Sacramento River National Wildlife Refuge

Environmental Assessment Supplement
Cumulative Impact Analysis

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Introduction

This document is a Supplement to the *Environmental Assessment (EA)* for the *Sacramento River National Wildlife Refuge (Refuge) Final Comprehensive Conservation Plan (CCP) (2005).* This Draft Supplement provides additional information in the cumulative impact analysis.

This Draft Supplement was prepared as a result of the Fund for Animals lawsuit against the U.S. Fish and Wildlife Service (Service) on March 14, 2003, alleging noncompliance with the National Environmental Policy Act (NEPA) in opening 37 refuges to hunting during the 1997-98 through 2002-03 seasons. On August 31, 2006, the U.S. District Court Judge granted plaintiff's motion for summary judgment agreeing that the Service did not adequately consider the cumulative impacts of opening these refuges to hunting. The Service's October 5, 2006 brief asked the court not to enjoin the hunt programs while the Service proceeded to address the NEPA deficiencies in the original 37 hunting packages. In addition, the Service informed the court that by May 30, 2007, it would also correct NEPA deficiencies for the refuges opened to hunting since the lawsuit was filed, including Sacramento River Refuge.

Hunting is identified in the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act) (Public Law 105-57) as a priority use for refuges when it is compatible with the refuge purposes and mission of the Refuge System. In 2005, the Service determined hunting of dove, waterfowl, coot, common moorhen, pheasant, quail, snipe, turkey and deer to be a compatible wildlife-dependent use on the Sacramento River National Wildlife Refuge (NWR) (Hunting Compatibility Determination, Appendix B, CCP (USFWS 2005c). California Fish and Game Department (2004a) has determined that fish and wildlife resources found along the Sacramento River are healthy and robust enough to support regulated hunting and fishing, complimenting the other activities available to the public in their enjoyment of their public resources. Section 7 consultations with USFWS (2004) and NOAA-Fisheries (2004) concluded that the implementation of the CCP (USFWS 2005a) is not likely to adversely affect any of the special status species/designated critical habitat occurring on the Refuge including: bald eagle, giant garter snake, winter-run Chinook salmon, spring-run Chinook salmon, Central Valley steelhead, Valley elderberry longhorn beetle, western yellow billed cuckoo, fall-run Chinook salmon, and late fall-run Chinook salmon.

The *Final CCP for Sacramento River Refuge, Final EA, Hunting Compatibility Determination, Camping and Recreational Boating Compatibility Determination, Hunting Plan* (USFWS 2005a,b,c), and the Section 7 consultations (USFWS 2004) are herein incorporated by reference. These documents are available at the following website: http://pacific.fws.gov/planning/draft/docs/CA/docssacriver.htm.

Purpose and Need

The purpose of this Draft Supplement is to provide supplemental information and analysis in the cumulative impact analysis, for the *EA* for the *Sacramento River National Wildlife Refuge Final CCP (2005).* Cumulative impacts are impacts on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. The additional cumulative impact analysis will focus on impacts regarding the

Refuge's hunting program (hunting of dove, waterfowl, coot, common moorhen, pheasant, quail, snipe, turkey and deer) that was implemented in 2005.

Project Area

The Sacramento River Refuge is part of the Sacramento National Wildlife Refuge Complex (Complex) and is located in the Sacramento Valley of north-central California. The Valley is bordered by the Cascade Range and Sierra Nevada Range to the east and the Northern Coast Ranges to the west. The Refuge was established in 1989 and is currently composed of 26 units along a 77-mile stretch of the Sacramento River between the cities of Red Bluff and Princeton, 90 miles north of the metropolitan area of Sacramento. In addition, the Service has 1,281 acres of riparian habitats in conservation easement owned by Llano Seco Ranch.

The Valley is an extensive agricultural area that is a major wintering area for millions of ducks and geese. Lands that surround the Refuge are mostly orchards and irrigated rice lands with some dairy operations and safflower, barley, wheat, and alfalfa crops. The topography is flat with a gentle slope to the south. The predominant soil type is Columbia loam.

More detailed information about the project area can be found in Chapter 3 of the CCP (USFWS 2005a).

Anticipated Direct and Indirect Impacts of Proposed Hunt on Wildlife Species.

Resident Wildlife

The California Department of Fish and Game (CDFG) is California's lead agency for management of fish, wildlife, and native plants- collectively called "wildlife." CDFG has trustee responsibility for the conservation and management of wildlife for the benefit and enjoyment of the public.

Resident game species are protected by both Federal and State laws and regulations to ensure that harvest rates do not negatively impact populations. The potential impacts of hunting on resident upland game birds and deer are discussed and evaluated in the California Environmental Quality Act process. This process results in periodically updated and publicly reviewed documents. Based on the findings of these documents, the State insures that game animal hunting in California does not adversely impact its wildlife populations to an unacceptable level (CDFG 2004a). Table 1 contains a summary of hunting seasons and bag limits for 2006-2007 for the game species on the Sacramento River Refuge.

Table 1. Sacramento River NWR, Hunting Season Bag Limit Summary for 2006-2007*

Species	Dates	Daily Bag Limits
Quail – Archery Only	Third Saturday in **August** extending 21 consecutive days	10/day; possession double the bag limit
Deer – Archery (Zone C4, A Tag, all units open to hunting)	Third Saturday in **August** extending for 16 consecutive days	One buck, forked horn or better / tag
Dove	**September** 1-15 and from second Saturday in November for 45 days	10/day; possession double the bag limit
Deer – General (Zone C4, all units open to hunting)	Third Saturday in **September** extending for 16 consecutive days	One buck, forked horn or better / tag
Waterfowl – Ducks	Third Saturday in **October** extending for 100 consecutive days	Up to 7 ducks; see below; possession double the bag limit**
Waterfowl – Geese	**October** - concurrent with duck season	Up to 4 geese any species; possession double the bag limit
American Coot and Common Moorhen	**October** - concurrent with duck season	25/day, 25 in possession, either all of one species or a mixture of these species
Snipe	Third Saturday in **October** extending for 107 days	8/day; possession double the bag limit
Quail – General	Third Saturday in **October** extending through the last Sunday in **January**	10/day; possession double the bag limit
Deer – G1 Late Season (Zone C4 all units open to hunting)	Fourth Saturday in **October** extending for 9 consecutive days	One buck, forked horn or better / tag
Pheasants – General	Second Saturday in **November** extending for 44 days	2 – males first two days; 3 males thereafter; possession double the bag limit
Pheasants – Archery Only	Second Saturday in **November** extending for 60 days	2 – pheasants first two days; 3 pheasants thereafter; 1 female/day; possession double the bag limit
Dove	Second Saturday in **November** for 45 days and (September 1-15)	10/day; possession double the bag limit
Turkey – Fall	Second Saturday in **November** extending for 16 consecutive days	1 either sex; 1/season
Turkey – Spring	Last Saturday in **March**, extending for 37 consecutive days	1 male/day; possession 3 males/season
Turkey – Spring – Archery Only	First Monday in **May** extending 14 consecutive days	1 male/day; possession 3 males/spring seasons combined

***SR =** Sacramento River NWR, all or part of the following units: La Barranca, Mooney (closed to waterfowl hunting), Heron Island, Rio Vista, Pine Creek, Capay, Phelan Island, Jacinto, South Ord, Llano Seco Island 1&2, and Sul Norte

****Duck Bag Limits:** 7 ducks/ but not more than 2 hen mallards, 1 pintail, 1 canvasback, 2 redhead, 3 scaup, throughout the season

Deer

Regional Analysis

CDFG has responsibility for managing deer in California and is guided by State law and the policies of the Fish and Game Commission and the Fish and Game Department. With this responsibility, CDFG goals for deer management are to encourage the conservation, restoration, maintenance, and utilization of California's wild deer populations (CDFG 2004b).

As specified in the Fish and Game Code (sections 450-460), deer are managed on a unit basis, where a unit consists of an individual deer herd or group of similar herds. The objectives of the plans are to restore and maintain healthy deer herds in the wild state and to provide for high-quality and diversified use of deer in California. CDFG also collects, compiles, and analyzes deer population data throughout the State and develops proposed hunting regulations for deer. Hunter quotas are determined using annual deer herd survey data and state-of-the-art deer population modeling techniques.

California's mule and black-tailed deer are among the most visible and widespread wildlife species, inhabiting much of the wildlands of the State. Deer are enjoyed for viewing. Deer are also an integral component of the food chain, from their role as grazers/browsers of wildland plants to their role as prey to California's top carnivores including the mountain lion, black bear, coyote, and golden eagle. Deer are also California's most popular game mammal, attracting between 165,000-200,000 hunters to the field annually (CDFG 1998). The economic value that the deer resource contributes to California through recreational activities was estimated in a detailed study in 1987 (Loomis et al. 1989) at over $450 million annually (at 1987 dollars and conditions).

CDFG estimates deer populations by Deer Assessment Units (DAU). Figure 1 illustrates that deer populations in California peaked in the late 1950s to 1960s (see also Figure 2) and are now at a lower level of statewide population. The deer decline appears due largely to long-term declines in habitat quality throughout the state, brought about by various factors.

Figure 1. Generalized deer population trends as they relate to key periods of increasing habitat quality due to disturbances (e.g., fire and logging) and decreasing habitat quality due to declining disturbance (fewer fires and more regulated logging). Opening of forests as a result of post World War II logging activities likely contributed to the final peak in deer numbers in the 1960s, but also signaled the start of the decline as those forests began to "close" again (CDFG 1998).

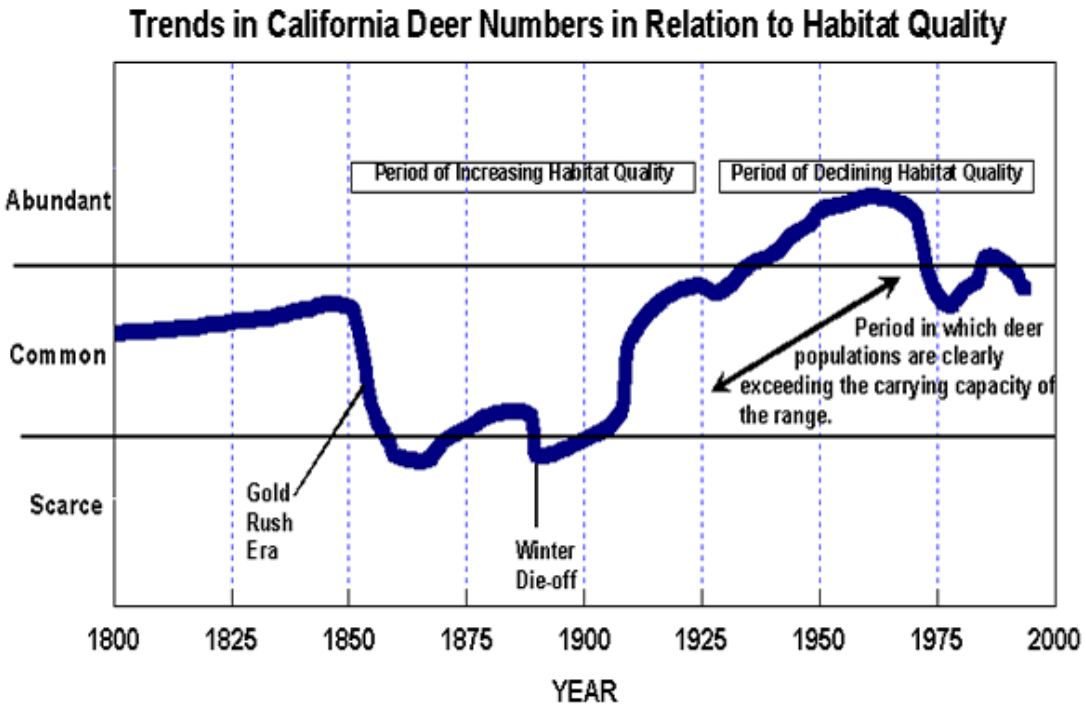
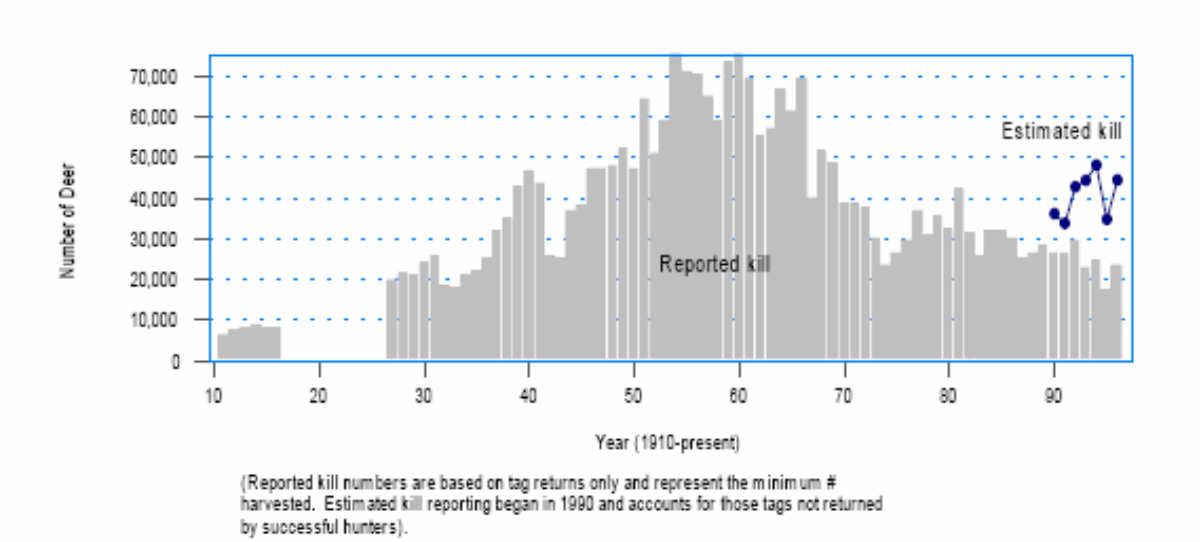


Figure 2. Deer harvest in California reflects the general changes in deer populations, and is affected by long-term changes in habitat quality (CDFG 1998).



The decline in deer numbers during the past couple decades does not, however, mean that deer should be protected from hunting. CDFG (2004b) explains the reason that current deer hunting strategies do not affect the local population size over the longer term is because of the high productive potential of deer. During the annual cycle, fawns are added to the adult population in the late spring/early summer. Because about 1.5 fawns are produced from each doe (every other doe produces twins) the population size nearly doubles each late spring/early summer. Most of these fawns will die (usually 70 to 80%) during the first year of life and only enough will survive (20 to 30%) to replace adult deer which died during the previous year. If there is new habitat available or improved habitat conditions to support additional animals, a proportionate number of fawns will be sustained. Consequently, the annual removal of deer will be replaced by incoming fawns during the next late spring/early summer, and the local population size will not be affected over the annual cycle.

The CDFG (2005a) reported in 2005, the statewide total estimated deer harvest including all zones, hunts, and private lands management areas (PLMs) was approximately 29,566; of which 545 were does and 29,021 were bucks. The estimated deer kill for state zones and hunts accounted for approximately 28,878 (377 does and 28,501bucks), while the actual deer kill on PLMs was 688 deer (168 does and 520 bucks). The overall statewide hunter success was estimated to be 16.2 percent (PLMs excluded). The estimated archery kill for statewide zones and hunts was 2,153 deer (PLMs excluded). Comparisons of estimated kill numbers between tables may not agree due to rounding.

Local Analysis

Sacramento River Refuge is located in the DAU 4-Cascade-North Sierra Nevada and DAU 5-Central Sierra Nevada. The deer population trend for DAU 4 has declined from 60,000-70,000 animals down to 35,000-45,000 in 1996 (CDFG 1998). In DAU 5, the deer population has declined from 120,000-130,000 animals down to 50,000-90,000 in 1996 (CDFG 1998).

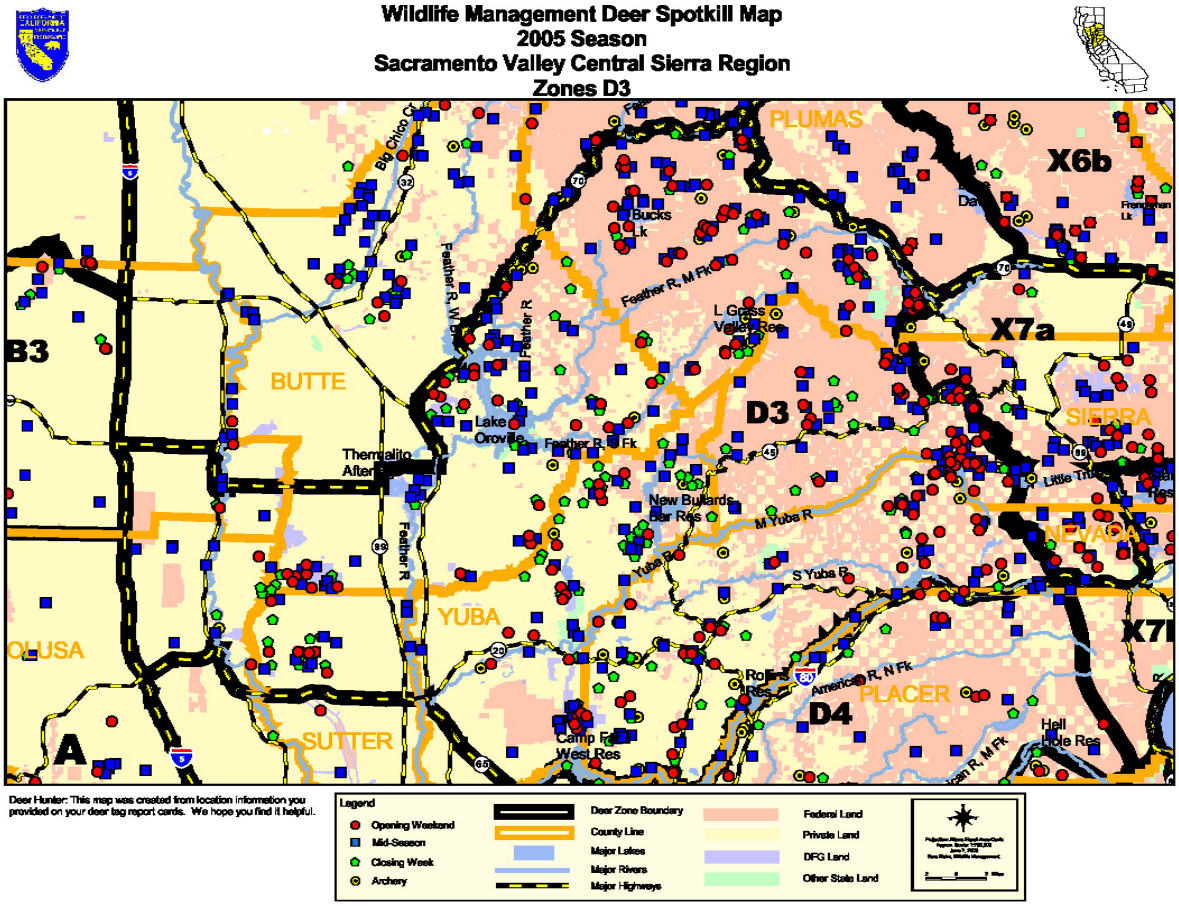
The CDFG (2005a) reports the total deer kill in 2005 in zones C4, D3, and G1 was 469, 617, and 364 respectively. The total deer harvest for DAU 4, which includes Zones C1, C2, C3, and C4, was 1,586. The total deer harvest for DAU 5, which includes Zones D3, D4, D5, D6, and D7, was 2,535.

Sacramento River Refuge was opened for deer hunting for the first time in 2005. The Refuge falls in three management Zones including C4, D3, and G1 (Zone C4 Late Season Buck). The CDFG (2004b) estimates the 3-year average population of deer in Zone C4 to be 19,333 and in Zone D3 to be 18,837. C Zones (including Zones C1, C2, C3, and C4) have a tag quota of 8,000-20,000 tags for one buck, forked horn or better per tag. In 2005 (CDFG 2005a), C Zones issued 9,025 tags out of a 9,025 tag quota. The reported deer kill was 1,033 (11.4% hunter success) and estimated deer kill was 1,551 (17.2% hunter success). D3-5 Zones (including Zones D3, D4, and D5) have a tag quota of 30,000-40,000 tags for one buck, forked horn or better per tag. In 2005 (CDFG 2005a), D3-5 Zones issued 28,386 tags out of a 33,000 tag quota. The reported deer kill was 1,473 (5.2% hunter success) and estimated deer kill was 2,224 (7.8% hunter success). Zone G1 have a tag quota of 500-5,000 tags for one buck, forked horn or better per tag. In 2005 (CDFG 2005a), Zone G1 issued 2,850 tags out of a 2,850 tag quota. The

reported deer kill was 364 (12.8% hunter success) and estimated deer kill was 529 (18.6% hunter success).

CDFG spotkill map for 2005 (Figure 3, CDFG 2005b), indicates a relatively small number of deer are harvested along the Sacramento River in the vicinity of the Refuge. Deer harvest rates are not expected to change significantly over time.

Figure 3. 2005 Season Deer Spotkill Map for Zone D3 (CDFG 2005b).



Since 1991, Sacramento River Refuge is currently 10,058 acres which includes: 3,900 acres of remnant riparian and floodplain vegetation; 3,680 acres of restored vegetation/habitats; and, 2,478 acres of walnuts, row crops, and fallow agricultural lands. Restored vegetation is diverse and includes: willow scrub; cottonwood forest, riparian herblands; mixed-forest; valley oak forest and woodland; valley oak and elderberry savanna; grasslands; freshwater wetlands. This diversity of vegetation provides deer with high quality breeding (fawning) habitat, which provides abundant and diverse food items and supply to meet the needs of various age and sex classes of deer; escape cover to provide safety from predators including humans; shelter from

weather related elements; resting areas; water; and high quality winter habitat, which provides similar food, escape, shelter, resting, and water needs.

Based on a recent 30-mile spotlight survey adjacent to the Sacramento River conducted by CDFG district biologist, buck numbers, which are currently the only harvested sex, are at or above CDFG's management goals identified in the management plan. Although no formal surveys have been conducted for the entire Refuge, the Refuge wildlife biologist and assistant manager have observed more deer on the Refuge since restoration has occurred. Furthermore, they have observed more deer on the Refuge than in surrounding private agricultural lands. They believe this observed increase in Refuge deer is a result of restoring the natural diversity of riparian and floodplain vegetation and habitats. That is, Refuge lands have increased the capacity of the land to produce and maintain deer through the conversion of agricultural lands to restored vegetation and habitats. It stands to reason that restoration of the additional 2,478 acres of Refuge agricultural lands will increase local populations and have a positive long-term effect on Refuge deer populations.

Conclusion

CDFG released a Draft Environmental Document regarding Deer Hunting (2004b) and concluded the following:

> Sport hunting is a controversial issue. A segment of the public has contended that the loss of a single animal by hunting is a significant impact by virtue of the mortality of the individual. Because the activity of hunting deer will result in the death of individual animals, specific safeguards are included in the proposed action. These safeguards include limited quotas, specified seasons, bag and possession limits and herd monitoring, which should result in removing deer at a level that is consistent with individual herd performance. Therefore, the proposed actions have been designed to avoid significant adverse effects on the environment.
>
> The removal of individual animals through hunting, together with other natural mortality, from any of the deer herds, should not significantly reduce herd size over the annual cycle. The proposed action is expected to result in maintaining the herd ratio objectives around the approved management plan objectives. The production and survival of young animals within each herd should replace the animals removed by hunting. Therefore, the proposed action of harvesting deer by hunting should not have a significant adverse impact on either local populations or the statewide population of deer beyond the annual cycle.

The Service believes hunting on Sacramento River Refuge will not have a significant impact on local populations or statewide populations of deer beyond the annual cycle.

Quail

Regional Analysis

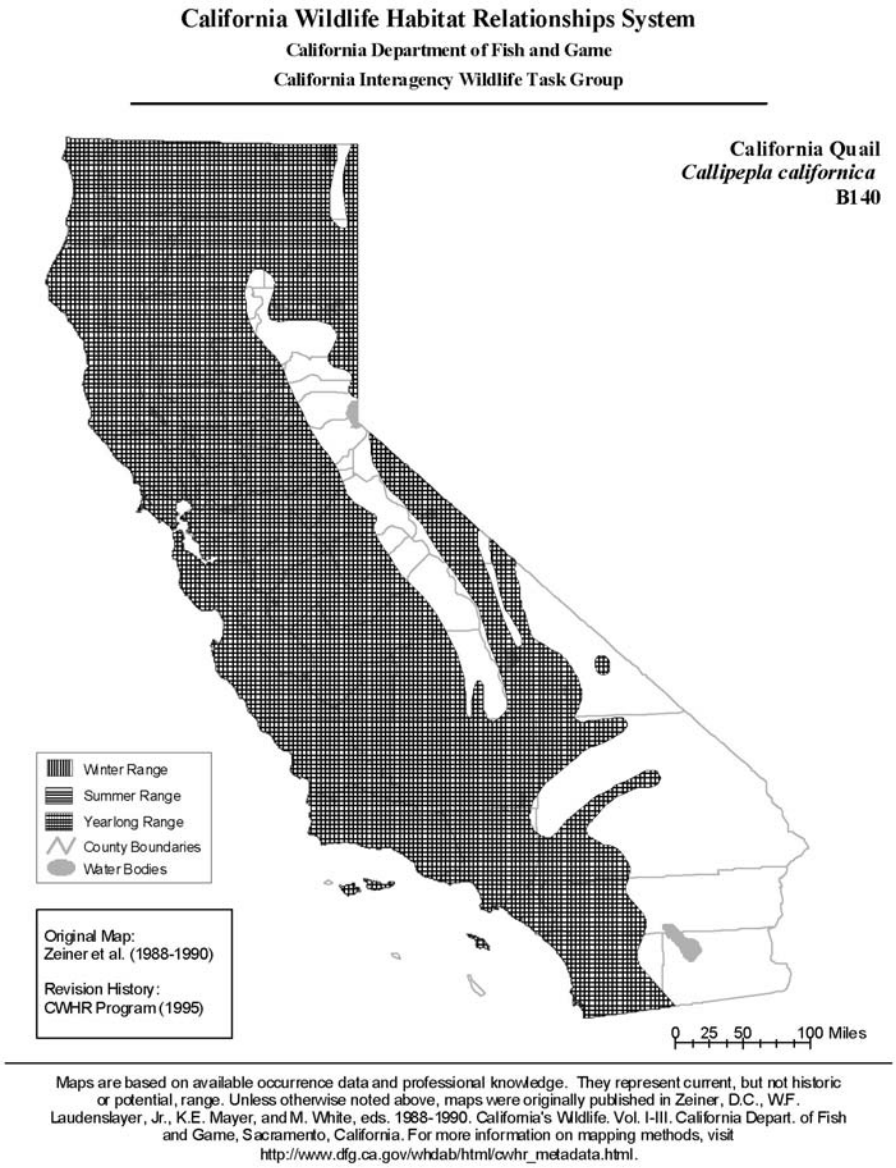
CDFG (2004c) objectives include maintaining healthy resident game bird populations including quail and providing public hunting opportunities through regulated harvest. These objectives are consistent with the wildlife conservation policy adopted by the State Legislature in Section 1801 of the Fish and Game Code. The State's wildlife conservation policy, among other items, contains the objective of providing for the harvest of wildlife resources where such use is consistent with maintaining healthy wildlife populations.

The California quail was selected by the State Legislature in 1931 as the official State bird of California. It is widely distributed over about 70 percent of the State where suitable habitat remains (Figure 4) (CDFG 2004c). California quail are found in 38 habitat types consisting of 65,303,992 acres. Densities range between one and ten acres per bird (Savage 1974, Raitt and Genelly 1964, Francis 1965). The adult spring population for California quail is estimated to be at least 6,530,399 birds (CDFG 2004c).

The adult population of California quail includes about 43 percent females (Leopold 1977). Nesting success is 25 to 64 percent (Williams 1967; Glading 1938; Sumner 1935), clutch size averages 14 (Glading 1938; Sumner 1935), and the hatching rate of eggs is 90 percent (Williams 1967). Brood mortality is 50 percent (Anthony 1970; Johnsgard 1973), and adult mortality (including hunting) is around 70 percent (Raitt and Genelly 1964, Glading and Saarni 1944). Total annual mortality (natural) is estimated to be between 12,532,163 and 125,321,626 birds from a premortality population of between 22,452,165 and 224,521,655 birds.

The five-year average harvest estimate of 694,944 (including un-retrieved hunting mortality) (CDFG 2002) represents about 1.0 percent of the total annual mortality. The 2004 Hunter Survey (CDFG 2004e) reports the 2004 harvest of California quail to be 684,895 birds. The estimated number of quail hunters statewide for 2004 was 86,069 (CDFG 2004e). During 2004, the California quail harvest for Butte, Glenn, and Tehama counties was 6,210, 2,450, and 15,173 respectively (CDFG 2004e). The number of hunters for these counties in 2004 was 1,007, 336, and 1,309 respectively.

Figure 4. California quail range map (CDFG website 2007)



Local Analysis

The Refuge is currently 10,058 acres which includes: 3,900 acres of remnant riparian and floodplain vegetation; 3,680 acres of restored vegetation/habitats; and, 2,478 acres of walnuts, row crops, and fallow agricultural lands. Restored vegetation is diverse and includes: willow scrub; cottonwood forest, riparian herblands; mixed-forest; valley oak forest and woodland; valley oak and elderberry savanna; grasslands; freshwater wetlands. This diversity of vegetation provides quail with high quality breeding (nesting) habitat, which provides abundant and diverse food items such as seeds and legumes; escape cover to provide safety from predators including humans; shelter from weather related elements; roosting habitat (trees and shrubs); water; and

high quality winter habitat, which provides similar food, escape, shelter, roosting, and water needs.

Although no formal surveys have been conducted on the Refuge, the Refuge wildlife biologist and assistant manager have observed more quail on the Refuge since restoration has occurred. Furthermore, they have observed more quail on the Refuge than in surrounding private agricultural lands. They believe this observed increase in quail on the Refuge is a result of restoring the natural diversity of riparian and floodplain vegetation and habitats. That is, Refuge lands have increased the capacity of the land to produce and maintain quail through the conversion of agricultural lands to restored vegetation and habitats. It stands to reason that restoration of the additional 2,478 acres of Refuge agricultural lands will increase local populations and have a positive long-term effect on Refuge quail populations.

Sacramento River Refuge was opened for hunting for the first time in 2005. Based on information from Refuge staff, harvest rates on the Refuge were low despite good quail populations. Hunting pressure and success are limited by difficult access (primarily limited to boat access only) and dense vegetation (difficult to traverse and get a clear shot at flushing game). Quail harvest rates are not expected to change significantly over time.

Conclusion

The CDFG (2004c) determined that the removal of individual animals from resident game bird populations statewide will not significantly reduce those populations and will, therefore, not have a significant environmental impact on resident game birds. The CDFG (2004c) also determined that the resident game bird hunting will not have a significant impact on other aspects of the natural environment. Moreover, the CDFG (2004c) determined there are no significant adverse impacts to the quail population expected as a result of existing hunting regulations.

The adult population in spring can more than sustain the total annual mortality (natural and harvest), whether or not the harvest is considered compensatory or additive. The CDFG (2004c) concludes there are no significant adverse impacts to the quail population are expected to result from hunting. In addition, with species such as quail, where hunters are not selecting for particular attributes (i.e., larger antlers or horns, or males only), impacts on the gene pool as a result of hunting are not cause for concern.

The Service believes that hunting on Sacramento River Refuge will not have a significant impact on local or statewide populations of quail.

Wild Turkey

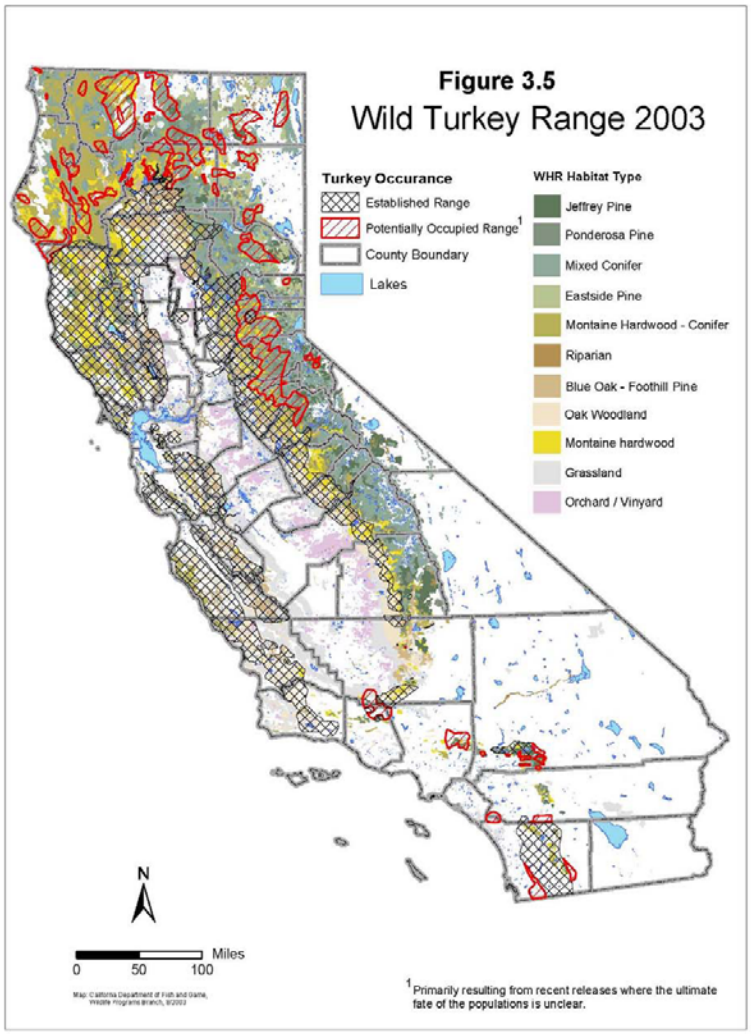
Regional Analysis

The wild turkey is native to much of North America, but not California (Figure 5). The first record of wild turkey introduction into California was in 1877 (CDFG 2004d). The first

introduction attempts of wild turkeys in California by the Commission were made in June of 1908 (CDFG 2004c). Many releases have been made since that time and have resulted in establishing viable populations in approximately 54 counties.

The CDFG (2004c) objectives include maintaining healthy resident game bird populations including wild turkeys and providing public hunting opportunities through regulated harvest. These objectives are consistent with the wildlife conservation policy adopted by the State Legislature in Section 1801 of the Fish and Game Code. The State's wildlife conservation policy, among other items, contains the objective of providing for the harvest of wildlife resources where such use is consistent with maintaining healthy wildlife populations.

Figure 5. Wild Turkey Range 2003 (CDFG 2004d).



Wild turkeys populations have grown tremendously and are estimated to occupy 29,168 square miles (18.5%) of California (CDGF 2004c). This figure does not include the potentially occupied range where turkeys may exist, but at very low population densities. Densities vary between 4 and 15 acres per bird in portions of their range (Lehmann 1957, Hewitt 1967), however in California; the densities are lower and estimated to be between 60 and 120 acres per bird. The wild turkey population (adults in spring) in California is estimated to be between 147,329 birds (CDFG 2004c) and 242,000 birds (CDFG 2004d).

The first hunting season for wild turkeys in California was 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 (CDFG 2004d). 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.

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.

It is estimated that the sex ratio of wild turkeys is 50 percent (Gwynn 1964, Gainey 1955). Nesting success is 45 percent, the average number of eggs per clutch is 10.59, and the egg hatching rate is 87 percent (Dickson 1992). Brood mortality is 66 percent and adult mortality is 58 percent (Dickson 1992). Total annual mortality (natural) is estimated to be at least 284,784 from a premortality population of at least 449,349 birds.

The five-year average annual harvest of wild turkeys is 20,064 (including unretrieved hunting mortality) (CDFG 2002), and represents about 2.4 percent of the total annual mortality. The 2004 Hunter Survey (CDFG 2004e) reports the 2004 harvest of wild turkey to be 25,209 birds (18,865 in the spring and 6,344 in the fall). The number of turkey hunters statewide in spring 2004 was 25,411 and was 11,715 in the fall. During 2004, the spring wild turkey harvest for Butte, Glenn, and Tehama counties was 1,007, 101, and 772 respectively (CDFG 2004e). The fall wild turkey harvest was 168, 67, and 235 respectively. The number of hunters for these counties in spring 2004 was 1,376, 201, and 1,578 respectively and was 436, 101, and 739 respectively in the fall.

Local Analysis

Throughout the wild turkey's range, suitable habitat contains a combination of three key components: trees, open grasslands and moisture (CDFG 2004d). The Refuge is currently 10,058 acres which includes: 3,900 acres of remnant riparian and floodplain vegetation; 3,680 acres of restored vegetation/habitats; and, 2,478 acres of walnuts, row crops, and fallow agricultural lands. Restored vegetation is diverse and includes: willow scrub; cottonwood forest, riparian herblands; mixed-forest; valley oak forest and woodland; valley oak and elderberry savanna; grasslands and freshwater wetlands. This diversity of vegetation provides wild turkeys with high quality breeding (nesting) habitat, which provides abundant and diverse food items such as seeds, legumes, and acorns; escape cover to provide safety from predators including humans; shelter from weather related elements; roosting habitat (tall trees); water; and high quality winter habitat, which provides similar food, escape, shelter, roosting, and water needs.

Although no formal surveys have been conducted on the Refuge, the Refuge wildlife biologist and assistant manager have observed more wild turkeys on the Refuge since restoration has occurred. Furthermore, they have observed more wild turkeys on the Refuge than in surrounding private agricultural lands. They believe this observed increase in wild turkeys on the Refuge is a result of restoring the natural diversity of riparian and floodplain vegetation and habitats. That is, Refuge lands have increased the capacity of the land to produce and maintain wild turkeys through the conversion of agricultural lands to restored vegetation and habitats. It stands to reason that restoration of the additional 2,478 acres of Refuge agricultural lands will increase local populations and have a positive long-term effect on Refuge wild turkey populations.

Sacramento River Refuge was opened for hunting for the first time in 2005. Based on information from Refuge staff and CDFG game wardens obtained during law enforcement field checks, harvest success on the Refuge was approximately 20 percent and well distributed throughout the Refuge Units. Hunting pressure and success are limited by difficult access (primarily limited to boat access only) and dense vegetation. Turkey harvest rates are not expected to change significantly over time. Turkey populations, including male turkeys which are the only sex hunted during the spring season, observed by the assistant manager and refuge law enforcement officers following the spring hunting 2006 season appeared unaffected.

Conclusion

The CDFG (2004c) determined that the removal of individual animals from resident game bird populations statewide will not significantly reduce those populations and will, therefore, not have a significant environmental impact on resident game birds. The CDFG (2004c) also determined that the resident game bird hunting will not have a significant impact on other aspects of the natural environment.

The CDFG (2004c) demonstrates the adult turkey population in the spring can more than sustain annual mortality, including hunting mortality whether or not the harvest is considered compensatory or additive. The CDFG (2004c) determined there are no significant adverse impacts to the wild turkey population expected as a result of existing hunting regulations.

The Service believes that hunting on Sacramento River Refuge will not have a significant impact on local populations or statewide populations of wild turkey.

Ring-necked Pheasant

Regional Analysis

The ring-necked pheasant is native to eastern Asia. First attempts to introduce the species in California were made in the 1880s (CDFG 2004c). In 1925, pheasants became established in sufficient numbers for a hunting season, first held in Inyo and Mono counties.

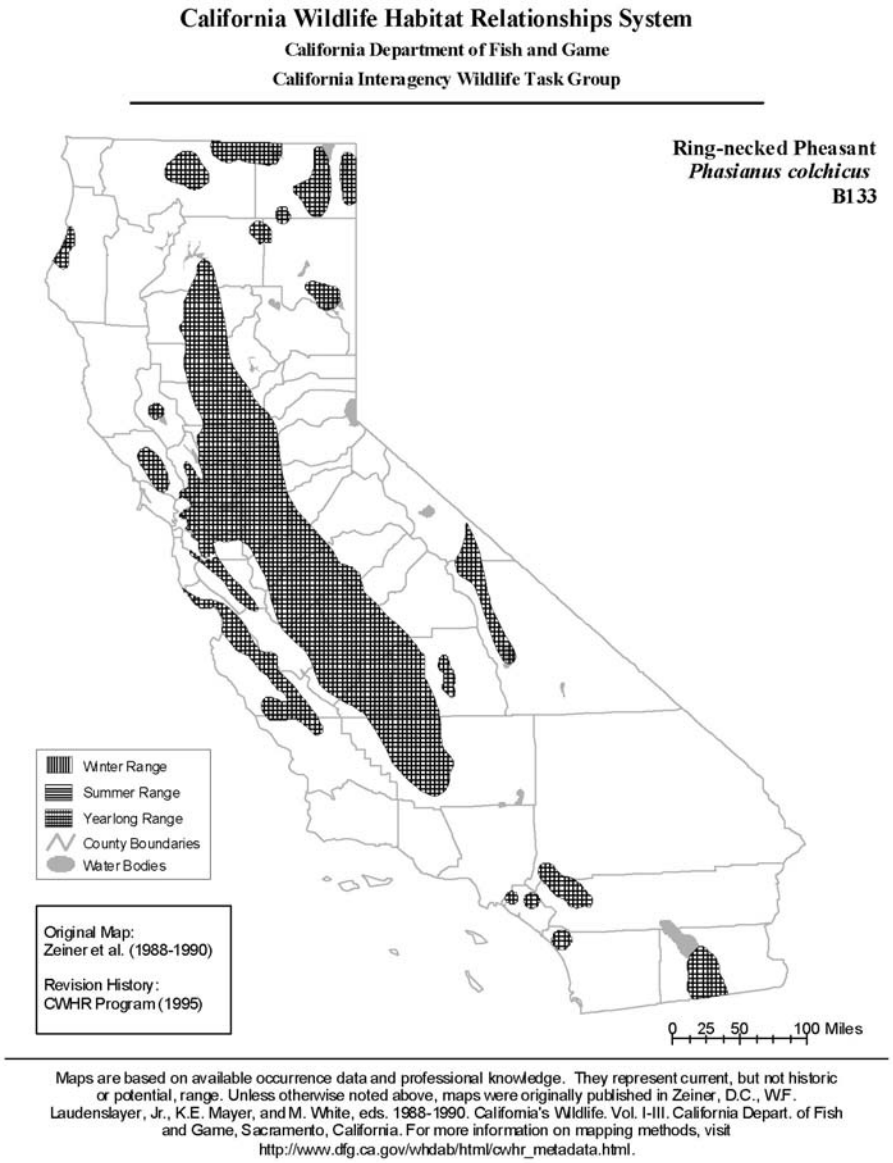
The CDFG (2004c) objectives include maintaining healthy resident game bird populations including ring-necked pheasants and providing public hunting opportunities through regulated harvest. These objectives are consistent with the wildlife conservation policy adopted by the State Legislature in Section 1801 of the Fish and Game Code. The State's wildlife conservation policy, among other items, contains the objective of providing for the harvest of wildlife resources where such use is consistent with maintaining healthy wildlife populations.

Ring-necked pheasants are found in six habitat types in California consisting of 14,390,125 acres (Figure 6) (CDFG 2004c). Densities range between 0.66 and 12 acres per bird (Hart 1990, Hart et al. 1956). The size of the pheasant population (adults in the spring) is estimated to be at least 1,199,177 birds (CDFG 2004c). The Breeding Bird Survey Data for the Central Valley Region of California during the period of 1966-2002 shows a slightly increasing trend.

The adult spring population of ring-necked pheasants includes about 58 percent females (Hart 1990). Nesting success is 53 percent, clutch size averages 12, and the percent of eggs hatching is 83 (Schemnitz 1980). Brood mortality is 63 percent (Hill and Robertson 1988), and adult mortality (including hunting) is 63 percent (Petersen et al. 1988). Total annual mortality (natural) is estimated to be at least 3,068,542 from a premortality population of at least 4,870,702 birds.

The five-year average annual harvest of 176,815, including unretrieved hunting mortality (CDFG 2002), represents about 0.60 percent of the total annual mortality. The 2004 Hunter Survey (CDFG 2004e) reports the 2004 harvest of ring-necked pheasant to be 132,998 birds. In 2004, the number of pheasant hunters statewide was 39,107. During 2004, the pheasant harvest for Butte, Glenn, and Tehama counties was 11,984, 9,735, and 2,048 respectively (CDFG 2004e). The number of hunters for these counties in 2004 was 3,793, 2,518, and 537 respectively.

Figure 6. Ring-necked pheasant range map (CDFG website 2007).



Local Analysis

Sacramento River Refuge was opened for pheasant hunting for the first time in 2005. Since there are no check stations on the Refuge, pheasant harvest is not recorded. Pheasant harvest is, however, tracked for other Refuges in the Complex including Sacramento, Delevan, Colusa, and Sutter Refuges. In 2005, 233 pheasants were harvested on Sacramento Refuge (0.30 average pheasants/hunter); 184 pheasants were harvested on Delevan Refuge (0.11 average pheasants/hunter); 135 pheasants were harvested on Colusa Refuge (0.29 average pheasants/hunter); and 26 pheasants were harvested on Sutter Refuge (0.02 average pheasants/hunter). State Wildlife Areas (WA) near the Sacramento River Refuge also tract the

pheasant harvest. The Llano Seco Unit of Upper Butte Basin WA harvested 78 pheasants in 2005 (0.65 average pheasants/hunter); Howard Slough Unit of Upper Butte Basin WA harvested 257 pheasants (0.28 average pheasants/hunter); Little Dry Creek Unit of Upper Butte Basin WA harvested 520 pheasants (0.37 average pheasants/hunter); and Gray Lodge WA harvested 987 pheasants (0.24 average pheasants/hunter).

These other Refuges and WAs have higher pheasant populations than occur on the Sacramento River Refuge primarily due to the differences in habitat. Sacramento, Delevan, Colusa, and Sutter Refuges, consist of 23,000 acres of wetland, grassland, and riparian habitats. Seasonal wetlands comprise the majority of habitats allowing these Refuges to support almost 1,400,000 ducks and 550,000 geese. In contrast, Sacramento River Refuge consists of 10,058 acres of riparian and floodplain remnant vegetation (scrublands, forests, herblands, woodlands savannas, grasslands and wetlands) and agricultural lands (walnut orchards, row crops, and fallow fields). Scrub, forest, and woodlands comprise a greater proportion of riparian and floodplain habitats compared to savanna and grassland habitats which are preferred by pheasants. Likewise, walnuts comprise a greater proportion of agricultural lands compared to certain row crops. Therefore, there is a relatively smaller proportion of pheasant habitat at this Refuge which consequently supports smaller populations of pheasants compared to other Refuges and Wildlife Areas in the Basins.

However, relative to the Sacramento River floodplain, the Refuge is restoring oak and elderberry savannas and grasslands at the site of former orchards. The Refuge wildlife biologist and assistant manager have observed a relatively small increase in the number of pheasants on the Refuge.

Based on information from Refuge staff obtained during law enforcement field checks, harvest rates on the Refuge were low despite moderate populations on isolated units. Hunting pressure and success are limited by difficult access (primarily limited to boat access only) and dense vegetation (difficult to traverse and get a clear shot at flushing pheasants). Pheasant harvest rates are not expected to change significantly over time.

Conclusion

The CDFG (2004c) determined that the removal of individual animals from resident game bird populations statewide will not significantly reduce those populations and will, therefore, not have a significant environmental impact on resident game birds. The CDFG (2004c) also determined that the resident game bird hunting will not have a significant impact on other aspects of the natural environment. Current hunting regulations permit the harvest of males only in most cases, and because pheasants are polygynous (one male capable of breeding several females); there is very little effect on reproduction (Hart 1990). In addition, the CDFG (2004c) determined there are no significant adverse impacts to the ring-necked pheasant population expected as a result of existing hunting regulations.

For pheasants and turkeys (during the spring season), hunters select for males. However, because there is an abundance of males in both species, there is an excess of males for breeding

needs (Avery and Ridley 1988). For pheasants, ratios as low as one male to 10 females have no effect on the breeding success (Edwards 1988, Avery and Ridley 1988). In any case, various strains of both of these species have been introduced into California, resulting in a mixed genetic makeup. Therefore, impacts on the gene pool as a result of hunting are not cause for concern.

The Service believes that hunting on Sacramento River Refuge will not have a significant impact on local populations or statewide populations of ring-necked pheasant.

Migratory Species

Waterfowl

Flyway Analysis

Waterfowl populations throughout the United States are managed through an administrative process known as flyways, of which there are four (Pacific, Central, Mississippi and Atlantic). The review of the policies, processes and procedures for waterfowl hunting are covered in a number of documents.

NEPA considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, ''Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FSES 88– 14),'' filed with the Environmental Protection Agency on June 9, 1988. The Service published a Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582), and the Record of Decision on August 18, 1988 (53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate Environmental Assessment and Finding of No Significant Impact. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53776); the Service announced its intent to develop a new Supplemental Environmental Impact Statement for the migratory bird hunting program. Public scoping meetings were held in the spring of 2006, as announced in a March 9, 2006, Federal Register notice (71 FR 12216).

Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 CFR Part 20) establishing the Migratory Bird Hunting Frameworks. The frameworks are essentially permissive in that hunting of migratory birds would not be permitted without them. Thus, in effect, Federal annual regulations both allow and limit the hunting of migratory birds.

The Migratory Bird Hunting Frameworks provide season dates, bag limits, and other options for the States to select that should result in the level of harvest determined to be appropriate based upon Service-prepared annual biological assessments detailing the status of migratory game bird populations. In North America, the process for establishing waterfowl hunting regulations is conducted annually. In the United States, the process involves a number of scheduled meetings (Flyway Study Committees, Flyway Councils, Service Regulations Committee, etc,) in which information regarding the status of waterfowl populations and their habitats is presented to

individuals within the agencies responsible for setting hunting regulations. In addition, public hearings are held and the proposed regulations are published in the Federal Register to allow public comment.

For waterfowl, these annual assessments include the Breeding Population and Habitat Survey, which is conducted throughout portions of the United States and Canada, and is used to establish a Waterfowl Population Status Report annually. In addition, the number of waterfowl hunters and resulting harvest are closely monitored through both the Harvest Information Program (HIP) and Parts Survey (Wing Bee). Since 1995, such information has been used to support the adaptive harvest management (AHM) process for setting duck-hunting regulations. Under AHM, a number of decision-making protocols render the choice (package) of pre-determined regulations (appropriate levels of harvest) which comprise the framework offered to the States that year. California's Fish and Game Commission then selects season dates, bag limits, shooting hours and other options from the Pacific Flyway package. Their selections can be more restrictive, but can not be more liberal than AHM allows. Thus, the level of hunting opportunity afforded each State increases or decreases each year in accordance with the annual status of waterfowl populations.

Each National Wildlife Refuge considers the cumulative impacts to hunted migratory species through the Migratory Bird Frameworks published annually in the Service's regulations on Migratory Bird Hunting. Season dates and bag limits for National Wildlife Refuges open to hunting are never longer or larger than the State regulations. In fact, based upon the findings of an environmental assessment developed when a refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the State allows.

As a result of the recent regulations, the estimated average annual duck harvest for the Pacific Flyway is 2.5 million birds which represent approximately 18 percent of the estimated average annual U.S. harvest of 14 million ducks (USFWS 2005f). The estimated average annual goose harvest for the Pacific Flyway is 383,091 which represent 12.4 percent of the estimated annual U.S. harvest of over 3.5 million geese.

For comparison, in 2005, the breeding duck population estimate for those areas surveyed (California, Oregon, Nevada, Utah and Washington) in the Pacific Flyway was 1,097,276 birds, which was a 22.7 percent increase from the 2004 average (USFWS 2005f). The estimated average duck breeding population for these areas from 1994-2005 was approximately 1.10 million birds. These numbers serve to demonstrate the relative importance of the more southern portions of the Pacific Flyway for wintering waterfowl, rather than waterfowl production. In fact, the vast majority of birds wintering and subsequently harvested in the Flyway come from breeding grounds to the north.

Regional Analysis

The estimated breeding duck population in California in 2005 was 618,241 birds, which was a 49 percent increase from the 2004 estimate (USFWS 2005f). The average estimated breeding duck population for California from 1990-2005 was 605,263 birds. Mallards generally comprise more

than half of each years breeding population estimate. Add to that, an estimate of a few thousand breeding Western Canada Geese, and you have a pretty good picture of the magnitude of California's waterfowl reproduction on an annual basis. In contrast, the Mid-winter Waterfowl Survey index for California totals 4 million ducks and 1 million geese in recent years, further illustrating the relative importance of California's overall wintering waterfowl capacity within the Pacific Flyway.

Annual harvest estimates for California indicate that a total of approximately 1.5 million ducks and 130,000 geese have been harvested by some 65,000 (based on Federal Duck Stamp sales) waterfowl hunters in recent years (USFWS 2005f).

Closer to home, for those counties in which the Sacramento River NWR occurs, the estimated duck harvest for Butte, Glenn, and Tehama counties was 252,065; 128,768; and 10,238 respectively. The goose harvest was 21,282; 18,127 and 2,081 respectively (CDFG 2004e). The estimated number of duck hunters for these counties in 2004 was 11,313; 5,270; and 1,041 respectively. The estimated number of goose hunters was 6,177; 4,331; and 772 respectively. The harvest of coots and moorhens for Butte, Glenn, and Tehama counties was 2,484; 0 and 0 respectively and the number of hunters was 168; 0 and 0 respectively.

Local Analysis

Sacramento River Refuge was formally opened for waterfowl hunting for the first time in 2005. Prior to that time, hunters had a long history of accessing flood waters within the "ordinary high water mark" by boat when conditions allowed, and had also hunted waterfowl along the main stream of the Sacramento River on a more frequent but less intensive level. In addition, historically some waterfowl hunting had also taken place on the private land acquired by the Service beginning in 1989. Since there are no check stations on the Refuge, waterfowl harvest is not recorded.

However, waterfowl harvest is tracked for other Refuges in the Complex including Sacramento, Delevan, Colusa, and Sutter Refuges. In 2005-2006, 7,683 hunters at Sacramento Refuge harvested 16,871 birds (15,180 ducks, 1,575 geese, and 116 coots) with an average of 2.26 birds/hunter. For the same time period at Delevan Refuge, 6,386 hunters harvested 19,130 birds (17,432 ducks, 1,659 geese, and 39 coots) with an average of 3.04 birds/hunter; at Colusa Refuge, 3,910 hunters harvested 9,805 birds (9,240 ducks, 377 geese, and 188 coots) with an average of 2.60 birds/hunter; and at Sutter Refuge, 2,152 hunters harvested 4,157 birds (3,859 ducks, 292 geese, and 6 coots) with an average of 1.93 birds/hunter. In combination, these four refuge hunt programs resulted in some 20,000 hunter visits harvesting nearly 46,000 ducks and 3,900 geese, which amounted to 23.7 percent of the ducks and 42.6 percent of the geese taken on all the CDFG conducted public hunt areas (40) in California.

Sacramento, Delevan, Colusa, and Sutter Refuges, consist of 23,000 acres of wetland, grassland, and riparian habitats. Seasonal wetlands comprise the majority of habitats allowing these Refuges to support peak populations of approximately 1,400,000 ducks and 550,000 geese. In contrast, the Sacramento River Refuge consists of 10,058 acres of riparian and floodplain

remnant vegetation (scrublands, forests, herblands, woodlands savannas, grasslands, and wetlands) and agricultural lands (walnut orchards, row crops, and fallow fields). Therefore, there is a relatively small proportion of wintering waterfowl habitat at this Refuge, and consequently it supports much smaller wintering populations of waterfowl compared to other Refuges and State Wildlife Areas in the Sacramento Valley. Furthermore, wintering waterfowl populations are variable, depending on Sacramento River over-bank flooding during fall, winter, and spring.

Based on information from Refuge staff, harvest on the Sacramento River Refuge varies from year to year. Low water years result in limited amounts of quality wetland habitat. During these dry years, waterfowl hunting is limited to the shoreline where wintering waterfowl habitat conditions (food and standing water for roosting) are poor and, consequently, so is the hunting success. Wet years often result in the River overflowing its banks and inundating thousands of acres of floodplain habitat for relatively short periods of time. When this occurs, waterfowl are attracted to newly flooded habitat to feed, seek cover from the weather, and rest; or utilize the long riparian floodplain as a migratory corridor. During these high water events, waterfowl hunting success is generally good, but limited to boaters that are outfitted for higher River flows.

Conclusion

The hunting of waterfowl in the United States is based upon a thorough regulatory setting process that involves numerous sources of waterfowl population and harvest monitoring data. As a result of the regulatory options produced (AHM) in recent years, California hunter's estimated harvest of nearly 1.5 million ducks totals approximately 12 percent of the U.S. harvest of 12.3 million, and 55 percent of the Pacific Flyway's 2.65 million harvest estimates. Comparative numbers for estimated goose harvest yield percentages of 4.1 percent and 33 percent of the U.S. and Pacific Flyway totals, respectively. Further, some 40 CDFG administered public hunt areas allow take of approximately 12-15 percent and 7 percent of California's estimated duck and goose harvest, respectively. Of the 40 CDFG administered hunts, the previously mentioned four refuges (Sacramento, Delevan, Colusa and Sutter) represent nearly 23 and 42 percent of all ducks and geese harvested, respectively. While these percentages may be noteworthy at the local level, they amount to only 3 percent of California' estimated duck harvest, only 1.7 percent of the Pacific Flyways estimate, and only 0.37 percent of the U.S. total.

With the much smaller wetland habitat base, attendant wintering waterfowl populations and number of hunters on the Sacramento River Refuge, and given the already existing, though varying degree of waterfowl harvest prior to the Refuge being opened, the Service believes that hunting on the Sacramento River Refuge will not have a significant impact on local, regional or Pacific Flyway waterfowl populations.

Dove

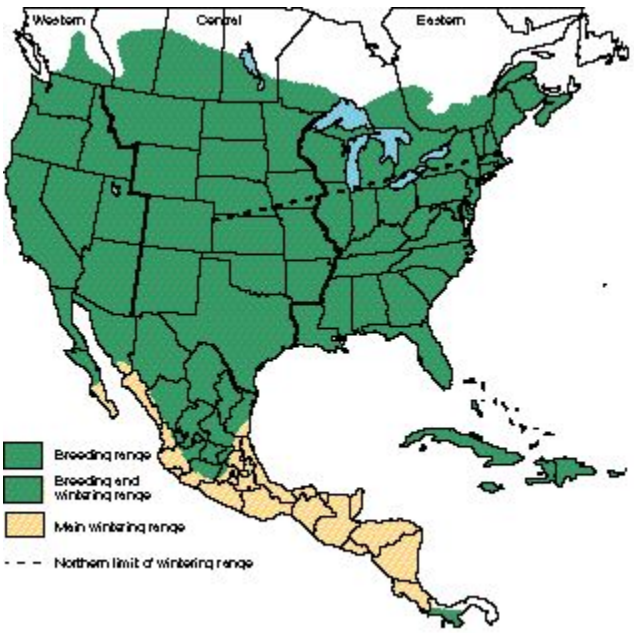
Flyway Analysis

The mourning dove is one of the most widely distributed and abundant birds in North America (Droege and Sauer 1990). It is also the most important U.S. game bird in terms of numbers harvested. The U.S. fall population of mourning doves has been estimated to be about 475 million (Tomlinson et al. 1988; Tomlinson and Dunks 1993).

The breeding range of the mourning dove extends from the southern portions of the Canadian Provinces throughout the continental United States into Mexico, the islands near Florida and Cuba, and scattered areas in Central America (Aldrich 1993; Figure 7). Although some mourning doves are nonmigratory, most migrate south to winter in the United States from northern California to Connecticut, south throughout most of Mexico and Central America to western Panama.

Within the United States, three areas contain breeding, migrating, and wintering mourning dove populations that are largely independent of each other (Kiel 1959). In 1960, three areas were established as separate management units: the Eastern (EMU), Central (CMU), and Western (WMU) (Figure 7).

Figure 7. Breeding and wintering ranges of mourning doves and mourning dove management units in the United States.



The two main tools used to manage mourning doves are an annual breeding population survey (known as the Mourning Dove Call-count Survey; Dolton 1993a, b) and harvest surveys. The Call-count Survey provides an annual index to population size as well as data for determining long-term trends in dove populations. State harvest surveys and the National Migratory Bird

Harvest Information Program, begun in 1992, estimate dove harvest. In addition, recoveries from banded doves have provided vital information for managing the species (Hayne 1975; Dunks et al. 1982; Tomlinson et al. 1988). The resulting information on population status and trends is used by wildlife administrators in setting annual hunting regulations.

In 2001, a National Mourning Dove Planning Committee was formed to further develop guidelines that could be used for regional harvest management. The committee produced The Mourning Dove National Strategic Harvest Management Plan (NMDPC 2003). The implementation of the plan began in July 2003 with the initiation of a national pilot reward-band study.

Dolton and Rau (2006) reported that between 2005 and 2006, the average number of doves heard per route did not change significantly in the EMU, decreased significantly in the CMU, and increased significantly in the WMU. Over the most recent 10 years, no significant trend was indicated for doves heard in either the EMU or WMU while the CMU showed a significant decline. Over the 41-year period, all 3 units exhibited significant declines. In contrast, for doves seen over the 10-year period, a significant increase was found in the EMU while no trends were found in the CMU and WMU. Over 41 years, no trend was found for doves seen in the EMU and CMU while a significant decline was indicated for the WMU.

U.S. dove harvest appears to be decreasing. In recent years, less than 6 percent of the fall population of mourning doves was estimated to have been harvested annually (Dolton and Rau 2006). The total estimated harvest for the 2005-06 season by management unit and for the U.S. are as follows: Eastern: 9,793,000 ± 6%; Central: 9,891,400 ± 9%; Western: 2,465,500 ± 7%; and, U.S.: 22,149,900 ± 5% (Dolton and Rau 2006).

The mourning dove remains an extremely important game bird, especially since more doves are harvested than all other migratory game birds combined. A 1991 survey indicated that the mourning dove provided about 9.5 million days of hunting recreation for 1.9 million people (USFWS and U.S. Bureau of Census 1993).

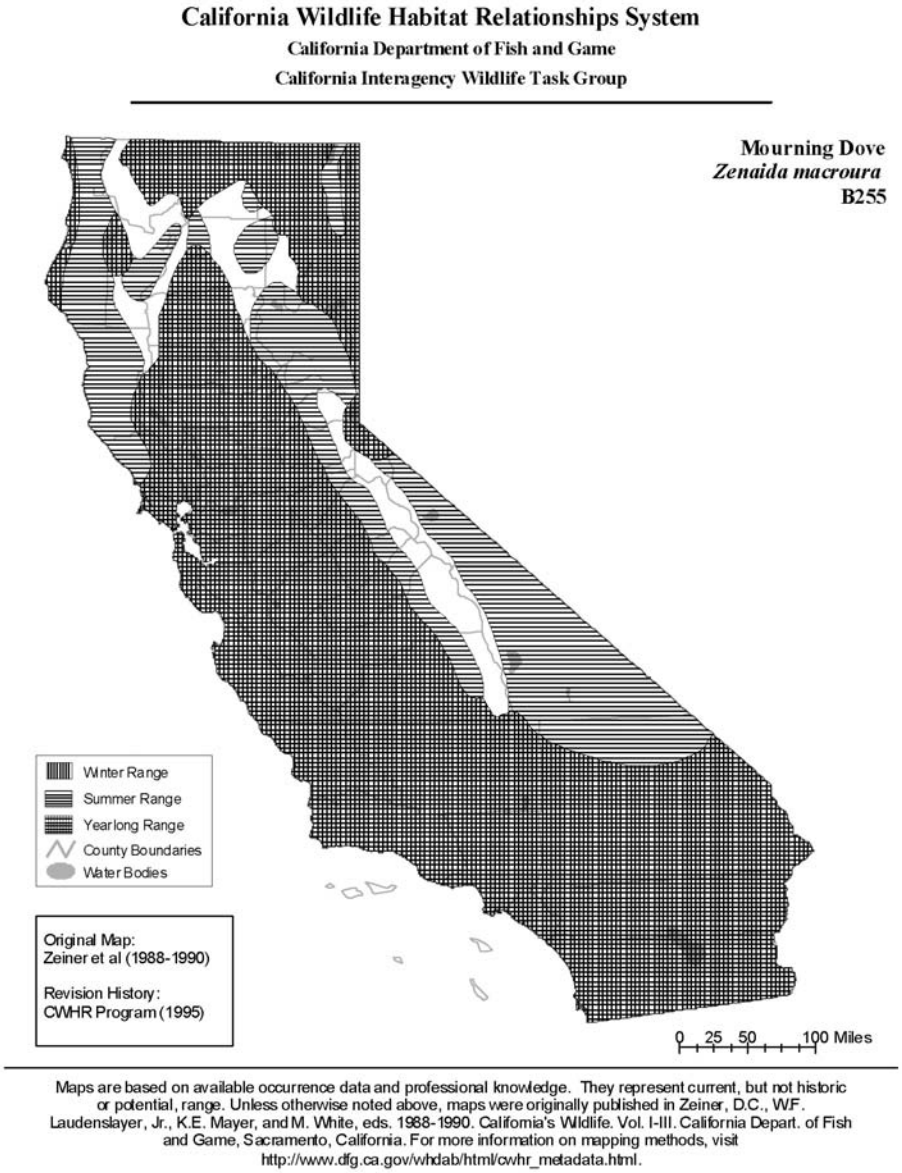
Regional Analysis

Mourning dove populations in the WMU have declined a significant 2.2% annually during the last 30 years (1966-1995) as determined with annual call-count data from WMU states (Dolton 1995). California (3.5% annually) and Nevada (3.9% annually) have experienced the greatest declines, whereas lesser declines have occurred in all other WMU states (Dolton 1995). Harvest and number of hunters have declined along with population indices in the WMU. In California, the annual index, as measured with spring call-count surveys, declined from 28 doves heard per transect in 1966 to only 9.5 in 1994. Causes of these declines are unknown; however it is unlikely that hunting was solely responsible for the decline (NMDPC 2003).

Dolton and Rau (2006) report that for 2005-2006 the average number of doves heard per route increased significantly in the WMU. They also state that over the past 41 years (1966-2006), a significant decline for mourning doves was indicated for the WMU.

Mourning doves inhabit the majority of the state (Figure 8) and are very important to California hunters. The CDFG (2004e) reported a five year annual harvest average for dove to be 1,933,961. The estimated number of hunters for the same time period was 99,657. The 2004 Hunter Survey (CDFG 2004e) reports the 2004 harvest of mourning dove to be 1,904,264 birds. In 2004, the number of mourning dove hunters statewide was 86,069. During 2004, the mourning dove harvest for Butte, Glenn, and Tehama counties was 50,218, 24,875, and 50,319 respectively (CDFG 2004e). The number of hunters for these counties in 2004 was 3,961, 1,913, and 3,390 respectively.

Figure 8. Mourning dove range map (CDFG website 2007).



Local Analysis

The Refuge is currently 10,058 acres which includes: 3,900 acres of remnant riparian and floodplain vegetation; 3,680 acres of restored vegetation/habitats and, 2,478 acres of walnuts, row crops, and fallow agricultural lands. Restored vegetation is diverse and includes: willow scrub; cottonwood forest, riparian herblands; mixed-forest; valley oak forest and woodland; valley oak and elderberry savanna; grasslands and freshwater wetlands. This diversity of vegetation provides mourning doves with high quality breeding (nesting) habitat, which provides abundant and diverse food items such as seeds and legumes; shelter from weather related elements; roosting habitat (tall trees); water; and high quality winter habitat, which provides similar food, escape, shelter, roosting, and water needs. Refuge management has increased the capacity of the land to produce and maintain dove through the conversion of agricultural lands to restored vegetation and habitats. It stands to reason that restoration of the additional 2,478 acres of Refuge agricultural lands will increase local populations and have a positive long-term effect on Refuge mourning dove populations.

Population levels fluctuate seasonally. A relatively small local population of dove utilizes the Refuge for breeding, while larger populations frequent the Refuge during migration. The influx of dove during migration appears to be dependant on the types of crops that are grown locally. Dove prefer cereal grain crop, which vary from year to year, and almond nuts that are grown in close proximity to Refuge lands.

Based on information from Refuge staff, dove harvest on the Refuge varies depending on the types of agricultural crops and timing of crop harvest. Dove hunting occurs primarily on shorelines and gravel bars where dove are attracted to a water source and grit to use in digestion of seeds. These areas primarily occur below the ordinary high water mark of the Sacramento River. The Refuge recognizes the rights of public use, consistent with State and Federal laws, in the waters below the ordinary low water mark and the public trust easement in the area between the ordinary low water mark and the ordinary high water mark (USFWS 2005a). These areas are open to the public as a result of the public trust easement; therefore, opening the Refuge to dove hunting would have created only a minor increase in the dove harvest. Hunting pressure and success are limited by difficult access (primarily limited to boat access only) and dense vegetation (difficult to traverse). Dove harvest rates are not expected to change significantly over time.

Conclusion

The Service believes that hunting on Sacramento River Refuge will not have a significant impact on local populations or statewide populations of dove.

Endangered Species

It is the policy of the Service to protect and preserve all native species of fish, amphibians, reptiles, birds, mammals, invertebrates, and plants, including their habitats, which are designated threatened or endangered with extinction. The Service has listed a number of plant species as

endangered, threatened, or rare, and a number of animal species as endangered or threatened which occur on the Refuge including: bald eagle, giant garter snake, winter-run Chinook salmon, spring-run Chinook salmon, Central Valley steelhead, Valley elderberry longhorn beetle, western yellow billed cuckoo, fall-run Chinook salmon, and late fall-run Chinook salmon.

A common concern among members of the public and wildlife professionals, including Service and Wildlife Services personnel, is the impact of damage management assistance methods and activities on non-target species, particularly threatened and endangered species. Section 7 of the Endangered Species Act (ESA), as amended (16 U.S.C. 1531-1543; 87 Stat. 884), provides that,

> "The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act" (and shall) "ensure that any action authorized, funded or carried out ... is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of (critical) habitat ..."

Section 7 consultations with USFWS (2004) and NOAA-Fisheries (2004) concluded that the CCP/EA (USFWS 2005a) which included hunting of dove, waterfowl, coot, common moorhen, pheasant, quail, snipe, turkey and deer is not likely to adversely affect any of the special status species/designated critical habitat occurring on the Refuge including: bald eagle, giant garter snake, winter-run Chinook salmon, spring-run Chinook salmon, Central Valley steelhead, Valley elderberry longhorn beetle, western yellow billed cuckoo, fall-run Chinook salmon, and late fall-run Chinook salmon.

The Service believes that hunting on Sacramento River Refuge will not have a significant impact on endangered or threatened species.

Non-hunted Wildlife Species

Hunted species and other wildlife will possibly compete for habitat. While each species occupies a unique niche, there is only a finite amount of space available to satisfy various habitat requirements of water, food, cover, breeding, roosting, and fawning areas. So, while individuals of a species compete for habitat within the species niche, most species occupy space to the exclusion of many other species. Hunted species (dove, waterfowl, coot, common moorhen, pheasant, quail, snipe, turkey and deer) generally do not prey on other species at unacceptable levels. Occasionally, in certain areas, deer browse of seedling valley oak is particularly heavy. The primary species that will be hunted above the ordinary water high mark will be nonnative wild turkey and deer. Harvesting these two species, or any other hunted species, would not result in a substantial decrease in biological diversity on the Refuge.

Hunting is a highly regulated activity, and generally takes place at specific times and seasons (dawn, fall and winter) when the game animal is less vulnerable, and other wildlife-dependent activities (e.g., wildlife observation, environmental education and interpretation) are less common, reducing the magnitude of disturbance to non-hunted wildlife species.

Hunting is an appropriate wildlife management tool that can be used to manage wildlife populations. Some wildlife disturbance will occur during the hunting seasons. Proper zoning, regulations, and Refuge seasons will be designated to minimize any negative impacts to wildlife populations using the Refuge.

Human disturbance associated with hunting includes loud noises and rapid movements, such as those produced by shotguns and boats powered by outboard motors. This disturbance, especially when repeated over a period of time, may compel waterfowl (and other wildlife species) to change food habits, feed only at night, lose weight, or desert feeding areas (Madsen 1995, Wolder 1993).

These indirect impacts are not significant on the Refuge since they can be reduced by the presence of adjacent sanctuary areas where hunting does not occur, and birds can feed and rest relatively undisturbed. Sanctuaries or non-hunt areas have been identified as the most common solution to disturbance problems caused from hunting (Havera et. al 1992). Prolonged and extensive disturbances may cause large numbers of waterfowl to leave disturbed areas and migrate elsewhere (Madsen 1995, Paulus 1984). Thus sanctuary and non-hunt areas are very important to minimize disturbance to waterfowl populations to ensure their continued use of the Sacramento River.

The CCP (USFWS 2005a) balances all of the compatible priority public uses that occur on the Refuge with the mission of the Service and the purposes of the Refuge, and it is also consistent with the Improvement Act. Sensitive areas for wildlife, plants and cultural resources have been set aside as sanctuaries (20 percent) and are closed to the public. The remaining 80 percent of the Refuge that allows carefully planned wildlife-dependent public uses. Compatible locations of trails and facilities, including restrooms and parking lots, have been chosen to minimize disturbance to wildlife. Areas outside the trails and facilities, will not receive as much visitation or as concentrated visitation due to the thick “jungle” nature of the riparian habitat. To alleviate any negative effects, areas that are known to have sensitive species would have restricted public access and may have temporary closures instituted for protection during critical lifecycle periods such as nesting. Increased public education, trails and signage, and law enforcement, will help to alleviate the degree of disturbance to non-hunted wildlife species.

As stated in the Hunting Plan (USFWS 2005b) biological conflicts will be minimized by the following:

- Proper zoning, regulations, and Refuge seasons will be designated to minimize negative impacts to wildlife.
- Due to difficult access to most units where hunting is allowed, (primarily only by boat) the number of hunters and visits will self-limit the amount of hunting that occurs on the Refuge.
- Sanctuary units are located within separate reaches of the River, which distributes areas needed by wildlife for resting, feeding, nesting, and fawning.
- Density of the riparian forests provides additional sanctuary for wildlife species.
- Use of federally approved non-toxic shot for all hunting except deer will help minimize the possibility of lead poisoning.

- No hunting during the breeding season (except spring turkey). Hunting will be allowed only during designated seasons for waterfowl, upland game birds, and deer.
- Law enforcement presence to minimize excessive harvest and other infractions (illegal use of lead shot, take of non-game species, littering, etc.).
- No firearms permitted on the Refuge outside the designated firearm hunting seasons and areas.

Hunting will result in disturbance to other wildlife species on the Refuge; however, this disturbance will not be significant.

Anticipated Direct and Indirect Impacts of Proposed Action on Refuge Programs, Facilities, and Cultural Resources.

Other Refuge Wildlife-Dependent Recreation.

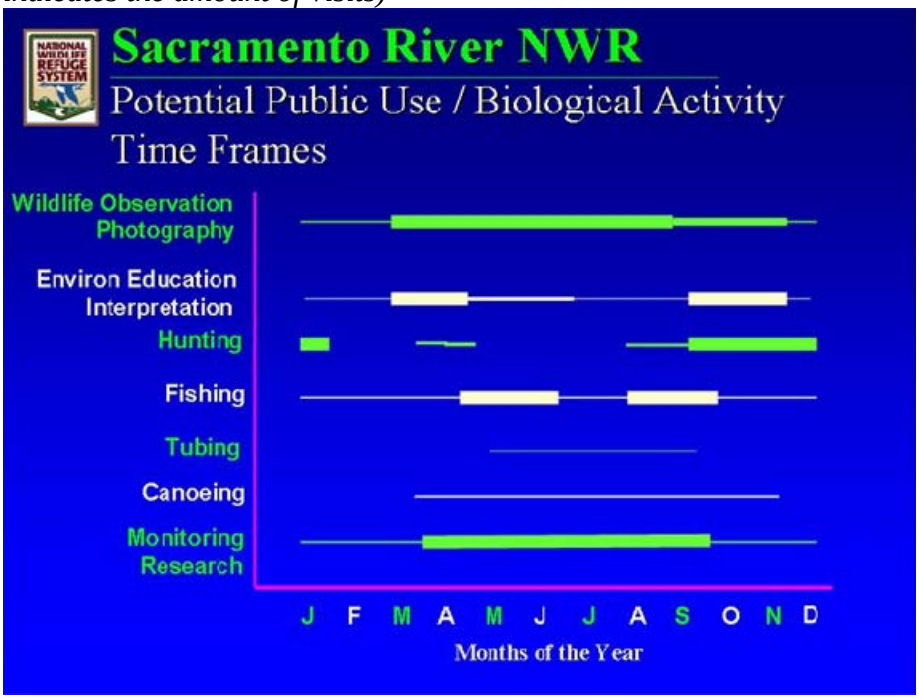
The CCP will open 8,261 acres to wildlife-dependent recreation (hunting, fishing, wildlife observation, photography, environmental education, and interpretation) over the next 15 years (USFWS 2005a). Of the total acres, 2,857 acres provide exclusive use for other wildlife-dependent recreation users (i.e. no hunting allowed). Each of the Refuge units or portions of units open to hunting are posted (e.g. signs, information kiosk, maps, flyers, web site) to ensure that Refuge visitors are able to determine the types of recreation allowed on each unit. The CCP provides a balance of hunting, other wildlife-dependent opportunities, and sanctuary areas on the Refuge to minimize those situations where direct conflicts between user groups may occur.

Hunting affects other wildlife-dependent recreation opportunities in a variety of ways. Many non-hunters plan their vacations or visits to avoid being in the "woods" during the hunting seasons. Most tend to seek out areas that offer amenities such as trails, parking areas, and information kiosks. These facilities provide bird watchers, photographers, and students an opportunity to experience these Refuge units for a safe, informally guided visit. The bulk of the wildlife-dependent recreation use occurs during the spring and summer months, when there is very, limited hunting (i.e. spring turkey season and some archery hunting in August) (Figure 9).

On the other hand, hunters plan their visits to correspond with the hunting seasons. They seek out the natural “wooded” habitats that support the game species they are hunting. Most of the hunting occurs in fall and early winter (Figure 9).

The different seasons and locations that these two groups of visitors seek out tend to reduce their concurrent physical presence, avoiding possible conflicts between the two user groups. Figure 9 portrays the type and amount of public use and biological activity visits that occur throughout the year. Although the timing of environmental education and interpretation activities may overlap with hunting activities in the fall, they occur in geographically distinct areas.

Figure 9. Potential Public Use/Biological Activity Time Frames (the thickness of the line indicates the amount of visits)



Managed and regulated hunting, through proper zoning, regulations, and Refuge seasons, will maintain species populations to levels where other wildlife-dependent uses will not be significantly affected. The Service believes that hunting will have no significant effect on other wildlife-dependent recreation opportunities.

Refuge Facilities

Hunting is conducted on foot/boat by individuals or small groups, often accompanied by a hunting dog. This direct impact of foot travel by hunters on the habitat is often different from that of other wildlife-dependent recreation users because hunters tend to travel in very dispersed patterns over wide areas, minimizing the chances of negatively impacting sites (in contrast to the tendency of many other wildlife-dependent recreation users to congregate on a limited number of trails).

Impact to Refuge roads and trails from hunting activities will be minimal. Most of the Refuge is only accessed by boat. Also, units are not open for vehicle or off-road vehicle traffic. Currently, only Sul Notre Unit has walk-in access for hunting. In the future, three other units; Capay, North Drumheller, and Drumheller Slough will have walk-in access for hunting. The parking areas for these units will receive normal wear and tear from hunters as well as from other wildlife dependent recreation users. Hunter visits will result in no additional maintenance requirements. This impact; therefore, is not expected to be significant.

Cultural Resources

Impact to cultural resources from hunting activities on the Refuge, if any, will be minimal. Sensitive areas of the Refuge have been protected as sanctuaries and therefore are not open to the public. The Service believes that hunting will have no significant effect on cultural resources.

Anticipated Impacts of Proposed Hunt on Refuge Environment and Community.

Refuge Environment

Impacts to Refuge soils and vegetation by hunters are expected to be minimal, such as insignificant soil compaction. Hunting is conducted by boat or on foot by individuals or small groups, often accompanied by a hunting dog. This direct impact of foot travel by hunters on the habitat is often different from that of other wildlife-dependent recreation users because hunters tend to travel in very dispersed patterns over wide areas, minimizing the chances of negatively impacting sites (in contrast to the tendency of many other wildlife-dependent recreation users to congregate on a limited number of trails).

Boating activity associated with hunting during the fall and winter can alter wildlife distribution, reduce use of particular habitats or entire areas by waterfowl and other birds, alter feeding behavior and nutritional status, and cause premature departure from areas (Knight and Cole 1995). Access to the Refuge units is primarily by boat only access. However, boating occurs primarily on the Sacramento River and not on the interior of the Refuge land base, hence disturbance caused by boats is limited to the Refuge perimeter boundaries. Fifteen of the twenty units open for public use (above the ordinary high water mark) require refuge visitors to access the unit by boat (USFWS 2005a). Those 15 units lack public or county roads and access through private farms is limited to refuge staff for management and administrative purposes only. The Sacramento River is a navigable water within California and boating has been a traditional use. It is the policy of the Sacramento River Refuge to recognize the rights of the public to use, consistent with State and Federal laws, the waters below the ordinary low water mark and the "public trust easement" in the area between the ordinary low water mark and ordinary high water mark. Recreational boating use includes motorboats and non-motorized boats, including kayaks and canoes, in those waters under the jurisdiction of the Refuge (e.g. floodwater areas, isolated oxbows, and other floodplain wetlands) was determined to be a compatible use (Camping and Recreational Boating Compatibility Determination, USFWS 2005a). The compatibility determination defines motorboats as a variety of crafts powered by 2-cycle or 4-cycle engines or electric motors. The compatibility determination does not include personal watercraft (jet ski) use.

Long-term minor increases in tailpipe and fugitive dust emissions from increased visitor trips (including hunters) are expected to have a minimal impact to air quality on the Refuge. Motorized boats introduce noise and pollution, in the form of gas and oil in water, and particulates in the air in the riverine habitats of the Refuge. However, please note that the majority of the boat access occurs on State waters outside the jurisdiction of the Refuge (Camping and Recreational Boating Compatibility Determination, USFWS 2005a).

Lead poisoning has been a chronic and significant cause of migratory bird (primarily waterfowl) mortality associated with hunting in some areas of North America. Birds ingest spent lead shotgun pellets. The pellets are ground in their gizzards, converted to soluble form, and absorbed into tissues, which can have lethal effects. Secondary poisoning of predatory birds can also occur when they feed on birds carrying lead pellets embedded in body tissues (USDI 1988). The Service has mandated the use of nontoxic shot for waterfowl hunting on all refuges (USDI 1988). The use of nontoxic shot is required for hunting of all species on the Refuge except deer.

Other potential sources of impacts, such as littering specifically associated with hunting, are not known to be significant.

There is a long history of hunters investing significant resources into the betterment of many of California's habitats (Leopold 1977). The interest generated by these programs has resulted in the formation of numerous local sportsmen's organizations dedicated to the protection and improvement of wildlife habitat. Moreover, organizations, such as Ducks Unlimited, California Waterfowl Association, National Wild Turkey Federation, Quail Unlimited, Pheasants Forever, Safari Club International, Safari Club International Foundation, and California Deer Association, invest resources to benefit many types of wildlife.

The Service believes that hunting activities will have no significant impact to water quality, air, quality, soils, vegetation, or solitude. The bulk of the other wildlife-dependent recreation use occurs during the spring and summer months, during which there is only very limited hunting (spring turkey season and some archery hunting in August) (Figure 9). Most of the hunting use occurs in fall and early winter under circumstances which reduce possible conflicts between the different user groups that could impact solitude.

Community

Refuge Neighbors & Visitors

Agriculture is the dominant economic enterprise in the northern Sacramento Valley. The diversity of crops grown in the Sacramento Valley reflects the diversity of soils, climate, cultural and economic factors. Major crops include rice, almonds, prunes, and walnuts. Impacts from deer browsing on agricultural crops would be expected to continue. Without hunting, agricultural losses to neighboring fruit and nut orchards would continue to increase.

During scoping and public meetings for the CCP, several refuge neighbors and adjacent farmers supported hunting with the restriction of rifles.

In addition, increasing numbers of deer will increase risks to human safety. Large deer populations may contribute to an increase in the risk of deer - vehicle collisions on public roads.

As stated in the Hunt Plan (USFWS 2005b), conflicts between hunting and other wildlife-dependent recreation and neighboring landowners will be minimized by the following:

- Provide 1,740 acres of the Refuge for non-hunting activities only (i.e. wildlife observation, photography, interpretation, environmental education and fishing activities) by 2005 and an additional 1,198 acres within 2-10 years for a total of 2,938 acres (28 percent) which will separate the different user groups spatially. Non hunting activities are also allowed on the 52 percent (5,323 acres) of the Refuge open to hunting. The remaining 20% of the Refuge is closed to the public.
- Landward boundaries are closed to discourage trespass from and onto adjacent private lands.
- Hunting will not be allowed on Refuge units that are small in area and close in proximity to urban areas or private dwellings.
- Post all Refuge units with boundary signs and provide public use information signs prior to opening to the public.
- Construct gates and fences at access points to reduce the potential of trespass. Each gate is signed with access restrictions and a contact number for more information.
- Provide information about the Refuge hunting program by installing informational signs/kiosks, creating and distributing flyers, and utilizing the Refuge's website (www.sacramentovalleyrefuges.fws.gov).
- Place public use signs at vehicle access points and at the approximate ordinary high water mark on all Refuge units open to the public. The signs will display the unit name, river mile, and public uses allowed/prohibited (Figures 26 & 27 of the CCP).
- Restrict entry and departure times on the refuge i.e. one hour before sunrise to one hour after sunset.
- Camping is allowed on gravel bars up to seven days during any 30-day period. We prohibit camping on all other refuge lands (see Camping and Recreational Boating Compatibility Determination (USFWS 2005a).
- Allow pedestrian and boat traffic only.
- Hunters using boats (motorized and non-motorized) must abide by the boating stipulations described in the State and Coast Guard regulations on boating.
- Provide coordinated law enforcement patrols by game wardens, park rangers, and refuge officers to enforce state and federal regulations.
- Outreach plan will serve as a means for managing social conflicts.

The Service believes that hunting will have no significant effect on Refuge neighbors and other wildlife-dependant recreational activities on the Refuge.

Economic

Hunting on Sacramento River Refuge does have the potential to result in some economic impacts on the communities near where hunting occurs. Because some of the communities in the project area are small, there would be some economic benefits near the hunt areas since hunters from outside the local area visit the region and purchase goods and services from local merchants. This additional spending is likely to generate additional retail sales, income, and possibly short-term employment in businesses such as motels, restaurants, and retail stores.

California hunters spent an estimated 1,033,989 days and $27,100,000 (100,000 hunters x $271/year) to local economies in pursuit of resident game birds alone during the 2002 hunting season (CDFG 2002, USFWS and US Bureau of Census 1993). Although the exact figure is unknown, the CDFG believes that approximately 100,000 hunters buy hunting licenses solely for the purpose of hunting resident game birds. If the hunting of resident game birds were to cease, the Department could expect to lose about $3.77 million in revenues ($31.25 license + $6.50 upland game bird stamp x 100,000). A revenue loss of this magnitude would effectively halt all resident game bird management activities.

Deer hunting provided recreational opportunity to 147,578 individuals in 2002. Approximately 1.3 million hunter-days of recreation were expended on deer in 2002 (CDFG 2002). A recent study estimated the relative value of hunting and viewing deer in California (Loomis et al. 1989). Deer hunters and the general public derive substantial benefits from the presence of deer in California. The study indicated that the deer hunting season is valued at $230 million per year by the hunters themselves (using 1987 dollars). The business activity generated by hunter and viewer expenditures generates $184 million (out of a total of $450 million generated annually) in personal and business income in California each year (Loomis et al. 1989). Approached from the employment side, hunter expenditures support 7,700 jobs in California.

In 2001, approximately 1.8 million people participated in waterfowl hunting (USFWS 2005e). The majority of waterfowl hunters live in the Mississippi Flyway (44%), followed by the Atlantic Flyway (21%), the Central Flyway (19%), and the Pacific Flyway (15%) (USFWS 2005d). Waterfowl hunters spent $495 million on trip expenses and $440 million on equipment expenditures in 2001. These expenditures created 21,415 jobs and $725.2 million in employment income. In 2001, over $129.5 million in State tax revenue and $201.8 million in Federal tax revenue was generated.

In 2001, approximately 102,000 people participated in waterfowl hunting in California (USFWS 2005e). Waterfowl hunters spent $86.5 million on trip expenses and equipment expenditures. These expenditures created 1,303 jobs and $44.9 million in employment income. In 2001, approximately $8.4 million in State tax revenue and $12.5 million in Federal tax revenue was generated.

The Banking on Nature 2004: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation (USFWS 2005e) details findings from 93 national wildlife refuges, including Sacramento Refuge. The National Wildlife Refuge System (Refuge System) encompasses nearly 100 million acres and 545 national wildlife refuges. The Banking on Nature 2004 study included money spent for food and refreshments, lodging at motels, cabins, lodges or campgrounds, and transportation when it calculated the total economic activity related to refuge recreational use.

Sacramento Refuge had over 71,000 visitors in 2004. Refuge visitors enjoyed a variety of activities, including wildlife viewing, hiking, and migratory bird hunting. About 80 percent of recreation visits were undertaken by northern California residents. Sacramento Refuge generated an estimated $3,398,400 in total economic activity related to refuge recreational use and 22 jobs for the nearby communities. Sacramento Refuge generated $1.21 of recreation-related benefits are derived from every $1 of budget expenditure during 2004.

The same report, found that some national wildlife refuges are major economic engines for communities, putting almost $1.4 billion into the economy. Nationally, the $1.4 billion in total economic activity related to national wildlife refuge recreational use is nearly four times the $391 million that the Refuge System received in fiscal year 2004 for operations and maintenance. Moreover, the Refuge System created nearly 24,000 private sector jobs as the $1.4 billion flowed through the economy, generating about $454 million in employment income. Additionally, recreational spending on national wildlife refuges generated nearly $151 million in tax revenue at the local, county, state and Federal levels.

Hunting on Sacramento River Refuge will not result in any economic effects, either direct or indirect, which would produce any significant adverse environmental impacts.

Other Past, Present, Proposed, and Reasonably Foreseeable Hunts and Anticipated Impacts

Past

The Refuge was established in 1989 to help protect and restore riparian habitat along the Sacramento River as it meanders from Red Bluff to Colusa. These lands were acquired from willing sellers. These lands consisted primarily of agricultural crops including walnut, almond, and prune orchards.

Hunting has traditionally occurred along the Sacramento River on private lands, State owned conservation properties, and federally owned public lands.

Present

Wildlife populations along the Sacramento River are currently hunted on both private and public lands, such as Sacramento River Wildlife Area (CDFG), Todd Island and Foster Island (Bureau of Land Management). No impacts to those local populations have been documented (CDFG 2004a). Hunting is a highly regulated activity, and generally takes place at specific times and seasons (dawn, fall and winter) when the game animal is less vulnerable (e.g., breeding season) and other wildlife-dependent activities (e.g., bird watching, environmental education and interpretation) are less common, reducing the magnitude of disturbance to Refuge wildlife. Managed and regulated hunting will not reduce species populations to levels where other wildlife-dependent uses will be affected.

The hunt program at Sacramento River Refuge provides consistent management with the existing program on adjacent CDFG lands and waters, preventing confusion among hunters on the river.

Two species, the ring-necked pheasant and turkey, were introduced into the area years ago. These non-native species have the potential to compete for habitat with native species, however no such competition has been noted along the river (CFDG 2004a). In addition, selected game species are not known to prey upon other species at unacceptable levels. The potential for

competition and predation exists whether the populations are hunted or not; however, removing individual non-native species by hunting could conceivably reduce this potential (CDFG 2004a).

Various factors may affect wildlife populations in California in addition to hunting on Sacramento River Refuge. These factors include habitat loss or degradation, drought, flooding, wildfire, agricultural practices, diseases, illegal take, pesticides and other contaminants, and road kills.

The CDFG (2004a) has determined that fish and wildlife resources found along the Sacramento River are healthy and robust enough to support regulated hunting and fishing, complimenting the other activities available to the public in their enjoyment of their public resources.

Reasonably Foreseeable

Since 1991, Sacramento River Refuge has grown to 10,058 total acres which includes: 3,900 acres of remnant riparian and floodplain vegetation; 3,680 acres of restored vegetation/habitats; and, 2,478 acres of walnuts, row crops, and fallow agricultural lands. Restored vegetation is diverse and includes: willow scrub; cottonwood forest, riparian herblands; mixed-forest; valley oak forest and woodland; valley oak and elderberry savanna; grasslands and freshwater wetlands. This diversity of vegetation provides wildlife with high quality breeding habitat, escape cover to provide safety from predators including humans; shelter from weather related elements; resting areas; water; and high quality winter habitat, which provides similar food, escape, shelter, resting, and water needs.

Although no formal surveys have been conducted on the Refuge, the Refuge wildlife biologist and assistant manager have observed more wildlife on the Refuge since restoration has occurred. Furthermore, they have observed more wildlife on the Refuge than in surrounding private agricultural lands. They believe this observed increase in Refuge wildlife is a result of restoring the natural diversity of riparian and floodplain vegetation and habitats. That is, Refuge lands have increased the capacity of the land to produce and maintain wildlife populations through the conversion of agricultural lands to restored vegetation and habitats. It stands to reason that restoration of the additional 2,478 acres of Refuge agricultural lands will increase local populations and have a positive long-term effect on Refuge wildlife populations.

The most important consideration in the maintenance of wildlife populations is the protection of their habitat. The Service, CDFG, The Nature Conservancy, River Partners, and the California Wildlife Conservation Board are all working to acquire and restore native riparian forest along the river. Habitat restoration fulfills the Service's congressional mandate to preserve, restore, and enhance riparian habitat for threatened and endangered species, songbirds, waterfowl, other migratory birds, anadromous fish, resident riparian wildlife, and plants. Habitat restoration will also have a positive effect on wildlife populations on the Refuge.

Although hunting directly impacts individual animals, the amount of harvest is not expected to have a measurable effect on Refuge wildlife population levels, especially since hunting activity is not expected to be high along the river. In addition, hunting is monitored, regulated, and

designed to ensure that harvest does not reduce populations to unsustainable levels. Moreover, the amount of hunting on the Refuge is not expected to increase significantly in the future.

Anticipated Impacts if Individual Hunts are Allowed to Accumulate

In California, 38 refuges provide 471,526 acres of habitat for wildlife. Hunting, fishing, wildlife observation, photography, environmental education, and interpretation are enjoyed by millions of visitors annually. They are also wild places where people can find solace and reconnect with nature.

In California, fourteen refuges are closed to the public. Eighteen refuges, including Sacramento River Refuge, allow waterfowl hunting. Nine of these refuges also allow pheasant hunting. In addition, Clear Lake Refuge allows pronghorn hunting. Sacramento River Refuge is the only refuge in California to allow deer, quail, turkey, and dove hunting opportunities in addition to waterfowl and pheasant hunting. Hunting on Sacramento River Refuge will have an extremely minor impact on wildlife species on refuges within California. There is a benefit to California hunters to be able to hunt these species on the Refuge; however, is not a cumulatively significant benefit.

The Service has concluded that there will be no significant cumulative impacts on the Refuge's wildlife populations, either hunted or non-hunted species. The Service has also concluded that the proposed action will not cumulatively impact the Refuge environment or Refuge programs. This determination was based upon a careful analysis of potential environmental impacts of hunting on the Refuge together with other projects and/or actions. Hunting is an appropriate wildlife management tool that can be used to manage wildlife populations. Some wildlife disturbance will occur during the hunting seasons. Proper zoning, regulations, and Refuge seasons will be designated to minimize any negative impacts to wildlife populations using the Refuge. Due to the difficulty of accessing and traversing the refuge units (primarily boat access from the river, areas of impenetrable "jungle" habitat, e.g., blackberries, poison oak, etc., which limits hunter access), we anticipate that hunter numbers will be limited. The primary species that will be hunted above the ordinary water mark will be nonnative wild turkey and deer. Harvesting these two species, or any other hunted species, would not result in a substantial decrease in biological diversity on the Refuge.

It is predicted that there will be minimal hunting (1,500 annual visits) due to the limited vehicle access, dense cover, and seasonal boat access. Hunters must report take of deer according to State regulations. Field checks by refuge law enforcement officers will be planned, conducted, and coordinated with staff and other agencies to maintain compliance with regulations and assess species populations and numbers harvested. The Refuge CCP (Hunt Plan) describes management actions to address the need for changes to the hunt program if negative impacts are observed by the Service.

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