to

expand their range anywhere in the state, and focus on development of a statewide management plan to address comprehensive issues in wild turkey management.

A draft of this strategic management plan was released for public comment in 2003. The Department received comments suggesting that the Plan constituted a “project” for which an EIR was required. Specifically, comments claimed that the “projects” identified in the plan included “translocations; managing habitats to maximize non-native turkey populations on Department lands; and potential of turkeys to move into other areas and expand their numbers.” Other than hunting, which is analyzed in the Department’s Resident Game Bird Hunting Environmental Document, this strategic plan does not identify any specific “projects” that could be analyzed in an EIR.

CEQA applies to “discretionary projects proposed to be carried out or approved by public agencies.” (Public Resources Code section 21080(a)). This has come to require a threshold, two-part analysis to determine the applicability of CEQA. First, an agency must “approve,” and that approval must be of a “project.” *Lexington Hills Association v. State of California* (6th Dist. 1988) 200 Cal.App.3d 415, 430-433. CEQA does not define the term “approve.” However, the CEQA Guidelines define “approval” as: “the decision by a public agency which commits the agency to a definite course of action in regard to a project intended to be carried out. . .” (CEQA Guidelines section 15352(a)).

This strategic plan is not a document which requires “approval,” as it is used in the CEQA context. Furthermore, this plan does not require an action by the Department. Instead, it is an informational document meant only to identify current wild turkey management issues, establish long-term management goals, and outline possible strategies to achieve those goals. The strategic plan will be used by the Department in the future to assist in developing a vision for future management projects. Any “projects” requiring “approval” by the Department in the future will be examined in compliance with CEQA.

The Department recognizes the conflicts created by turkeys in residential areas, agricultural areas, and with the policies governing the management of certain lands, particularly parks. The strategic plan identifies translocation of nuisance and otherwise undesirable turkeys to Department Wildlife Areas within the area identified as established turkey range. The goals of any translocations would be primarily to resolve nuisances and remove birds from park lands, as requested by the jurisdictional agencies. A secondary goal would be to provide hunting opportunity on Department lands where turkey hunting is authorized. No specific translocations are identified, rather they would be addressed on an as-needed basis. The Department does not consider these types of translocations as “projects” that have “a potential for resulting in either a direct physical change in the environment, or a reasonable foreseeable indirect physical change in the environment” (CEQA Section 15378(a)). Rather, the Department views these translocations as necessary for the solution to problems created by turkeys occurring where they are not wanted. The Department will scrutinize the need for any such translocations closely and will likely move fewer than one-half of 1% annually of the current estimated statewide population. Additionally, any translocations determined to be necessary will be to areas where turkeys are already part of the long-term baseline environmental conditions in those areas of the state. The strategic plan also suggests that Department lands could be managed to maximize turkey populations, consistent with Commission policy. No habitat management is currently

employed by the Department specifically to benefit wild turkeys. Turkeys are generalists that do well in native California habitats. The types of habitat manipulation that benefit wild turkeys, such as water development and weed control, also benefit other wildlife. Management of habitats on Department lands are addressed in the management plans for those lands. Wild turkey populations may expand naturally on their own, but this strategic plan does not suggest that the Department take any actions to further any such expansion.

The Department also recognizes the concerns that wild turkeys, the present-day species of which is not native to the state, could have an effect to native species. Definitive scientific studies to address these concerns are not available and may never be available because of extraordinary difficulty in designing and conducting experiments for these complicated ecological issues. Public comments requesting that the Department prepare an EIR for the strategic management plan claim that the “draft strategic plan proposes similar concepts and direction to those presented in the draft EIR.” However, this plan clearly outlines strategies that are significantly different from past management strategies. The currently proposed plan suggests a policy that no turkeys be released anywhere in the state to expand their range, unless significant information demonstrating negligible or beneficial ecological effects is documented in compliance with CEQA. This is a very different approach from the project identified in the draft EIR for the previously proposed, and presently abandoned, range expansion project. Furthermore, the currently proposed plan calls for the removal of turkeys from lands where management goals are primarily preservation of indigenous plants and animals, and where hunting is not permitted. The plan identifies a need to take a conservative approach, which will protect native species from turkeys in many areas of the state, even though it has never been demonstrated that wild turkeys impact native California species.

6.0 LITERATURE CITED

- Beck, J.R. and D.O. Beck. 1955. A method for nutritional evaluation of wildlife foods. *J. Wildl. Manage.* 19(2):198-205.
- Blankenship, L.H. 1992. Physiology. Pages 84-100 in J.G. Dickson, ed. *The wild turkey: biology and management.* Stackpole Books, Mechanicsburg, PA.
- Brown, E.K. 1980. Home range and movements of wild turkey - a review. *Proc. National Wild Turkey Symp.* 4:251-261.
- Burger, G.V. 1954a. The status of introduced wild turkeys in California. *California Fish and Game.* 40(2):123.
- Burger, C.V. 1954b. Wild turkeys in Central Coastal California. *Condor* 56:198-206.
- Caton, J.D. 1877. The wild turkey and its domestication. *Am. Nat.* 11:321-330.
- Charlton, K.G. 1999. Prevalence of antibodies to selected disease agents in wild turkeys translocated in California, 1986-1996.
- Dalke, P.D., W.K. Clark, Jr., and L.J. Korschgen. 1942. Food habit trends of the wild turkey in Missouri as determined by dropping analysis. *J. Wildl. Manage.* 6(3):237-243.
- Delgado, A. 2004. Spatial and temporal habitat use and selection of wild turkeys (*Meleagris gallopavo*) in central San Diego County, California. M.S. Thesis, California State University, Sacramento. 114 pp.
- Garver, J.K. 1987. *The wild turkey in Illinois.* Springfield: Illinois Dept. Conservation, Division of Wildlife Resources. 28 pp.
- Gonzales, B. J. 1997. Disease testing protocol for wild turkey relocation programs in California. California Department of Fish and Game. 5 pp.
- Graves, W.C. 1975. Wild turkey management in California. *Proc. National Wild Turkey Symp.* 3:1-5.
- Grinnell, J. 1928. Introduction of the wild turkey into California. *Condor* 30:195.
- Grinnell, J. and A.H. Miller. 1944. *The distribution of the birds of California.* Cooper Ornithological Club.
- Harper, H.T. and W.A. Smith. 1973. California's turkey stocking program. Pages 55-63 in G.C. Sanderson and H.C. Schultz, eds. *Wild Turkey Management: Current Problems and Programs.* Missouri Press, Columbia. 355 pp.

Healy, W.M. 1985. Turkey poult feeding activity, invertebrate abundance, and vegetation structure. *J. Wildl. Manage.* 49(2):466-472.

_____. 1992. Behavior. Pages 46-65 in J.G. Dickson, ed. *The wild turkey: biology and management.* Stackpole Books, Mechanicsburg, PA.

_____ and S. M. Powell. 1999. Wild turkey harvest management: Biology, strategies, and techniques. United State Fish and Wildlife Service Biological Technical Publication BTP-R5001-1999. 96 pp.

Hoffman, R.W., H.G. Shaw, M.A. Rumble, B.F. Wakeling, C.M. Mollohan, S.D. Schemnitz, R. Engel-Wilson, and D.A. Hengel. 1993. Management guidelines for Merriam's wild turkeys. Colorado Division of Wildlife, Division Report 18. 24 pp.

Hollings, C.S., ed. 1978. *Adaptive Environmental Assessment and Management.* John Wiley and Sons, London, UK. 363 pp.

Hurst, G.A. 1992. Foods and Feeding, pages 66-83 in J.G. Dickson, ed. *The wild turkey: biology and management.* Stackpole Books, Harrisburg, PA.

Korschgen. L.J. 1967. Feeding habits and foods, pages 137-198 in O.H. Hewitt, ed. *The wild turkey and its management.* The Wildlife Society, Washington, DC.

Lewis, J.C. 1973. *The world of the wild turkey.* Philadelphia, PA: J.B. Lippencott Co. 158 pp.

Little, T.W. 1980. Wild turkey restoration in "marginal" Iowa habitat. *Proc. National Wild Turkey Symp.* 4:45-60.

_____, J. M. Kienzler, and G. A. Hanson. 1990. Effects of fall either-sex hunting on survival in an Iowa wild turkey population. *Proc. National Wild Turkey Symposium* 6:119-125.

Mayer, K. and Laudenslayer, S.L. 1988. *A Guide to Wildlife Habitats of California.* Sacramento, CA. California Department of Forestry and Fire Protection. 166 pp.

Miller, L.H. 1925. *The birds of Rancho La Brea.* Carnegie Inst. Washington Publ. 349:63-106.

Mosby, H.S. and C.O. Handley. 1943. *The wild turkey in Virginia: its status life history ad management.* Richmond: Virginia Division of Game, Commission of Game and Inland Fisheries. P-R Projects. 281 pp.

Pelham, P. H. and J.G. Dickson. 1992. Physical characteristics. Pages 32-45 in J.G. Dickson, ed. *The wild turkey: biology and management.* Stackpole Books, Mechanicsburg, PA.

Porter, W.F. 1992. Habitat requirements. Pages 202-213 in J.G. Dickson, ed. *The wild turkey: biology and management.* Stackpole Books, Mechanicsburg, PA.

- Rea, A.M. 1980. Late Pleistocene and Holocene turkeys in the Southwest. *Contrib. Sci. Nat. Hist. Mus. Los Angeles Co.* 330:209-224.
- Rumble, M.A. and S.H. Anderson. 1992. Stratification of habitats for identifying habitat selection by Merriam's turkeys. *Great Basin Naturalist* 52(2):139-144.
- _____ and _____. 1996. Feeding ecology of Merriam's turkeys (*Meleagris gallopavo merriami*) in the Black Hills, South Dakota. *American Midland Naturalist* 136:157-171.
- Schemnitz, S.D. 1956. Wild turkey food habits in Florida. *J. Wildl. Manage.* 20(2):132-137.
- Schorger, A. W. 1966. The wild turkey: its history and domestication. Norman:University of Oklahoma Press. 625 pp.
- Slossen, J. R., A.S. Walton, L.A. McKibben, J.D. Stokes, J.B. McCormick. 1970. Operational management plan for wild turkeys. California Department of Fish and Game.
- Smith, W.A. and B. Browning. 1967. Wild turkey food habits in San Luis Obispo County, California. *California Department of Fish and Game* 53(4):246-253.
- Stangel, P.W., P.L. Leber, and J.I. Smith. 1992. Systematics and population genetics. In J.G. Dickson, ed., *The wild turkey: biology and management*. Harrisburg, PA: Stackpole Books.
- Steadman, D.W. 1980. A review of the osteology and paleontology of turkeys (Aves: Meleagridinae). *Contrib. Sci. Nat. Hist. Mus. Los Angeles Co.* 330:131-207.
- Stringer, B.D., Jr. 1977. Food habits and behavior of wild turkey poults in east central Mississippi. M.S. Thesis. Mississippi State University, Mississippi State, 31 pp.
- Tapley, J. L., R. K. Abernethy, and J. E. Kennamer. 2001. Status and distribution of the wild turkey in 1999. *Proceedings of the 8th National Wild Turkey Federation Symposium*.
- Tefft, B.C., M.A. Gregonis, and R.E. Eriksen. 2001. Assessment of crop depredation by wild turkeys *Meleagris gallopavo* in the United States. A report to the Northeast Wildlife Administrators Association. 13 pp.
- Vanguilder, L. D. 1992. Population dynamics. Pages 144-164 in J.G. Dickson, ed. *The wild turkey: biology and management*. Stackpole Books, Harrisburg, PA.
- _____, and E. W. Kurzejeski. 1995. Population ecology of the eastern wild turkey in northern Missouri. *Wildl. Monogr.* 130:1-50.
- Walters, C.J. 1986. Adaptive management of renewable resources. MacMillan Publ. Co., New York, NY. 374 pp.