

Appendix B. Compatibility Determinations

Compatibility Overview

Compatibility is a tool refuge managers use to ensure that recreation and other uses do not interfere with wildlife conservation – the primary focus of refuges. For purposes of this document, uses include any recreational, economic/commercial, pest/predator control, or other use of the refuge by the public or a non-Refuge System entity. Compatibility is not new to the Refuge System and conceptually dates back to 1918. As policy, it has been used since 1962. The Refuge Recreation Act of 1962 (Recreation Act) directed the Secretary of Interior to allow only those public uses of refuge lands that were “compatible with the primary purposes for which the area was established.” This law also required that adequate funds be available for administration and protection of refuges before opening them to any public uses. Legally, refuges are closed to all public uses until officially opened through a compatibility determination.

The National Wildlife Refuge System Administration Act of 1966 set a compatibility standard which refuge managers used until new compatibility regulations, required by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act), were adopted. The Improvement Act maintains a compatibility standard but provides more detail regarding the standard and the process, and requires the process be promulgated in regulations. It also requires that a use must be compatible with both the mission of the System and the purposes of the individual refuge, which helps to ensure consistency in application across the System. The Improvement Act also requires that the public have an opportunity to comment on use evaluations.

The Improvement Act stipulates that the needs of wildlife must come first and defines a compatible use as one that “...in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the National Wildlife Refuge System or the purposes of the refuge.” Sound professional judgment is defined as “...a finding, determination, or decision, that is consistent with principles of sound fish and wildlife management and administration, available science and resources...” Compatibility for priority wildlife-dependent uses may depend on the level or extent of a use.

In 1978, the compatibility standard was tested in court when recreational uses at Ruby Lake NWR (water skiing and motor boating) were found to be in violation of the Refuge Recreation Act. The court determined that compatibility is a biological standard and cannot be used to balance or weigh economic, political, or recreational interests against the primary purpose of the refuge. This ruling stated that the existence of non-compatible uses on a refuge in the past has no bearing on the compatibility of present uses. In their summary of this case, Coggins et al. (1987) conclude “neither poor administration of the Refuge in the past nor prior interferences with its primary purpose, nor past recreational, nor deterioration of its wildlife resources since establishment, nor administrative custom or tradition alters the statutory standard.”

The Service recognizes that compatibility determinations are complex. For this reason, refuge managers are required to consider “principles of sound fish and wildlife management” and “available science” in making these determinations. Evaluations of the uses on the Sacramento River NWR are based on the professional judgment of refuge personnel including observations of refuge uses and reviews of appropriate scientific literature.

The compatibility determinations that follow are consistent with the Compatibility Policy and Regulations published in the Federal Register (603 FW 2, 50 CFR 25-26).

Use

Refuge Name:

Establishing and Acquisition Authorities:

Refuge Purposes:

NWRS Mission:

Description of Use

Availability of Resources:

Anticipated Impacts of the Use:

Public Review and Comment:

Determination:

Stipulations Necessary to Ensure Compatibility:

Justification

Prior to new activities being permitted on the Refuge, a compatibility determination and appropriate NEPA documentation is developed and approval and concurrence is obtained from the Regional Chief of Refuges and the California/Nevada Operations Manager.

Environmental Assessments are done to determine the significance of impacts from new activities or actions. When these activities or actions are found to have significant impacts affecting the quality of the human environment or there is disagreement on the impacts, an Environmental Impact Statement is required and includes public input on the decision process.

Some of the following activities were previously covered under compatibility determinations evaluated in 1994 and 2001. During the process of the Comprehensive Conservation Plan these activities have been reevaluated, new activities have been evaluated, and all the activities considered have been determined to be compatible.

Compatibility determinations for the following uses are included within this appendix:

Hunting

Fishing

Wildlife Observation, Wildlife Photography, and Interpretation

Environmental Education

Research

Camping and Recreational Boating

Farming

Grazing

Mosquito and Other Vector Control

COMPATIBILITY DETERMINATION

(March 2005)

Use: Hunting

Refuge Name: Sacramento River National Wildlife Refuge, located in Tehama, Butte, Glenn and Colusa counties, California.

Establishing and Acquisition Authority(ies): Sacramento River National Wildlife Refuge (Refuge) was established in 1989. Approximately 11,000 acres of the approved 18,000 acres have been acquired. Legal authorities used for establishment of the Refuge include: the Endangered Species Act of 1973 as amended (16 U.S.C. 1531-1543; 87 Statute 884), the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b) and the Fish and Wildlife Act of 1956 (16 U.S.C. 742).

Refuge Purpose(s): Sacramento River Refuge purposes include:

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ...” 16 U.S.C. Sec. 1534 (Endangered Species Act of 1973)

".. the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)

“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” 16 U.S.C. 742f (a) (4) “... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ...” 16 U.S.C. Sec. 742f (b) (1) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission: “To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-ee]).

Description of Use: Hunting is identified in the Improvement Act as a priority use for refuges when it is compatible with the refuge purposes and mission of the Refuge System. As a result the Refuge is proposing to allow dove, waterfowl, coot, common moorhen, pheasant, quail, snipe, turkey and deer hunting. Currently, there are limited opportunities to hunt these species on other public lands along the Sacramento River. The Proposed Action (Alternative B) analyzed in the Comprehensive Conservation Plan (CCP) (USFWS 2005) and the Hunt Plan (USFWS 2005), which are incorporated by reference, contain

maps and unit descriptions where hunting will be allowed. The hunting program will be developed to provide high quality, safe, and cost-effective hunting opportunities, and will be carried out consistent with State regulations, see Refuge Manual 8 RM 6, Hunting. The Hunting Plan was developed to provide safe hunting opportunities, while minimizing conflicts with other priority wildlife-dependent recreational uses. The Refuge hunting program will comply with the Code of Federal Regulations Title 50, 32.1 and managed in accordance with Refuge Manual 8 RM 6, Hunting.

Hunting will be permitted in accordance with State and Federal regulations and seasons (Table 1 gives example of annual state hunt seasons for areas within the Refuge) to ensure that it will not interfere with the conservation of fish and wildlife and their habitats. Therefore, the sport hunting of migratory birds, upland game birds and deer on the Refuge is in compliance with State regulations and seasons, the National Wildlife Refuge System Administration Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-ee), and the Refuge Recreation Act of 1962 (16 U.S.C. 460k).

Approximately 3,356 acres will be open by 2005 and an additional 1,967 acres within 2-10 years to total 5,323 acres (52 percent) open to hunting, see Figure 28, Chapter 5 CCP for details. Hunting of dove, waterfowl, coot, common moorhen, pheasant, quail, snipe, turkey and deer will be allowed in accordance with State hunting regulations during the legal hunting seasons and shooting times.

Most Refuge lands are accessible only by boat (motorized and non-motorized). There are no developed boat ramps or related facilities on the Refuge. There are existing boat ramps with related facilities that provide public access along the portion of the river where Refuge lands are located (Appendix N of CCP (USFWS 2005)). Units that have a parking area will be gated to allow only pedestrian traffic on refuge lands (bicycles and motorized vehicles will not be allowed). Limited camping on gravel bars up to seven days is allowed. Camping on Refuge land, other than gravel bars, is prohibited. For additional information, refer to the Camping and Recreational Boating Compatibility Determination, (USFWS 2005). Camping areas in the vicinity of the Refuge are also identified in Appendix N of the CCP (USFWS 2005).

Method of take: Federally approved non-toxic shot required for all species except deer. Weapons or ammunition for take of deer include shotgun, firing single shotgun slugs, and archery. No shot shell larger than 12 gauge and no shot size larger than "BB" is permitted, except steel "T". No rifles or pistols may be used or possessed.

There will not be any hunter check stations or direct method to regulate hunter quotas on each unit. 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 and number harvested. We require dogs to be kept on a leash, except for hunting dogs engaged in authorized hunting activities and under the immediate control of a licensed hunter (see 50 CFR 26.21(b)).

Table 1. California Hunting Seasons (2003-2004).

Species	Dates
Dove	September 1-15 and from second Saturday in November for 45 days
Waterfowl ¹ - Ducks	Third Saturday in October for 33 days and from third Friday in November for 66 days
Waterfowl ¹ - Geese	First Saturday in November extending 86 days
American Coot and Common Moorhen	Concurrent with duck season (and during split, if it occurs)
Pheasants	Second Saturday in November extending for 44 days
Quail – General	Third Saturday in October extending through the last Sunday in January
Quail – Archery	Third Saturday in August extending through the last Sunday in September
Snipe	Third Saturday in October extending for 107 days
Turkey – Fall	Second Saturday in November extending for 16 consecutive days
Turkey – Spring	Last Saturday in March, extending for 37 consecutive days
Deer – Archery (Zone C4, all units except Drumheller Unit)	Last Saturday in August extending for 16 consecutive days
Deer – General (Zone C4, all units except Drumheller Unit)	Third Saturday in September extending for 16 consecutive days
Deer – Archery (Zone D3, Drumheller Unit)	Third Saturday in August extending for 23 consecutive days
Deer –General (Zone D3, Drumheller Unit)	Fourth Saturday in September extending for 37 consecutive days
Deer – G1 Late Season (Zone C4 all units except Drumheller Unit)	Fourth Saturday in October extending for 9 consecutive days

Public use signs depicting allowable uses, river mile and unit name will be placed above the approximate ordinary high water mark and at parking areas. The boating guide, California Department of Boating and Waterways boating guide that will depict the unit name and river mile location, a large laminated boating guide, and the Sacramento River NWR brochure will be placed at public boat ramps and units accessible by vehicle.

Landward boundaries are closed to discourage trespass through adjacent private lands. Random, weekly hunter field checks will be conducted by refuge law enforcement officers to assess number of hunters, type and number of harvested species, enforce game laws, refuge regulations, and boundaries. The monitoring information will be summarized and provided to the refuge manager to be used to make management decisions under the adaptive management process. Coordinated law enforcement patrols by refuge officers, special agents, game wardens, park rangers, and deputy sheriffs will take place periodically. Law enforcement support would be provided by California Department of Fish and Game and California Department of Parks and Recreation wardens under a memorandum of understanding with the Refuge (USFWS et al 2001).

Availability of Resources: The following funding/annual costs (based on FY 2003 costs) would be required to administer and manage hunting activities as described above:

	One-Time Costs	Annual Costs
Administration		\$15,000
Law Enforcement		\$12,000
Outreach, Education, Monitoring		\$5,000
Signs, brochures, and maintenance	\$20,000	\$3,000
TOTAL	\$20,000	\$35,000

Additional funds would be required to operate and maintain the hunt program. Law enforcement staffing would be needed. Funding will be sought through the Service budget process. Other sources will be sought through strengthened partnerships, grants, and additional Refuge operations funding to support a safe and quality program as described above. In the future, user fees may be considered.

Funding for the parking areas and trails mentioned in the description of use are included under the Compatibility Determination for Wildlife Observation, Photography and Interpretation (USFWS 2005).

Anticipated Impacts of Use: The Office of Migratory Bird Management sets the general frameworks through their annual regulations permitting the sport hunting of migratory birds. The individual States set seasons within those frameworks. If necessary, the Service develops regulations that may be more restrictive than State hunting regulations in order to protect resources on a refuge-by-refuge basis (i.e., species hunted). Otherwise, the Service observes State regulations on all refuges open to hunting.

Service Regional and Refuge biologists along with scientists from the U.S. Geologic Survey–Biological Resources Division (Office of Migratory Bird Management) and university researchers meet twice annually with State flyway representatives to discuss inventory data and survey reports for migratory game bird populations which are hunted, proposed for hunting and closed to hunting. The Service bases its migratory waterfowl

season length and bag limits for the various species on these surveys. The annual breeding ground survey is one of the most important surveys and has been conducted since 1955. This cooperative effort between the Service and the Canadian Wildlife Service covers Canada, Alaska, and the northern United States prairies where 90 percent of the continental waterfowl populations breed. Results are summarized in various publications, including the annual fall flight forecast. Other important data include harvest and survival rate estimates from band returns. Whether to open a season for a species or not and the establishment of the season length and bag limits are determined by the population objectives for each species. A species must have a harvestable surplus to be considered for hunting. Population objectives for each species are calculated using data from population surveys and banding data.

Current management for mourning doves consists of annual population trend surveys, harvest surveys, and the establishment of annual hunting regulations. Since 1960, management decisions have been made within the boundaries of 3 zones that contain mourning dove populations that are largely independent of each other: the Eastern, Central and Western Management Units. Since 1966, Mourning Dove Call-count Surveys have been conducted annually in the 48 conterminous states by state and federal biologists to monitor mourning dove populations. In 1992, the U.S. Fish and Wildlife Service and state wildlife agencies initiated the national cooperative Harvest Information Program, which enables the Service to conduct nationwide surveys to provide reliable annual estimates of the harvest of mourning doves and other migratory game bird species. The resulting information on 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. The implementation of the plan began in July 2003 with the initiation of a national pilot reward-band study. Currently population models are being finalized which will aid in the preparation of regional harvest management plans for 2005. Demographic models and data collection programs to support needs of regional harvest management plans will be established in 2005.

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 and in the CCP and associated EA (USFWS 2005). 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 2004b).

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 Refuge wildlife. Managed and regulated hunting will not reduce species populations to levels where other wildlife-dependent uses will be affected.

The use of retrieving dogs would be permitted and encouraged in all areas open to waterfowl hunting. Dogs are also allowed for deer hunting, as described by State regulations. These dogs would be required to be under control at all times. Any hunter who allows his/her dog to disturb wildlife is not well received by other hunters who do not want waterfowl disturbed on the ponds that they are hunting. Law enforcement officers will enforce regulations requiring owners to maintain control over their dogs while on the Refuge. Although the use of dogs is not a form of wildlife-dependent recreation; they do in this case support a wildlife dependent use. Implementing the prescribed restrictions outlined in the Stipulations section should alleviate any substantial impacts.

Two species, the ring-necked pheasant and turkey, were introduced into the area years ago. These non-native species have more potential to compete for habitat with native species, however no such competition has been noted along the river (CFDG 2004b). 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 individuals of non-native species by hunting could conceivably reduce this potential (CDFG 2004b).

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.

Direct effects of hunting include mortality, wounding, and disturbance (De Long 2002). Hunting can alter behavior (i.e. foraging time), population structure, and distribution patterns of wildlife (Owens 1977, Raveling 1979, White-Robinson 1982, Thomas 1983, Bartelt 1987, Madsen 1985, and Cole and Knight 1990). There also appears to be an inverse relationship between the numbers of birds using an area and hunting intensity (DeLong 2002). In Connecticut, lesser scaup were observed to forage less in areas that were heavily hunted (Cronan 1957). In California, the numbers of northern pintails on Sacramento NWR non-hunt areas increased after the first week of hunting and remained high until the season was over in early January (Heitmeyer and Raveling 1988). Following the close of hunting season, ducks generally increased their use of the hunt area; however, use was lower than before the hunting season began. 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, compels waterfowl to change food habits, feed only at night, lose weight, or desert feeding areas (Madsen 1995, Wolder 1993).

These impacts 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). In Denmark, hunting disturbance effects were experimentally tested by establishing two sanctuaries (Madsen 1995). Over a 5-year period, these sanctuaries became two of the most important staging areas for coastal waterfowl. Numbers of dabbling ducks and geese increased 4 to 20 fold within the sanctuary (Madsen 1995). Thus sanctuary and non-hunt areas are very important to minimize disturbance to waterfowl populations to ensure their continued use of the Sacramento River.

Intermittent hunting can be a means of minimizing disturbance, especially if rest periods in between hunting events are weeks rather than days (Fox and Madsen 1997). It is common for Refuges to manage hunt programs with non-hunt days. At Sacramento NWR, 3-16 percent of pintails were located on hunted units during non-hunt days, but were almost entirely absent in those same units on hunt days (Wolder 1993). In addition, northern pintails, American wigeon, and northern shovelers decreased time spent feeding on days when hunting occurred on public shooting areas, as compared to non-hunt days (Heitmeyer and Raveling 1988). However, intermittent hunting may not always greatly reduce hunting impacts. The intermittent hunting program of three hunt days per week at Sacramento NWR results in lower pintail densities on hunt areas during non-hunt days than non-hunt areas (Wolder 1993). In Germany, several studies reported a range from a few days to approximately three weeks for waterbird numbers to recover to pre-disturbance levels (Fox and Madsen 1997).

The proposed hunt program at Sacramento River NWR will not be intermittent in order to provide consistent management with the existing program on adjacent CDFG lands and waters, preventing confusion among hunters on the river. Boating activity associated with hunting during the fall and winter can alter 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). Additional impacts from hunting activity may include conflicts with individuals participating in wildlife-dependent priority public uses, such as canoers, kayakers, and other wildlife observers.

The impacts addressed here are discussed in detail in Environmental Assessment (Appendix A, Chapter 4) for the CCP (USFWS 2005) which is incorporated by reference. Biological conflicts will be minimized by following proper zoning and regulations. Refuge

seasons will be designated to minimize negative impacts to wildlife. Difficult access to most units that allow hunting, which is primarily by boat, may limit number of hunters and visits. Sanctuary units, totaling 20 percent of refuge lands, are distributed within separate reaches of the River, which provides areas needed by wildlife for resting, feeding, nesting, and fawning. Dense riparian forests provide additional sanctuary for wildlife species.

Use of federally approved non-toxic shot for all hunting except deer will help minimize possibility of lead poisoning.

A Section 7 consultation with USFWS (2004) and NOAA-Fisheries (2004) concluded that the CCP (and Hunting Plan) 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.

Conflicts between hunting and other public uses and neighboring landowners will be minimized by the following:

- Provide 1,740 acres of the refuge for non-hunting activities (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).
- 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 and private dwellings.
- Hunting is not allowed within 50 feet of any landward boundaries adjacent to privately owned property. As per Fish and Game regulations, it is unlawful to hunt or discharge while hunting, any firearm or deadly weapon within 150 yards of any occupied dwelling house, residence, or other building or any barn or other outbuilding used in connection therewith. The 150-yard area is a “safety zone”.
- All Refuge units will be posted with boundary signs and public use information signs prior to opening to the public.
- Provide information about the Refuge hunting program by installing informational signs/kiosks, creating and distributing brochures, 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 depict the unit name, river mile, and public uses allowed/prohibited (Figures 26 & 27 of the CCP).
- On Refuge lands, excluding gravel bars, entry and departure is restricted to one hour before sunrise to one hour after sunset.
- Limited camping on gravel bars up to seven days is allowed. Camping on Refuge

land, other than gravel bars, is prohibited.

- Allow pedestrian and boat traffic only.
- Provide coordinated law enforcement patrols by game wardens, park rangers, and refuge officers to enforce state and federal regulations.

Wildlife populations on the Refuge are able to sustain hunting and support other wildlife-dependent priority uses. To manage the populations to support hunting, the Refuge adopts harvest regulations set by the State within Federal framework guidelines.

Possibly target species and other wildlife will 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. Target 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.

By its very nature, hunting has very few positive effects on the target species while the activity is occurring. However, in our opinion, hunting has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving their habitat, which has ultimately contributed to the Refuge System mission. Furthermore, despite the potential impacts of hunting, a goal of the Sacramento River Refuge is to provide visitors of all ages an opportunity to enjoy wildlife-dependent recreation. Of key concern is to offer a safe and quality program and to ensure adverse impacts remain at an acceptable level.

Recreational hunting will remove individual animals, but does not negatively affect wildlife populations. To assure that populations are sustainable, California Fish and Game Commission in consultation with the California Department of Fish and Game (CDFG) annually review the population censuses to establish season lengths and harvest levels. Each year the Refuge staff conducts habitat management reviews of each unit on the Complex to evaluate wildlife population levels, habitat conditions and public use activities. The areas closed to various hunting activities do provide adequate sanctuaries for wildlife.

The Refuge believes that there will be minimal conflicts between hunters and the other wildlife-dependent recreational uses. The uses differ seasonally (Figure 25, Chapter 5, CCP), are dispersed along the River, and most are not occurring on the same area at the same time. Currently, hunting occurs on the River, outside of the Refuge, without many known conflicts.

Anticipated Impacts of Uses on future lands within the approved boundary: The following conditions must be met before allowing existing uses to occur on newly acquired lands: (1) There is no indirect, direct, or cumulative threat anticipated to human health or safety; (2) There is no indirect, direct, or cumulative threat anticipated to natural or cultural resources; (3) The use is consistent with management of existing Sacramento River Refuge lands and would contribute to achieving Refuge goals. In particular, existing Refuge regulations would not be compromised; (4) The newly acquired lands represent a meaningful unit within which to manage the activity; and (5) There are no anticipated conflicts with priority public uses.

Public Review and Comment: Public review and comments were solicited in conjunction with distribution of the Draft CCP/EA for the Sacramento River Refuge, released in July 2004. Few comments were received specific to the Compatibility Determinations. Comments received (including those regarding hunting) were addressed in the Response to Comments (Appendix R). No changes were made based on comments received. CDFG (2004b) 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.

Determination:

Use is Not Compatible

Use is Compatible with the Following Stipulations

Stipulations necessary to ensure compatibility:

- Refuge Specific Regulations
 - A. Migratory Game Bird Hunting. We allow hunting of goose, duck, coot, moorhen, dove, and snipe on designated areas of the refuge in accordance with State regulations subject to the following conditions:
 1. We only allow shotgun hunting.
 2. You must unload firearms (see 50CFR 27.42(b)) before transporting them between parking areas and hunting areas. Unloaded means that no ammunition is in the chamber or magazine of the firearm.
 3. You may possess only approved nontoxic shotshells while in the field (see 50 CFR 32.2(k)).
 4. You may not hunt within 50 feet of any landward boundary adjacent to private property.
 5. You may not hunt within 150 yards of any occupied dwelling house, residence, or other building or any barn or other outbuilding used in connection therewith.
 6. Access to the hunt area is by foot traffic or boat only. We do not allow bicycles or other conveyances. Mobility-impaired hunters should consult with the Refuge Manager for allowed conveyances.

7. We prohibit fires on the refuge, except portable gas stoves on gravel bars (see 50 CFR 27.95(a)).

8. We allow camping 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 2005)).

9. The refuge is open for day use access from 1 hour before sunrise until 1 hour after sunset. We allow access during other hours on gravel bars only (see condition A8).

10. We require dogs to be kept on a leash, except for hunting dogs engaged in authorized hunting activities and under the immediate control of a licensed hunter (see 50 CFR 26.21(b)).

11. We do not allow permanent blinds. You must remove all personal property, including decoys and boats, at the end of each day (see 50 CFR 27.93).

12. We do not allow cutting or removal of vegetation for blind construction or for making trails.

B. Upland Game Hunting. We allow hunting of pheasant, turkey and quail on designated areas of the refuge in accordance with State regulations subject to the following conditions:

1. We only allow shotgun and archery hunting.

2. Conditions A3, A4, A5, A6, A7, A8, A9, A10, and A12 apply.

C. Big Game Hunting. We allow hunting of black-tailed deer on designated areas of the refuge in accordance with State regulations subject to the following conditions:

1. Conditions B1, A4, A5, A7, A8, A9, and A12 apply.

2. We do not allow construction or use of permanent blinds, platforms, ladders or screw in foot pegs.

3. You must remove all personal property, including stands from the refuge at the end of each day (see 50 CFR 27.93).

- All hunting activities and operations will be reviewed annually to ensure compliance with all applicable laws, regulations, and policies.
- Population censuses will be reviewed annually with the CDFG to ensure that harvest from hunting is not unacceptably impacting the targeted populations. The program will be modified accordingly.
- Each year the Refuge staff will conduct habitat management reviews of each unit to evaluate wildlife population levels, habitat conditions and public use activities.
- Refuge specific hunting information will be available via signs, information panels, brochures and website (www.sacramentovalleyrefuges.fws.gov).
- Refuge officers will patrol, monitor, and collect data on hunting activities in the field to assure that it does not interfere with wildlife resources and other wildlife dependent uses on a weekly basis. The program will be modified accordingly.
- Dog training on the Refuge will not be allowed.
- Hunters using boats (motorized and non-motorized) must abide by the boating stipulations described in the State and Coast Guard regulations on boating.
- Harvest will be estimated using stratified sampling, self-registration, patrol and direct observations.

- Monitor hunting visits by personal contact by law enforcement officers, comment drop box (Capay, Sul Norte and Drumheller Slough units), Refuge web site e-mail, and vehicle counters at units with parking areas.

Justification: Hunting is a wildlife-dependent recreational use listed in the National Wildlife Refuge System Improvement Act. Providing a quality hunting program contributes to achieving one of the Refuge goals (Goal 2, Objective 2.1, Chapter 5 of the CCP). By facilitating this use on the Refuge, we will increase the visitors' knowledge and appreciation of fish and wildlife, which may lead to increased public stewardship of wildlife and their habitats on the Refuge and along the Sacramento River. Increased public stewardship will support and complement the Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System. Approximately half of the Refuge acreage will be closed to hunting to ensure an adequate amount of high-quality feeding and resting habitat in relatively undisturbed areas (28 percent) and completely undisturbed areas (20 percent) (USFWS 2005).

CDFG (2004b) 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. Wildlife populations along the Sacramento River are currently hunted on both private and public lands, such as Sacramento River Wildlife Area (State), Todd Island and Foster Island (Bureau of Land Management). No impacts to those local populations have been documented (CDFG 2004b).

Based upon impacts described in the Hunting Plan, Comprehensive Conservation Plan and Environmental Assessment (USFWS 2005), it is determined that hunting within the Sacramento River National Wildlife Refuge as described herein, will not materially interfere with or detract from the purposes for which the Refuge was established or the mission of the Refuge System. In our opinion, implementing the hunt plan and associated stipulations will not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

Mandatory Re-Evaluation Date (March 2020):

 X Mandatory 15-year Re-Evaluation, Date will be provided in Final EA/CCP (for priority public uses)

 Mandatory 10-year Re-Evaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

- Categorical Exclusion without Environmental Action Statement
- Categorical Exclusion and Environmental Action Statement
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

References Cited

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Refuge Determination:

Prepared by:

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1/20/05
(Date)

Refuge Manager/
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Approval:

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3/21/2005
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COMPATIBILITY DETERMINATION

(March 2005)

Use: Fishing

Refuge Name: Sacramento River National Wildlife Refuge, located in Tehama, Butte, Glenn and Colusa counties, California.

Establishing and Acquisition Authority(ies): Sacramento River National Wildlife Refuge (Refuge) was established in 1989. Approximately 11,000 acres of the approved 18,000 acres have been acquired. Legal authorities used for establishment of the Refuge include: the Endangered Species Act of 1973 as amended (16 U.S.C. 1531-1543; 87 Statute 884), the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b) and the Fish and Wildlife Act of 1956 (16 U.S.C. 742).

Refuge Purpose(s): Sacramento River Refuge purposes include:

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ...” 16 U.S.C. Sec. 1534 (Endangered Species Act of 1973)

".. the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)

“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” 16 U.S.C. 742f (a) (4) “... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ...” 16 U.S.C. Sec. 742f (b) (1) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission: “To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-ee]).

Description of Use: The Refuge is proposing to open to fishing: gravel bars, sloughs, oxbow lakes, and the inundated floodplain on all Refuge units by 2005 (USFWS 2005). The Proposed Action (Alternative B) analyzed in the Comprehensive Conservation Plan (CCP) (USFWS 2005) and the Fishing Plan (USFWS 2005), which are incorporated by reference, contain maps and unit descriptions where fishing will be allowed. This will include twenty-three river miles and all seasonally submerged areas below the ordinary

high water mark (Figure 28, Chapter 5, CCP). Currently, only Packer Lake within Packer Unit is open to sport fishing.

Sport fishing is identified in the Improvement Act as one of the legislated wildlife-dependent, priority public uses. Fishing will be permitted in accordance with State and Federal regulations and seasons to ensure that it will not interfere with the conservation of fish and wildlife and their habitats.

Most refuge lands are accessible only by boat. There are no developed boat ramps or related facilities on the Refuge. There are existing boat ramps with related facilities that provide public access along the portion of the river where Refuge lands are located (Appendix N of CCP (USFWS 2005)). Refuge units that have parking areas will be gated so that only pedestrian traffic will be allowed on Refuge lands (bicycles and motorized vehicles will not be allowed). Limited camping on gravel bars up to seven days is allowed. Camping on Refuge land, other than gravel bars, is prohibited. For additional information, refer to the Camping and Recreational Boating Compatibility Determination, (USFWS 2005). Camping areas in the vicinity of the Refuge are also identified in Appendix N of the CCP (USFWS 2005). On Packer Lake, due to primitive access, we only allow boats up to 14 feet (4.2m) and canoes.

Method of enforcement and control will take place through boundary and public use signs, information kiosks at boat ramps and routine patrol by CDFG wardens and refuge officers. Landward boundaries are closed to discourage trespass through adjacent private lands. Entry and departure times on the Refuge will be restricted (i.e. one hour before sunrise to one hour after sunset). Anglers are required to have a State fishing license, but do not need to obtain a refuge fishing permit or a user fee.

Game fish species which will be allowed for legal take include all native and introduced species listed in the California regulations Freshwater Sport Fishing (i.e. Chinook salmon, steelhead, trout, sturgeon, sunfish, shad, striped bass, carp, catfish, bullhead, crappie, bass and spotted bass). These fish species occur in open water on the Refuge in the main River channel, sloughs, oxbow lakes, and on the inundated floodplain.

Federally listed species that occur on the Refuge include: Chinook salmon, Sacramento River winter-run evolutionary significant unit (ESU) (Federal and State-listed endangered species), Chinook salmon, Central Valley spring-run ESU (Federal and State-listed threatened species), Chinook salmon, Central Valley fall-run ESU and late-fall-run ESU (Federal candidate species and State species of concern), steelhead, Central Valley ESU (Federal-listed threatened species), Valley elderberry longhorn beetle (federally listed threatened species), bald eagle (federally listed threatened species and State-listed endangered species), western yellow-billed cuckoo (Federal candidate species, State-listed threatened species, and FWS Bird of Conservation Concern), and giant garter snake (federally listed endangered species and State-listed threatened species). Critical Habitat for the Sacramento River winter-run Chinook salmon was designated

June 16, 1993 (58 CFR 33212, June 16, 1993). Critical habitat includes the river bottom and riparian zone, which are those terrestrial areas that directly affect a freshwater aquatic ecosystem. Critical Habitat for this ESU includes the Sacramento River from Keswick Dam to Chipps Island, all the waters westward from Chipps Island to the Carquinez Strait Bridge, all the waters of San Pablo Bay, and all the waters of the San Francisco Bay north of the San Francisco Bay–Oakland. The Section 7 consultation with USFWS (2004) and NOAA-Fisheries (2004) concluded that the CCP (and Fishing Plan) is not likely to adversely affect any of the special status species/designated critical habitat occurring on the.

The Refuge adopts harvest regulations set by the State, which uses the best available population information. Sources of population data for Chinook salmon include the California Department of Fish and Game, the U.S. Fish and Wildlife Service (Fisheries Resources Offices and the National Oceanographic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS).

There will not be any method implemented to regulate fishing quotas. It is predicted that there will be minimal fishing (1,000 annual visits) on the Refuge due to the limited vehicle access and seasonal boat access to refuge lands. Fishing will occur year-round with peak fishing use projected to occur spring through the fall. High water and flood events limit fishing opportunities during the winter (Figure 27, Chapter 5, CCP).

The Fishing Plan proposes to open more areas of the refuge to fishing and improve opportunities and access for visitors:

- Provide additional parking areas, trails, and interpretive signs to inform the public about Refuge resources.
- Improve the Packer Lake small boat launching facility in cooperation with other stakeholders.
- Provide information for fishing opportunities in the Sacramento River Refuge brochure.

The Fishing Plan (USFWS 2005) and the Comprehensive Conservation Plan (USFWS 2005) Proposed Action (Alternative B), Chapter 5, which provide detailed discussions of this proposal, are herein incorporated by reference. The Refuge adopts harvest regulations set by the State, which uses the best available population information.

Availability of Resources: Limited funding and staffing would be required to manage the bank and boat fishing on the Sacramento River Refuge. Refuge officers will conduct regular patrols. Law enforcement support would be provided by California Department of Fish and Game and California Department of Parks and Recreation wardens under a memorandum of understanding with the Refuge (USFWS et al 2001). Additional funding would also be needed for the interpretive signs, interpretive materials, and kiosks. Those costs are incorporated into the compatibility determinations for environmental education and interpretation. The Refuge would pursue a variety of funding sources in order to fully

support this use, including agreements with other agencies, grant funding and volunteer assistance for monitoring. In the future, user fees may be considered.

	One-time Costs	Annual Costs
Administration		\$2,000
Law Enforcement		\$5,000
Outreach, Education, Monitoring		\$3,000
Signs and brochures	\$3,000	\$1,000
Maintenance of facilities		\$3,000
TOTAL	\$3,000	\$14,000

Additional funding (\$110,000) for improving the one-mile access road and small boat launch at Packer Lake has been requested through the Maintenance Management System (MMS) and Refuge Roads Program (Project 00001M).

Funding for the parking areas and trails mentioned in the description of use are included under the Compatibility Determination for Wildlife Observation, Photography and Interpretation (USFWS 2005).

Anticipated Impacts of the Use(s): Fishing as a solitary and stationary activity tends to be less disturbing to wildlife than hunting or motorized boating (Tuite et al 1983). It is well recognized that fishing can give many people a deeper appreciation of fish and wildlife and a better understanding of the importance of conserving habitat, which has ultimately contributed to the Refuge System mission. Furthermore, despite the potential impacts of fishing, a goal of Sacramento River NWR is to provide opportunities for wildlife-dependent recreation. Fishing is one of the six priority public uses on the National Wildlife Refuge System. Of key concern then, is to manage the activity to keep adverse impacts to within acceptable limits.

Fishing activities may influence the composition of bird communities, as well as distribution, abundance, and productivity of waterbirds (Tydeman 1977, Bouffard 1982, Bell and Austin 1985, Bordignon 1985, Edwards and Bell 1985, and Cooke 1987). Shoreline activities, such as human noise, would cause some birds to flush and go elsewhere. Disturbance and destruction of riparian vegetation, bank stability, and water quality may result from high levels of bank fishing activities. Boating associated with fishing can alter bird distribution, reduce use of particular habitats or entire areas by waterfowl and other waterbirds, alter feeding behavior and nutritional status, and cause premature departure from areas (Knight and Cole 1995).

The impacts addressed here are discussed in detail in Environmental Assessment (Appendix A, Chapter 4) for the CCP (USFWS 2005) which is incorporated by reference. Fishing and other human activities cause disturbance to wildlife (Burger 1981). Cumulative impacts of this increased use have correlating effects on wildlife, habitat and

the fisheries resource (Buckley and Buckley 1976; Glinski 1976; Miller et al. 1998; Reijnen and Foppen 1994; Smith and Hunt 1995).

These impacts will be minimized by the following:

- Open only riverine areas, oxbow lakes and ponds to fishing.
- Use Best Management Practices when maintaining parking areas, roads, and access facilities to prevent erosion or habitat damage.
- Promote use of non-toxic sinkers, split shot, and lures by providing educational information at Refuge kiosks.
- Monitor fishing activities to ensure facilities are adequate and wildlife disturbance is minimal.
- Section 7 consultations with USFWS (2004) and NOAA-Fisheries (2004) concluded that the CCP (USFWS 2005) 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.
- Law enforcement patrols will be conducted by game wardens, park rangers, and refuge officers to enforce state and federal regulations.
- Some human disturbance of forest and shrub bird species may occur during nesting and spring/fall migration periods. However, human impacts are expected to be low since many of these areas are covered with dense vegetation, which minimizes human access.
- Some human disturbance of gravel-scrape nesting species such as killdeer, spotted sandpiper, and lesser nighthawk will occur. The most concentrated human use of gravel bars occurs during dove season after nesting season. Other periods of high use may occur during early summer for camping and angling. During this time, volunteers will be utilized to monitor and track the disturbance to utilize for future management decisions. Refuge staff will monitor impacts and respond with best management practices.

Conflicts between fishing and other public uses, and neighboring landowners will be minimized by the following:

- Disseminate California Department of Boating & Waterways boating guide, which depicts Refuge units by river mile, at public boat ramps i.e. Red Bluff Diversion Dam, Woodson Bridge, Irvine Finch, Ord Bend, Butte City, and Sacramento River-Colusa State Park, by 2005.
- 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 depict the unit name, river mile, and public uses allowed/prohibited (Figures 26 & 27 of the CCP).

- Provide information about the Refuge fishing program by installing informational signs/kiosks, creating and distributing brochures, and utilizing the Refuge’s website (www.sacramentovalleyrefuges.fws.gov).
- Law enforcement patrols by game wardens, park rangers, and refuge officers to enforce state and federal regulations.
- Landward boundaries are closed to discourage trespass through adjacent private lands.
- 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 2005)).
- Install public use ethics panel, including the importance of removing fishing line, not littering and displaying the “pack it in and pack it out” message at appropriate access points.

The Refuge believes that there will be minimal conflicts between anglers and the other wildlife-dependent recreational uses. The uses differ seasonally (Figure 25, Chapter 5, CCP), are dispersed along the River, and most are not occurring on the same area at the same time. Currently, fishing occurs on the River, outside of the Refuge, without many known conflicts.

Anticipated Impacts of Uses on Future Lands within the Approved Boundary: The following conditions must be met before allowing existing uses to occur on newly acquired lands: (1) There is no indirect, direct, or cumulative threat anticipated to human health or safety; (2) There is no indirect, direct, or cumulative threat anticipated to natural or cultural resources; (3) The use is consistent with management of existing Sacramento River Refuge lands and would contribute to achieving Refuge goals. In particular, existing Refuge regulations would not be compromised; (4) The newly acquired lands represent a meaningful unit within which to manage the activity; and (5) There are no anticipated conflicts with priority public uses.

Public Review and Comment: Public review and comments were solicited in conjunction with distribution of the Draft CCP/EA for the Sacramento River Refuge, released in July 2004. Few comments were received specific to the Compatibility Determinations. Comments received (including those regarding fishing) were addressed in the Response to Comments (Appendix R). No changes were made based on comments received. CDFG (2004b) 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.

Determination:

Use is Not Compatible

Use is Compatible with the Following Stipulations

Stipulations necessary to ensure compatibility:

- Refuge Specific Regulations
Sport Fishing. We allow sport fishing on designated areas of the refuge in accordance with State regulations subject to the following conditions:
 1. We prohibit fires on the refuge, except portable gas stoves on gravel bars (see 50 CFR 27.95(a)).
 2. We allow camping 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 2005)).
 3. The refuge is open for day use access from 1 hour before sunrise until 1 hour after sunset. We allow access during other hours on gravel bars only (see condition 2).
 4. We do not allow cutting or removal of vegetation for blind construction or for making trails.
 5. On Packer Lake, due to primitive access, we only allow boats up to 14 feet (4.2m) and canoes.
- Monitor fishing use to ensure that facilities are adequate and disturbance to wildlife continues to be minimal.
- Only riverine sections, oxbow lakes and ponds, and Packer Lake of the Refuge will be open to fishing (Figure 28, Chapter 5, CCP).
- Parking areas, roads, and related access facilities will be maintained as necessary to ensure public safety and to prevent erosion or habitat damage.
- Promote use of non-toxic sinkers, split shot, and lures by providing information in Refuge kiosks.
- Proper zoning and regulations will be designated.
- Law enforcement patrols by game wardens, park rangers, and refuge officers to enforce state and federal regulations.
- Anglers using boats (motorized and non-motorized) must abide by the boating stipulations described in the State and Coast Guard regulations on boating.

Justification: Fishing is an appropriate wildlife-dependent recreational activity. Based upon impacts described in the Fishing Plan, Comprehensive Conservation Plan and Environmental Assessment (USFWS 2005), it is determined that fishing within the Sacramento River National Wildlife Refuge, as described herein, will not materially interfere with or detract from the purposes for which the Refuge was established or mission of the National Wildlife Refuge System.

Fishing is a priority public use listed in the Improvement Act. By facilitating this use on the Refuge, the visitors' knowledge and appreciation of fish and wildlife will increase, which may lead to increased public stewardship of wildlife and their habitats on the Refuge and along the Sacramento River. Increased public stewardship will support and complement the Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System.

Because of the limited access and number of visitors to the Refuge, this would not pose a problem and could be handled with existing staff. This program as described is determined to be compatible and will not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

Mandatory Re-Evaluation Date (March 2020):

Mandatory 15-year Re-Evaluation, Date will be provided in Final EA/CCP (for priority public uses)

Mandatory 10-year Re-Evaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

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USFWS, California Department of Fish and Game and California Department of Parks and Recreation. 2001. Memorandum of Understanding. 5 pgs.

COMPATIBILITY DETERMINATION

(March 2005)

Use: Wildlife Observation, Wildlife Photography, and Interpretation

Refuge Name: Sacramento River National Wildlife Refuge, located in Tehama, Butte, Glenn and Colusa counties, California.

Establishing and Acquisition Authority(ies): Sacramento River National Wildlife Refuge (Refuge) was established in 1989. Approximately 11,000 acres of the approved 18,000 acres have been acquired. Legal authorities used for establishment of the Refuge include: the Endangered Species Act of 1973 as amended (16 U.S.C. 1531-1543; 87 Statute 884), the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b) and the Fish and Wildlife Act of 1956 (16 U.S.C. 742).

Refuge Purpose(s): Sacramento River Refuge purposes include:

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ...” 16 U.S.C. Sec. 1534 (Endangered Species Act of 1973)

".. the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)

“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” 16 U.S.C. 742f (a) (4) “... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ...” 16 U.S.C. Sec. 742f (b) (1) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission: “To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-ee]).

Description of Use: Wildlife observation, photography, and interpretation are considered together in this Compatibility Determination because all are considered to be wildlife-dependent, non-consumptive uses and many elements of these programs are similar. All three of these public uses are dependent upon establishing trails and vehicle parking areas in the Refuge as well as remote access points from boats. An estimated 1,000 annual visits will be to participate in these activities. These uses are identified and discussed in detail in Chapter 5 of the CCP (USFWS 2005) and are incorporated by reference.

Some highlights are as follows:

- a) Develop and maintain walking trails on Rio Vista, Pine Creek, Capay, Ord Bend, Sul Norte, Codora and Packer Units to provide wildlife viewing and photographic opportunities and to promote awareness about the value of riparian habitat, management efforts, and plant/wildlife identification tips.
- b) Construct a wildlife viewing/photography blind on the Codora Unit as funding becomes available.
- c) Place public use signs at the approximate ordinary high water mark on units that will be opened to the public (Figure 27, Chapter 5, CCP) at appropriate (1/2 mile intervals) accessible points. The signs will depict the unit name, river mile, and public uses allowed/prohibited. The public will be able to access the units by boat.
- d) Place interpretive signs and brochure racks at vehicle entrances and boat ramps.

Availability of Resources: The following funding/annual costs (based on FY 2003 costs) would be required to administer and manage the activities as described above:

	One-time Costs	Annual Costs
Administration		\$20,000
Law enforcement		\$45,000
Construct and maintain 7 interpretive walking trails	\$60,000	\$5,000
Construct and maintain photography blind	\$4,000	\$1,000
Interpretive panels and kiosk	\$25,000	\$2,000
Signs, brochures, and brochure racks at 13 vehicle parking areas/boat launches	\$20,000	\$3,000
Construct and maintain 8 parking areas	\$80,000	\$2,000
TOTAL	\$189,000	\$78,000

Refuge operational funds are currently available through the Service budget process to administer these uses.

Anticipated Impacts of Use: The construction and maintenance of trails, photography blind and parking lots will have minor impacts on soils and vegetation around the trails. This could include an increased potential for erosion, soil compaction (Liddle 1975), reduced seed emergence (Cole and Landres 1995), alteration of vegetative structure and composition, and sediment loading (Cole and Marion 1988).

The Refuge provides habitat for resident and migratory wildlife. As a result of these activities, individual animals may be disturbed by human contact to varying degrees. Human activities on trails can result in direct effects on wildlife through harassment, a form of disturbance that can cause physiological effects, behavioral modifications, or death (Smith and Hunt 1995). Many studies have shown that birds can be impacted from human activities on trails when they are disturbed and flushed from feeding, resting, or

nesting areas. Flushing, especially repetitive flushing, can strongly impact habitat use patterns of many bird species. Flushing from an area can cause birds to expend more energy, be deterred from using desirable habitat, affect resting or feeding patterns, and increase exposure to predation or cause birds to abandon sites with repeated disturbance (Smith and Hunt 1995). Migratory birds are observed to be more sensitive than resident species to disturbance (Klein 1989). Herons and shorebirds were observed to be the most easily disturbed (when compared to gulls, terns and ducks) by human activity and flushed to distant areas away from people (Burger 1981). A reduced number of shorebirds were found near people who were walking or jogging, and about 50 percent of flushed birds flew elsewhere (Burger 1981). In addition, the foraging time of sanderlings decreased and avoidance (e.g., running, flushing) increased as the number of humans within 100 meters increased at a coastal bay refuge on the Atlantic (Burger and Gochfeld 1991). Nest predation for songbirds (Miller et al. 1998), raptors (Glinski 1976), colonial nesting species (Buckley and Buckley 1978), and waterfowl (Boyle and Samson 1985) tends to increase in areas more frequently visited by people. In addition, for many passerine species, primary song occurrence and consistency can be impacted by a single visitor (Gutzwiller et al. 1994). This could potentially limit the number of breeding pairs of certain passerine species, thus limiting production within refuge riparian habitats (Reijnen and Foppen 1994). In our opinion, due to the habitat requirements and life cycles of Valley elderberry longhorn beetle and Chinook salmon these species will not be impacted by these activities.

Of the wildlife observation techniques, wildlife photographers tend to have the largest disturbance impacts (Klein 1993, Morton 1995, Dobb 1998). While wildlife observers frequently stop to view species, wildlife photographers are more likely to approach wildlife (Klein 1993). Even slow approach by wildlife photographers tends to have behavioral consequences to wildlife species (Klein 1993). Other impacts include the potential for photographers to remain close to wildlife for extended periods of time, in an attempt to habituate the wildlife subject to their presence (Dobb 1998) and the tendency of casual photographers, with low-power lenses, to get much closer to their subjects than other activities would require (Morton 1995), including wandering off trails. This usually results in increased disturbance to wildlife and habitat, including trampling of plants.

The Wildlife Observation, Photography, and Interpretation programs have been designed to avoid or minimize impacts anticipated to Refuge resources and Refuge visitors. Hunting may be impacted by wildlife observation, photography and interpretation. However, the timing of hunt seasons minimizes the overlap with other public uses (Figure 25, Chapter 5, CCP). Accordingly, in our opinion, these uses will not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

Section 7 consultations with USFWS (2004) and NOAA-Fisheries (2004) concluded that the CCP (USFWS 2005) 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.

Anticipated Impacts of Uses on Future Lands within the Approved Boundary: The following conditions must be met before allowing existing uses to occur on newly acquired lands: (1) There is no indirect, direct, or cumulative threat anticipated to human health or safety; (2) There is no indirect, direct, or cumulative threat anticipated to natural or cultural resources; (3) The use is consistent with management of existing Sacramento River Refuge lands and would contribute to achieving Refuge goals. In particular, existing Refuge regulations would not be compromised; (4) The newly acquired lands represent a meaningful unit within which to manage the activity; and (5) There are no anticipated conflicts with priority public uses.

Public Review and Comment: Public review and comments were solicited in conjunction with distribution of the Draft CCP/EA for the Sacramento River Refuge, released in July 2004. Few comments were received specific to the Compatibility Determinations. Comments received were addressed in the Response to Comments (Appendix R). No changes were made based on comments received.

Determination:

Use is Not Compatible

Use is Compatible with the Following Stipulations

Stipulations necessary to ensure compatibility:

- Adequate areas would be designated as wildlife sanctuary with no or limited public use activities to provide high quality habitat for feeding, resting, and nesting. Trails will be designed utilizing existing service roads and open savannah habitat types to provide adequate sanctuary areas. Where site conditions permit, native trees and shrubs will be planted to create screening along trails to reduce disturbance. These measures will also enhance viewing opportunities and provide quality wildlife observation, photography and interpretation experiences.
- Regulations and wildlife friendly behavior (e.g., requirements to stay on designated trails, dogs must be kept on a leash, etc.) will be described in brochures and posted at the Visitor Contact Station(s).
- Refuge biologists and public use specialists will conduct regular surveys of public activities on the refuge. The data will be analyzed and used by the refuge manager to develop future modifications if necessary to ensure compatibility of the wildlife observation, photography, and interpretation programs.

Justification: These wildlife-dependent uses are priority public uses of the National Wildlife Refuge System. Providing opportunities for wildlife observation, photography, and environmental interpretation would contribute toward fulfilling provisions of the National Wildlife Refuge System Administration Act, as amended in 1997, and one of the goals of the Sacramento River Refuge (Goal 2, Chapter 5, CCP). Wildlife observation, photography, and interpretation would provide an excellent forum for allowing public access and increasing understanding of Refuge resources. The stipulations outlined above should minimize potential impacts relative to wildlife/human interactions. Based upon impacts described in the Comprehensive Conservation Plan and Environmental Assessment (USFWS 2005), it is determined that wildlife observation, photography and interpretation within the Sacramento River National Wildlife Refuge, as described herein, will not materially interfere with or detract from the purposes for which the Refuge was established or the mission of the Refuge System. In our opinion, these wildlife dependent uses will not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

Mandatory Re-Evaluation Date (March 2020):

Mandatory 15-year Re-Evaluation, Date will be provided in Final EA/CCP (for priority public uses)

Mandatory 10-year Re-Evaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

References Cited

Boyle, S. A. and F. B. Samson. 1985. Effects of non-consumptive recreation on wildlife: a review. Wildl. Soc. Bull. 13:110-116.

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COMPATIBILITY DETERMINATION

(March 2005)

Use: Environmental Education

Refuge Name: Sacramento River National Wildlife Refuge, located in Tehama, Butte, Glenn and Colusa counties, California.

Establishing and Acquisition Authority(ies): Sacramento River National Wildlife Refuge (Refuge) was established in 1989. Approximately 11,000 acres of the approved 18,000 acres have been acquired. Legal authorities used for establishment of the Refuge include: the Endangered Species Act of 1973 as amended (16 U.S.C. 1531-1543; 87 Statute 884), the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b) and the Fish and Wildlife Act of 1956 (16 U.S.C. 742).

Refuge Purpose(s): Sacramento River Refuge purposes include:

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ...” 16 U.S.C. Sec. 1534 (Endangered Species Act of 1973)

".. the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)

“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” 16 U.S.C. 742f (a) (4) “... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ...” 16 U.S.C. Sec. 742f (b) (1) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission: “To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-ee]).

Description of Use: Currently, the environmental education program at Sacramento River Refuge serves approximately 300 students a year. The environmental education program is designed to provide effective resources, tools, and training which facilitates the teaching of accurate scientific and environmental information about the Sacramento River watershed and surrounding areas. The Refuge encourages environmental education as a process of building knowledge in students. The Refuge staff will work with schools (K-12) to integrate environmental concepts and concerns into structured educational

activities. Refuge staff will promote environmental education that is: aligned to the current Federal, State and local standards; curriculum based the meets the goals of the school districts adopted instructional standards; and provides interdisciplinary opportunities, linking the natural world with all subject areas. The environmental education program will be managed in accordance of Refuge Manual 8 RM 3, Outdoor Classroom and Educational Assistance). The proposed environmental education program is discussed in detail as part of the Proposed Action in the CCP and associated EA (CCP Chapter 5 and Appendix A), which are incorporated by reference (USFWS 2005).

Environmental education is identified in the Improvement Act as one of the Big 6 legislated wildlife-dependent, priority public uses.

Environmental education is not considered a Refuge management economic use.

The Refuge proposes to develop an environmental education program by 2005 to service about 1,000 students. Primary visitation will occur during the traditional school year of August through May. Educators will attend a teacher orientation and will design, schedule, and facilitate their own field trips on the Refuge. Refuge staff will provide teacher training, site-specific curricula, materials, and activities, and field trip assistance to enhance learning in an outdoor setting. A local school district guideline for supervision during a field trip recommends one adult for up to ten students and requires at least one credentialed teacher.

Rio Vista, Pine Creek, Phelan Island, Ord Bend, and Packer Units could be promoted as the primary units for school groups to visit (Figure 28, Chapter 5, CCP). The areas meet the basic health and safety needs for students i.e. rest rooms, trails, bus parking, etc. Students will utilize walking trails and picnic tables, to complete their activities and studies. Environmental education study sites on Phelan, Pine Creek, and Ord Bend Units will provide areas for more in-depth studies where students and teachers will participate in restoration and monitoring activities through one-time activities or more long-term monitoring studies.

Students participating in restoration and monitoring activities will work as described in the environmental education program and as permitted in their reservation form. The reservation form allows the teacher to request specific activities or materials. Students will be trained by Refuge staff before they start restoration and monitoring projects to ensure their safety while out in the field, to minimize wildlife and habitat disturbance and to maximize project success.

Future environmental education opportunities on newly acquired lands will include student and teacher participation in habitat restoration and monitoring activities that would be incorporated into the overall program. This compatibility determination will be re-evaluated if new activities in the expansion area are anticipated to significantly change the level of use or impacts.

Availability of Resources: The following funding/annual costs (based on FY 2003 costs) would be required to administer and manage environmental education activities as described above:

	One-time Costs	Annual Costs
Visitor Contact Station	\$332,000	\$20,000
Administration		\$5,000
Establish and Maintain Study Sites	\$10,000	\$2,000
Staffing (teacher training, student support curriculum development, field trip assistance, teaching students, and administration)	\$3,000	\$1,000
Equipment, materials, and supplies	\$5,000	\$2,000
TOTAL	\$350,000	\$30,000

Funds are anticipated to be available through the Service budget process for construction of a visitor contact station, establishment of study sites, and potentially some operational costs. Additional funding for staffing and operational costs would be needed. Other sources will be sought through strengthened partnerships, grants, and additional Refuge operations funding to support a safe, quality environmental education program as described above.

Anticipated Impacts of Use: Opening the Refuge to environmental education activities will be compatible with the Refuge’s purposes, goals, and objectives and the Refuge System mission.

The construction and maintenance of packed gravel or dirt trails, boardwalks, and platforms will have minor impacts on soils and vegetation around the trails. This could include an increased potential for erosion, soil compaction (Liddle 1975), reduced seed emergence (Cole and Landres 1995), alteration of vegetative structure and composition, and sediment loading (Cole and Marion 1988).

Human activities on trails can result in direct effects on wildlife through harassment, a form of disturbance that can cause physiological effects, behavioral modifications, or death (Smith and Hunt 1995). Birds can be impacted from human activities on trails when they are disturbed and flushed from feeding, resting, or nesting areas. Flushing, especially repetitive flushing, can strongly impact habitat use patterns of many bird species. Flushing from an area can cause birds to expend more energy, be deterred from using desirable habitat, affect resting or feeding patterns, and increase exposure to predation or cause birds to abandon sites with repeated disturbance (Smith and Hunt 1995). Migratory birds are observed to be more sensitive than resident species to disturbance (Klein 1989). Herons and shorebirds were observed to be the most easily disturbed (when compared to gulls, terns and ducks) by human activity and flush to distant areas away from people (Burger 1981). A reduced number of shorebirds were found near people who were walking or jogging, and about 50 percent of flushed birds

flew elsewhere (Burger 1981). In addition, the foraging time of sanderlings decreased and avoidance (e.g., running, flushing) increased as the number of humans within 100 meters increased at a coastal bay refuge on the Atlantic (Burger and Gochfeld 1991). Nest predation for songbirds (Miller et al. 1998), raptors (Glinski 1976), colonial nesting species (Buckley and Buckley 1978), and waterfowl (Boyle and Samson 1985) tends to increase in areas more frequently visited by people. In addition, for many passerine species, primary song occurrence and consistency can be impacted by a single visitor (Gutzwiller et al. 1994). This could potentially limit the number of breeding pairs of certain passerine species, thus limiting production within refuge riparian habitats (Reijnen and Foppen 1994).

The disturbance by environmental education activities is considered to be of minimal impact because: (1) the total number of students permitted through the reservation system is limited to 100 per day; (2) students and teachers will be instructed in trail etiquette and the best ways to view wildlife with minimal disturbance; (3) education groups will be required to have a sufficient number of adults to supervise the group; (4) trail design will provide adequate cover for wildlife; and (5) observation areas and scopes are provided to view wildlife at a distance which reduces disturbance.

Disturbance by students is considered minimal as study sites will be placed in areas already impacted by trail users and Refuge staff, and all off-trail activity will be focused in these small areas. Educators will be instructed on use of the study areas during teacher orientation workshops. Collection of samples for study (i.e., mud, water, plants) will be restricted to study areas, and samples must be used on site. Collection will be of materials needed to enhance hands-on learning and investigation and will be designed as part of structured activities and lessons, guided by teachers, and monitored by Refuge staff. These activities are an integral part of the education program design and philosophy and their impacts are considered minimal.

Education staff will coordinate with Biology staff regarding activities associated with restoration or monitoring projects to ensure that impacts to both wildlife and habitat are minimal. As with any restoration and monitoring activities conducted by Refuge personnel, these activities conducted by students would be at a time and place where the least amount of disturbance would occur.

Section 7 consultations with USFWS (2004) and NOAA-Fisheries (2004) concluded that the CCP (USFWS 2005) 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.

Anticipated Impacts of Uses on future lands within the approved boundary: The following conditions must be met before allowing existing uses to occur on newly acquired

lands: (1) There is no indirect, direct, or cumulative threat anticipated to human health or safety; (2) There is no indirect, direct, or cumulative threat anticipated to natural or cultural resources; (3) The use is consistent with management of existing Sacramento River Refuge lands and would contribute to achieving Refuge goals. In particular, existing Refuge regulations would not be compromised; (4) The newly acquired lands represent a meaningful unit within which to manage the activity; and (5) There are no anticipated conflicts with priority public uses.

Future environmental education opportunities in the expansion area associated with habitat restoration and monitoring will have similar impacts as described above.

Public Review and Comment: Public review and comments were solicited in conjunction with distribution of the Draft CCP/EA for the Sacramento River Refuge, released in July 2004. Few comments were received specific to the Compatibility Determinations. Comments received were addressed in the Response to Comments (Appendix R). No changes were made based on comments received.

Determination:

Use is Not Compatible

Use is Compatible with the Following Stipulations

Stipulations necessary to ensure compatibility:

- Participants in the Refuge’s environmental education program will be restricted to established trails, study sites, and other facilities including buildings and photo blinds
- All groups using the Refuge for environmental education will be required to make reservations in advance through the Refuge office. This process, which takes the place of a Special Use Permit, allows refuge staff to manage the number and location of visitors for each unit. There is a current refuge policy that educational groups are not charged a fee or required to have a SUP. A daily limit of 100 students participating in the education program will be maintained through this reservation system. Efforts will be made to spread out use by large groups while reservations are made, reducing disturbance to wildlife and over-crowding of Refuge facilities during times of peak demand.
- Trail etiquette including ways to reduce wildlife disturbance will be discussed with teachers during orientation workshops and with students upon arrival during their welcome session. On the refuge, the teacher(s) is responsible for ensuring that students follow required trail etiquette.

- Environmental education study sites will be located where minimal impact to Refuge resources will occur. Refuge biologists and public use specialists will conduct regular surveys of public activities on the refuge. The data will be analyzed and used by the refuge manager to develop future modifications if necessary to ensure compatibility of environmental education programs.

Justification: Environmental education is a priority public use of the National Wildlife Refuge System. It is the intent of the Refuge staff to provide a quality environmental education program. To achieve this goal, the Refuge environmental education program would provide a diversity of environmental education opportunities to students and teachers. These include: (1) facilities, materials, and training; (2) access to a variety of Refuge habitats; and (3) the ability to observe wildlife and conduct hands-on exploration. The program is intended to foster a better understanding of Refuge ecosystems and wildlife resources, and in turn foster a public that is knowledgeable about and involved in natural resource stewardship. Although there is some impact to Refuge lands and wildlife in having an environmental education program, efforts will be made to ensure that they are kept within acceptable levels. Based upon impacts described in the Comprehensive Conservation Plan and Environmental Assessment (USFWS 2005), it is determined that environmental education within the Sacramento River National Wildlife Refuge, as described herein, will not materially interfere with or detract from the purposes for which the Refuge was established or the mission of the Refuge System. In our opinion, environmental education will not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

Mandatory Re-Evaluation Date (March 2020):

Mandatory 15-year Re-Evaluation, Date will be provided in Final EA/CCP (for priority public uses)

Mandatory 10-year Re-Evaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

References Cited

- Boyle, S. A. and F. B. Samson. 1985. Effects of non-consumptive recreation on wildlife: a review. *Wildl. Soc. Bull.* 13:110-116.
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- Cole, D. N. and P. B. Landres. 1995. Indirect effects of recreation on wildlife. Pages 183-201 in R. L. Knight and K. J. Gutzwiller, ed. *Wildlife and Recreationists: coexistence through management and research* Island Press, Washington, D. C. 372pp.
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- Glinski, R. L. 1976. Birdwatching etiquette: the need for a developing philosophy. *Am. Bird* 30(3):655-657.
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- Klein, M. 1989. Effects of high levels of human visitation on foraging waterbirds at J. N. "Ding" Darling National Wildlife Refuge, Sanibel Florida. Masters thesis. Gainesville, Florida: University of Florida.
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- Miller, S. G., R. L. Knight, and C. K. Miller. 1998. Influence of recreational trails on breeding bird communities. *Ecol. Appl.* 8:162-169.
- Reijnen, R. and R. Foppen. 1994. The effects of car traffic on breeding bird populations in woodland. I. Evidence of reduced habitat quality for willow warbler (*Pyloscopus trochilus*) breeding close to a highway. *J. Appl. Ecol* 31: 85-94.
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USFWS. 2005. Sacramento River National Wildlife Refuge Comprehensive Conservation Plan. U.S. Fish and Wildlife Service, Region 1.

Refuge Determination:

Prepared by:

Kelly Manning
(Signature)

1/20/05
(Date)

Refuge Manager/
Project Leader
Approval:

[Signature]
(Signature)

1/20/05
(Date)

Concurrence:

Refuge Supervisor:

Dan Walsworth
(Signature)

3/16/05
(Date)

Regional Chief,
National Wildlife
Refuge System:

Margaret J. Kolac
(Signature)

3/18/05
(Date)

California/Nevada
Operations Manager:

Steve Thompson
(Signature)

3/21/2005
(Date)

COMPATIBILITY DETERMINATION

(March 2005)

Use: Research

Refuge Name: Sacramento River National Wildlife Refuge, located in Tehama, Butte, Glenn and Colusa counties, California.

Establishing and Acquisition Authority(ies): Sacramento River National Wildlife Refuge (Refuge) was established in 1989. Approximately 11,000 acres of the approved 18,000 acres have been acquired. Legal authorities used for establishment of the Refuge include: the Endangered Species Act of 1973 as amended (16 U.S.C. 1531-1543; 87 Statute 884), the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b) and the Fish and Wildlife Act of 1956 (16 U.S.C. 742).

Refuge Purpose(s): Sacramento River Refuge purposes include:

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ...” 16 U.S.C. Sec. 1534 (Endangered Species Act of 1973)

".. the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)

“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” 16 U.S.C. 742f (a) (4) “... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ...” 16 U.S.C. Sec. 742f (b) (1) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission: “To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-ee]).

Description of Use: Two provisions of the National Wildlife Refuge Improvement Act are to “maintain biological integrity, diversity and environmental health” and to conduct “inventory and monitoring.” Monitoring and research are an integral part of National Wildlife Refuge management. Plans and actions based on research and monitoring provide an informed approach, which analyzes the management affects on refuge wildlife. The proposed research program is discussed in detail as part of the Proposed Action in the CCP and associated EA, which are incorporated by reference (USFWS 2005).

Sacramento River Refuge receives over 20 requests per year to conduct scientific research at the Refuge. From 1993 to 2003, there have been between two and 20 active Special Use Permits issued for research and monitoring. Special Use Permits would only be issued for monitoring and investigations which contribute to the enhancement, protection, preservation, and management of native Refuge plant and wildlife populations and their habitats. Research applicants are required to submit a proposal that outlines: (1) objectives of the study; (2) justification for the study; (3) detailed methodology and schedule; (4) potential impacts on Refuge wildlife or habitat, including disturbance (short and long term), injury, or mortality (this includes a description of measures the researcher will take to reduce disturbance or impacts); (5) research personnel required; (6) costs to Refuge, if any; and (7) progress reports and end products (i.e., reports, thesis, dissertations, publications). Research proposals are reviewed by Refuge staff and conservation partners, as appropriate. Special Use Permits are issued by the refuge manager, if the proposal is approved.

Evaluation criteria will include, but not be limited to, the following:

- Research that will contribute to specific Refuge management issues will be given higher priority over other research requests.
- Research that will conflict with other ongoing research, monitoring, or management programs will not be granted.
- Research projects that can be accomplished off-Refuge are less likely to be approved.
- Research which causes undue disturbance or is intrusive will likely not be granted. Level and type of disturbance will be carefully evaluated when considering a request.
- Refuge evaluation will determine if any effort has been made to minimize disturbance through study design, including considering adjusting location, timing, scope, number of permittees, study methods, number of study sites, etc.
- If staffing or logistics make it impossible for the Refuge to monitor researcher activity in a sensitive area, the research request may be denied, depending on the specific circumstances.
- The length of the project will be considered and agreed upon before approval. Projects will be reviewed annually.

These criteria will also apply to any properties acquired in the future within the approved boundary of the Refuge.

Availability of Resources: The following funding/annual costs (based on FY 2003 costs) would be required to administer and manage research activities as described above:

	Annual Costs
Administration (Evaluation of applications, management of permits, and monitoring of research projects)	\$18,000
TOTAL	\$18,000

Refuge operational funds are currently available through the Service budget process to administer this program.

Anticipated Impacts of Use: Use of the Refuge to conduct research will benefit Refuge fish, wildlife, plant populations, and their habitat. Monitoring and research investigations are an important component of adaptive management. Research investigations would be used to evaluate habitat restoration projects and ecosystem health (Golet et al. 2003; Stillwater Sciences 2003). Specific restoration and habitat management questions would be addressed in most research investigations to improve habitat and benefit wildlife populations. Standardized monitoring would be used to insure data compatibility for comparisons from across the landscape so that natural resource bottleneck areas could be identified for habitat enhancement and restoration (Elzinga et al. 1998; Ralph et al. 1993). Focal species and indicator species would be identified and investigated and monitored to measure and track riparian habitat restoration success and ecosystem health (Riparian Habitat Joint Venture 2004; Stillwater Sciences 2003).

An expected short-term effect of monitoring and research investigations is that Refuge management activities would be modified to improve habitat and wildlife populations, as a result of new information. Expected long-term and cumulative effects include a growing body of science-based data and knowledge as new continued monitoring and new research compliments and expands upon previous investigations; and, an expanded science-based body of data and information from which to draw upon to implement the best Refuge management possible. Natural resources inventory, monitoring and research are not only provisions of the Refuge Improvement Act, but they are necessary tools to maintain biological integrity and diversity and environmental health, which are also key provisions of the act. Inventory, monitoring and research are intended to improve habitat and wildlife populations. This would improve wildlife-dependent recreation by increasing encounters with wild things.

Some direct and indirect effects would occur through disturbance which is expected with some research activities, especially where researchers are entering sanctuaries. Researcher disturbance would include altering wildlife behavior, going off designated trails, collecting soil and plant samples or trapping and handling wildlife. However, most of these effects would be short-term because only the minimum of samples (e.g., water,

soils, vegetative litter, plants, macroinvertebrates) required for identification and/or experimentation and statistical analysis would be permitted and captured and marked wildlife would be released. Long-term effects would be eliminated/reduced because refuge evaluation of research proposals would insure only proposals with adequate safeguards to avoid/minimize impacts would be accepted. Potential impacts associated with research activities would be mitigated/minimized because sufficient restrictions would be included as part of the study design and researcher activities would be monitored by Refuge staff. Refuge staff would ensure research projects contribute to the enhancement, protection, preservation, and management of native Refuge wildlife populations and their habitats thereby helping the Refuge fulfill the purposes for which it was established, the mission of the National Wildlife Refuge System, and the need to maintain ecological integrity. Additionally, Special Use Permit conditions would include conditions to further ensure that impacts to wildlife and habitats are avoided and minimized.

Section 7 consultations with USFWS (2004) and NOAA-Fisheries (2004) concluded that the CCP (USFWS 2005) 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.

Anticipated Impacts of Uses on future lands within the approved boundary: The following conditions must be met before allowing existing uses to occur on newly acquired lands: (1) There is no indirect, direct, or cumulative threat anticipated to human health or safety; (2) There is no indirect, direct, or cumulative threat anticipated to natural or cultural resources; (3) The use is consistent with management of existing Sacramento River Refuge lands and would contribute to achieving Refuge goals. In particular, existing Refuge regulations would not be compromised; (4) The newly acquired lands represent a meaningful unit within which to manage the activity; and (5) There are no anticipated conflicts with priority public uses.

When new lands are acquired by the Refuge, the Refuge would ensure, through the Stipulations presented herein and the terms and conditions in the Special Use Permit, that impacts would be similar to, if not less than, those described.

Public Review and Comment: Public review and comments were solicited in conjunction with distribution of the Draft CCP/EA for the Sacramento River Refuge, released in July 2004. Few comments were received specific to the Compatibility Determinations. Comments received were addressed in the Response to Comments (Appendix R). No changes were made based on comments received.

Determination: This program as described is determined to be compatible. Potential impacts of research activities on Refuge resources will be minimized because sufficient restrictions and safeguards would be included in the Special Use Permit and research

activities will be monitored by the refuge manager and biologist. The refuge manager and biologist would ensure that proposed monitoring and research investigations would contribute to the enhancement, protection, conservation, and management of native Refuge wildlife populations and their habitats thereby helping the Refuge fulfill the purposes for which it was established, the mission of the National Wildlife Refuge System, and the need to maintain ecological integrity, diversity, and environmental health.

Use is Not Compatible

Use is Compatible with the Following Stipulations

Stipulations necessary to ensure compatibility: The criteria for evaluating a research proposal, outlined in the Description of Use section above, will be used when determining whether a proposed study will be approved on the Refuge. If proposed research methods are evaluated and determined to have potential adverse impacts on refuge wildlife or habitat, then the refuge would determine the utility and need of such research to conservation and management of refuge wildlife and habitat. If the need was demonstrated by the research permittee and accepted by the refuge, then measures to minimize potential impacts (e.g., reduce the numbers of researchers entering an area, restrict research in specified areas) would be developed and included as part of the study design and on the Special Use Permit (SUP). Special Use Permits will contain specific terms and conditions that the researcher(s) must follow relative to activity, location, duration, seasonality, etc. to ensure continued compatibility. All Refuge rules and regulations must be followed unless otherwise accepted in writing by Refuge management.

All information, reports, data, collections, or documented sightings and observations, that are obtained as a result of this permit are the property of the Service and can be accessed by the Service at any time from the Permittee at no cost, unless specific written arrangements are made to the contrary. The Refuge also requires the submission of annual or final reports and any/all publications associated with the work done on the Refuge. Each SUP may have additional criteria. Each SUP will also be evaluated individually to determine if a fee will be charged and for the length of the permit.

Extremely sensitive wildlife habitat areas would be avoided unless sufficient protection from research activities (i.e., disturbance, collection, capture and handling) is implemented to limit the area and/or wildlife potentially impacted by the proposed research. Where appropriate, some areas may be temporarily/seasonally closed so that research would be permitted when impacts to wildlife and habitat are no longer a concern. Research activities will be modified to avoid harm to sensitive wildlife and habitat when unforeseen impacts arise.

Refuge staff will monitor researcher activities for potential impacts to the refuge and for compliance with conditions on the Special Use Permit. The refuge manager may

determine that previously approved research and special use permits be terminated due to observed impacts. The refuge manager will also have the ability to cancel a Special Use Permit if the researcher is out of compliance with the conditions of the SUP.

Justification: This program as described is determined to be compatible. Based upon impacts described in the Comprehensive Conservation Plan and Environmental Assessment (USFWS 2005), it is determined that research within the Sacramento River National Wildlife Refuge, as described herein, will not materially interfere with or detract from the purposes for which the Refuge was established or the mission of the Refuge System. Refuge monitoring and research will directly benefit and support refuge goals, objectives and management plans and activities. Fish, wildlife, plants and their habitat will improve through the application of knowledge gained from monitoring and research. Biological integrity, diversity and environmental health would benefit from scientific research conducted on natural resources at the refuge. The wildlife-dependent, priority public uses (wildlife viewing and photography, environmental education and interpretation, fishing and hunting) would also benefit as a result of increased biodiversity and wildlife and native plant populations from improved restoration and management plans and activities associated with monitoring and research investigations which address specific restoration and management questions.

Mandatory Re-Evaluation Date (March 2015):

- Mandatory 15-year Re-Evaluation (for priority public uses)
- Mandatory 10-year Re-Evaluation, Date will be provided in Final EIS/CCP (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

- Categorical Exclusion without Environmental Action Statement
- Categorical Exclusion and Environmental Action Statement
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

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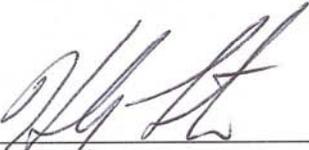
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Prepared by:


(Signature)

1/20/05
(Date)

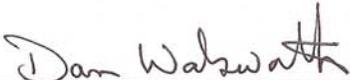
Refuge Manager/
Project Leader
Approval:


(Signature)

1/20/05
(Date)

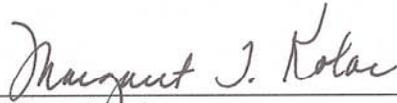
Concurrence:

Refuge Supervisor:


(Signature)

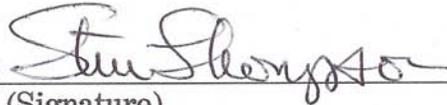
3/16/05
(Date)

Regional Chief,
National Wildlife
Refuge System:


(Signature)

3/18/05
(Date)

California/Nevada
Operations Manager:


(Signature)

3/21/2005
(Date)

COMPATIBILITY DETERMINATION

(March 2005)

Use: Camping and Recreational Boating

Refuge Name: Sacramento River National Wildlife Refuge, located in Tehama, Butte, Glenn and Colusa counties, California.

Establishing and Acquisition Authority(ies): Sacramento River National Wildlife Refuge (Refuge) was established in 1989. Approximately 11,000 acres of the approved 18,000 acres have been acquired. Legal authorities used for establishment of the Refuge include: the Endangered Species Act of 1973 as amended (16 U.S.C. 1531-1543; 87 Statute 884), the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b) and the Fish and Wildlife Act of 1956 (16 U.S.C. 742).

Refuge Purpose(s): Sacramento River Refuge purposes include:

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ...” 16 U.S.C. Sec. 1534 (Endangered Species Act of 1973)

".. the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)

“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” 16 U.S.C. 742f (a) (4) “... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ...” 16 U.S.C. Sec. 742f (b) (1) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission: “To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-ee]).

Description of Use: Camping and recreational boating are combined and evaluated together in this compatibility determination because access to camping on the refuge can only occur by boat. The Comprehensive Conservation Plan (CCP) Proposed Action and Environmental Assessment, which are incorporated by reference, would provide camping and associated recreational opportunities below the ordinary high water mark with an emphasis on facilitating priority public uses, including hunting, fishing, wildlife observation, photography, environmental education, and interpretation (USFWS 2005).

Thirteen of the twenty units proposed to be open for public use (above the ordinary high water mark) require refuge visitors to access the unit by boat (Figure 28, Chapter 5, CCP). Those 13 units lack public or county roads and access through private farms is limited to refuge staff for management and administrative purposes only. Restrictions on camping would be aimed at minimizing impacts to wildlife and habitat as well as conflicts with other users, and reducing the potential for wildfires. The Sacramento River is a navigable water within California and boating has been a traditional use. The jurisdiction of the Service regarding navigable waters within the Refuge is discussed in Chapter 1 of the CCP. Boating activities within the river are subject to existing State and Federal laws. No changes are proposed.

Recreational boating use addressed in this compatibility determination 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). Motorboats include a variety of crafts powered by 2-cycle or 4-cycle engines. It does not include personal watercraft (jet ski) use.

Camping has not previously been allowed on the Refuge. Historically, camping occurred on most gravel bars along the Sacramento River including those that were eventually acquired by the Refuge. Some demand occurs for camping on the Refuge from visitors wishing to conduct multiple day floats and visitors desiring to secure a hunting location on the Refuge. This demand is seasonal, with a majority of the camping activities occurring during the months of August and September. The anticipated peak use period weekend would be the annual opening of dove season in early September. Camping activity will be allowed to occur on designated Refuge gravel bars below the ordinary high water mark (Figure 27, Chapter 5, CCP) for up to seven days during any 30-day period. An estimated 500 camping visits are anticipated annually on the Refuge. No special facilities would be provided for this type of camping with the exception that a primitive group camping area may be designated at the gravel bar on the Dead Man's Reach Unit. The group site would be available by permit only to formal organizations with groups larger than 20 individuals (e.g., boy scout groups, youth groups, etc.). Approximately 100 annual camping visits, under this Special Use Permit, are anticipated. Access to all of the camping areas is by boat from the navigable waters of the Sacramento River (under State jurisdiction).

Boat ramps and camping areas in the vicinity of the Refuge are identified in EDAW 2002 and can be found in Appendix N of the CCP (USFWS 2005). Camping on the Refuge will not detract from use on other campgrounds.

Availability of Resources: Development of specific a campground on the Dead Man's Reach Unit would require additional funding to build, maintain, and monitor. Currently, resources are stretched to maintain existing Refuge facilities and conduct law enforcement of existing public uses.

The following funding/annual costs (based on FY 2003 costs) would be required to administer and manage boating activities as described above:

	One-time Costs	Annual Costs
Administration	\$2,000	\$2,000
Law Enforcement		\$10,000
Outreach, Education, and Monitoring		\$5,000
Boundary surveys and posting	\$15,000	\$2,000
Camp Site Development and Maintenance	\$25,000	\$10,000
Signs	\$3,000	\$1,000
TOTAL	\$45,000	\$30,000

Additional funds would be required to construct, operate, and maintain visitor facilities and interpretive materials (see summary table above). Law enforcement staffing would also be needed. Funding would be sought through the Service budget process. Other sources will be sought through strengthened partnerships, grants, coordination with other law enforcement agencies, and additional Refuge operations funding to support a safe, quality public use program as described above.

No boat ramps or other boating related facilities are proposed to be developed within the Refuge.

Anticipated Impacts of Use: Camping and associated recreational boating have occurred for many years along the Sacramento River. Boating activity, both motorized and non-motorized, can alter distribution, reduce use of particular habitats or entire areas by waterbirds and other birds, alter feeding behavior and nutritional status, and cause premature departure from areas (Knight and Cole 1995). More sensitive species may find it difficult to secure adequate food or loafing sites as their preferred habitat becomes fragmented and recreation-related disturbances increase (Skagen et al. 1991; Pfister et al. 1992). Motorized boats generally have more impact on wildlife than non-motorized boats because motorboats produce a combination of movement and noise (Tuite et al. 1983, Knight and Cole 1995). For example, a significant decrease in the proportion of bald eagles feeding at a site was observed when motorized boating activity occurred within 200 meters of that area in the preceding 30 minutes (Skagen 1980). Motorized boats can also cover a larger area in a relatively short time, in comparison to non-motorized boats. Even canoes and kayaks can cause significant disturbance effects based on their ability to penetrate into shallower areas of the marsh (Speight 1973, Knight and Cole 1995). In the Ozark National Scenic Riverway, green-backed heron activity declined on survey routes when canoes and boat use increased on the main river channel (Kaiser and Fritzell 1984). Canoes or slow-moving boats have also been observed to disturb nesting great blue herons (Vos et al. 1985). Huffman (1999) found that non-motorized boats within 30 meters of the shoreline in south San Diego Bay caused all wintering waterfowl to flush between the craft and shore. However, compared to motorboats, canoes and kayaks appear to have

less disturbance effects on most wildlife species (Jahn and Hunt 1964, Huffman 1999, DeLong 2002).

In Denmark, fast-moving boats were observed to have the greatest impact on red-breasted merganser broods (Kahlert 1994). The presence of fast-moving boats also caused the most significant modifications to the amount of time animals spent feeding and resting. In England, an increased rate of disturbance from boats partly caused a decline in roosting numbers of shorebird species (Burton et al. 1996). In addition, boaters have been observed to cause massive flights of diving ducks on the Mississippi River (Thornburg 1973). Motorized boats within 100 meters of shore caused all wintering waterfowl and shorebirds to flush between the craft and shore in south San Diego Bay, regardless of speed. However, disturbance to birds in general was reduced when boats traveled at or below the 5 mph speed limit (Huffman 1999).

Impacts of boating can occur even at low densities, given their noise, speed, and ability to cover extensive areas in a short amount of time. The total number of boats and people can be an inappropriate measure of recreational intensity because the presence of a single boat might be just as disturbing as that of many (Tuite et al. 1983, Knight and Knight 1984).

The habitat along the Sacramento River is a relatively narrow riparian corridor system that receives high use by a variety of Neotropical migratory birds, waterbirds, and raptors. Because boats in confined areas are generally closer to shorelines, waterbirds in sloughs and on the river may be exposed to more human activity than birds in other shoreline habitats (Bratton 1990). Even low levels of boating activity affect the duration and pattern of use by wildlife in this narrow system. In addition, disturbance to nesting birds is caused by boat activity. Active osprey nests occur along the river within and outside the Refuge. Nesting heron and egret colonies occur along the river in the Llano Seco, Flynn, and Mooney Units. Nesting great blue herons are sensitive to a variety of human disturbances. Great blue herons were one of the most sensitive of 23 waterbird species, when measuring flush distances from motorized watercraft (Rodgers and Schwikert 2002).

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 is a high impact activity which can result in the degradation of Refuge habitat. Camping in itself can disturb and disperse wildlife. Human activity, generators, loud motors, music and dogs associated with some types of camping disturb wildlife and can detract from the outdoor experience of other Refuge users. Fires and firewood collection damage habitat. Use of detergent, soap, and toothpaste in or near rivers harm fish and other aquatic life. Human waste creates unsanitary conditions and litter. Campers sometimes leave garbage, litter, and other undesirable items. Creation of improvements

(e.g., lean-tos, tables, rock walls, etc.) and alteration of the site can be byproducts of camping and may impact localized gravel bar vegetation.

Camping can result in inappropriate uses (e.g., littering, deposition of human waste), devalues vegetation and trampled and devalued wildlife habitats. Camping can degrade land, water, and wildlife by simplifying plant communities, increasing mortality, displacing and disturbing wildlife and distributing refuse (Boyle and Samson 1985). In addition, camping induced soil disturbance may provide conditions that favor weed infestations. Camping in riparian areas may also result in increased runoff into streams due in part to exposed soil and reduction in vegetation (Green 1998). Camping also requires additional law enforcement efforts that may have to be directed at a wide range of violations from those listed above to domestic disturbance/assaults.

Section 7 consultations with USFWS (2004) and NOAA-Fisheries (2004) concluded that the CCP (USFWS 2005) 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.

In our opinion, the limited camping and associated boating will not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

Anticipated Impacts of Uses on future lands within the approved boundary: The following conditions must be met before allowing existing uses to occur on newly acquired lands: (1) There is no indirect, direct, or cumulative threat anticipated to human health or safety; (2) There is no indirect, direct, or cumulative threat anticipated to natural or cultural resources; (3) The use is consistent with management of existing Sacramento River Refuge lands and would contribute to achieving Refuge goals. In particular, existing Refuge regulations would not be compromised; (4) The newly acquired lands represent a meaningful unit within which to manage the activity; and (5) There are no anticipated conflicts with priority public uses.

Public Review and Comment: Public review and comments were solicited in conjunction with distribution of the Draft CCP/EA for the Sacramento River Refuge, released in July 2004. Few comments were received specific to the Compatibility Determinations. Comments received were addressed in the Response to Comments (Appendix R). No changes were made based on comments received.

Determination:

Use is Not Compatible

Use is Compatible with the Following Stipulations

Stipulations necessary to ensure compatibility:

- No refuge lands other than gravel bars below ordinary high water mark would be open to camping. Refuge informational signs will be located at the approximate ordinary high water mark. Information will also be distributed in brochures and on the web-site.
- Monitoring of boating and camping activities and associated effects on habitat and wildlife will be conducted. Monitoring data will be used by the refuge manager in the periodic re-evaluation of this Compatibility Determination.
- Groups permitted to camp on Refuge lands for the purpose of completing specific projects or utilize a specific refuge unit must adhere to all conditions specified in a special use permit and Refuge regulations.
- Refuge staff will post seasonal camping closures on areas that contain sensitive wildlife species (e.g., active heron colony, osprey nest nearby, etc.).
- No person shall build or maintain fires except on gravel bars in portable gas stoves.
- Limited camping on gravel bars up to seven days during any 30 day period is allowed. Camping on Refuge land, other than gravel bars, is prohibited.
- On Refuge lands, excluding gravel bars, entry and departure is restricted to one hour before sunrise to one hour after sunset.
- We require dogs to be kept on a leash, except for hunting dogs engaged in authorized hunting activities and under the immediate control of a licensed hunter (see 50 CFR 26.21(b)).
- Visitors using boats must abide by the boating stipulations described in the State and Coast Guard regulations on boating.
- All property and other items including litter must be removed from campsites upon leaving the Refuge (i.e. pack it in, pack it out).

Justification: Camping and associated boating are not considered wildlife-dependent recreation, but many wildlife-dependent recreational activities (fishing, hunting, environmental education, interpretation, wildlife observation and photography) along the river and within the Refuge are associated with boating. Providing opportunities for wildlife-dependent priority public uses would contribute toward fulfilling provisions under the National Wildlife Refuge System Administration Act as amended in 1997. Although boating has a potential to impact riparian wildlife, implementing the prescribed measures

listed in the Stipulations section should reduce many of these impacts to acceptable levels. It is anticipated that an adequate amount of habitat would be available to the majority of migratory birds and other native wildlife because State boating regulations would be maintained and enforced. Thus, it is anticipated that migratory birds and other native wildlife will find sufficient food resources and resting places such that their abundance and use of the Refuge will not be measurably lessened, the physiological condition and production of migratory birds and other native wildlife will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall status will not be impaired. The Refuge will also implement a monitoring program to help assess disturbance effects on wildlife and habitat and discern adaptive management options. Improved outreach and educational information for Refuge visitors involved in activities associated with boating would also help to reduce the impacts associated with boating and riverside camping activities. Based upon impacts described in the Comprehensive Conservation Plan and Environmental Assessment (USFWS 2005), it is determined that camping and recreational boating (motorized and non-motorized) within the Sacramento River National Wildlife Refuge, as described herein, will not materially interfere with or detract from the purposes for which the Refuge was established or the mission of the Refuge System. In our opinion, camping and associated boating (motorized and non-motorized) will not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

Mandatory Re-Evaluation Date (March 2015):

Mandatory 15-year Re-Evaluation, Date will be provided in Final EA/CCP (for priority public uses)

Mandatory 10-year Re-Evaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

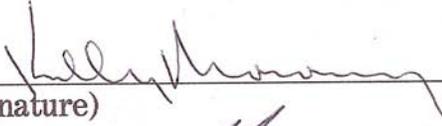
Environmental Impact Statement and Record of Decision

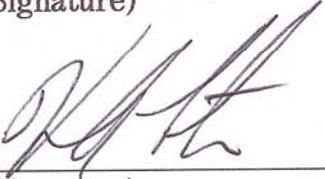
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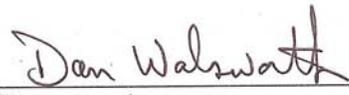
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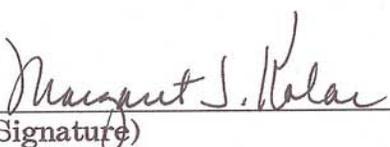
Refuge Determination:

Prepared by:  1/20/05
(Signature) (Date)

Refuge Manager/
Project Leader
Approval:  1/20/05
(Signature) (Date)

Concurrence:

Refuge Supervisor:  3/16/05
(Signature) (Date)

Regional Chief,
National Wildlife
Refuge System:  3/18/05
(Signature) (Date)

California/Nevada
Operations Manager:  3/21/2005
(Signature) (Date)

COMPATIBILITY DETERMINATION

(March 2005)

Use: Cooperative Farming Program

Refuge Name: Sacramento River National Wildlife Refuge, located in Tehama, Butte, Glenn and Colusa counties, California.

Establishing and Acquisition Authority(ies): Sacramento River National Wildlife Refuge (Refuge) was established in 1989. Approximately 11,000 acres of the approved 18,000 acres have been acquired. Legal authorities used for establishment of the Refuge include: the Endangered Species Act of 1973 as amended (16 U.S.C. 1531-1543; 87 Statute 884), the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b) and the Fish and Wildlife Act of 1956 (16 U.S.C. 742).

Refuge Purpose(s): Sacramento River Refuge purposes include:

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ...” 16 U.S.C. Sec. 1534 (Endangered Species Act of 1973)

".. the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)

“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” 16 U.S.C. 742f (a) (4) “... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ...” 16 U.S.C. Sec. 742f (b) (1) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission: “To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-ee]).

Description of Use: For the past twelve years the Service has been acquiring parcels of land to establish the Sacramento River Refuge. The Service’s goal is to purchase remnant forests, oxbow sloughs, and flood prone lands adjacent to or near the Sacramento River. These properties, along the riparian corridor, often include commercial farmland that includes English walnuts, *Juglans regia*, prunes, *Prunus domestica*, almonds, *Prunus amygdalus*, and various field crops. Currently the Refuge has 1,968 acres of agricultural land that includes; 1,001 acres of walnuts, 243 acres of almonds, 924 acres of row crops,

and 870 acres of fallow fields. Transition farming activities occur on 8 of the 26 refuge units (La Barranca, Jacinto, Capay, Dead Man's Reach, Llano Seco, Hartley Island, Codora, and Drumheller Slough). The proposed cooperative farming program is discussed in detail as part of the Proposed Action in the CCP and associated EA (CCP Chapter 4 and Appendix A), which are incorporated by reference (USFWS 2005). The long-term goal for these agricultural lands is restoration to riparian habitat. In the interim, crops are farmed under an existing Cooperative Land Management Agreement with nonprofit conservation groups that lease the property to local farmers (Refuge files, CLMA). The remaining refuge acreage consists mostly of mixed riparian forest, cottonwood riparian forest, herbland cover, riparian willow scrub, valley oak woodland and savannah, elderberry savannah, gravel bar, grasslands and the 3,307 acres that have been restored to native riparian communities.

General Orchard Management Practices

Orchard production within the Refuge requires progressive management to protect habitat and species while maintaining healthy, productive trees that avoid pest problems. Weeds and pests are controlled throughout the year using an integrated pest management (IPM) strategy (Cerus 2003). Methods include irrigation of the tree rows, domestic bee pollination, and the use of various types of pesticide spraying implements for application of Service approved pesticides. All pesticides are reviewed through the Fish and Wildlife Service National Pesticide Use Proposal Policy prior to authorizing use on the Refuge.

The understory vegetation in the majority of walnut orchards is a managed cover composed of nonnative annual winter weeds; and annual and perennial summer weeds usually Bermuda grass, *Cyanodon dactylon*. The orchards are part of the river floodplain and have a year round cover of resident vegetation which limits the run off of pest control materials. The surface vegetation is mowed during early spring and summer; the walnut orchard units are not disked (Cerus 2003).

General Row Crop Management Practices

Row crops grown on the refuge include corn, wheat, barley, safflower, and sunflower. Typical activities include: disking, planting, mowing to control weed growth, irrigation management, and Service approved herbicide sprays to control weeds. Row crop management activities occur between May and November. The row crop program helps to control weeds during the transition from orchard management to restoration activities.

Research Needs:

There are many research needs regarding the effects of walnut management within the inner river area adjacent to the Refuge units. The role of biological control from the riparian forest as well as the role of bats, birds, and generalist predators is yet not clearly understood. Success with pheromone disruption in walnuts in northern California is being explored, but success has not been demonstrated on a large scale. Further research on

the efficacy of pheromone disruption will be needed before this technology can be recommended for more than one third of the Refuge's walnuts.

Availability of Resources: The following funding/annual costs would be required to administer and manage research activities as described herein: The CLMA cooperator carries the major burden of administering the farming program.

	One-time Costs	Annual Costs
Administration		\$10,000
Research	\$25,000	\$10,000
TOTAL	\$25,000	\$20,000

Monitoring is addressed in the CLMA and is conducted and reported to the Refuge by our CLMA partners. Refuge operational funds are currently available through the Service budget process to administer this program.

Anticipated Impacts of Use: The Refuge units, which contain managed walnut orchard production, use the most effective methods of pest control for codling moth, navel orange worm, mites, and walnut husk fly all of which may require a chemical control. All decisions to use a chemical control are based upon monitoring by licensed Pest Control Advisors and are used when cultural and biological methods have failed to control the pests below significantly damaging levels. Failure to treat the pests like codling moth and navel orangeworm, both of which have 3 or 4 generations, will result in population buildups that can impact neighboring walnut and almond orchards. This IPM Plan provides sufficient flexibility to keep the properties managed until further research and field experience with pest control methods can be evaluated and implemented.

It is important to keep the walnut crops managed by the tenant farmers who derive proceeds from the crop versus allowing the large units of walnuts to be unmanaged for years while funding is solicited for restoration. The phasing out of farming on Refuge lands, as opposed to immediate termination, offsets immediate impact to the local farming community and the county tax roles (Jones & Stokes 2002). This is a refuge management economic activity and its utilization, at least in the short-term, helps the Refuge achieve the purposes for which it was created and the mission of the Refuge System.

Effects to non-target organisms can be: interference with normal biological systems and functions, loss of biomass, loss of diversity, interference with normal ecological relationships, bioaccumulation, and other known and unknown effects. The mission of Refuge is to provide for the conservation of migratory birds, native anadromous fish, endangered and threatened species, native plants and other native animals and their habitats. There was a concern that the walnut pest control treatments interfere with the Refuge's purposes by reducing and contaminating existing food and water components of habitat. Rare insects or insects that may function as important pollinators for native plants may also be impacted by walnut arthropod pest treatments. Significant

bioaccumulation has not been associated with any of the approved chemical treatments referred to in this plan (Cerus 2003). Specific impacts to non-target species are addressed in the Orchard Integrated Pest Management Plan (Cerus 2003). Potential impacts from pesticides on anadromous fish, invertebrates, songbirds, and other wildlife are mitigated through restricted pesticide use, implementation of vegetative buffers, and seasonal restrictions on activities that may impact sensitive species.

Section 7 consultations with USFWS (2004a, b) and NOAA-Fisheries (2004a, b) concluded that the CCP (USFWS 2005) 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.

Anticipated Impacts of Uses on future lands within the approved boundary: The following conditions must be met before allowing existing uses to occur on newly acquired lands: (1) There is no indirect, direct, or cumulative threat anticipated to human health or safety; (2) There is no indirect, direct, or cumulative threat anticipated to natural or cultural resources; (3) The use is consistent with management of existing Sacramento River Refuge lands and would contribute to achieving Refuge goals. In particular, existing Refuge regulations would not be compromised; (4) The newly acquired lands represent a meaningful unit within which to manage the activity; and (5) There are no anticipated conflicts with priority public uses.

Public Review and Comment: Public review and comments were solicited in conjunction with distribution of the Draft CCP/EA for the Sacramento River Refuge, released in July 2004. Few comments were received specific to the Compatibility Determinations. Comments received were addressed in the Response to Comments (Appendix R). No changes were made based on comments received.

Determination:

Use is Not Compatible

Use is Compatible with the Following Stipulations

Stipulations necessary to ensure compatibility:

1. Compliance with annual Pesticide Use Proposal policy.
 - The use of buffers 300 feet or more between the walnut orchard pest control applications and blue elderberry plants should substantially help mitigate effect of applications of walnut pest control treatments on Valley elderberry longhorn beetle (VELB).
 - Wide unsprayed vegetated buffers (200 to 300 feet), reduced application rates

- (50 to 100 gallons per acre), low active ingredient concentrations, rapid degradation and soil binding, avoidance of applications during inversions or winds over 7mph, and the addition of drift control agents all reduce the opportunity for pesticides of concern to enter aquatic environments.
- Despite the existence of buffer strips to prevent off site movement or drift of the pest control materials there is still concern that the use of Malathion may have either a transitory or cumulative effects on the reduction of non-target aerial or terrestrial insects, especially those that are rare or serve as pollinators for rare plant species. Inventories of at risk species should be undertaken based on their susceptibility to Malathion treatments. Further field research on the alternative for walnut husk fly control, the spinosad bait, should be accelerated (Cerus 2003).
2. Implementation of the IPM Plan for Walnut Production on the Sacramento River National Wildlife Refuge.
 - Conduct Best Management Practices for orchard farming
 - Experimentation with biological control methods for pest control
 - Monitoring potential impacts to non-target species
 3. No public access will occur on farmlands
 - No spray buffers near areas open to the public
 - Notification/signing during periods of pesticide application
 4. The Refuge consulted with and received concurrence from both the Sacramento Fish & Wildlife Office and from NOAA-Fisheries for threatened, endangered, and candidate species consultation.
 - Compliance with Intra-Service Section 7 with USFWS (2004a, b) and NOAA-Fisheries (2004a, b).

Research from other areas needs to continue to be evaluated for application to the Refuge. Furthermore, as new methods or products become available to control walnut pests, those that can provide adequate control with less negative impacts than the existing methods will be evaluated for use on the refuge walnut units if appropriate and feasible.

Justification: Part 29.2 of Title 50, Code of Federal Regulations, entitled “Cooperative Land Management” provides: Cooperative agreements with persons for crop cultivation, haying, grazing, or the harvest of vegetative products, including plant life, growing with or without cultivation on wildlife refuge areas may be executed on a share-in-kind basis when such agreements are in aid or benefit to the wildlife management of the area.

Currently, there are not sufficient funds to restore the 1,968 acres of agricultural lands. The refuge cooperators provide resources to the Refuge to assist in other management activities including the Refuge’s goal of riparian habitat restoration associated with these lands. The program provides a cost-effective and economical means for the Service to proceed with restoration projects (USFWS 1994 & 2002). Refuge cooperators combined with refuge personnel and resources working together will provide enhanced overall

management of Sacramento River Refuge. Cooperative farmers and private nonprofit conservation organizations have shown a willingness to work with the Service and have the expertise and resources necessary to cooperatively assist in management of Sacramento River Refuge. The completion of defined land management activities by the cooperators will provide direct and substantial overall benefits to Refuge habitat and the associated wildlife.

PRBO has monitored bird populations in different habitat types on the Refuge for over ten years including orchards and fallow fields. Although species diversity and richness is lower in orchards than in riparian habitat, species diversity and richness is measurably higher in the orchards when compared fallow fields (Gilchirst et al. 2002). By eliminating the farming program, in-kind services provide by cooperators for riparian restoration would no longer be available, problems with agricultural pests and noxious weeds would result in poor habitat quality and a perception of irresponsible management of public lands (USFWS 1994).

Based upon impacts described in the Comprehensive Conservation Plan and Environmental Assessment (USFWS 2005), it is determined that cooperative farming within the Sacramento River National Wildlife Refuge, as described herein, will not materially interfere with or detract from the purposes for which the Refuge was established or the mission of the Refuge System. In our opinion, implementing the Integrated Pest Management Plan, Cooperative Land Management Agreements, and associated stipulations will not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

Mandatory Re-Evaluation Date (March 2015):

- Mandatory 15-year Re-Evaluation, Date will be provided in Final EA/CCP (for priority public uses)
- Mandatory 10-year Re-Evaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

- Categorical Exclusion without Environmental Action Statement
- Categorical Exclusion and Environmental Action Statement
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

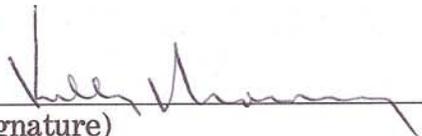
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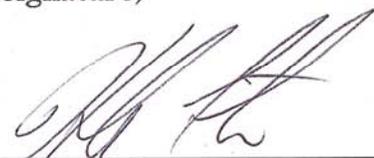
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Prepared by:


(Signature)

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(Date)

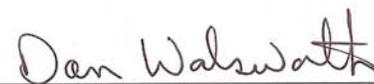
Refuge Manager/
Project Leader
Approval:


(Signature)

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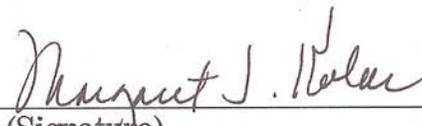
Concurrence:

Refuge Supervisor:


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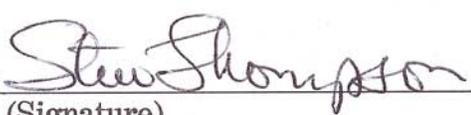
3/16/05
(Date)

Regional Chief,
National Wildlife
Refuge System:


(Signature)

3/18/05
(Date)

California/Nevada
Operations Manager:


(Signature)

3/21/2005
(Date)

COMPATIBILITY DETERMINATION

(March 2005)

Use: Grazing

Refuge Name: Sacramento River National Wildlife Refuge, located in Tehama, Butte, Glenn and Colusa counties, California.

Establishing and Acquisition Authority(ies): Sacramento River National Wildlife Refuge (Refuge) was established in 1989. Approximately 11,000 acres of the approved 18,000 acres have been acquired. Legal authorities used for establishment of the Refuge include: the Endangered Species Act of 1973 as amended (16 U.S.C. 1531-1543; 87 Statute 884), the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901(b) and the Fish and Wildlife Act of 1956 (16 U.S.C. 742).

Refuge Purpose(s): Sacramento River Refuge purposes include:

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ...” 16 U.S.C. Sec. 1534 (Endangered Species Act of 1973)

".. the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)

“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” 16 U.S.C. 742f (a) (4) “... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ...” 16 U.S.C. Sec. 742f (b) (1) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission: “To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-ee]).

Description of Use: The natural and managed vegetation at the refuge provides habitat in the form of water, food, cover, breeding areas, rearing areas, and sanctuary for a variety of wildlife including endangered and threatened species, rare and endemic species, migratory birds, anadromous fish, and game animals, such as waterfowl and deer. Livestock grazing would be conducted annually for a specified period (i.e., seasonally) to manage vegetation for native plant and wildlife habitat. Grazing is administered with a livestock cooperator under a U.S. Fish and Wildlife Service Cooperative Land

Management Agreement (CLMA). The CLMA states provisions for habitat objectives, expected wildlife benefits, shared staffing, facility maintenance, pest control damages, remedies, operating rules and laws and reporting requirements. An annual grazing plan identifies the refuge tract to be grazed and specifies: vegetation and habitat type, grazing objective (primary target weed and/or primary native species or taxa), prescribed expected tract conditions (vegetation height), date by which expected conditions are to be met, livestock turn-in/turn-out dates and Animal Unit Months (AUM). The specific dates are determined by the refuge manager through consultation with the refuge biologist and cooperator to develop a strategy that meets target tract objectives. Each year the needs for vegetation management, including grazing, are evaluated during the annual review of the habitat management plan. The grazing plan has built-in flexibility due to the uncertainties of annual and seasonal precipitation, flooding, and temperatures, and their consequent affect on vegetation growth. This is to insure that expected conditions are met and that refuge vegetation is neither over-grazed nor under-grazed—both conditions result in degraded habitat. Included in the annual grazing plan is a project plan, which also specifies by refuge tract: identified facilities and maintenance projects, materials, shared responsibilities, and special management problems and considerations. This is a refuge management economic activity and its utilization helps the refuge achieve the purposes for which it was created and the mission of the Refuge System. The proposed grazing program is discussed in detail as part of the Proposed Action in the CCP and associated EA (CCP Chapter 4 and Appendix A), which are incorporated by reference (USFWS 2005).

Vegetation and wildlife habitat management occurs in grasslands, Valley oak and elderberry savanna, Valley oak woodlands, mixed-riparian forest, and freshwater marshes. Grazing is conducted periodically (seasonal) each year. The specified time is determined by the refuge and cooperator to meet target tract conditions. Currently Sacramento Refuge Complex has a CLMA for cattle grazing with Llano Seco Ranch, Butte County and Ohm Ranch, Tehama County. The Llano Seco CLMA covers all areas at the Llano Seco Unit, which includes annual grasslands/vernal pools, Valley oak/elderberry savanna, and managed freshwater marsh. The Ohm CLMA covers all areas at the Mooney Unit and Ohm Unit, which includes annual grassland, Valley oak woodland/non-native hybridized California black walnut woodland, mixed-riparian forest, and willow-scrub.

Availability of Resources: The following funding/annual costs (based on FY 2003 costs) would be required to administer and manage research activities as described above:

	Annual Costs
Administration	\$1,000
Facilities maintenance	\$5,000
TOTAL	\$6,000

Monitoring is addressed in the annual grazing plan. The Refuge does not charge a user fee and in-kind services are determined annually during the annual grazing plan meeting. Refuge operational funds are currently available through the Service budget process to administer this program.

Anticipated Impacts of Use: Grazing by native wildlife species has long occurred in the California landscape where it has shaped its botanical and zoological resources (Edwards 1992; Edwards 1996). Currently, livestock grazing is an important method of vegetation management (Barry 2003; Griggs 2000). Beneficial effects to refuge habitat, wildlife and native plants would occur as a result of a well managed livestock grazing program. Primary, benefits associated with the grazing program include: the reduction and accumulation of dead plant material; reduction in non-native invasive weeds (Thomsen et al. 1993); increases in native plants, including special status species, from reduced competition for sunlight, water and nutrients with non-native annual grasses (Coppoletta and Moritsch 2001; Davis and Sherman 1992; Menke 1992; Muir and Moseley 1994); increases primary production and resultant increases in plant biomass (McNaughton 1985); increases in flowering, with consequent increases in macro-invertebrate populations, including native pollinators of native plants, and prey items for refuge wildlife such as migratory birds and anadromous salmonids. Grazing would provide optimal shorebird foraging habitat (Colwell and Dodd 1995; Knopf and Rupert 1995) and also would provide short, nutritious grasses for grazing migratory waterfowl (Buchsbaum et al. 1986), and local deer. Aquatic invertebrates, insects, and special status species would benefit from grazed herbaceous habitats (Bratton 1990; Bratton and Fryer 1990; Panzer 1988; Germano et al. 2001; Knopf). Primary burrowing mammals such as California ground squirrel would increase with grazing and this would result in increases of secondary burrowing animals such as burrowing owls and various snake taxa. Primary, long-term benefits include continued annual native plant production, non-native invasive plant species control, and annual, seasonal use of refuge habitat by migratory birds and resident deer herds. The condition of nesting cover would be maintained through increases in new plant biomass and removal of dense thatch layers. Secondary benefits of the program are the habitat and water system maintenance work done by the cooperator as specified in the CLMA. Periodic grazing can also be used to reduce thatch and mulch accumulation, lessening the threat of wildfire near rural structures and agricultural industrial facilities.

The grazing program would also impact refuge wildlife and habitat. Impacts to some nesting waterfowl, songbirds, would occur (Kirsch 1969; Krueper 1993), as well as Northern Harrier and American Bittern. Mammals, which burrow through thatch such as California meadow vole would likely decrease with grazing. However, these impacts would be short-term because the program would stipulate seasonal grazing. Songbirds, harriers and larger mammals, such as black-tailed jackrabbit, would move to other areas of the Refuge which would provide cover outside the grazed area. Seasonal grazing would improve plant species composition and structure so that short-term impacts to wildlife and habitat would be mitigated by long-term benefits to Refuge vegetation, native plants,

and overall wildlife habitat quality. Therefore, the long-term benefits to habitat to migratory birds, resident deer herds, native plants, and nesting habitat condition would mitigate the short-term, localized impacts to local ground-nesting birds and some small mammals.

Section 7 consultations with USFWS (2004) and NOAA-Fisheries (2004) concluded that the CCP (USFWS 2005) 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.

Anticipated Impacts of Uses on future lands within the approved boundary: The following conditions must be met before allowing existing uses to occur on newly acquired lands: (1) There is no indirect, direct, or cumulative threat anticipated to human health or safety; (2) There is no indirect, direct, or cumulative threat anticipated to natural or cultural resources; (3) The use is consistent with management of existing Sacramento River Refuge lands and would contribute to achieving Refuge goals. In particular, existing Refuge regulations would not be compromised; (4) The newly acquired lands represent a meaningful unit within which to manage the activity; and (5) There are no anticipated conflicts with priority public uses.

When new lands are acquired by the Refuge, the Refuge would ensure, through the Stipulations presented herein and the terms and conditions in the CLMA or a Special Use Permit, that impacts would be similar to, if not less than, those described.

Public Review and Comment: Public review and comments were solicited in conjunction with distribution of the Draft CCP/EA for the Sacramento River Refuge, released in July 2004. Few comments were received specific to the Compatibility Determinations. Comments received were addressed in the Response to Comments (Appendix R). No changes were made based on comments received.

Determination: This program as described is determined to be compatible. Potential impacts of grazing activities on Refuge resources will be minimized because sufficient restrictions would be included as part of the annual grazing plan and grazing activities will be monitored by the refuge manager and biologist. The refuge manager and biologist would ensure the grazing plan and associated projects contribute to the enhancement, protection, conservation, and management of native Refuge wildlife populations and their habitats thereby helping the Refuge fulfill the purposes for which it was established, the mission of the National Wildlife Refuge System, and the need to maintain ecological integrity, diversity, and environmental health.

_____ Use is Not Compatible

X Use is Compatible with the Following Stipulations

Stipulations necessary to ensure compatibility:

- The criteria for evaluating need for vegetation management, including grazing, are determined during the annual review of the refuge habitat management plan.
- Grazing is conducted in accordance with the CLMA. Any potential problems and impacts to refuge natural and cultural resources are identified during the annual review of the habitat management plan. These problems and impacts are also recorded in the annual grazing plan under associated projects. Measures to eliminate or reduce grazing impacts to refuge resources would be identified in both the CLMA and annual grazing plan and the refuge manager and biologist would monitor their outcome. If grazing impacts could not be eliminated or reduced to sufficiently protect natural and cultural resources, then other techniques for vegetation management would be considered. In addition to stipulations outlined above, in the CLMA, and annual grazing plan, all refuge rules and regulations must be followed by the livestock grazing cooperators unless otherwise accepted in writing by the refuge manager.
- Grazing would not be allowed in sensitive natural or cultural resource sites.

Justification: This program as described is determined to be compatible. Based upon impacts described in the Comprehensive Conservation Plan and Environmental Assessment (USFWS 2005), it is determined that grazing within the Sacramento River National Wildlife Refuge, as described herein, will not materially interfere with or detract from the purposes for which the Refuge was established or the mission of the Refuge System. Refuge livestock grazing will directly benefit and support refuge goals, objectives and management plans and activities. Fish, wildlife, plants and their habitat will improve through vegetation management which will result in short-term and long-term reductions of non-native invasive plant species, increases in native plants, increases in biomass, improved foraging conditions for migratory birds and local deer herds, and long-term improved nesting conditions. Consequently, the livestock grazing program would increase or maintain biological integrity, diversity and environmental health. The wildlife-dependent, priority public uses (wildlife viewing and photography, environmental education and interpretation, fishing and hunting) would also benefit as a result of increased biodiversity and wildlife and native plant populations from improved habitat conditions associated with the grazing program. In our opinion, grazing will not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

Mandatory Re-Evaluation Date (March 2015):

- Mandatory 15-year Re-Evaluation (for priority public uses)
- Mandatory 10-year Re-Evaluation, Date will be provided in Final EA/CCP (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

- Categorical Exclusion without Environmental Action Statement
- Categorical Exclusion and Environmental Action Statement
- Environmental Assessment and Finding of No Significant Impact
- Environmental Impact Statement and Record of Decision

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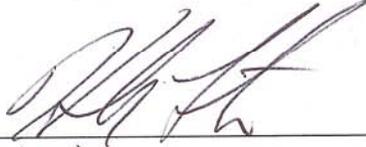
Refuge Determination:

Prepared by:


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1/20/05
(Date)

Refuge Manager/
Project Leader
Approval:


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3/21/2005
(Date)

COMPATIBILITY DETERMINATION

(March 2005)

Use: Mosquito and Other Vector Control

Refuge Name: Sacramento River National Wildlife Refuge (NWR), located in Tehama, Butte, Glenn and Colusa counties, California.

Establishing and Acquisition Authorities: Sacramento River National Wildlife Refuge was established in 1989. Approximately 11,000 acres of the approved 18,000 acres have been acquired. Legal authorities used for establishment of the Refuge include: the Endangered Species Act of 1973 as amended (16 U.S.C. 1531-1543: 87 Statute 884), the Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901) and the Fish and Wildlife Act of 1956 (16 U.S.C. 742).

Refuge Purpose(s): Sacramento River NWR purposes include:

“... to conserve (A) fish or wildlife which are listed as endangered species or threatened species or (B) plants ...” 16 U.S.C. Sec. 1534 (Endangered Species Act of 1973)

".. the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions ..."16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)

“... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” 16 U.S.C. 742f (a) (4) “... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ...” 16 U.S.C. Sec. 742f (b) (1) (Fish and Wildlife Act of 1956)

National Wildlife Refuge System Mission: “To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (National Wildlife Refuge System Administration Act of 1996, as amended [16 U.S.C. 668dd-ee]).

Description of Use: The proposed use is the implementation of mosquito monitoring and control activities requested and to be conducted by various Mosquito and Vector Control Districts (Districts) within the Sacramento River NWR including Tehama County Mosquito and Vector Control, Butte County Mosquito and Vector Control, Glenn County Mosquito and Vector Control, and Colusa Mosquito Abatement District. This is not a wildlife-dependent public use. There are five mosquito species of concern potentially

produced or harbored on the refuge: *Ochlerotatus melanimon*, *Ochlerotatus nigromaculis*, *Aedes vexans*, *Culex tarsalis*, and *Anopheles freeborni*.

This represents an update of a compatibility determination approved in August 1994 (USFWS 1994). To our knowledge, no mosquito control activities have been conducted or are being conducted on the Sacramento River NWR even though this compatibility determination was approved. Mosquito monitoring and limited control activities have occurred within Sanctuary 1 and Sanctuary 2 of the Llano Seco Unit. This part of the Refuge was acquired for inclusion in the North Central Valley Wildlife Management Area, and is not included within the Sacramento River National Wildlife Refuge Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) (USFWS 2005) which is incorporated by reference. Riparian and agricultural habitats on the Refuge include sand and gravel bars, willow scrub, cottonwood forest, herblands, mixed riparian forest, valley oak woodlands and savannas, grasslands, freshwater wetlands, pastures, cover crops (i.e., winter wheat, safflower, corn, bell beans), almond and walnut orchards. There are no managed wetland units covered under the CCP/EA.

The Districts have verbally informed the refuge manager of their desire to conduct mosquito monitoring and, if necessary, abatement activities in order to protect the public from any mosquito borne diseases. While mosquitoes are considered a nuisance because of their biting, many species are known vectors of serious diseases in California. Although 12 mosquito-borne viruses are known to occur in the state, based on current human health risks, the main disease of concern for mosquito abatement programs in northern California are Western Equine Encephalitis (WEE), St. Louis Encephalitis (SLE), California Encephalitis, West Nile Virus (WNV), and malaria (USFWS 2004a). Only WEE and SLE have caused significant outbreaks of human disease (CA Dept. of Health Services 2003). California is also at risk for WNV which was first detected in the summer of 2003 in adult mosquitoes in Imperial County, and in crows in Orange County. WEE tends to be most serious in very young children, whereas elderly people are most at risk to SLE and WNV (CA Dept. of Health Services 2003). WEE and WNV can cause serious diseases in horses and emus, and WNV kills a wide variety of endemic and imported birds.

Public concern over human health issues related to mosquito-borne disease has intensified on the west coast with the advance of WNV across the United States. To address mosquito management, a phased response strategy has been developed for implementation on refuges in the Pacific Region (USFWS 2003). This strategy encourages an integrated pest management approach that incorporates habitat and best management practices to reduce the need for and use of insecticides on refuges, while also ensuring that legitimate human, fish, and wildlife health concerns are addressed. To better address issues related to WNV, the current procedures for managing mosquitoes on this Refuge include this phased response program, which identifies thresholds for mosquito treatment and presents specific responses to various conditions encountered in the field (USFWS 2004a). Under this program, if mosquito population monitoring and disease surveillance (implemented by District vector control personnel) indicate that human health thresholds are exceeded, the use of larvicides, pupicides, and/or adulticides

may become necessary. In some cases, emergency actions may be required that are not addressed by this compatibility determination.

The current procedures for implementing mosquito management on the Sacramento NWR Complex are covered under a Special Use Permit (SUP), which involves an annual meeting between District and Refuge staff to coordinate all necessary permitting and implementation planning required to conduct mosquito monitoring and control on the Complex for the upcoming year. When any District formally identifies that mosquito monitoring and control is needed on the Refuge, they will then be included in this process. Issues such as access points and pathways to be used by District personnel, appropriate hours of operation, and requirements for field coordination are discussed, agreed upon, and incorporated into the SUP. As part of this coordination process, District vector control personnel are provided with habitat management data generated by the Refuge biologist on listed species and other trust resources. District personnel share relevant data related to mosquito and disease monitoring in the vicinity of the Refuge. In addition, periodic meetings are conducted in the field with District field staff and the refuge staff to further coordinate activities. These meetings are scheduled throughout the season, when warranted, to ensure protection of endangered and threatened species and other wildlife.

The proposed use would apply the principles in the Draft Integrated Pesticide Management (IPM) Plan for Mosquito Control Activities on the Sacramento National Wildlife Refuge Complex (Complex) incorporated herein by reference (USFWS 2004a). The purposes of the IPM Plan are to: 1) identify mosquito control methods and materials currently approved for use on the Complex; 2) identify their use in an IPM program that is consistent with the goals of the Complex and minimizes public health risk from refuge-harbored mosquitoes; and 3) provide long-term planning to meet the Service's goal of reducing effects of pesticide use on Department of Interior (DOI) trust resources to the greatest extent possible. The IPM Plan outlines a risk-based, hierarchical approach to mosquito management (see attached IPM Figure 3). This approach uses an understanding of mosquito biology and ecology whereby intervention measures depend on continuous monitoring of mosquito populations. When unacceptable mosquito populations are reached, as determined by appropriate monitoring and thresholds, control measures could be implemented. Potential control measures include maintaining or restoring natural drainage channels through Refuge lands, burning, mowing, disking, mosquitofish, BTI, Methoprene, Golden Bear Oil, Adulticides (Pyrethrin, Malathion, Sumitrin, and Naled). For more information about the control measures see IPM Table 3 (attached) and the IPM Plan.

Monitoring mosquitoes on the Refuge is also facilitated by the same SUP, allowing District personnel to sample wetlands and other areas throughout the refuge on a weekly basis throughout the mosquito production season. Three types of monitoring may be conducted pre and post treatment: “dipper” samples for larvae; New Jersey Light Traps for relative abundance of adult *Culex tarsalis* and *Anopheles freeborni* mosquitoes; and landing counts for relative abundance of *Ochlerotatus* mosquitoes. Further details about

these techniques can be found in the IPM Plan. District personnel conducting monitoring will be restricted to public access points on the Refuge. Specific locations and any sites that are within closed areas will be determined within the SUP process, if the need for mosquito control on the Refuge arises.

The Districts would use ground and/or aerial methods to apply larvicides, pupicides, and adulticides depending on the IPM Plan thresholds, Pesticide Use Proposal (PUP) requirements, Endangered Species Act - Section 7 compliance, and SUP conditions imposed by the Refuge. The decision making process would follow the IPM figure #3 (see attached).

Because the U.S. Fish and Wildlife Service uses insecticides, herbicides and fungicides on national wildlife refuges and fish hatcheries, a formal pesticide use review process is employed to ensure that all chemical pesticides approved for use on National Wildlife Refuges have been reviewed for their potential impacts to groundwater, surface water and terrestrial and aquatic non-target vegetation and wildlife, including threatened and endangered species. Pesticides approved for use must be shown to pose the lowest toxicity-related threat to non-target terrestrial and aquatic ecosystems, while addressing the specific pest control objectives. PUPs describe the target pest, crop, method of control, chemicals applied, rates of application, area being treated, sensitive habitats and best management practices are required. PUPs are reviewed and approved at the Refuge Manager, Regional Office, or Washington Office level, depending on the product.

Non-chemical preventative treatments will be used whenever possible. Among chemical treatments, adulticides are considered a last resort, used only after treatment thresholds have been met. Every attempt will be made to treat source areas in the riparian areas with mosquitofish or larvicides rather than adulticides. Other upland habitat blocks receive no treatments. Adulticide applications will not be made within 100 feet of wetlands, lakes, rivers or streams containing listed fish species, unless winds or inversions favor pesticide drift away from the water. Aerial application of adulticides is not anticipated to occur due to the threatened and endangered species that occur within the river and in the riparian areas on the Refuge.

Mosquito monitoring and control is discussed in Chapter 6 of the CCP. It is also detailed in the Draft IPM Plan (which is included as Appendix P of the CCP).

Availability of Resources: The following funding/annual costs would be required to administer and manage activities as described above:

	ANNUAL COSTS
Administration (Evaluation of applications, permit compliance, and monitoring)	\$5,000
TOTAL	\$5,000

Refuge operational funds are currently available through the Service budget process to administer this program.

Anticipated Impacts of Use: One of the major objectives of the Refuge is to provide high quality feeding areas for migratory birds and other wildlife; there is concern that mosquito control treatments may be interfering with that objective by reducing the existing food base. Effects on non-target organisms (i.e., those other than mosquitoes) can be loss of biomass, loss of diversity, interference with normal ecological relationships, bioaccumulation, or other unknown effects. Another concern is that rare insects and/or insects that may function as important pollinators for rare plants may be impacted by mosquito control treatments. Use of non-native biological controls such as mosquitofish may alter ecological relationships of native species. Significant bioaccumulation has not been associated with any of the chemical treatments proposed in the IPM Plan. Moreover, in a study conducted on Colusa NWR and Sutter NWR, researchers found no reductions in total abundance or biomass of aquatic macro-invertebrates in the treated (i.e., application of pyrethrin, permethrin, or malathion) or control fields (Lawler et al. 1997). While this study provides encouraging information about adulticides use there are still some questions about their effects on refuge resources. This study focused on the effects of a single adulticide treatment. During most years, Colusa, Butte Sink, and Sutter NWRs receive multiple adulticide treatments, often weekly during the fall flood-up season. Effects of multiple applications may have cumulative effects not detected in the 1997 study. In addition, effects on smaller common invertebrates (i.e. cladocera, copepods) were not studied, but should be included in future research efforts, given their lower acute toxicity tolerances (Johnson and Finley 1980).

The following text in italics is the conclusion/summary section from the Environmental Effects of Mosquito Control “white paper” (USFWS 2004b) and serves to substantiate the importance of using the IPM approach.

Mosquitoes are a natural component of many aquatic and terrestrial ecosystems. Like other aquatic insects with terrestrial adult stages, mosquitoes provide a link between aquatic and terrestrial habitats. Predation is probably the largest source of mortality for both larval and adult mosquitoes and, although there are relatively few predators that specialize on mosquitoes, these insects are fed upon by a wide variety of invertebrate and vertebrate predators. The impact of greatly reducing mosquito populations in aquatic and terrestrial ecosystems has not been studied.

Virtually every pesticide currently used to manage mosquito populations has the potential to adversely impact nontarget species. Widely used larvicides such as Bti and methoprene have been demonstrated to kill susceptible chironomid midge larvae, with experimental evidence suggesting that such population-level impacts may result in community-level food web effects. All adulticides are broad-spectrum insecticides that can potentially impact a wide variety of invertebrates and some vertebrates. The degree to which non-target organisms or communities may be impacted by mosquito control

pesticides is often difficult to predict because of differences in susceptibility among species, differences in toxicity of various formulated products, and basic knowledge gaps in toxicity data to certain species. An additional factor is the paucity of studies examining non-target impacts of mosquito control at large spatial and temporal scales. Organized mosquito control most often occurs at a landscape level such as a county or parish. When pesticides are applied to manage mosquito populations, it is often at multiple locations over relatively large spatial scales. Furthermore, pesticides may be applied to any given area multiple times in a season, year after year. The majority of non-target mosquito control pesticide studies have examined impacts at much smaller temporal and spatial scales, such as one application in a single wetland. While these studies provide useful data, it is difficult to extrapolate the results of these small-scale experiments into predictions of impacts from much larger scale treatments.

Mosquito monitoring will include regular visits by District personnel to sample mosquito larvae (dip counts) and adults (landing counts) in wetlands and adjacent areas. Currently, there is no monitoring occurring on the Refuge and it is not expected to occur more than once a week in the future. The Refuge will provide the Districts current habitat management maps which will include sensitive areas to avoid.

Larval treatment for mosquitoes does not involve a route, and may be applied on the ground. B.t.i. and methoprene may be applied aerially. Adulticide treatments will occur along a specific route, designated to minimize drift into sensitive areas. The Refuge will provide these maps to the Districts during the SUP process. Adulticide treatments will occur in evenings or early mornings when adult mosquitoes are active and Refuge personnel and visitors are not present. Their frequency will be determined by a combination of mosquito population levels exceeding treatment thresholds and the maximum allowable applications per site for a given season (approximately June 1 to October 31). Treatment thresholds are found in the IPM Plan.

For the purposes of using certain pesticides to control mosquitoes, a mosquito-borne public health emergency is defined as:

Actual or threatened, imminent outbreak of western equine encephalitis (WEE), St. Louis encephalitis (SLE), West Nile encephalitis (WNE), malaria, or other mosquito-borne public health disease. The presence of WEE, SLE, WNE, or malaria viral titers or mosquito pool titers in the mosquito population or in sentinel chickens (in accordance with test protocols developed by the California Department of Health Services, Environmental Management Branch, and the U.S. Department of Health and Human Services, Center for Disease Control) will confirm that a public health emergency exists or is imminent. This threshold will have been met when the mosquito abatement districts notifies the refuge manager of a laboratory test that is positive for any of the above viruses. The West Nile encephalitis is now also being monitored due to the discovery of its presence on the east coast in the vicinity of New York City and other locations in September 1999.

Mosquito monitoring will cause direct and indirect disturbance effects. Disturbance would include altering wildlife behavior, going off designated trails, and collecting water samples. However, most of these effects would be short-term because of the short duration of mosquito monitoring. The sampling interval is also spread out over time and would typically be once a week. Sampling locations will be restricted to areas already open to the public (unless specifically designated in the SUP process), and therefore will not be in sensitive wildlife areas. Long-term effects would be eliminated/reduced because sufficient restrictions would be included as part of the SUP, and District activities would be monitored by Refuge staff. Refuge staff would ensure that mosquito monitoring does not detract from the Refuge purposes, the mission of the National Wildlife Refuge System, and the need to maintain ecological integrity. Additionally, SUP conditions would include conditions to further ensure that impacts to wildlife and habitats are avoided and minimized.

Mosquito control will have minimal impact to public use activities on the Refuge. Using the approach identified in this determination and the IPM Plan, mosquito control will utilize the least toxic and the least amount of insecticide is used at each level of the hierarchy. Adulticide treatments will occur in evenings or early mornings when adult mosquitoes are active and Refuge personnel and visitors are not present.

Section 7 consultations with USFWS (2004) and NOAA-Fisheries (2004) concluded that the CCP (USFWS 2005) 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.

Following the IPM approach, including the implementation of adequate monitoring, will lessen potential short-term, long-term, and cumulative impacts of mosquito control activities to acceptable levels. As part of the IPM approach, the annual PUP and SUP processes would continue to be used by the Sacramento NWR Complex staff.

Anticipated Impacts of Uses on future lands within the approved boundary: The following conditions must be met before allowing existing uses to occur on newly acquired lands: (1) There is no indirect, direct, or cumulative threat anticipated to human health or safety; (2) There is no indirect, direct, or cumulative threat anticipated to natural or cultural resources; (3) The use is consistent with management of existing Sacramento River NWR lands and would contribute to achieving Refuge goals. In particular, existing Refuge regulations would not be compromised; (4) The newly acquired lands represent a meaningful unit within which to manage the activity; and (5) There are no anticipated conflicts with priority public uses.

Public Review and Comment: Public review and comments were solicited in conjunction with distribution of the Draft CCP/EA for the Sacramento River Refuge, released in July

2004. Few comments were received specific to the Compatibility Determinations. Comments received were addressed in the Response to Comments (Appendix R). No changes were made based on comments received.

Determination:

Use is Not Compatible

Use is Compatible with the Following Stipulations

Stipulations necessary to ensure compatibility:

1. All mosquito abatement activities will be evaluated and authorized via steps identified in the risk-based, hierarchical approach outlined in the IPM Plan (Figure 3).
2. The implementation of mosquito control measures will be conducted in accordance with approved PUPs. PUPs will require the use of Best Management Practices (BMPs) to ensure the least toxic and the least amount of insecticide is used at each level of the hierarchy. A list of BMPs can be found in the attached Appendix 2 from the IPM Plan.
3. The implementation of mosquito control measures will be conducted in accordance with Section 7 of the Endangered Species Act. The Refuge will provide a map of sensitive areas to avoid while monitoring or treating mosquitoes.
4. Mosquito control will be authorized on an annual basis by a SUP. The SUP will detail the justification for pesticide applications, identify the specific areas to be treated, and list any additional, necessary restrictions or conditions that must be followed before, during, or after treatment. District and Refuge staff will work together to agree upon issues related to access, methods of operation, and timing of access, as well as to exchange information related to listed species occurrences, permitting, and relevant agency policy.
5. The Refuge will monitor mosquito monitoring and control activities to ensure compliance with the Stipulations presented here and any additional restrictions or conditions specified in the SUP, as well as to ensure the impacts remain at an acceptable level.
6. Districts are required to notify the refuge manager prior to treatments or expected series of treatments. Treatments can occur after mosquito populations exceed treatment thresholds as documented by monitoring data. The refuge manager will be notified of any detection or virus activity in a sentinel flock or mosquito pools as soon as possible. This will establish the risk of a public health emergency.
7. While on the Refuge, District personnel must display a copy of the SUP on vehicle dashboards at all times. Speed limit on the Refuge is 25 miles per hour and gates are to be left as found.
8. An annual report summarizing the mosquito control activities will be provided to the refuge manager by December 31 each year. The report will include: 1) a brief narrative describing the season in general including whether or not a virus was

detected, by which method it was detected, and what date; 2) identify any useful observations such as unusually high or low production areas that might help in future habitat management considerations to minimize mosquito populations; 3) summaries of dip count and light trap data by mosquito species; 4) summary of landing count data, including pre and post treatment evaluations; 5) a list of treatment dates, locations marked on Refuge map, material and amount used, and whether on an individual unit or a route.

9. Adulticide applications will also not be made within 100 feet of wetlands, lakes, rivers or streams containing listed fish species, unless winds or inversions favor pesticide drift away from the water.
10. Adulticide treatments will occur in evenings or early mornings when adult mosquitoes are active and Refuge personnel and visitors are not present.

Justification: Mosquito management activities controlled by a process that involves incorporating the National and Regional Mosquito Guidance, the local IPM Plan, annual PUPs and SUPs would contribute towards a compatible program consistent with refuge purposes and Refuge System mission. Appropriate safeguards are incorporated into the planning efforts to ensure that the level of mosquito control is commensurate with the associated public health risk. In particular, the above stipulations and those within the PUPs and SUPs will help to alleviate or lessen any impacts to fish, wildlife, plants and their habitats along with the Refuge's ability to maintain the biological integrity, diversity, and environmental health of the Refuge. Any additional terms and conditions included in the SUP will be based, at least in part, on the results of monitoring efforts. If monitoring demonstrates an unacceptable impact to Refuge resources, this use will be reevaluated. Based upon impacts described in the Integrated Pest Management Plan for Mosquito Control, Comprehensive Conservation Plan and Environmental Assessment (USFWS 2005), it is determined that mosquito management activities within the Sacramento River National Wildlife Refuge, as described herein, will not materially interfere with or detract from the purposes for which the Refuge was established or the mission of the Refuge System. In our opinion, mosquito management activities will not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the refuge.

Although mosquito control has a potential to impact non-target wetland wildlife, implementing the prescribed measures listed in the Stipulations section should reduce many of these potential impacts. Mosquito-borne disease issues are a real threat in the northern Central Valley. Refuge staff has worked with local Districts on mosquito control at the other refuges within the Complex. The Refuges and the Districts have worked cooperatively to implement IPM and we anticipate doing the same for the Sacramento River NWR.

The Refuge in association with the Districts will implement a monitoring program to help assess disturbance effects on wildlife and habitat and to ensure those effects remain

within acceptable levels. Monitoring will help to reduce impacts associated with mosquito management activities.

This compatibility determination may need to be reevaluated in the event that a national policy for management of mosquitoes on National Wildlife Refuges is finalized.

Mandatory Re-Evaluation Date (March 2015):

Mandatory 15-year Re-Evaluation (for priority public uses)

Mandatory 10-year Re-Evaluation, Date will be provided in Final EA/CCP (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision (check one below):

Categorical Exclusion without Environmental Action Statement

Categorical Exclusion and Environmental Action Statement

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision

References

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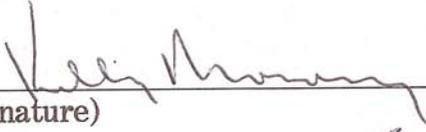
USFWS 2004a. Draft Integrated Pest Management Plan for Mosquito Control at the Sacramento National Wildlife Refuge Complex. Revised May 2004. Willows, California

USFWS 2004b. Environmental Effects of Mosquito Control “white paper.” U.S. Fish and Wildlife Service, Region 1.

USFWS. 2005. Sacramento River National Wildlife Refuge Comprehensive Conservation Plan. U.S. Fish and Wildlife Service, Region 1.

Refuge Determination:

Prepared by:


(Signature)

1/20/05
(Date)

Refuge Manager/
Project Leader
Approval:


(Signature)

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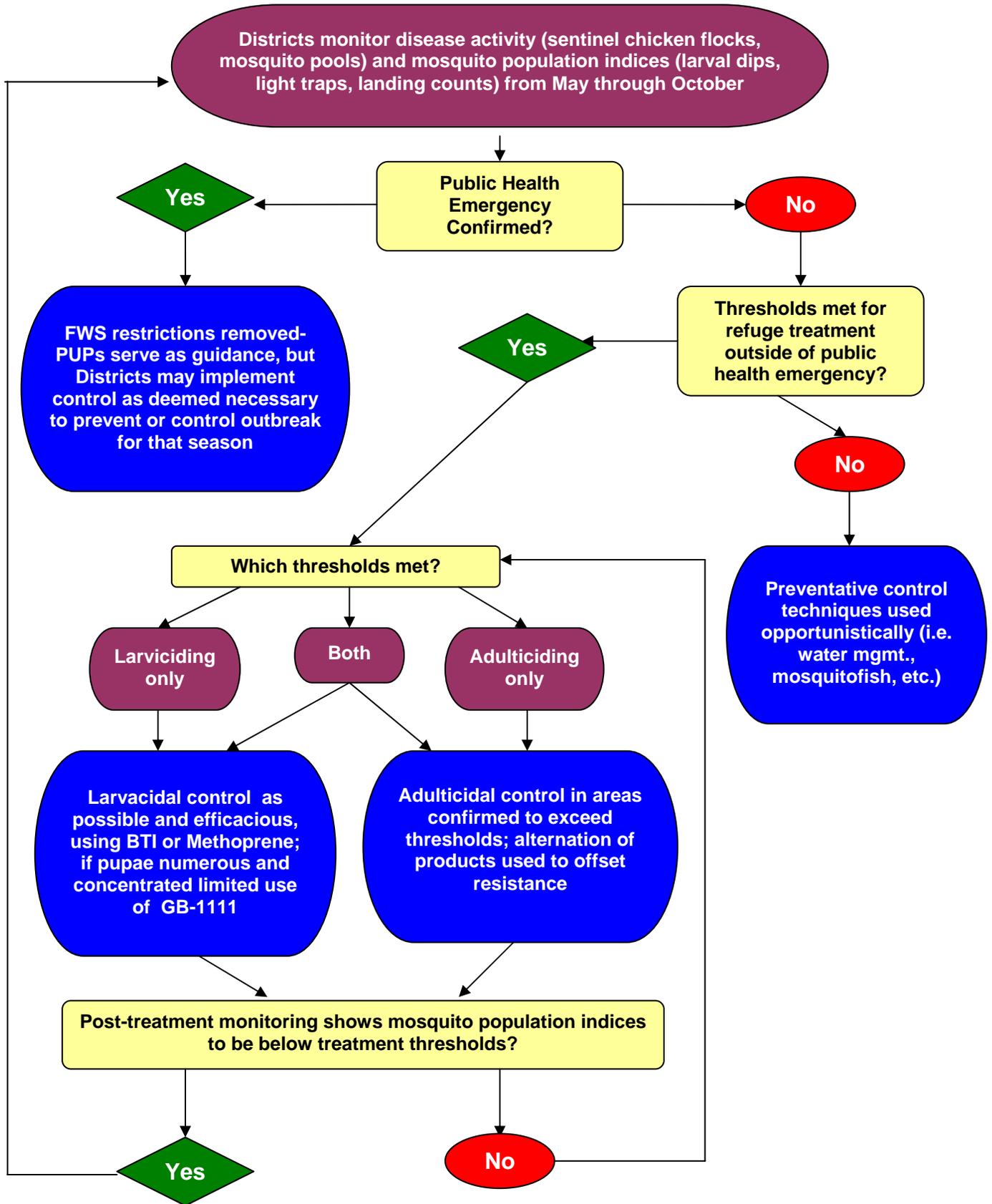


Figure 3. Decision-making process regarding mosquito control on an individual refuge at the Sacramento National Wildlife Refuge Complex.

Table 3. Comparison of mosquito control techniques and materials.

Control Technique	Mosquito Control Objectives	Usage	Advantages	Disadvantages
Delayed Flooding	To delay initiation of major refuge mosquito production at the onset of fall floodup.	Preventative; can be optimized by refuge depending on historic/documentated timing of wildlife use (i.e. migration patterns) and water availability.	Potentially reduces need for treatment during the late summer/early fall season.	None apparent at this time.
Rapid Floodup/Irrigation	To minimize the number of cohorts of <i>Aedes</i> mosquitoes hatching from individual units or blocks of units.	Preventative; used on 10-20% of wetlands, including spring/summer WPU irrigations and initial fall floodup of SFM units; large water control structures have been installed in these units for this purpose.	Potentially reduces number of additional treatments by helping to synchronize larval development and adult emergence.	Sacrifices slower flooding, which reduces amount of sustained "feather edge" habitat in SFM wetlands preferred by many migratory birds.
Mid-irrigation Drainage	To flush larvae into sub-optimal habitats, interrupting life cycle and minimizing subsequent adult emergence.	Opportunistic active management to control mosquitoes; available for use infrequently and only on a very small percentage of habitat base; during irrigations on small units, when majority of larvae can be drained quickly (i.e. in one day).	Potentially eliminates or reduces need for additional control efforts.	Removes abundant food source for migratory birds; results in less efficient irrigation in terms of labor/water costs.
Irrigation Prior to Full Pond Drying	To avoid dry phase necessary for <i>Aedes</i> eggs to "ripen" prior re-flooding, resulting in reduced hatch and emergence.	Opportunistic/preventative; available for use only when weather conditions favor rapid plant growth and plants have achieved appropriate height prior to pond drying.	Potentially eliminates or reduces need for additional control efforts.	Requires more intensive monitoring of habitat conditions to achieve proper timing of irrigation.
Burning	Literature indicates potential to reduce mosquito populations by killing eggs and substrate beneficial to their life cycle.	Ancillary to mosquito control; used mainly for wetland habitat enhancement by reducing rank vegetation or undesirable species; typically does not occur on more than 5-10% of wetland habitats for a given refuge.	May be able to reduce need for additional control efforts; benefits habitat condition.	If used over large acreages, annual sacrifice of vegetative structure could be detrimental to many species of wildlife, including non-target invertebrates.
Mowing/Disking	May have potential to reduce mosquito populations by killing eggs and substrate beneficial to their life cycle.	Ancillary to mosquito control; used mainly for wetland habitat enhancement by reducing undesirable species and providing openings for bird use, avian disease monitoring and wildlife viewing; typically annual use is $\leq 5\%$ of wetland habitats per refuge.	May be able to reduce need for additional control efforts; periodic use benefits condition of some habitat types;	If used over large acreages, annual sacrifice of vegetative structure could be detrimental to many species of wildlife, including non-target invertebrates.

Table 3 (cont.). Comparison of mosquito control techniques and materials.

Control Technique	Mosquito Control Objectives	Usage	Advantages	Disadvantages
Mosquitofish	To maintain a constant predation pressure on low to moderate mosquito larvae/pupae densities and minimize adult emergence.	Mostly preventative; typically stocked at 0.1 to 1.0 lbs./acre (roughly 1000 fish/pound) in SW and PP wetlands during summer and selected SFM wetlands during the fall.	Persistent in wetlands, often present without stocking.	Cannot effectively control <i>Aedes</i> densities that occur on most SFM;
BTI	To minimize adult emergence by reducing larvae populations.	For larvae control in discrete areas such as standing pools or small open units. Applied at 16-32 oz./acre depending on formulation.	Low toxicity, low persistence in environment; target-specific to dipterans; can effectively control mosquitoes in localized areas.	Questionable efficacy on heavy floodwater mosquito (<i>Ochlerotatus</i>) densities; non-target mortality to some midge larvae.
Methoprene	To minimize adult emergence by preventing larvae from hatching.	For larvae control; growth regulator that prevents larvae from hatching; rates vary depending on formulation.	Low toxicity, low persistence in environment; target-specific to dipterans; can effectively control mosquitoes in localized areas; may leave larvae available as forage items.	Non-target impacts to dipterans other than mosquitoes.
Golden Bear Oil	To minimize adult emergence by reducing pupae populations.	For pupae control in discrete areas such as standing pools or windrowed concentrations. Applied at 3-5 gallons/acre.	Provides a method to control pupae.	Not target specific; can cause mortality to other air breathing invertebrates.
Adulticides – Pyrethrin, Malathion, Sumithrin, Naled	Reduction of adult mosquitoes to reduce public health risk or significant nuisance.	For active control of adult mosquitoes; applied with ULV fogger at dusk to treat extensive areas. Rates vary with product.	Method to control adult mosquitoes if necessary; not applied directly to water.	Not target specific; likely effects flying insects active at dusk; Efficacious use relies upon light wind and inversion conditions to treat standard 300-foot swath; insecticide resistance can develop without material rotation.

Appendix 2. Suggested “best management practices” for mosquito control efforts in managed wetlands (Source: Selected Tables from Central Valley Joint Venture. 2004. Best Management Practices for Mosquitoes in Managed Wetland Environments. in Draft, 33pp.

Water Management Practices to reduce mosquito production in managed wetlands.

Best Management Practice	Strategies	Mosquito Control Objective	Advantages	Disadvantages
<i>Delayed fall flooding</i>	Delay flooding of some wetland units until later in the fall. Target units with greatest historical mosquito production and/or closest to urban areas.	To delay initiation of floodwater mosquito production in seasonal wetlands by reducing the amount of mosquito habitat available during optimal breeding conditions (warm summer/early fall weather).	Depending on flood date, can reduce the need or amount of additional treatment. Delayed flooding can provide “new” food resources for wildlife later in the season.	Reduces the amount of habitat for early fall migrants and other wetland-dependent species, and may increase potential for waterfowl depredation on agricultural crops (especially rice). Flooding is often dictated by water availability or contractual dates for delivery. Delayed flooding may still produce mosquitoes in warm years. Private hunting clubs can’t lease blinds that aren’t flooded.
<i>Rapid fall flooding</i>	Flood wetland basin as fast as possible. Coordinate flooding with neighbors or water district to maximize flood-up rate.	To minimize number of mosquito cohorts hatching on a given area.	Reduces the need for multiple treatments needed by synchronizing larval development and adult emergence.-	Requires coordination & ability to flood quickly. Reduces slow, feather-edge flooding that is heavily utilized by waterbirds.
<i>Flood & drain wetland</i>	Flood wetland and hatch larvae in pond. Drain wetland to borrow or other ditch where larvae can be easily treated, drowned in moving water, or be consumed by predators. Immediately re-flood wetland.	Hatches mosquito larvae and moves them to a smaller area for treatment before they can emerge into adults.	Can eliminate or reduce the need for additional mosquito control efforts.	Additional cost to purchase water to re-flood wetland. More labor intensive.

Best Management Practice	Strategies	Mosquito Control Objective	Advantages	Disadvantages
<i>Early fall flood-up planning</i>	Apply BMPs to wetlands identified for early flooding. To the extent possible, areas targeted for early fall flooding should not be near urban centers and should not have a history of heavy mosquito production.	To reduce the early season production of mosquitoes or to reduce their encroachment on urban areas.	Allows for the provision of early flooded habitat while minimizing mosquito production and conflicts with urban areas.	Some additional effort required to monitor and identify suitable areas and possible planning among multiple landowners.
<i>Maintain stable water level</i>	Ensure constant flow of water into pond to reduce water fluctuation due to evaporation, transpiration, outflow, and seepage.	To reduce conditions for additional floodwater mosquito production in summer and fall.	Provides a stable wetland environment for breeding wildlife during spring and summer. Discourages undesired excessive vegetative growth which could also become additional mosquito breeding substrate.	Requires regular monitoring and adjustments to water control structures. May be difficult if water availability is intermittent or unreliable. Reduces mudflat habitat that is attractive to shorebirds and waterfowl.
<i>Water circulation</i>	Provide a constant flow of water equal to discharge at drain structure.	To keep water fresh and moving to deter stagnant conditions for mosquito production; reduces water level fluctuation and potential production of floodwater mosquitoes.	Discourages warm water conditions associated with avian botulism outbreaks.	Requires landowner to purchase additional "maintenance" water. May be difficult if water availability is intermittent or unreliable
<i>Rapid irrigation</i>	7-10 day irrigation (from time water enters the pond to complete drawdown).	Shorten irrigation period to reduce time available for mosquitoes (especially <i>Culex tarsalis</i> and <i>Anopheles freeborni</i>) to complete lifecycle.	Provides some level of wetland irrigation while reducing the time available for mosquitoes to complete lifecycle.	Does not allow manager to use long duration irrigation for weed control. Requires ability to rapidly flood & drain wetland.

Best Management Practice	Strategies	Mosquito Control Objective	Advantages	Disadvantages
<i>Reduced number of irrigations</i>	Evaluate necessity of irrigation, especially multiple irrigations, based on spring habitat conditions and plant growth. Eliminate irrigations when feasible.	To eliminate unneeded additional irrigations which could provide potential habitat for mosquitoes.	Reduces potential need for additional mosquito control. Saves water and manpower costs. Discourages excessive growth of undesirable vegetation (i.e. joint and Bermuda grass)	May reduce seed production or plant biomass with less irrigation.
<i>Early spring drawdown and irrigation</i>	Drawdown wetland in late March or early April. Irrigate in late April or early May when weather is cooler and mosquitoes are less of a problem.	To reduce need for irrigation in June, July, and August, when potential for mosquito production would be higher.	Wetland irrigation can be accomplished without creating potential mosquito problems. May allow moist-soil plants to take advantage of natural rainfall during the spring.	Reduces shallow wetland habitat for migratory shorebirds and waterfowl in April and May, during a major migration period. Newly germinated wetland plants may be impacted by cold weather conditions.
<i>Don't let field completely dry and crack between spring drawdown and irrigation</i>	Irrigate wetland before soil completely dries.	To eliminate necessary drying period for floodwater mosquito egg hatchability.	May reduce mosquitoes produced from irrigation	Requires close monitoring of soil conditions to prevent soil from drying before irrigation.
<i>Subsurface irrigation</i>	Maintain high ground water levels by keeping boat channels or deep swales permanently flooded.	To reduce amount of irrigation water during mosquito breeding season.	Reduce need for surface irrigation while maintaining soil moisture to promote moist-soil plant production.	Requires deep swales or boat channels to be effective. Requires additional pipes in channels for equipment access. May not produce intended irrigation result if water table is naturally low. Requires that water be maintained longer than normal in swales. May promote unwanted vegetation growth in swales or promote irrigation of non-target plants in wetland.
<i>Utilize water sources with mosquito predators for flooding wetlands</i>	Flood wetlands with water sources containing mosquito fish or other invertebrate predators such as permanent ponds to passively introduce mosquito predators	To inoculate newly flooded wetlands with mosquito predators.	May establish mosquito predators faster than natural colonization.	Requires source of water with already established sources of mosquito predators. Not applicable to wetlands flooded with well water.

Best Management Practice	Strategies	Mosquito Control Objective	Advantages	Disadvantages
<i>Drain irrigation water into ditches or other water bodies with abundant mosquito predators</i>	Drain irrigation water into locations with mosquito predators as opposed to adjacent seasonal wetland or dry fields.	To provide predators opportunities to consume mosquito larvae. To reduce chance of second hatch from draining water into adjacent seasonal wetland or dry field.	Already a common wetland management practice.	Must have ditch or water body with established predator population available to accept drain water. Does not allow for irrigation water to be reused in adjacent wetlands.

Vegetation management practices to reduce mosquito production in managed wetlands.

Best Management Practice	Strategies	Mosquito Control Objective	Advantages	Disadvantages
<i>Mowing</i>	Mow undesirable or overgrown vegetation that serves as mosquito breeding substrate prior to flooding.	To reduce standing vegetation that mosquitoes can use for egg laying and larval development. To create open water habitat that allows mosquito predators (fish, invertebrates, birds) better access to larvae and potentially more wave action to drown mosquito larvae.	Dual benefits of improving wildlife habitat and reducing mosquito breeding substrate.	Effects are largely temporary, so must be conducted annually. Overuse could be detrimental to some species of wildlife and non-target invertebrates. Mowed vegetation may float providing mosquito habitat and decomposition may affect water quality.
<i>Burning</i>	Controlled burn of undesirable or overgrown vegetation that may provide mosquito breeding substrate.	See mowing. Can also kill mosquito eggs.	See mowing.	Requires burn permit. Liability concerns. Most landowners are not adequately prepared to conduct a controlled burn. Special consideration should be taken around plastic pipes or water control structures. Overuse could be detrimental to some species of wildlife and non-target invertebrates.
<i>Discing</i>	Disc undesirable or overgrown vegetation that may provide mosquito breeding substrate.	See mowing.	See mowing. Can provide longer-term control of undesirable vegetation by itself or in conjunction with other management practices.	Creates walking problems for hunters. Overuse could be detrimental to some species of wildlife and non-target invertebrates.
<i>Haying</i>	Mow and bale undesirable or overgrown vegetation that may provide mosquito breeding substrate.	See mowing. Also removes vegetation after cutting.	Dual benefits of improving habitat and reducing mosquito breeding substrate. Removal of mowed vegetation further decreases mosquito breeding substrate and may improve water quality.	Overuse could be detrimental to some species of wildlife and non-target invertebrates. Removes seed that wintering waterfowl forage on. Expensive. Often difficult to find someone to bale and haul plant material.
<i>Selective Grazing</i>	Summer-Fall grazing. Short duration, high intensity grazing.	To reduce standing vegetation that provides habitat for mosquitoes.	Relatively inexpensive.	Irrigation for grass and/or livestock watering may exacerbate mosquito production. Livestock tend to forage on plants that produce seed for waterfowl. Livestock may damage levees or ditches.

Wetland infrastructure maintenance activities used to reduce mosquito production in managed wetlands.

Best Management Practice	Strategies	Mosquito Control Objective	Advantages	Disadvantages
<i>Levee Inspection & Repair</i>	Walk or drive levees, flag problem spots, repair as needed. Consider design elements to improve integrity of levee (see levee design).	To reduce mosquito habitat/production caused by seepage into adjacent fields or dry ponds.	Allows for early identification of problem spots. Helps conserve water and reduces growth of unwanted vegetation.	Requires annual monitoring and funding for repairs.
<i>Water Control Structure Inspection, Repair, & Cleaning</i>	Inspect structures and repair or replace as needed. Remove silt and vegetation build-up in front of structures. Adequately close, board or mud-up controls.	To reduce mosquito habitat/production caused by seepage into adjacent ponds or drainage ditches. Remove silt blockages that may trap water and impede drainage.	Enhances water management capabilities and limits unwanted vegetation or standing water.	Requires annual monitoring and funding for cleaning or repair.
<i>Ditch Cleaning</i>	Periodically remove silt or vegetation from ditches to maintain efficient water delivery and drainage.	To allow for rapid flooding/drainage & reduce vegetation substrate for breeding mosquitoes.	Enhances water management capabilities and limits unwanted vegetation or standing water.	Requires funding for ditch cleaning. Excessive vegetation removal on ditch banks can result in negative impacts to nesting birds and other wildlife.
<i>Pump Tests & Repair</i>	Test pump efficiency and make any necessary repairs to maximize output.	Could identify output problems and if corrected, allow managers to flood more rapidly.	May promote faster irrigation and flood-up if output can be improved.	Requires pump test. May be costly to repair or replace pump/well.

Wetland restoration and enhancement features to reduce production of mosquitoes in managed wetlands.

Best Management Practice	Strategies	Mosquito Control Objective	Advantages	Disadvantages
<i>Independent water management</i>	To the extent possible, design wetland projects to include independent inlets and outlets for each wetland unit.	To reduce the need to move water through multiple wetland units when flooding or irrigating target areas. This can reduce the number of mosquitoes produced per flood event.	Creates wetland units that are hydrologically distinct from one another allowing for diverse wetland management.	May require additional water control structures and ditches to be constructed and maintained. Increases restoration costs and complexity of management.
<i>Adequately sized water control structures</i>	Increase size and number of water control structures. When installing, set to proper grade to allow for complete drawdown.	To improve ability to implement rapid flooding/irrigation BMPs (Table 1).	See rapid flooding/irrigation BMPs (Table 1).	Increased size and number of water control structures will increase restoration costs and management complexity.
<i>Swale construction (sloped from intake to drain)</i>	Construct or enhance swales so they are sloped from inlet to outlet and allow the majority of the wetland to be drawdown.	To improve ability to implement rapid flooding/irrigation BMPs (Table 1). Creates a means to move water through wetlands without flooding entire wetland basin. Reduces mosquito habitat by allowing isolated sections of habitat to drain. Provides mosquito predators with access to all portions of wetland.	See rapid flooding and irrigation BMPs (Table 1). Provides habitat diversity and enhances capabilities to implement moist-soil management. Provides a more cost-effective and wildlife friendly alternative to laser-leveling to create drainage.	See rapid flooding and irrigation BMPs (Table 1). Reduces standing water in spring that is often used by foraging waterbirds. May result in additional expense to create swales. Shallow swales must be periodically re-cut if silt deposition or dense emergent vegetation is a problem. Could be a deep water hazard in hunting areas.
<i>Wetland size considerations</i>	Install cross-levees to facilitate more rapid irrigation and flood-up (Table 1). Build “underwater” levees that isolate irrigation water during the spring, but can be overtopped during fall and winter flooding.	To improve ability to implement rapid flooding/irrigation BMPs (Table 1).	Assists with faster flooding and drainage. Cross levees (checks) can provide loafing habitat for waterfowl and shorebirds.	Additional levees may result in decreased wildlife use and diversity. Expensive. Requires additional levee maintenance and water control structures.

Best Management Practice	Strategies	Mosquito Control Objective	Advantages	Disadvantages
<p><i>Ditch design (2:1 slopes & minimum 4 foot bottom)*</i></p> <p><i>*consider 3:1 slope or greater to discourage burrowing animal damage and potential seepage problems</i></p>	Construct or improve ditches to quality standard that prevents unwanted vegetation growth or unnecessary seepage.	Reduces likelihood of vegetation growing along ditch banks. Excessive vegetation slows water flow, traps silt, and can be used as substrate for mosquito eggs.	Improves water flow and decreases maintenance of vegetation that grows along canal banks.	May require re-designing some delivery ditches to meet specific design criteria. Could affect habitat for wildlife species such as giant garter snakes. Steeper slopes may erode more quickly and created a hazard for hunters.
<p><i>Levee design & compaction ($\geq 3:1$ slopes & $>80\%$ compaction)*</i></p>	Construct or improve levees to quality standard that ensures stability and prevents unwanted seepage.	To reduce mosquito habitat caused by seepage into adjacent fields or dry ponds.	Properly constructed levees prevent seepage from erosion or rodent damage, and reduce need for annual maintenance.	Additional expense to repair or build levees on existing properties.
<p><i>Deep channels or basins constructed in seasonal wetlands</i></p>	Excavate deep channels or basins to maintain permanent water areas (> 2.5 feet deep) within a portion of seasonal wetlands. Provides year-round habitat for mosquito predators which can inoculate seasonal wetlands when they are irrigated or flooded.	To reduce mosquito larvae through predation.	Provides on-site source of mosquitofish and other mosquito predators to seasonal wetlands. Increases overall habitat diversity.	Expensive to excavate and maintain permanent water. Potential problems with emergent vegetation. May be a deep water hazard in hunting areas.
<p><i>Permanent water reservoir that floods into seasonal wetlands</i></p>	Maintain separate permanent water reservoir that conveys water to seasonal wetlands. Provides year-round habitat for mosquito predators which can inoculate seasonal wetlands when they are irrigated or flooded.	To reduce mosquito larvae through predation.	Provides on-site source of mosquitofish and other mosquito predators to seasonal wetlands. Increases overall habitat diversity.	Additional expense to construct reservoir that feeds water to seasonal wetlands and expensive to maintain permanent water.

Biological Controls

Best Management Practice	Strategies	Mosquito Control Objective	Advantages	Disadvantages
<i>Mosquitofish</i>	Stock managed wetlands with mosquitofish or encourage habitats for naturalized populations. Utilize water sources with mosquitofish to passively transport predators to newly flooded habitats.	To supplement mosquito predator population.	Provides a non-chemical control of mosquito larvae. Mosquito fish are often available free of charge to landowners from their local district.	May reduce non-target populations of invertebrates or other mosquito predators. Not appropriate for vernal pool habitats.
<i>Encourage invertebrate predators</i>	Maintain permanent or semi-permanent water where mosquito predators can develop and be maintained. Discourage use of broad spectrum pesticides.	To reduce mosquito populations through predation.	Provides biological control of mosquito larvae and adults.	None.
<i>Swallow colonies</i>	Do not discourage nesting swallows.	To reduce mosquito populations through predation.	Provides biological control of adult mosquitoes.	Guano.
<i>Bats</i>	Build bat boxes	To reduce mosquito populations through predation.	Provides biological control of adult mosquitoes.	Potential (or perceived potential) for transmission of rabies.

Suggested coordination activities between wetland managers and Mosquito and Vector Control Districts (MVCD).

Best Management Practice	Strategies	Mosquito Control Objective	Advantages	Disadvantages
<i>Habitat management and flooding schedule coordination</i>	Consult with MVCDs on Agency-sponsored habitat management plans on private lands (i.e. Presley Program). Consult with Districts on the timing of wetland flooding on public lands – urge private landowners to do the same.	Allows MVCDs the opportunity to provide input on habitat management and recommend BMPs to reduce mosquitoes.	Reduces potential conflicts between MVCDs, landowners, and Agencies/NGOs when managing or flooding wetlands. Provides information exchange.	Requires a commitment of time from MVCDs, landowners, and Agencies/NGOs to meet and coordinate activities.
<i>Identify problem areas for mosquito production and target for implementation of BMPs</i>	Local MVCDs identify problem locations for mosquito production and work with landowners and Agencies/NGO's to implement mosquito BMPs. Identify potential cost-share opportunities to implement BMPs.	Work to reduce mosquito production through BMPs on properties that are most problematic.	Allows limited resources from MVCDs and Agencies/NGO's to be targeted towards problem areas. Provides opportunities for monitoring the effectiveness of BMPs.	None
<i>Wetland Habitat Restoration and enhancement project design & coordination</i>	Consult with local MVCDs on the design of restoration and enhancement projects.	To determine where features to discourage mosquito production can be incorporated into wetland habitat restoration and enhancement projects where feasible.	Reduces potential conflicts between Districts, landowners, and Agencies/NGOs when restoring or enhancing wetlands. Provides a priori consultation for MVCDs on wetland projects.	Requires some flexibility from MVCDs, landowners, and Agencies/NGOs when designing projects. BMPs will likely increase the project cost.
<i>Coordinate Monitoring Activities</i>	Facilitate monitoring mosquito populations of larval and adult stages before and after implementation of BMPs.	Determine the effectiveness of BMPs to refine and prioritize their future use.	Provides a means to evaluate and document effectiveness of BMPs.	Requires time and resources to accomplish.