WILDLAND FIRE MANAGEMENT PLAN

SACRAMENTO RIVER NATIONAL WILDLIFE REFUGE

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TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

INTRODUCTION

The Department of the Interior (DOI) fire management policy requires that all refuges with vegetation that can sustain fire must have a Fire Management Plan that details fire management guidelines for operational procedures and values to be protected/enhanced. The Fire Management Plan (FMP) for the Sacramento River National Wildlife Refuge (NWR) will provide guidance on preparedness, prescribed fire, wildland fire, and prevention. The Refuge is a part of the Sacramento NWR Complex, but a separate FMP is being prepared for this refuge because of differences in habitats, management goals, and strategies. Values to be considered in the Fire Management Plan include protection of Refuge resources and neighboring private properties, effects of burning on refuge habitats/biota, and firefighter safety. Refuge resources include properties, structures, cultural resources, trust species including Endangered, Threatened, and species of special concern, and their associated habitats. The Fire Management Plan will be reviewed periodically to ensure that the fire program is conducted in accordance and evolves with the U.S. Fish and Wildlife Service (USFWS) mission and the Refuge's goals and objectives.

When approved, this document will become the Sacramento River NWR Fire Management plan. Major components include:

- Implementation of management objectives outlines in the Refuge Master Plan and Habitat Management Plans.
- Format changes under the direction of Fire Management Handbook.
- Continuation of a program of prescribed burning and full suppression of all wildland fires.

This plan is written to provide guidelines for appropriate suppression and prescribed fire programs at Sacramento River NWR. Prescribed fires may be used to reduce hazard fuels, restore the natural processes and vitality of ecosystems, improve wildlife habitat, remove or reduce non-native species, and/or conduct research.

This Plan will help achieve resource management objectives by enabling the Refuge to utilize prescribed fire, as one of several tools, to control non-native vegetation and reduce fire hazards in grassland and riparian habitats. It will be used in conjunction with other management tools that are currently applied on Refuge properties (i.e. grazing, mowing, and herbicide applications) to meet resource objectives.

Sacramento River National Wildlife Refuge is part of the Sacramento National Wildlife Refuge Complex (Figure 1). Sacramento River NWR is still actively acquiring land and consists of many properties (22 as of January 2002) located in Northern California's Sacramento Valley, along the Sacramento River between Red Bluff and Colusa. The Valley lies between the Coast Range Mountains to the west and the Sierra Nevada /Cascade Ranges to the east. Presently the total acreage for the Refuge is 11,504 acres located in Tehama, Butte, and Glenn counties (Figure 2).

Figure 1. Location Map of the Sacramento National Wildlife Refuge Complex.

Figure 2. Location Map of the Sacramento River National Wildlife Refuge.

COMPLIANCE WITH USFWS POLICY

Authority and guidance for implementing this plan are found in:

- Protection Act of September 20, 1922 (42 Stat. 857; 16 U.S.C.594): authorizes the Secretary of the Interior to protect from fire, lands under the jurisdiction of the Department directly or in cooperation with other Federal agencies, states, or owners of timber.
- Economy Act of June 30, 1932: authorizes contracts for services with other Federal agencies.
- Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66, 67; 42 U.S.C. 1856, 1856a and b): authorizes reciprocal fire protection agreements with any fire organization for mutual aid with or without reimbursement and allows for emergency assistance in the vicinity of agency lands in suppressing fires when no agreement exists.
- Disaster Relief Act of May 22, 1974 (88 Stat. 143; 42 U.S.C. 5121): authorizes Federal agencies to assist state and local governments during emergency or major disaster by direction of the President.
- National Wildlife Refuge System Administrative Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997, 16 U.S.C. 668dd et seq.: defines the National Wildlife Refuge System as including wildlife refuges, areas for the protection and conservation of fish and wildlife which are threatened with extinction, wildlife ranges, game ranges, wildlife management areas and waterfowl production areas. It also establishes a conservation mission for the Refuge System, defines guiding principles and directs the Secretary of the Interior to ensure that biological integrity and environmental health of the system are maintained and that growth of the system supports the mission.
- Federal Fire Prevention and Control Act of October 29, 1974 (88 Stat. 1535; 15 U.S.C.2201): provides for reimbursement to state or local fire services for costs of firefighting on federal property.
- Wildfire Suppression Assistance Act of 1989. (Pub.L. 100-428, as amended by Pub.L 101- 11, April 7, 1989).
- Departmental Manual (Interior), Part 620 DM, Chapter 1, Wildland Fire Management, General Policy and Procedures (April 10, 1998): defines Department of Interior Fire Management Policies.
- National Environmental Policy Act of 1969: regulations implementing the National Environmental Policy Act (NEPA) encourages the combination of environmental comments with other agency documents to reduce duplication and paperwork (40 CFR 1500.4(o) and 1506.4).
- Clean Air Act (42 United State Code (USO) 7401 et seq.): requires states to attain and maintain the national ambient air quality standards adopted to protect health and welfare. This encourages states to implement smoke management programs to mitigate the public health and welfare impacts of Wildland and prescribed fires managed for resource benefit
- Endangered Species Act of 1973.
- U.S. Fish & Wildlife Service Fire Management Handbook.

This plan meets NEPA/NHPA compliance and will be implemented in cooperation with the Endangered Species Act of 1973, as amended, under the section 7 programmatic review, and

will take appropriate action to identify and protect from adverse effects on any rare, Threatened, or Endangered species (see Appendix A). The authority for funding (normal fire year programming) and all emergency fire accounts is found in the following authorities:

- Section 102 of the General Provisions of the Department of Interior's annual Appropriations Bill provides the authority under which appropriated monies can be expended or transferred to fund expenditures arising from the emergency prevention and suppression of wildland fire.

- P.L. 101-121, Department of the Interior and Related Agencies Appropriation Act of 1990, established the funding mechanism for normal year expenditures of funds for fire management purposes.

- 31 US Code 665(E)(1)(B) provides the authority to exceed appropriations due to wildland fire management activities involving the safety of human life and protection of property.

Authorities for procurement and administrative activities necessary to support wildland fire suppression missions are contained in the Interagency Fire Business Management Handbook.

FIRE MANAGEMENT OBJECTIVES

The following considerations where used to develop the Sacramento River NWR fire management goals and objectives, as outlined in the Refuge Master Plan and the annual Habitat Management Plan. Appendix B contains a list of terminology definitions.

1. Considerations
    - Fire is an essential natural part of the refuge's native biotic communities.
    - Prescribed fire has positive long-term effects on vegetation and wildlife when conducted during the appropriate burning conditions, time of year, plant phenology, and using the proper techniques.
    - Uncontrolled wildland fire has the potential for negative impacts (out of season, increased intensity, fire trespass, burning onto neighboring properties...).
    - Use Minimum Impact Suppression Tactics (MIST) concept to minimize environmental damage.

2. Fire Management Objectives (General)
    - Protect life and resources / property.
    - Use prescribed fire for hazard fuel reduction and habitat enhancement.

3. Fire Management Objectives (Specific)
    - Suppress all wildland fires using strategies and tactics safely and considering values at risk (Fire Use not feasible).
    - Provide for and protect habitat for trust species, especially Endangered, Threatened, and species of concern.
    - Use prescribed fire to reduce hazardous fuels and improve habitat conditions.
    - Prevent human-caused wildland fires.
    - Educate the public regarding fire management.

At present, Sacramento River National Wildlife Refuge is in the planning process of creating a Comprehensive Conservation Plan. Refuge management plans include objectives which pertain to fire management. The primary objectives of the Refuge are to:

- Provide habitat and manage for Endangered, Threatened, or sensitive species of concern.
- Protect and provide habitat for neotropical migratory land birds.
- Preserve a natural diversity and abundance of flora and fauna.
- Provide feeding and resting habitat for migrating and wintering waterfowl and other water birds.
- Provide opportunities for understanding and appreciation of wildlife ecology, and the human role in the environment; and provide high-quality wildlife-dependent recreation and education.
- Provide an area for compatible, management-oriented research.

DESCRIPTION OF REFUGE

Sacramento River National Wildlife Refuge was established in 1989 by the authority provided under the Endangered Species Act of 1973 and Emergency Wetlands Resources Act of 1986, using monies made available through the Land and Water Conservation Fund Act of 1965. The Refuge was created for the purpose of preserving, restoring, and enhancing riparian habitat for Threatened and Endangered species, neotropical migrants, waterfowl and other migratory birds, anadromous fish, resident species, and plants. Sacramento River National Wildlife Refuge is located in the Sacramento Valley of north central California. The approved Refuge boundary includes up to 18,000 acres along the Sacramento River between Red Bluff and Colusa, and currently encompasses 22 different properties (Units) which total 11,648 acres and vary in size from 43 to 2,639 acres (Figure 2).

The region is generally rural in nature with a low population density. Farming activity predominates, and the lands that surround the Refuge consist mostly of orchards, pastures, and public and private riparian areas.

The various units of the Refuge currently consist of 46 percent riparian habitats, and 40 percent agricultural lands, 7 percent uplands, and 7 percent wetlands. These are described further in the Vegetation section.

CLIMATE

The climate is classified as Mediterranean, with cool, wet winters and hot, dry summers. Rainfall is fairly well distributed throughout the winter, occurring in steady but gentle two or three day storms. The annual average precipitation is 16-18 inches. Heavy fogs are common during the winter months, while thunderstorms, hail and snow are a rare occurrence. The mean annual temperature is 61.7EF with extremes of 118EF and 15EF. The south winds are associated with storms in the winter and the cooling trends in the summer. North winds are usually dry following winter storms, and hot and dry in the summer, creating the most hazardous wildland fire conditions during the summer.

CULTURAL RESOURCES

Many portions of the Refuge has historically been farmed or cultivated and subjected to some disturbance over the years. Where native soils have not been disturbed by farming or past refuge activities, no firelines will be constructed unless deemed absolutely necessary by Incident Commander, Refuge Manager, or designate.

Structures and areas of historical significance are identified in Appendix C.

VEGETATION

The Refuge currently consists 11,684 acres of agricultural, wetland, upland, and riparian habitats. For a listing of plant species common to the Refuge, see Appendix D. Fuel types are described further in the Wildland Fire Section of the Plan.

Agricultural areas include walnut, almond, and prune orchards, as well as pasture and fallow fields. Wetland units are divided into seasonally flooded marsh, watergrass/moist soil, summer water, and permanent ponds. Uplands are comprised mostly of vernal pools, alkali meadow, and alkali non-native grassland. Riparian habitats are described as willow scrub, cottonwood riparian forest, mixed-riparian forest, valley oak riparian forest, valley oak woodland/savanna, or

elderberry savanna. Descriptions of wetland, upland, and riparian habitats and their associated plant/wildlife species are as follows. Distributions of habitats can be seen in Appendix E.

Agricultural
Walnut orchards account for about half of the Refuge's agricultural acreage, while fallow fields comprise another one-third. Prune, almond, and pasture each make up 5 to 10 percent of the agricultural acreage. Walnut, prune, and almond orchards are farmed under cooperative agreements with local farmers and land managers, and are maintained using current farming techniques that include mowing, irrigation, pesticide and herbicide use, and mechanical harvest.

Seasonally Flooded Marsh
By far the most numerous and diverse of the wetland habitat types, these units comprise about 70 percent of the wetland habitat base and are typically flooded from early September through mid-April. Their diversity is the product of a variety of water depths which result in diverse patterns of plant species (vegetation) that, in combination, provide habitat for the greatest number of wildlife species throughout the course of a year. Throughout the fall and winter, seasonally flooded marshes are used by spectacular concentrations of waterfowl and smaller numbers of egrets, herons, ibis, and grebes, to name a few. In addition, a full compliment of raptors descend upon the waterbird prey base upon which they depend. As water is removed in the spring, large concentrations of shorebirds utilize the shallow depth and exposed mudflats on their northern migration. Seed-producing plants germinate and grow to maturity on the moist pond bottoms during the spring and early summer. Flood-up in the fall makes this food available to early migrant waterfowl and other waterbirds. Common plants to seasonally flooded marsh include swamp timothy, sprangletop, smartweed, alkali and hardstem bulrush, cattail, and bermuda grass.

Watergrass/Moist Soil
Comprising approximately 20 to 25 percent of the wetland habitat base, these units are typically flooded from late August through early May. Units are usually irrigated in mid-June to bring large quantities of watergrass, sprangletop, and smartweed plants to maturity. During these irrigation periods, these units are often utilized by locally-nesting colonial waterbirds (egrets, herons). Because this habitat type often results in thick monocultures, openings are disced or mowed prior to flood-up. Though not as diverse, once flooded these units provide an abundant food source for waterfowl at a very important (potential crop depredation) time of the year. In addition, a number of wading-bird species such as curlews, whimbrel, ibis, herons, and egrets frequent them throughout the year.

Summer Water
Combined with permanent ponds, these habitats make up 5 to 10 percent of the wetland base. During the summer growing season, water is often used to encourage growth in certain sparsely-vegetated units. Two water management strategies are employed: in some units, water removal will not take place until late July; in others, normal drawdown (April) is done, scheduled work is completed, and then the unit is flooded for the remainder of the year. Both practices serve to promote plant growth while providing habitat for "resident" wildlife during the hot summer months.

Permanent Ponds

Combined with summer water, these habitats make up 5 to 10 percent of the wetland base and remain flooded throughout the year. Characterized by both emergent and submergent aquatic plants, these units provide brood and molting areas for waterfowl, secure roosting and nesting sites for wading birds (herons, egrets, bitterns, ibis) and other over-water nesters (grebes, coots, blackbirds, marsh wrens), and feeding areas for species like cormorants and pelicans. These units are drawn down every four to five years to recycle nutrients to increase their productivity and discourage carp populations. Common plants to permanent ponds include hardstem bulrush, cattail, alkali bulrush, arrowhead, burhead, and several species of pondweeds.

Riparian Habitat

Comprised of a variety of mixed riparian vegetation, these habitats types are divided into willow scrub, cottonwood riparian forest, mixed-riparian forest, valley oak riparian forest, valley oak woodland/savanna, and elderberry savanna. Willow scrub consists of a shrubby streamside thicket dominated by any of several willow species, including black, sandbar, and arroyo willows, and commonly populated by cottonwood, California rose, Mexican tea, and wild grape. Cottonwood riparian forest is a winter deciduous forest that is dominated by Fremont's cottonwood and black willow, with a dense understory of box elder, buttonwillow, wild grape, Oregon ash, and various other willows and grasses. Mixed riparian forest is a tall, dense, winter-deciduous forest, with a closed canopy of box elder, black walnut, sycamore, cottonwood, and willow, and a dense understory of buttonwillow, Oregon ash, poison oak, and wild grape. Valley oak riparian forest is a medium to tall deciduous, closed-canopy forest dominated by valley oak, and with an understory typified by Oregon ash, black walnut, sycamore, California pipevine, virgin's bower, blue wild rye, blackberry, California rose, and poison oak. Valley oak woodland/savanna is an open, winter-deciduous savanna dominated by widely spaced oaks, blue elderberry, and coyote-brush, with an understory of grasses and forbs. Elderberry savanna is an open, winter-deciduous shrub savanna dominated by blue elderberry, with an understory of introduced annual grasses and forbs. All of these habitats provide nesting, roosting, and feeding habitat for passerine and raptor species. Deer, small mammals, and duck broods utilize riparian zones, especially during summer months when other seasonal water sources are dry.

Uplands

Uplands on the Refuge are mostly comprised of vernal pools, alkali meadows, and alkali non-native grasslands. Most plant species in these communities are natives and occur in a variety of patterns. Nine Federal, State, and California Native Plant Society (CNPS) special status plant species occur in these habitats, as well as three special status invertebrates. Characteristic plants of vernal pools include button-celery, smooth-stemmed popcornflower, stipitate popcornflower, white-flowered navarretia, dwarf woolly-heads, Oregon woolly-heads, Fremont's goldfields, and several species of downingia. Typifying the alkali meadow are saltgrass, alkali heath, alkali weed, Great Valley gumplant, common spikeweed, pappose spikeweed, eleven chenopod species, bush seepweed, horned sea-blite, and pickleweed. Alkali non-native grassland species include dwarf barley, foxtail barley, barbed oat, Pacific bentgrass, ripgut brome, soft chess, red brome, tall fescue, Mediterranean barley, annual ryegrass, Mediterranean beardgrass, and foxtail fescue. During the wet season, Canada geese, wigeon, and coots graze on the depauperate grasses in the alkali meadows, and dabbling ducks and shorebirds feed in the vernal pools. Killdeer, stilts, and avocets nest in

these habitats.

FISH AND WILDLIFE

Many avian groups, such as waterfowl, shorebirds, wading/diving birds, raptors, game birds, gulls/terns, and landbirds, are found on the Refuge at various times throughout the year. Also present are mammalian, herptile, fish, and invertebrate species. While many species are common year-round, others are here only for the winter, or during spring and summer months to breed. Appendix F contains a list of wildlife species common to the Sacramento River NWR. An overview of wildlife use of the Refuge follows.

Waterfowl

The primary waterfowl use of the Refuge is by wintering birds during the months of August through March. Peak wintering populations occur during December, when approximately 250,000 waterfowl are present. A small percentage remain through spring and summer months to nest. Common wintering duck species include northern pintail, mallard, wigeon, green-winged teal, gadwall, northern shoveler, wood duck, ring-necked duck, canvasback, redhead, and ruddy duck. Wintering goose species include lesser snow goose, Ross' goose, white-fronted goose, and Canada goose (mostly cackling and Aleutian subspecies). Those species that stay through the spring and summer to nest include mallard, cinnamon teal, gadwall, wood duck, and lesser numbers of pintail.

Shorebirds

Shorebirds use the Refuge in greatest numbers during their fall and spring migrations, with populations peaking in April when approximately 1,000-3,000 seek out shallow seasonal marsh and vernal pools. Common fall and spring migrants include western and least sandpipers, dunlin, dowitcher, black-necked stilt, American avocet, black-bellied and semi-palmated plovers, greater yellowlegs, long-billed curlew, and whimbrel. The American avocet, black-necked stilt, and killdeer may remain to nest. Spotted sandpipers are migrants that can be found along the river's edge.

Wading/diving birds

Many wading and diving birds use the Refuge year-round, utilizing all wetland and some riparian habitat types for foraging, roosting, and nesting. Such species include great blue heron, great, snowy and cattle egrets, green heron, American bittern, black-crowned night heron, white-faced ibis, Virginia rail, sora, moorhen, American coot, pied-billed and Western grebes, and double-crested cormorant. Other waterbirds use refuge wetlands at various times throughout the year, such as western/Clark's grebe, eared grebe, and American white pelican. Sandhill cranes can be found foraging and roosting in seasonal marsh and upland habitats throughout the winter.

Raptors

Raptor populations are largest during the winter when the waterfowl prey base is greatest. These birds are most often perching along riparian corridors where they roost, and hunting in wetland and upland areas. The most abundant wintering species are red-tailed hawk and Northern harrier, but bald eagle, golden eagle, white-tailed kite, sharp-shinned hawk, Cooper's hawk, peregrine falcon, and short-eared owl also occur regularly. Turkey vulture, red-tailed hawk, red-shouldered hawk, osprey, bald eagle, white-tailed kite, northern harrier, American kestrel, barn-owl, and great-horned owl are breeding species. Swainson's hawk and burrowing owl are most common during spring and summer when they are nesting in riparian and upland areas, respectively.

Gamebirds
Gamebirds occur year-round. Mourning doves and California quail can be found in riparian areas, while ring-necked pheasant are commonly seen in seasonal wetland and upland areas.

Gulls/terns
Ring-billed gull and herring gull are common during fall and into spring. The black tern occurs during the spring and summer and nests in wetlands and nearby rice fields. Forster's and Caspian terns occur infrequently, but are often seen in small numbers during spring and fall migration periods.

Landbirds
The Refuge attracts a large array of both resident and migrant landbird species. Common year-round wetland residents include marsh wren, brewer's blackbird, brown-headed cowbird, and black phoebe. Tricolored blackbirds nest in large colonies in wetland units. Resident species that can be found in riparian and upland areas include belted kingfisher, Nuttall's woodpecker, Acorn woodpecker, northern flicker, California towhee, scrub jay, yellow-billed magpie, American crow, common raven, bushtit, bewicks wren, mockingbird, northern shrike, European starling, savannah sparrow, western meadowlark, and housefinch. Additional breeding species supported by these habitats include yellow-billed cuckoo, western wood pewee, ash-throated flycatcher, western kingbird, house wren, American robin, blue and black-headed grosbeaks, lazuli bunting, Bullock's oriole, titmouse, and tree, violet-green, cliff, bank, and barn swallows which are found in upland and riparian areas during the nesting season. Wintering species including ruby-crowned kinglet, American pipit, yellow-rumped warbler, lark sparrow, golden-crowned sparrow, white-crowned sparrow, dark-eyed junco, and lesser and American goldfinches which may be found in wetland, upland, or riparian areas during the winter. Other commonly seen migrants include Anna's hummingbird, downy and hairy woodpeckers, olive-sided flycatcher, horned lark, Wilson's warbler, song sparrow, and Lincoln's sparrow.

Mammals
Many mammalian species are year-round residents of the Refuge. The more aquatic beaver, muskrat, mink, and otter occur in wetlands and riparian corridors along waterways. Upland species include black-tailed deer, black-tailed jackrabbit, desert cottontail, raccoon, ring-tailed cat, opossum, spotted and striped skunk, coyote, mountain lion, beechy ground squirrel, deer mouse, California vole, and Mexican free-tailed bat.

Herptiles
Reptiles are common residents in upland and riparian areas, and include common garter snake, gopher snake, western yellowbelly racer, common kingsnake, western fence lizard, and alligator lizard. A few species, such as giant garter snake and western pond turtle, are wetland-dependent residents. The American bullfrog and Pacific tree frog are the only amphibians known to be found on the Refuge.

Fish
Fish species are found in Refuge waterways, permanent ponds, and seasonal marshes. Common species include Gambusia (mosquitofish), carp, channel catfish, mosquitofish, green sunfish, Chinook salmon, steelhead, striped bass, American shad, and Sacramento splittail.

Invertebrates

Invertebrate populations are greatest and most diverse in aquatic habitats, and provide an important food base for many waterfowl, shorebird, and other avian and fish species. Common aquatic inverbrates include waterfleas, snails, clams, dragonflies, damselfiles, waterboatmen, backswimmers, beetles, midges, mosquitos, crayfish and worms. Terrestrial invertebrates are an important food base for many neotropical migrant bird species, and include species such as grasshoppers, beetles, butterflies, moths, and ants.

Generally, the direct impacts of fire on wildlife include disturbance or infrequent injury/mortality of individuals or groups of individuals, particularly slow moving and/or sedentary species. The long-term results of fire on wildlife are positive due to the benefits of increased habitat quality and diversity.

THREATENED AND ENDANGERED SPECIES

Sacramento River National Wildlife Refuge contains a number of Threatened, Endangered, and sensitive species including both plant and animal species. The fire management program will be implemented in accordance with the Endangered Species Act of 1973 and will take appropriate action to identify and protect from adverse effects on any rare, Threatened, or Endangered species. The refuge has consulted with the Sacramento Field Office on operations and maintenance activities of the Sacramento National Wildlife Refuge Complex (SNWRC), including the use of prescribed burning for habitat management. The resulting biological opinion (Appendix A) stated these activities would not jeopardize continuing existence of any federally Endangered/Threatened species on the SNWRC. U.S. Fish and Wildlife Service policy requires that State Threatened and Endangered species be incorporated into any planning activities. Appendix G contains a list of Threatened, Endangered, and sensitive species found on the Refuge.

PHYSICAL RESOURCES - WATER, TOPOGRAPHY

The Refuge lies in the northern and central portion of the Sacramento River Valley along many natural and human-made waterways. Llano Seco Unit Sanctuaries I & II (Figure 2 and Appendix E) are divided into separate habitat management units (tracts), most of which can be independently managed for water levels through a series of canals, levees, and water control structures. Most remaining Refuge properties have some irrigation capabilities, by the use of pumps, ditches, irrigation pipe, etc. Units bordering the Sacramento River are subjected to frequent to infrequent flooding, and fluctuating water levels in natural waterways (oxbows and sloughs) that are dependent on river flow levels. Annual habitat management plans outline water management objectives and are determined each spring by the Refuge Manager, biologist, fire staff, public use staff, and irrigator.

The Llano Seco Unit Sanctuaries I & II currently rely on a firm water supply which is made available by Parrot Investment Corportation (PIC). This water is delivered to the refuge by PIC under cooperative agreement with USFWS. The Refuge's irrigator is responsible for carrying out the water management as outlined in the habitat management plan.

The remaining Refuge Units receive their water supply from wells. Cooperative farmers are responsible for carrying out the water management of these units in accordance to the

individual cooperative agreements with the Refuge.

The Sacramento Valley is generally flat with a gradual slope from northwest to southeast. Elevations around the Refuge range from 137' to 30' above sea level.

SOCIO-ECONOMIC CONCERNS

Sacramento River National Wildlife Refuge has limited public use. The Llano Seco Unit hosts a visitor area that is open to the public year-round, which includes 2 viewing platforms and a walking trail. Packer Lake on the Packer Unit is open to public fishing. Wildland fire may impact habitat which could limit or enhance fishing and wildlife viewing opportunities.

STRUCTURES, FACILITIES, AND NEIGHBORING LANDS

The Llano Seco Unit of Sacramento River NWR has administrative structures within the boundaries. These structures include an office and shop buildings. A complete list of structures within the Refuge is located in Appendix C .

The Refuge is bordered mostly by private lands with some other federally and state owned public lands. Private lands are mostly agricultural land (orchards, row crops, rice), with some private duck-hunting clubs, farmsteads, businesses, trailer parks, and isolated homes. Preventing the spread of wildland fire to/or from adjacent properties provides for the safety of the general public and protection of private and public lands. Refuge maps with adjacent properties and owners are included in the Refuge Fire Dispatch Plan which is updated regularly.

WILDLAND FIRE MANAGEMENT SITUATION

HISTORIC ROLE OF FIRE

The period of high fire danger, based on weather and on fire occurrence, is from May through early November. Occasional fires have occurred from December through April. Wildland fires range in size from less than 1 to 150 acres with prescribed fires of between 30-200 acres per day. Most fires on the Refuge last no more than a few days (exception for some riparian units) with containment generally being completed within a few hours of report of the ignition.

Pre-settlement fires

The presence of fire in the landscape has been one of the major evolutionary factors determining the composition of flora throughout California. Lightning is the most common natural ignition source. Generated by summer thunder storms, lightning is responsible for much of the wildland fires that occur throughout the western United States each year. Fire, flood, and drought all played an important role in plant succession prior to settlement of the area.

Post-settlement Fire History

The recent fire history from 1990 is complied from the entries into the Shared Applications Computer System (SACS) and the Habitat Management Plan database.

Most wildland fires that occur each year are along the boundary (fire trespass), public use areas, adjacent roadways, and the river. Damage from these fires may have potential negative effects on resident or nesting wildlife and habitat depending on the time of year. Sacramento River National Wildlife Refuge wildland fire history is listed in Appendix H.

Prescribed fire history

Prescribed fire has been utilized for hazard fuel management and habitat management since the mid 1990's. Fire is used based on its ability to produce desired habitat conditions to meet the specific needs of wildlife or reduce non-native plant species. Sacramento River National Wildlife Refuge prescribed fire history is listed in Appendix H.

RESPONSIBILITIES

Sacramento River NWR is covered under the Sacramento NWR Complex fire management organization, which includes: principal members of the Complex fire management organization are the Refuge Managers, Zone Fire Management Officer (based at San Luis NWRC), Assistant Fire Management Officer, Prescribed Fire Specialist, Supervisory Firefighter, Lead Firefighter, Firefighters (Squad Leaders), Seasonal, and Collateral Duty Firefighters. Fire assignments are made on the basis of individual qualifications and position requirements. A listing of fire management team members by name, position, and qualifications can be found in Appendix I.

Refuge Manager

- Responsible for the overall management of the Refuge including the fire program.
- Ensure that Department, Service, and Refuge policies are maintained and followed.
- Ensure sufficient collateral duty firefighters meeting Service standards are available for initial attack.
- Supervise the resource management activities of the Refuge, working with

Refuge Biologists in setting goals and objectives and selecting methods/actions to achieve them including prescribed fire.

- Review and approve prescribed burn plans for SNWRC.

Zone Fire Management Officer

- Responsible for oversight of the Zone fire program and coordinates budget preparation and fire activities (Located at San Luis NWRC in Los Banos, CA).

Assistant Fire Management Officer

- Delegated the responsibility for coordination and supervision of the fire management program by the Refuge Manager.
- Prepares and manages the fire budget for the Complex, including the Sacramento River NWR.
- Administers the payroll, purchasing and travel for the fire staff.
- Supervises the Complex=s fire staff.
- Responsible for planning, coordinating, and directing all Preparedness activities including:
    - Fire training.
    - Physical fitness testing and Interagency Fire Qualification System data entry.
    - Fire weather station operation and data entry .
    - Fire cache and equipment inventory accountability, maintenance and operation.
    - Coordinates with cooperative agencies. Revises agreements as necessary.
    - Ensures the step-up preparedness plan is followed.
    - Prepares annual Fire Base budget request, tracks use of funding.
    - Informs Refuge staff of fire situation and potential.
- Responsible for coordinating and directing all suppression activities including:
    - Dispatching.
    - Fire command.
    - Ensures fire management and safety policies are observed.
    - Advises Refuge Managers of the status of fire suppression operations.
- Maintains liaison with Regional Fire Management Coordinator and Cooperators.
- Prepares a Refuge fire prevention plan, and coordinates fire prevention duties with other employees.
- Coordinates Complex fire training needs.
- Annually updates the Fire Management Operations Plan, maintains fire records, and reviews completed DF-1202's for accuracy.
- Administers the suppression evaluation process on wildland fires.

Prescribed Fire Specialist

- Responsible for managing prescribed fire activities including:
    - Coordinates annual prescribed fire program to meet management objectives.
    - Prepares or reviews individual prescribed fire plans.

- Serves as or designates Prescribed Fire Burn Boss.
- Provides daily validation that prescribed fires are under prescription and meet all Service policy requirements.

- Assists Refuge Biologists with fire research and fire effects monitoring.
- Assists with fire aspects of the public relations program.
- Responsible, with the Public Use Staff, for planning programs to educate the public regarding the role of fire in the Complex.
- Prepares and presents slide programs, video presentations and displays about the Fire Management Program

Supervisory Firefighter (Fire Operations)

- Supervises the Complex Engine Crews.
- Assists the FMO with planning, coordinating, and directing all Preparedness activities including:
  - Fire training.
  - Physical fitness testing and Interagency Fire Qualification System and data entry.
  - Fire weather station operation and data entry.
  - Fire cache and equipment inventory accountability, maintenance and operation.
  - Coordination with cooperative agencies.
  - National Fire Danger Rating System (NFDRS) use.
  - Ensuring the step-up Preparedness plan is followed.
- Assists with coordinating and directing all suppression activities including:
  - Dispatching.
  - Fire Command.
  - Ensures fire management and safety policies are observed.
  - Advises Refuge Manager of the status of fire suppression operations.
- May be responsible for supervising prescribed fire activities including:
  - Preparing and reviewing individual prescribed fire plans
  - Serving as Prescribed Fire Burn Boss.
  - Providing daily validation that prescribed fires are under prescription.

Lead Firefighter (Crew Leader)

- Leads Engine Crew assignments.
- Assists the Supervisory Firefighter with planning, coordinating, and directing all Preparedness activities, and assists FMO and PFS with prescribed fire activities.

Firefighters (Squad Leaders)

- Lead Engine Crew as needed with on -Refuge assignments.
- Assist the Supervisory Firefighter with planning, coordinating, and directing all Preparedness activities, and assists FMO and PFS with prescribed fire activities.

Seasonal and Collateral Duty Firefighters

- Maintain assigned fire equipment in ready state and use all safety gear assigned.
- Participate on wildfire and prescribed fire assignments as qualified (ignition,

holding, and engine operation).

Incident Commander

Incident Commanders (of any level) use strategies and tactics to implement selected objectives on a particular incident. A specific Limited Delegation of Authority (Appendix J) will be provided to each Incident Commander prior to assuming responsibility for an incident. Major duties of the Incident Commander are given in NWCG Fireline Handbook, including:

- Brief subordinates, direct their actions and provide work tools.
- Ensure that safety standards identified in the Fire Orders, the Watch Out Situations, and agency policies are followed at all times .
- Personally scout and communicate with others to be knowledgeable of fire conditions, fire weather, tactical progress, safety concerns and hazards, condition of personnel, and needs for additional resources.
- Order resources to implement the management objectives for the fire.
- Inform appropriate dispatch of current situation and expected needs.
- Coordinate mobilization and demobilization with dispatch and the Collateral FMO.
- Perform administrative duties; i.e., approving work hours, completing fire reports for command period, maintaining property accountability, providing or obtaining medical treatment, and evaluating performance of subordinates.
- Assure aviation safety is maintained to the highest standards.

INTERAGENCY OPERATIONS

Interagency contacts are established at the Federal, State, and Local levels to provide the most efficient level of fire management operations. Agreements and Memorandums of Understanding (MOU) (sample MOU in Appendix K) should be established and used to foster guidelines for assistance from local cooperators. The MOU allows the responding agency to assume command of the incident until a representative of the Complex arrives to establish a unified command or assume responsibility for the incident if qualified. Depending on time of year federal, state, or local resources may perform initial attack for the Refuges.

The Refuge Dispatch Plan (Appendix L) Contains the guidelines for a reported fire and the proper dispatching to effect a quick and orderly initial attack by the closest local resource. The appendix also contains a list of cooperative agreements and MOU's. Radio frequencies are available in Appendix M.

Closest Fire Departments and Fire Districts (by county):

all Units -

Mendocino National Forest (530) 934-7758

Glenn County -

Willows Fire Department: (530) 934-3323

Butte County -

Butte County Fire (CDF) 1-800-540-2008

Tehama County -

CDF - Tehama - Glenn Unit (Red Bluff) (530) 529-8548

PROTECTION OF SENSITIVE RESOURCES

To protect the Refuge's resources, mechanical line construction (dozers, discing) and off- road travel must be authorized by the Refuge Manager or their designate. Sensitive areas include areas containing Endangered, Threatened, or sensitive species, as well as habitats or cultural resources (i.e. vernal pools/archeological sites) that could incur damage due to mechanical manipulation. These areas are designated in Pre-Attack Plans located in each fire vehicle and will be updated annually.

In the event of a new sensitive resource is discovered during any fire activity, the area will be noted and protected from further disturbance. A report will be made and the proper agencies notified.

The Regional Archaeologist and/or his/her staff will work with fire staff, Refuge Managers, and incident commanders to ensure that cultural resources are protected from fire and fire management activities. The "Request For Cultural Resource Compliance" form (RCRC, Appendix N) will be used to inform the Regional Archaeologist of impending activities, thereby meeting the regulations and directions governing the protection of cultural resources as outlined in Departmental Manual Part 519, National Historic Preservation Act (NHPA) of 1966, Code of Federal Regulations (36CFR800), the Archaeological Resources Protection Act of 1979, as amended, and the Archaeological and Historic Preservation Act of 1974. The NHPA Section 106 clearance will be followed for any fire management activity that may affect historic properties (cultural resources eligible to the National Register of Historic Places).

Impacts to archaeological resources by fire resources vary. The four basic sources of damage are (1) fire intensity, (2) duration of heat, (3) heat penetration into soil, and (4) suppression actions. Of the four, the most significant threat is from equipment during line construction for prescribed fires or wildland fire holding actions.

The following actions will be taken to protect archaeological and cultural resources:

Wildland Fires

- Minimum impact fire suppression tactics will be used to the fullest extent possible.
- Resource Advisors will inform Fire Suppression personnel of any areas with cultural resources. The Resource advisor should contact the Regional Archaeologist and/or his/her staff for more detailed information.
- Foam use will be limited in areas known to harbor surface artifacts.
- Mechanized equipment should not be used in areas of known cultural significance.
- The location of any sites discovered as the result of fire management activities will be reported to the Regional Archaeologist.
- Rehabilitation plans will address cultural resources impacts and will be submitted to the Regional Archaeologist using the RCRC.

Prescribed Fires and Mechanical Fuel Manipulation Projects

- The Complex Fire staff will submit a completed RCRC to the Regional Archaeologist and/or his/her staff as soon as the site is identified (i.e., as soon as feasible).

- Upon receipt of the RCRC, the Regional Archaeologist and/or his/her staff will be responsible for consulting with the FMO and evaluating the potential for adverse impacts to cultural resources.
- When necessary, the Regional Archaeologist and/or his/her staff will coordinate with the State Historic Preservation Officer (SHPO). The SHPO has 30 days to respond. The Refuge will consider all SHPO recommendations.
- Mechanized equipment should not be used in areas of know cultural significance.
- The location of any sites discovered as the result of fire management activities will be reported to the Regional Archaeologist.

WILDLAND FIRE ACTIVITIES

Fire program management describes the operational procedures necessary to implement fire management at Sacramento River NWR. Program management includes: fire prevention, preparedness, step-up plan, fire detection, fire suppression, training, and documentation.

All fires not classified as prescribed fires are wildfires and will be appropriately suppressed. All fire operations will be coordinated out of the Sacramento NWRC Headquarters. A well-established mutual aid program will be utilized to supplement suppression operations on the refuge.

FIRE MANAGEMENT STRATEGIES

The following strategies will be employed to meet the fire management objectives:

- Suppress all wildland fires in a safe and efficient manner consistent with resources and values at risk.
- Utilize Minimum impact suppression tactics (MIST).
- Conduct all fire management programs in a manner consistent with applicable laws, policies and regulations.
- Maintain an Initial Attack organization capable of suppressing wildland fires within the Complex.
- Maintain Memorandums of Understanding with local fire protection agencies to promote cooperative prevention, suppression, and prescribed fire activities. Provide assistance to local or federal cooperators under the “closest resources” principles in accordance with Service policy.
- Prepare and implement an effective fire prevention plan to minimize wildland fires, particularly fires occurring outside the fire season when adequate suppression resources may not be available.
- Integrate fire ecology, management, and prevention themes into existing interpretive and education programs.
- Utilize mechanical treatments to reduce hazardous fuels or disrupt fuel continuity.

PREPAREDNESS

Preparedness is the work accomplished prior to fire occurrence to ensure that the appropriate response, as directed by the Fire Management Plan, can be carried out. Preparedness activities include: budget planning, mechanical hazard reduction, equipment acquisition, equipment maintenance, dispatch, equipment inventory, and training. The preparedness objective is to have well trained and equipped fire management personnel to manage all fire situations within the Refuge. Preparedness efforts are to be accomplished in the time frames outside the normal fire season dates.

Fire readiness planning is to be done on an annual basis. This will ensure that all personnel, engines, fire cache, PPE, and training are identified and prepared for the fire season. Lists of engines, equipment, and inventory are located in Appendix O.

Historical weather

The largest numbers of fires are in the summer season, which generally starts about June and runs through early November. However there is potential for prescribed and wildland fires year-round.

No historical data is available from a refuge NFDRS weather station. A station is presently established (SAC NWR, 041102) and gathering the data for an analysis. This data needs to be collected for a period of at least 3 years to obtain a proper analysis. Until that time, to best estimate the NFDRS indices the Stonyford, CA station (MENDO FS, 041503) will be used. Burning Index for fuel model A (western annual grasses) and fuel model N (sawgrass) is graphed in Appendix P, as well as Energy Release Component. For the period 1990-2000, 90th percentile of Burning Index for fuel model A (western annual grasses) at Stonyford RAWS is 41.

Fire Prevention

An active fire prevention program will be conducted by Refuge staff in conjunction with other agencies to protect human life and property, and prevent damage to cultural resources or physical facilities.

A program of internal and external education regarding potential fire danger will be implemented. Visitor contacts, bulletin board materials, handouts and interpretive programs may be utilized to increase visitor and neighbor awareness of fire hazards. Trained employees need to relate to the public the beneficial effects of prescribed fires as opposed to unwanted human-caused fires, with emphasis on information essential to understanding the potential severity of human-caused wildland fires and how to prevent them.

During periods of extreme or prolonged fire danger emergency restrictions regarding refuge operations, or area closures may become necessary. Such restrictions, when imposed, will usually be consistent with those implemented by cooperators. Closures will be authorized by the Refuge Manager.

Mechanical Hazard Reduction

Mechanical methods (discing and mowing) will be used to create and maintain fuel breaks to reduce the threat of wildland fire to cultural and natural resources, structures and improvements, and adjacent private property. These activities will conform to the Endangered Species Act and historic preservation mandates. Typically these fuel breaks will be in previously farmed areas where soil disturbance had been practiced before. Some areas needing treatment have already been identified by refuge staff and by refuge neighbors. Because new lands are acquired and vegetation changes over time, hazard, risk, and values will be assessed by refuge staff annually. When a prevention plan is developed, it will outline hazards, risks, and values and allow subjective evaluation of priorities.

Staffing Levels

National and State Preparedness Levels are designed to increase readiness and response to wildland fire incidents. The levels range from I to V with V being the most severe. These levels are changed depending on fire activity, weather, or lack of adequate fire personnel. Each level has a set of guidelines as to crew activities and movement that should correspond to the Complex Step-up Planning. In the event that the State and National Preparedness Levels are different, the refuges will follow the guidelines based on the higher of the two levels. The following are the guidelines for each of the levels:

Level I:	Normal Staffing and activities to include prescribed fires.
Level II:	Normal Staffing and activities to include prescribed fires.
Level III:	Normal Staffing and activities to include prescribed fires, monitor

conditions and prepare for step-up plan activation.

Level IV: Activate the Complex step-up plan and prescribed fire activity must be approved by Regional Fire Management Coordinator (RFMC).

Level V: Activate the Complex step-up plan and suspend prescribed fire activity.

Daily fire danger will coincide with the Tehama - Glenn Ranger Units daily calculations of the spread component. These are based on the Stonyford, CA RAWS. These break points will be used until the Sacramento NWR station has the necessary database to run a historical analysis and to be the primary NFDRS station. The data from the Sacramento NWR station will be downloaded to WIMS via GOES and will be the responsibility of the Assistant Fire Management Officer.

The step-up plan (Appendix Q) is reviewed annually, and is used to provide appropriate dispatch response commensurate with fire danger. Elements of the plan include: implementation and staffing levels, crew and equipment placement, and funding (additional firefighters [emergency hire/casual] may be hired temporarily to supplement the existing fire crew). The Fire Staff will monitor current and predicted fire weather reports and preparedness levels for daily staffing.

Training

Departmental policy requires that all personnel engaged in suppression and prescribed fire duties meet the standards set by the National Wildfire Coordinating Group (NWCG). Sacramento NWRC will conform strictly to the requirements of the wildland fire management qualification and certification system (310-1) and USFWS guidelines.

Individual training needs will be identified in a training plan and will utilize interagency training opportunities. Service policy sets training, qualification, and fitness standards for all fire positions. All fire personnel (full time fire or collateral duty) will be provided with the training (classroom and on-the-job) required to meet Service fire position qualification standards for the positions they are expected to perform. All firefighters will be required to participate in an annual refresher to remain qualified. Refreshers will focus on local needs, fire shelter deployment, LCES, fire orders, and watch out situations. On-the-job training is encouraged and will be conducted at the field level. Whenever appropriate, the use of fire qualification task books will be used to document fire experience of trainees. The FMO will coordinate fire training needs with those of other nearby refuges, cooperating agencies, and the RO.

Personnel should be hired and prepared for the start of the fire season by June. All fire qualified employees are required to pass the mandatory fitness and training requirements prior to June or within 2 weeks of entering duty. Employees not meeting fitness and training requirements may assist in support capacities, but will not be permitted on the fireline. Personnel will not perform fire jobs they are not qualified for.

Engines are the primary initial attack resource, with fire trailers serving as back up resources, on the Refuge because of the predominance of areas with fine fuels and good vehicle access. All primary engines will be equipped with tools, firing devices, and water handling accessories. To ensure engine readiness all annual maintenance should be completed in the off season or at the latest by June.

The refuge supports the development of individual Incident Command System (ICS) overhead

personnel from among qualified and experienced refuge staff for assignment to overhead teams at the local, regional, and national level.

Supplies and Equipment
The Fire Cache will be located at the Complex Headquarters. The Supervisory Firefighter will be the cache manager. All equipment should be in a ready state and inventoried prior to the start of the fire season or by June. Equipment includes: hand tools, hoses, fittings, firing devices, and ATV=s and trailer. An inventory of cache equipment is located in Appendix O. Service guidelines determine fire cache size in relation to number of fire-qualified personnel.

All firefighters will be issued the required personal protective equipment to include: Nomex pants and shirts, gloves, helmet and goggles, field pack with shelter, overnight pack, sleeping bag, headlamp, and personal first aid kit.

Additional equipment and supplies are available through cooperators and the interagency cache system. Requests for additional personnel and equipment are made through the servicing dispatch office for the area (Mendocino National Forest).

DETECTION
The refuge relies on neighbors, visitors, staff, and cooperators to detect and report fires. Reports of fires reach the refuge directly or through dispatch offices of the Mendocino National Forest or county law enforcement or fire agencies. The dispatch plan (Appendix L) will be reviewed and updated annually. Copies will be kept at all Refuges, check stations, and with local cooperators.

The Fire Management Plan does not discriminate between human-caused and lightning caused fire. All wildland fires will be appropriately suppressed. Detection may include an investigation of fire cause. Moreover, human-caused fires will require an investigation and report by law enforcement personnel. For serious human-caused fires, including those involving loss of life, a qualified fire investigator will be requested.

COMMUNICATIONS
A daily resource summary should be provided to the Mendocino NF dispatch to maintain a quick response. The Complex fire radios will be programmed with the Mendocino NF and selected local frequencies (Appendix M) to maintain communication with the local response area.

Inter -Refuge - Cell phones are the primary communication link. Most refuge mangerial staff are issued cell phones. Fire staff phones include FMO, PFS, and Sup FF with 1 per engine. A complete cell phone list is included in Appendix L. During fire operations radios will be issued to the overhead staff and at least 1 radio to each crew. The main operational channel for the Complex will be the TAC2 CREW, channel 7 (168.200).

Interagency - Most of the local agencies have capability to communicate using the NIFC and CDF tactical Channels. The most frequently used for all operations on the refuges is NIFC tactical channel 2 (168.200). For those local agencies that do not have that capability a USFWS radio will be provided and cell phone information exchanged to ensure communication during the incident. Cell phones are not to be used for conveying tactical information on the fire because firefighters are excluded from hearing potentially critical information.

PRE-ATTACK PLAN

Pre-attack planning data will be reviewed annually by the fire staff. Pre-attack plans will be placed in each Engine, the Fire Management Office, and with the Dispatch plan at each Refuge. Pre-attack plans should include:

- Response map: roads, gates, water sources, fire cooperator districts.
- Hazard/Risk map: power lines, main ditches and canals.
- Natural and Cultural Resources map: sensitive zones, non-sensitive zones, restricted vehicle access areas.
- Structure list.
- Current Habitat maps.
- Adjacent Landowner maps.

FIRE MANAGEMENT UNITS

Each of the refuge properties will be a separate Fire Management Unit (FMU) due to the distance between properties. Although the properties are separated by distance, suppression strategies, management restrictions, fuels, fire environment, and values at risk are similar throughout the Refuge.

Initial attack of wildland fires at all refuges may be conducted by the Complex fire staff. Because of the geographic location of all the units (see Figure 2), many of the fires on the Refuge are reported to 911 and the local county dispatchers initiate suppression actions. For units in Glenn County, fires reported to 911 are dispatched through Willows to the local fire departments and reported to Complex fire personnel. Complex fire staff and/or Willows Dispatch will report the fire to Mendocino Dispatch.

Wildland fires on units in Butte and Tehama Counties are also reported to 911 by the public. Local fire departments respond to these fires and initiate suppression actions. Refuge personnel who may be on scene will notify Complex fire staff of any wildland fire. Complex fire staff will notify Mendocino dispatch of fire activities.

Due to staff limitations, relatively small land management parcels, long response times, valuable resources, and values at risk on neighboring lands, this plan does not recommend wildland fire managed for resource benefit as an option for any of the units. Wildland fires will be suppressed using the appropriate suppression response. Prescribed fires will be used to reduce hazardous fuels and to meet resource management objectives.

Sacramento River National Wildlife Refuge - Burnable Acres

Fire Management Unit	Habitat Type			Suppression Assistance
	Managed Freshwater Wetlands (Fuel Model 3)	Upland/ Fallow Fields (Fuel Model 1)	Riparian/ Orchard (Fuel Model 9)	Fire Department with Responsibility for General Area
La Barranca	0	5	1063	California Div. of Forestry (CDF)
Moony	0	0	324	CDF
Ohm	0	208	476	CDF
Flynn	0	35	517	CDF
Nakazato	0	0	116	CDF
Rio Vista	0	60	1142	CDF
McIntosh Landing North	0	0	50	Hamilton City
McIntosh Landing South	0	0	33	Hamilton City
Pine Creek	0	106	635	CDF
Capay	0	594	73	Hamilton City
Phelan Island	0	4	284	Ord Bend
Jacinto	0	21	61	Ord Bend
Dead Man's Reach	0	35	634	CDF
North Ord	2	22	19	Ord Bend
Ord Bend	0	1	108	Ord Bend
South Ord	0	13	109	Ord Bend
Llano Seco Sanctuaries I & II	762	791	41	CDF
Llano Seco Riparian Sanctuary	2	550	355	CDF
Hartley Island	0	70	404	Butte City
Sul Norte	0	170	420	Glenn-Codora
Codora	0	9	371	Glenn-Codora
Packer	0	21	313	Glenn-Codora
Drumheller Slough	0	204	22	Butte City

Fuel Types and Fire Behavior

The following behaviors are based on the average conditions found on the Refuge in a normal fire season or mid-July averages for the 2:00 p.m. weather. These averages include: maximum temp of 98 degrees Fahrenheit, 25% relative humidity, mid-flame wind speed of 6 mph, and 4% average 1hr (< 1/4 " diameter) dead fuel moisture. The slope is 0 to 2% and the rate of spread is for a head fire. The outputs are from the BEHAVE Fire Behavior Prediction Models based on the conditions above and for the major fuel models found within the Refuge:

- Fuel Model 1 - Upland Grass and Vernal Pools: Fire spread is governed by the fine and continuous herbaceous fuels that have cured or are nearly cured. Fires are surface fires that move rapidly through the cured grass and associated material. The fire behavior is directly related to the fuel moisture and windspeed. Fuel loading is 0.74 tons/acre and consists of 1/4" or smaller (1 hr) dead fuel component. Spot fires are generally not produced because fuels are consumed too quickly and thoroughly. Resistance to control is low to moderate, depending on windspeed. The behavior output includes:
    - Rate of Spread - 275 chains/hr (3.5 mph)
    - Flame Length - 7.7 feet

- Fuel Model 3 - Seasonal Marsh: Fires in this model display high rates of spread under the influence of wind. Wind may drive fire into the uppers heights of the bulrush and across standing water. Stands are tall, averaging about 3 to 6 ft., but considerable variation may occur. Approximately 1/3 or more of the stand is considered dead or cured and maintains the fire. Fuel loading is 3.0 tons/acre and consists of up to 1/4" (1 and 10 hr) dead fuel component. Fire behavior is directly related to the fuel moisture and windspeed. Short-range (up to 100') spotting usually occurs and causes high to extreme control problems. The behavior output includes:
    - Rate of Spread - 259 chains/hr (3.0 mph)
    - Flame Length - 20.4 feet

- Fuel Model 9 - Riparian Woodland: Fires are carried by dead, loosely compacted leaves and understory grasses. Wind tumbled leaves and torching trees may cause short-range spotting that may increase the rate of spread above the predicted value. Fuel loading is 3.5 tons/acre and consists of <3"of dead and live fuel. Fire behavior is directly related to the fuel moisture and fuel loading with windspeed in exposed areas. Resistence to control is moderate except during drought conditions when extreme fire conditions are present. The behavior output includes:
    - Rate of Spread - 22 chains/hr (0.2 mph)
    - Flame Length - 4.8 feet

SUPPRESSION TACTICS

Wildland fires will be suppressed in a prompt, safe, and cost-effective manner to produce fast, efficient action with minimum damage to resources. Suppression involves a range of possible actions from initial attack to final suppression. All wildland fires will be appropriately suppressed.

Personnel and equipment must be efficiently organized to suppress fire effectively and safely. To this end, the FMO assumes the command function on major or multiple fire situations, setting priorities for the use of available resources and establishing a suppression organization.

There will be only one Incident Commander responsible through the FMO to the Refuge Manager. The Incident Commander will designate all overhead positions on fires requiring extended attack. Reference should be made to a Delegation of Authority (Appendix J).

Protection of Structures
Service-owned structures on the refuge will be inventoried and assessed for surrounding hazardous fuels by the refuge fire staff. If needed, annual maintenance will be done to prevent hazardous fuel buildup around the structures. Currently, the refuge has structures only at the headquarters area on the Llano Seco unit (Appendix C). These are somewhat protected from fire by a graveled parking area. Wooden observation platforms exist along 7-Mile Road.

Priorities for protection are listed below:

1. Human life and safety.
2. Buildings and facilities.
3. Power lines along rights-of-way.

Specific tactics for fire suppression:

1. Use direct attack where safe and feasible to minimize risk and damage.
2. Use existing roads, canals, parking lots, and natural features for control lines, anchor points, safety zones, and escape routes.
3. Use burnouts to stabilize and reinforce control lines.
4. Heavy equipment (i.e., ground-disturbing activities) is allowed if necessary to protect human life or if there has been an archaeological clearance.
5. Retardant and foam are allowed with standard restrictions on use near waterways.

Suppression Conditions
The Refuge Manager will ensure that a qualified Incident Commander (IC) is assigned for each fire occurring on the Refuge. If a qualified IC is not available, one will be ordered and a unified command with be established with a representative from the Refuge. The IC will be responsible for all aspects of the fire's management. The IC will select the appropriate suppression strategies and tactics. Minimum impact tactics will be used whenever possible. Dozers, plows, discs, or graders will not be used inside refuge boundaries without permission from the Refuge Manager or their designate. THE IC HAS DISCRETION AND RESPONSIBILITY TO TAKE WHATEVER ACTION IS NECESSARY TO PROTECT HUMAN LIFE.

Mutual aid resources responding from local fire departments to Refuge fires must meet federal fire qualifications as outlined in PMS 310-1 or National Fire Protection Association (NFPA) standards. The California State Fire Marshall's Office has issued standards for the State that meet or exceed PMS 310-1 standards. Mutual aid resources will report to the IC (in person or by radio) for assignment and will be the first priority for release.

The IC will notify the Refuge Manager whenever it appears that a fire will exceed initial attack efforts, may threaten private lands, or when fire complexity will exceed the capabilities of command or operations. The Refuge Manager will be responsible for coordinating with the IC all extended attack actions including:

- Completion and daily review of a WFSA (Wildland Fire Situation Analysis)
- Assignment or ordering of appropriate resources
- Completion of Delegation of Authority if needed
- Development of standards and guidelines for use of heavy equipment, foam, retardant, aircraft, etc. using an interdisciplinary process

Initial Attack
Upon receipt of a fire or smoke report, answer the questions in the Complex fire dispatch plan (Appendix L). If the fire is on FWS land, or is threatening (usually restricted to burning within a mile of the boundary), then dispatch firefighting resources based on information at hand. A record of phone or radio contacts should be kept. As soon as possible, notify both the FMO and the Refuge Manager about the ignition. Prompt decisive action during the early stages of a fire often determines the success or failure of the Initial Attack (IA).

After the resources arrive at the fire, the Refuge FMO or Refuge Manager should request a field report from the IC. The Initial Attack Incident Commander (IAIC) should follow the Fire Line Handbook, which covers IA with details about duties and responsibilities, checklists, and general descriptions of both strategy and tactic. Both the IAIC and Refuge staff should be assessing the possibility that the fire will transition to an extended attack operation using the following list:

1. The IAIC requests additional resources.
2. Fire will not be contained by the beginning of the second full operational period.
3. Fire activity has required a change in strategy or tactics.
4. The IAIC request an Extended Attack IC.
5. Or, the Refuge staff wants a more experienced IC.

The Refuge FMO should complete the following tasks during the transition period to an extended attack operation:

1. Prepare a complexity analysis.
2. Prepare a briefing package for incoming IC and overhead.
3. Prepare a Wildland Fire Situation Analysis (WFSA) in conjunction with the incoming IC.

The Refuge Manager should complete the following tasks during the transition period:

1. Based upon the WFSA prepared by the FMO and IC, complete and approve the WFSA.
2. Prepare a Delegation of Authority.
3. Assign a Resource Advisor to the incident.
4. Consider using a Unified Command (e.g., refuge and local volunteer fire department or California Department of Forestry).
5. Prepare and deliver a briefing to incoming overhead.

Wildland Fire Situation Analysis
For fires that cannot be contained in one burning period, a Wildland Fire Situation Analysis

(WFSA) must be prepared. In the case of a wildland fire, the Refuge Manager and Refuge staff, in conjunction with the FMO, will prepare the WFSA. Approval of the WFSA resides with the Refuge Manager. Sample WFSA is located in Appendix R.

The purpose of the WFSA is to allow for a consideration of alternatives by which a fire may be controlled. Damages from the fire, suppression costs, safety, and the probable character of suppression actions are all important considerations.
Public safety will require coordination between all refuge staff and the IC. Notices should be posted to warn visitors, trails may be closed, traffic control will be necessary where smoke crosses roads, etc. Where wildland fires cross roads, the burned area adjacent to the road should be mopped up and dangerous snags felled. Every attempt will be made to utilize natural and constructed barriers, including changing fuel complexes, in the control of wildland fire. Rehabilitation efforts will concentrate on the damages done by suppression activities rather than on the burned area itself.

Aircraft Operations
Aircraft may be used in all phases of fire management operations. All aircraft must be Office of Aircraft Services (OAS) or Forest Service approved. An OAS Aviation Policy Department Manual will be provided by OAS.

Helicopters may be used for reconnaissance, bucket drops and transportation of personnel and equipment. Natural helispots and parking lots are readily available in most cases. Clearing for new helispots should be avoided where possible. Improved helispots will be rehabilitated following the fire.

As in all fire management activities, safety is a primary consideration. Qualified aviation personnel will be assigned to all flight operations.

EMERGENCY STABILIZATION AND REHABILITATION
When suppression action is taken, rehabilitation is appropriate. The most effective rehabilitation measure is prevention of impacts through careful planning and the use of minimum impact suppression techniques.

Suppression rehabilitation will be initiated by the Incident Commander, FMO, or Refuge Manager. Rehabilitation will be directed toward minimizing or eliminating the effects of the suppression effort and reducing the potential hazards caused by the fire. These actions may include:

1. Backfill control lines, scarify, and seed.
2. Install water bars and construct drain dips on control lines to prevent erosion.
3. Install check dams to reduce erosion potential in drainages.
4. Restore natural ground contours.
5. Remove all flagging, equipment and litter.
6. Consider and plan more extensive rehabilitation or revegetation to restore sensitive impacted areas.

If revegetation or seeding is necessary, only native plant species will be used.

If Emergency Stabilization and Rehabilitation (ESR) measures are needed or if rehabilitation is needed to reduce the effects of a wildland fire then the Refuge can request appropriate funding through the burned area ESR fund. The ESR fund is administered through the Service's ESR coordinator at the National Interagency Fire Center.

Fire rehabilitation will be as prompt as possible to prevent erosion and spread of non-native plants. This will be developed by the Refuge staff and submitted to the Regional Fire Management Coordinator for review within 90 days of the unplanned ignition being declared out.

REQUIRED REPORTING

The fire staff will complete all situation reports as soon as practical. The IC will complete the DI-1202 Fire Report and Crew Time Reports for all personnel assigned to the fire, and return these documents to the Fire Program Manager for entry into the DOI Computer (SACS). The Fire Management Officer will ensure that all expenses and/or items lost on the fire are reported, that the timekeeper is advised of all fire time and premium pay to be charged to the fire, and that expended supplies are replaced.

FIRE INVESTIGATION

Fire management personnel will attempt to locate and protect the probable point of origin and record pertinent information required to determine fire cause. They will be alert for possible evidence, protect the scene and report findings to the fireline supervisor.

Prompt and efficient investigation of all suspicious fires will be carried out. However, fire management personnel should not question suspects or pursue the fire investigation unless they are a qualified fire investigator or commissioned law enforcement personnel. Fire investigations should follow the guidelines outlined in Service Fire Management Handbook.

PRESCRIBED FIRE ACTIVITIES

PRESCRIBED BURN PROGRAM OBJECTIVES

Sacramento River National Wildlife Refuge has been active with prescribed burning as part of the overall management of the resources. Prescribed fire has been an integral part of the resource management on the Complex since 1997. The prescribed fire activity is established and coordinated annually as part of each Refuge's Habitat Management Plan. The planning allows for an annual target of 5-10% of the Refuge's total acreage to be treated. The use of prescribed fire to remove excess vegetation in uplands, wetlands, and riparian areas provides for less intense fires and provides quality habitat desirable for many waterfowl, waterbird, and other species. The prescribed fire program goals are hazard fuel reduction and resource/habitat management.

Hazard fuel reduction (mechanical removal or prescribed fire) should occur within or near Refuge development zones, sensitive natural resources, and boundary areas to reduce the risk from wildlfire. To the greatest extent possible, hazard fuel burns should compliment resource management objectives. Goals of hazard fuel reduction prescribed burning include:

- maintain fuel loadings within the natural ranges (determined by fuel type).
- protect resources/habitat from wildland fire trespass.
- establish defensible space around improvements and structures.

Resource management prescribed fire is used to restore, create, enhance, and/or maintain a diversity and quality of habitats in order to restore and perpetuate native or desirable wildlife species and plant communities. To achieve these goals, prescribed burns may be required as often as every 5-10 years in wetland units and every 1-5 years in upland units. Goals of resource management burns include:

- control excessively dense emergent vegetation growth in wetlands.
- enhance wetland plant species that provide food for waterbirds.
- enhance native upland species production.
- aid in control of noxious weeds such as cockleburr, jointgrass, bermuda grass, and starthistle.
- maintain/rejuvenate quality "green browse" for ducks, geese, and cranes in upland areas.
- maintain/rejuvenate perennial grasslands used for nesting/winter cover.

Complexity is dependent upon location, fuels, vegetation, objectives, fuel breaks, crew size, burn size, adjacent landownership, presence of improvements or facilities, and smoke considerations. Burns on the Refuge vary from low-medium in fuel models 1 and 3, which represents approximately 80 to 90% of the total acres treated, to low- high in the model 9 fuels.

The refuge reserves the option to utilize an interagency team approach for complex burns carried out on the boundaries and close to developed areas or burns of large acreage. The most highly qualified and experienced personnel in the regional interagency community would be requested to serve on this team.

FIRE MANAGEMENT STRATEGIES

The following strategies will be employed to meet the fire management objectives:

- Conduct all fire management programs in a manner consistent with applicable laws, policies and regulations.
- Maintain Memorandums of Understanding with local fire agencies and protection districts to promote cooperative prevention, suppression, and prescribed fire activities. Provide assistance to local or federal cooperators under the "closest resources" principles in accordance with Service policy.
- Utilize prescribed fire as a management treatment for achieving hazard fuel reduction and resource management objectives.
- Initiate cost effective fire monitoring which will assist determination of whether objectives are being met. Monitoring information will also be used to refine burn prescriptions to better achieve objectives.
- Integrate fire ecology, management, and prevention themes into existing interpretive and education programs.

Fire Effects by Vegetation Type

Burning removes accumulated residual fuels, thus reducing wildland fire potential. Sensitive vegetation may be impacted by fire that occurs at the wrong time of year, and growing plants may be killed by fire, which may or may not be a desired result. A recent study conducted at Sacramento National Wildlife Refuge Complex documents the effects of fire on four rare plants, and is summarized under the "Fire Research" section.

Upland

When properly applied, prescribed fire may stimulate native upland species production by reducing some non-native plants and their thatch. Burning also removes accumulated residual fuels, thus reducing wildland fire potential.

Wetlands

Wetlands benefit by opening up overly dense stands of emergent vegetation or by reducing problem species such as jointgrass and managing tule. The results are found within the first year and are documented through the yearly bird use data.

Riparian

Little data exists as to the results of burning in these areas. However research is presently being conducted to see how these areas respond to burning under various conditions. Data from prescribed burns and wildland fires in Riparian zones show some impact to the areas. However, these areas start to recover within 1 - 2 years.

PRESCRIBED FIRE PLANNING

The climate of the Sacramento Valley and the diverse vegetation and habitat management objectives allow prescribed burns to be conducted at almost any time of the year. However, most burning occurs from June through November.

Annual Activities

The FMO will be responsible for completing an annual fire summary report. The report will contain the number of fires by type, acres burned by fuel type, cost summary, personnel utilized, and fire effects.

The prescribed fire planning begins with the annual Habitat Management Plans for the refuge. From the plan, the Refuge Biologist and Assistant Refuge Manager are responsible for developing resource goals and treatment objectives for those units/areas. The fire staff determines if prescribed fire can be utilized to meet the treatment objectives and prepares the Prescribed Fire Plan (see below).

Smoke permits from the local air quality districts will be obtained. Permit parameters and fees vary by air district and are subject to change. A list of air quality districts and fee structures is located in Appendix S. An estimate of total acres should be provided early in the planning process to allow the air districts to complete and coordinate for the proposed emissions.

Prescribed Fire Burn Plan
Individual prescribed fire burn plans will be the primary document used to record prescribed fire information. Burn plans document air quality requirements, personnel, costs, fire behavior, weather, fire summary, and burn critique information. Prescribed burns will also be documented on DI-1202 forms and entered into the DOI shared applications computer system (SACS).

The Prescribed Fire Burn Boss will conduct a field reconnaissance of the proposed burn location with the Refuge FMO, PFS, Biologist, and/or Refuge Manager to discuss objectives, special concerns, and gather all necessary information to write the burn plan. After completing the reconnaissance, a Prescribed Fire Burn Boss will write the prescribed fire burn plan.

All prescribed fires will have prescribed burn plans. The prescribed burn plan is a site specific action plan describing the purpose, objectives, prescription, and operational procedures needed to prepare and safely conduct the burn. The treatment area, objectives, constraints, and alternatives will be clearly outlined. No burn will be ignited unless all prescriptions of the plan are met. Fires not within those parameters will be suppressed. Prescribed Burn Plans will follow the format contained in AppendixT. Each burn plan will be reviewed by the Refuge Manager, Biologist, and Refuge FMO and must meet technical review standards set in the Service Fire Management Handbook. The Refuge Manager has the authority to approve the burn plan. The term “burn unit” refers to a specific tract of land to which a prescribed fire burn plan applies.

Strategies and Personnel
The fire staff will oversee and assist the Refuge field staff with the unit preparations including equipment maintenance, fuel break mowing, and blacklining. The Public Use Specialist will be responsible for assisting with public relations and education regarding the use of fire as a management practice.

The Refuge FMO or PFS will assign a burn boss of the appropriate level to implement the burn. The burn boss will follow all guidelines and procedures that are contained in the Prescribed Fire Plan.

The Complex will meet or exceed standard and qualification requirements as outlined in USFWS Fire Management Handbook and Interagency prescribed fire qualification (NWCG publication 310-1). The Refuge Manager shall delegate to the Fire Program Manager responsibility for ensuring that Refuge personnel maintain the qualifications necessary to implement the fire program. The Complex will develop and maintain employees at the burn

boss II level, with a target of 2 fully-qualified employees.

An updated spot weather forecast will be obtained on the day of ignition and all prescription elements will be rechecked to determine if all elements are still within the approved ranges. If all prescription and plan elements are met using the Go-No-Go checklist, and a test fire will be ignited to determine on-site fire behavior conditions as affected by current weather. If conditions are not satisfactory, the test fire will be suppressed and the burn will be rescheduled. If conditions are satisfactory the burn will continue as planned.

If a prescribed burn escapes the predetermined burn area, all further ignitions will be halted except as needed for suppression efforts. Suppression efforts will be initiated, as discussed in the pre-burn briefing. The Refuge FMO will be notified immediately of any control actions on a prescribed burn. If the burn exceeds the initial suppression efforts, the burn will be declared a wildland fire and suppressed using guidelines established in this plan. A WFSA will be completed and additional personnel and resources ordered when the fire exceeds initial attack capabilities. If the fire continues to burn out of control, additional resources will be called from the local cooperating agencies via the servicing dispatch.

Monitoring and Evaluation

Monitoring of prescribed fires is intended to provide information for quantifying and predicting fire behavior and its ecological effects on refuge resources while building a historical record. Monitoring measures the parameters common to all fires: fuels, topography, weather and fire behavior. In addition, ecological changes such as species composition and structural changes will be monitored after a fire. This information will be very useful in fine-tuning the prescribed burn program.

All wildland fires will be appropriately suppressed. However, monitoring wildland fires may be appropriate and potentially valuable in mapping and documenting the growth of the fire, measuring on-site weather and fuel loading to provide the fire staff with present and expected fire behavior and effects. During prescribed burns, monitoring can serve as a precursor to invoking suppression action by determining if the fire is in prescription, assessing its overall potential, and determining the effects of the prescribed burn.

Monitoring and evaluation are part of the prescribed fire process. Monitoring is completed in 3 steps: pre-burn, burn day, and post-burn.

- Pre-burn evaluations use photo points or general photos, gross visual species composition and vigor and, if requested, plots.
- Burn day evaluations document temperature, relative humidity, windspeed, fine fuel moisture, rate of spread, flame length, smoke dispersal, objectives, and % scorch of woody species.
- Post burn evaluations use photo points or general burn photos, and qualitative estimates of bird use by species as well as native species response and effectiveness in achieving objectives.

Required Reports

All prescribed burn forms will be completed as outlined by the Prescribed Burn Boss. A monitor will be assigned to collect all predetermined information and complete all necessary forms prior to, during, and after the burn. All records will be archived in the Refuge's fire records for future

use and reference.

The Prescribed Burn Boss will prepare a final report on the prescribed burn. Information will include a narrative of the burn operation, a determination of whether objectives were met, weather and fire behavior data, map of the burn area, photographs of the burn, number of work hours, and final cost of the burn.

Prescribed Burn Critique

Prescribed fires will be critiqued by the burn boss and documented in the burn plan. The FMO and Refuge Manager will conduct a formal critique if:

- significant injury/accident.
- an escape prescribed fire occurs.
- significant safety concerns are raised.
- smoke management problems occur.

AIR QUALITY / SMOKE MANAGEMENT GUIDELINES

Visibility and clean air are primary natural resource values. The protection of these resources must be given full consideration in fire management planning and operations. In addition, smoke management can have serious health and safety effects which must be considered during the planning and approval process.

All prescribed burns must comply with the State of California Air Quality Regulations for Burning (CCR TITLE 17, Sub-chapter 2. “Smoke Management Guidelines for Agricultural and Prescribed Burning”), and local implementation plans. The Sacramento Valley Air Basin is comprised of 8 Air Quality Districts located in 9 Counties. All burn projects are required to have a permit from the local air quality or pollution control district (listed in Appendix S). Projects must be submitted to the local district for compliance review and approval at least 3-4 weeks in advance of the planned burn date by submitting a copy of the smoke management plan (Appendix S) with the required fees.

The management of smoke will be incorporated into the planning of prescribed fires, and, to the extent possible, in the suppression of wildland fires. Sensitive areas will be identified and precautions will be taken to safeguard visitors and Refuge neighbors. When burning is done adjacent to roads and highways, close attention will be kept on wind conditions to prevent a driving hazard. There will be no hesitation to postpone a burn when the wind conditions are questionable.

FIRE RESEARCH

The effects of fire upon the Refuge's plant and animal populations need to be better understood. Through applied research and careful application of fire, data collected can provide managers with a better understanding of the natural ecological effects of fire, and the information needed to refine prescriptions to meet resource objectives.

Fire behavior data will be collected on all fires occurring on Refuge lands. Monitoring will comply with accepted scientific methods. This data, along with information gathered through research studies, will be used to improve the effectiveness of the fire management program. Data from other refuges in the complex will also help fill gaps in information.

The following research is needed :

- comprehensive inventory and assessment of hazard fuels, and the identification and prioritization of hazard fuel units.
- assessment of hazard fuel management options, and their effects upon Refuge resource objectives
- assessment of long and short term fire effects in the uplands, wetlands, and vernal pools of the Refuge with recommendations for using prescribed fire in conjunction with other management tools to meet resource objectives.
- assessment of fire effect monitoring needs and preparation of fire effect monitoring plan.

Preliminary research results from a recent study conducted at Sacramento NWRC indicate that the rare halophytes, *Cordylanthus palmatus* (palmate-bracted bird's-beak), *Atriplex joaquiniana* (San Joaquin spearscale), *Atriplex cordulata* (heartscale), and *Atriplex depressa* (brittlescale) are not fire-adapted species. Seeds are destroyed when subjected to laboratory heat experiments. Field investigations show a decrease in total number of plants for these species the year following a fire, but abundance increased in the second season. Palmate-bracted bird's-beak responds better after fall burns, while heartscale recovers better after spring burns. San Joaquin spearscale responded equally poorly in the first season following both spring and fall burns. Brittlescale abundance was not affected because it mostly occurs on alkali scalds that do not carry fire. While post burn abundance decreased for these plants, the size of individual plants increased. A large seed bank, shielded from killing heat, is indicated in the increasing abundance in the second year following prescribed fire. Future fire management research should focus on population dynamics of palmate-bracted bird's-beak, especially plant reproductivity (seed counts on live plants) and the role of the soil seed bank in population recovery and maintenance.

PUBLIC SAFETY

Firefighter and public safety will always take precedence over property and resource protection during any fire management activity.

The greatest threat to public safety from Refuge wildland fires or escaped prescribed fires is entrapment by extremely fast moving fire fronts or fingers. Of particular concern are hunters or visitors who may be present in the area of the fire, and neighbors who initiate their own suppression actions without proper training, equipment, or communication. Refuge staff will attempt to keep the fire scene clear of people except for qualified fire personnel.

Another concern is smoke from a Refuge wildland or prescribed fire, particularly smoke that drifts into a roadway causing dangerously reduced visibility. The fire dispatcher will notify the local Law Enforcement Agency whenever the IC believes that smoke may be causing a safety hazard. The County Sheriff can assess the situation and take action as needed.

The final concern is for fires which might escape from the Refuge and spread to inhabited private property. The IC is responsible for making sure that the public is warned and evacuated if necessary, by going through county law enforcement offices or the California Highway Patrol.

A Pre-attack Plan will include names and phone numbers of adjacent landowners and can be found in each engine, in the fire management office and within the Dispatch Plan at Refuge Headquarters. The Pre-attack Plan will be updated annually to ensure land ownership information is still valid.

PUBLIC INFORMATION AND EDUCATION

Informing the public is an important part of fire suppression, fire prevention, prescribed fire, and the USFWS mission. During fire operations the IC / Burn Boss is responsible for providing fire information to the press and the public. The IC may delegate this task as needed.

Informing the public is a vital element of the prescribed fire program. Areas that have been burned will present an opportunity for the public to actually see the effects of fires, and offer staff members an excellent opportunity to explain the purpose of the burns to the public. These programs should demonstrate the refuge's capability to safely conduct prescribed fire operations, and increase the public's tolerance of the aesthetic effects.

Between 90 and 95 percent of the Refuge's fires have been human caused (including equipment, power poles) and thus could have been prevented. Human caused fires have the potential to be the most damaging because they can occur at a time of the year when fewer initial attack resources are available and fuels are cured.

In general, the local public and many visitors to the refuge are very aware of fire prevention. As a reminder, the Refuge will use the following measures as appropriate:

- signing.
- closures when necessary.
- public contacts through press releases and individual contacts.
- enforcement of regulations and prosecution of violators.
- employee training and awareness.
- implementation of State regulations and restrictions.
- contacts with Refuge cooperators and neighbors.
- maintain fuel breaks.

FIRE CRITIQUES AND ANNUAL PLAN REVIEW

FIRE CRITIQUES

Wildland fires with be critiqued by the IC. The FMO will conduct formal fire critiques in the event of:

- significant injury/accident
- significant property or resource damage.
- significant safety concerns are raised.
- an extended attack is necessary.

ANNUAL FIRE SUMMARY REPORT

The FMO will be responsible for completing an annual fire summary report. The report will contain the number of fires by type, acres burned by fuel type, cost summary (prescribed burns and wildland fires), personnel utilized, and fire effects.

ANNUAL FIRE MANAGEMENT PLAN REVIEW

The Fire Management Plan will be reviewed annually. Necessary updates or changes will be accomplished prior to the next fire season. Any additions, deletions, or changes will be reviewed by the Refuge Manager to determine if such alterations warrant a re-approval of the plan.

CONSULTATION AND COORDINATION

The following agencies, organizations and/or individuals were consulted in preparing this plan. All fire management program activities will be implemented in cooperation and coordination with federal, state, county, and local agencies. Other agencies and organizations will be consulted with as needed.

Roddy Baumann, Prescribed Fire Specialist, Pacific Region, USFWS, Portland, OR.

Michael Durfee, former Prescribed Fire Specialist, Sacramento NWRC, USFWS, Willows, CA

Steve Emmons, Assistant Refuge Manager, Sacramento NWRC, Willows, CA

Richard Hadley, Assistant Refuge Supervisor, California/Nevada Operations, Sacramento, CA

Jennifer Isola, Wildlife Biologist, Sacramento NWRC, Willows, CA.

Amanda McAdams, Fire Planner, Pacific Region, USFWS, Portland, OR.

Greg Mensik, Deputy Refuge Manager, Sacramento NWRC, Willows, CA.

Joel Miller, Assistant Refuge Supervisor, California/Nevada Operations, Sacramento, CA

Dave Paullin, Refuge Supervisor, California/Nevada Operations, Sacramento, CA

Mike Peters, Assistant Refuge Manager, Sacramento NWRC, Willows, CA.

Joe Silveira, Wildlife Biologist, Sacramento NWRC, Willows, CA.

Mike Wolder, Wildlife Biologist, Sacramento NWRC, Willows, CA.

Appendix A: Nepa Documentation/Other Planning Documents

Appendix B: Definitions of Terminology

Agency Administrator. The appropriate level manager having organizational responsibility for management of an administrative unit. May include Director, Regional Director, Refuge Manager or Refuge Manager (FWS); Director, State Director, District Manager or Field Manager (BLM); Director, Regional Director, Park Superintendent, or Unit Manager (NPS), or Director, Office of Trust Responsibility, Area Director, or Superintendent (BIA).

Appropriate Management Action. Specific actions taken to implement a management strategy.

Appropriate Management Response. Specific actions taken in response to a wildland fire to implement protection and fire use objectives.

Appropriate Management Strategy. A plan or direction selected by an agency administrator which guide wildland fire management actions intended to meet protection and fire use objectives.

Appropriate Suppression. Selecting and implementing a prudent suppression option to avoid unacceptable impacts and provide for cost-effective action.

Bureau. Bureaus, offices or services of the Department.

Class of Fire (as to size of wildland fires):
Class A - 3 acre or less.
Class B - more than 3 but less than 10 acres.
Class C - 10 acres to 100 acres.
Class D - 100 to 300 acres.
Class E - 300 to 1,000 acres.
Class F - 1,000 to 5,000 acres.
Class G - 5,000 acres or more.

Emergency Stabilization and Rehabilitation/Burned Area Emergency Stabilization and Rehabilitation (ESR/BAESR). Emergency actions taken during or after wildland fire to stabilize and prevent unacceptable resource degradation or to minimize threats to life or property resulting from the fire. The scope of ESR/BAESR projects are unplanned and unpredictable requiring funding on short notice.

Energy Release Component (ERC) A number related to the available energy (BTU) per unit area (square foot) within the flaming front at the head of a fire. It is generated by the National Fire Danger Rating System, a computer model of fire weather and its effect on fuels. The ERC incorporates thousand hour dead fuel moistures and live fuel moistures; day to day variations are caused by changes in the moisture content of the various fuel classes. The ERC is derived from predictions of (1) the rate of heat release per unit area during flaming combustion and (2) the duration of flaming.

Extended attack. A fire on which initial attack forces are reinforced by additional forces.

Fire Suppression Activity Damage. The damage to lands, resources and facilities directly attributable to the fire suppression effort or activities, including: dozer lines, camps and staging areas, facilities (fences, buildings, bridges, etc.), handlines, and roads.

Fire effects. Any consequences to the vegetation or the environment resulting from fire, whether neutral, detrimental, or beneficial.

Fire intensity. The amount of heat produced by a fire. Usually compared by reference to the length of the flames.

Fire management. All activities related to the prudent management of people and equipment to prevent or suppress wildland fire and to use fire under prescribed conditions to achieve land and resource management objectives.

Fire Management Plan. A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational procedures such as preparedness plans, preplanned dispatch plans, prescribed fire plans and prevention plans.

Fire prescription. A written direction for the use of fire to treat a specific piece of land, including limits and conditions of temperature, humidity, wind direction and speed, fuel moisture, soil moisture, etc., under which a fire will be allowed to burn, generally expressed as acceptable range of the various fire-related indices, and the limit of the area to be burned.

Fuels. Materials that are burned in a fire; primarily grass, surface litter, duff, logs, stumps, brush, foliage, and live trees.

Fuel loadings. Amount of burnable fuel on a site, usually given as tons/acre.

Hazard fuels. Those vegetative fuels which, when ignited, threaten public safety, structures and facilities, cultural resources, natural resources, natural processes, or to permit the spread of wildland fires across administrative boundaries except as authorized by agreement.

Initial Attack. An aggressive suppression action consistent with firefighter and public safety and values to be protected.

Maintenance burn. A fire set by agency personnel to remove debris; i.e., leaves from drainage ditches or cuttings from tree pruning. Such a fire does not have a resource management objective.

Natural fire. A fire of natural origin, caused by lightning or volcanic activity.

NFDRS Fuel Model. One of 20 mathematical models used by the National Fire Danger Rating System to predict fire danger. The models were developed by the US Forest Service and are general in nature rather than site specific.

NFFL Fuel Model. One of 13 mathematical models used to predict fire behavior within the conditions of their validity. The models were developed by US Forest Service personnel at the Northern Forest Fire Laboratory, Missoula, Montana.

Prescription. Measurable criteria which guide selection of appropriate management response and actions. Prescription criteria may include safety, public health, environmental, geographic, administrative, social, or legal considerations.

Prescribed Fire. A fire ignited by agency personnel in accord with an approved plan and under prescribed conditions, designed to achieve measurable resource management objectives. Such a fire is designed to produce the intensities and rates of spread needed to achieve one or more planned benefits to natural resources as defined in objectives. Its purpose is to employ fire scientifically to realize maximize net benefits at minimum impact and acceptable cost. A written, approved prescribed fire plan must exist and NEPA requirements must be met prior to ignition. NEPA requirements can be met at the land use or fire management planning level.

Preparedness. Actions taken seasonally in preparation to suppress wildland fires, consisting of hiring and training personnel, making ready vehicles, equipment, and facilities, acquiring supplies, and updating agreements and contracts.

Prevention Activities directed at reducing the number or the intensity of fires that occur, primarily by reducing the risk of human-caused fires.

Rehabilitation (1) Actions to limit the adverse effects of suppression on soils, watershed, or other values, or (2) actions to mitigate adverse effects of a wildland fire on the vegetation-soil complex, watershed, and other damages.

Suppression. A management action intended to protect identified values from a fire, extinguish a fire, or alter a fire's direction of spread.
Unplanned ignition. A natural fire that is permitted to burn under specific conditions, in certain locations, to achieve defined resource objectives.

Wildfire. An unwanted wildland fire.

Wildland Fire. Any non-structure fire, other than prescribed fire, that occurs in the wildland.

Wildland Fire Situation Analysis (WFSA). A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, economical, political, and resource management objectives as selection criteria.

Wildland/urban interface fire A wildland fire that threatens or involves structures

Appendix C: Structures and Cultural Resources of Sacramento River NWR

* = of historical significance

Located at Llano Seco Unit

STRUCTURE	DESCRIPTION
Repair Shop	Concrete block / floor, asphalt tile roof
Office	Concrete floor, wood siding
Storage / Pumphouse	Concrete floor, wood siding
Equipment Storage	Open bay, metal structure
Repair Shop	Concrete floor, metal structure
Equipment Storage	Open bay, wood structure

Appendix D: Plant Species of Sacramento River National Wildlife Refuge

ACERACEAE
Acer negundo californicum-Box-elder
Acer saccharinum-Silver Maple

ALISMATACEAE
Alisma plantago-aquatica-Water-plantain
Damasonium californicum-Fringed Water-plantain
Echinodorus berteroi-Upright Burhead
Sagittaria latifolia-Tule-potato
Sagitarria longiloba-Long-lobed Arrowhead
Sagittaria montevidensis calycina-Hooded Arrowhead

AMARANTHACEAE
Amaranthus albus-Tumbleweed
Amaranthus blitoides-Mat Amaranth
Amaranthus retroflexus-Red-rooted Amaranth

ANACARDIACEAE
Pistacia chinensis-Oriental Pistachio
Toxicodendron diversilobum-Western Poison-oak

APIACEAE
Ammi visnaga-Toothpick-weed
Anthriscus caucalis-Bur-chervil
Conium maculatum-Poison-hemlock
Eryngium vaseyi-Coyote Thistle
Foeniculum vulgare-Fennel
Perideridia kelloggii-Kellogg's Yampah
Scandix pecten-veneris-Shepherd's-needle
Torilis arvensis arvensis-Common Hedge-parsley
Torilis arvensis purpurea-Purple Hedge-parsley
Torilis nodosa-Knotted Hedge-parsely

Gnaphalium palustre-Western Marsh Cudweed
Helenium puberulum-Rosilla
Hemizonia congesta luzulifolia-Hayfield Tarweed
Hemizonia fitchii-Fitch's Spikeweed
Hemizonia parryi rudis-Parry's Spikeweed
Hesperevax caulescens-Hogwallow Evax
Heterotheca oregona rudis-Oregon Golden-aster
Hypochoeris glabra-Smooth Cat's-ear
Lactuca saligna-Willow-leaved Lettuce
Lactuca serriola-Prickly Lettuce
Lasthenia californica-California Goldfields
Lasthenia fremontii-Fremont's Goldfields
Layia fremontii-Fremont's Tidytips
Leontodon taraxacoides longirostris-Long-beaked Hawkbit
Microseris douglassi douglasii-Douglas'

ARISTOLOCHIACEAE
Aristolochia californica-California Pipevine

ASCLEPIADACEAE
Asclepias fascicularis-Narrow-leaved Milkweed
Asclepias speciosa-Showy Milkweed

ASTERACEAE
Achyrachaena mollis-Blow-wives
Agoseris heterophylla-Annual Agoseris
Ambrosia psilostachya-Western Ragweed
Anthemis cotula-Mayweed
Artemisia douglasiana-Mugwort
Aster chilensis invenustus-California Aster
Aster subulatus ligulatus-Annual Saltmarsh Aster
Aster sp.-Unidentified Aster
Baccharis douglasii-Marsh Baccharis
Baccharis pilularis-Coyote-brush
Baccharis salicifolia-Mule's-fat
Bidens frondosa-Sticktight
Brickellia californica-California Brickellbush
Centaurea solstitialis-Yellow Star-thistle
Chamomilla occidentalis-Valley Pineapple-weed
Chamomilla suaveolens-Common Pineapple-weed
Cichorium intybus-Chicory
Cirsium vulgare-Bull Thistle
Conyza bonariensis-South American Horseweed
Conyza canadensis-Canadian Horseweed
Conyza floribunda-Many-flowered Horseweed
Cotula australis-Australian Cotula
Euthamia occidentalis-Western Goldenrod
Filago gallica-Narrow-leaved Filago
Filago pyramidata pyramidata-Herba Impia
Gnaphalium luteo-album-Weedy Cudweed

Microseris
Picris echioides-Bristly-Oxtongue
Psilocarphus brevissimus brevissimus-Dwarf Woolly- marbles
Psilocarphus oregonus-Oregon Woolly-marbles
Senecio vulgaris-Old-man-of-the-spring
Silybum marianum-Milk-thistle
Sonchus asper asper-Spiny-leaved Sow-Thistle
Sonchus oleraceus-Common Sow-thistle
Sonchus tenerrimus-Slender Sow-thistle
Xanthium spinosum-Spiny Cocklebur
Xanthium strumarium-Rough Cocklebur

BETULACEAE
Alnus rhombifolia-White Alder

BORAGINIACEAE
Amsinckia lycopsoides-Bugloss Fiddleneck
Amsinckia menziesii intermedia-Common Fiddleneck
Heliotropium curassavicum-Wild Heliotope
Plagiobothrys canescens-Valley Popcorn-flower
Plagiobothrys stipitatus stipitatus-Large-flowered Stipitate Popcorn-flower
Plagiobothrys stipitatus micranthus-Small-flowered Stipitate Popcorn-flower

BRASSICACEAE
Brassica nigra-Black Mustard
Capsella bursa-pastoris-Shepherd's purse
Coronopus didymus-Lesser Swinecress
Hirschfeldia incana-Mediterranean Hoary-Mustard
Lepidium latifolium-Broad-leaved Pepper-grass
Lepidium nitidum nitidum-Shining Pepper-grass
Lepidium strictum-Upright Pepper-grass
Raphanus raphanistrum-Jointed Charlock
Raphanus sativus-Radish
Rorippa curvisiliqua occidentalis-Western
Herniaria hirsuta hirsuta-Herniaria
Spergularia bocconei-Boccone's Sandspurry
Stellaria media-Common Chickweed

CHENOPODIACEAE
Chenopodium album-Lamb's Quarters
Chenopodium ambrosioides-Mexican Tea
Chenopodium botrys-Jerusalem-oak
Chenopodium pumilio-Tasmanian Goosefoot
Chenopodium strictum glaucophyllum-Glaucous-leaved Goosefoot
Cycloloma atriplicifolium-Winged-pigweed
Salsola tragus-Russian-thistle

CONVOLVULACEAE
Convolvulus arvensis-Bindweed

CORNACEAE
Cornus glabrata-Brown Dogwood

CRASSULACEAE
Crassula aquatica-Water Pygmy-weed

CUCURBITACEAE
Marah fabaceus agrestis-California Manroot

CUSCUTACEAE
Cuscuta pentagona-Field Dodder

CYPERACEAE
Carex barbarae-Santa Barbara Sedge
Carex densa-Dense Sedge
Yellow- cress
Sibara virginica-Virginia Winged-Rockcress

CALLITRICHACEAE
Callitriche heterophylla bolanderi-Variable-leaved Water-starwort

CAMPANULACEAE
Downingia bicornuta bicornuta-Double-horned Downingia
Downingia ornatissima ornatissima-Folded Downingia

CAPRIFOLIACEAE
Sambucus mexicana-Blue Elderberry

CAPPARACEAE
Polanisia dodecandra trachysperma-Clammyweed

CARYOPHYLLACEAE
Cerastium glomeratum-Sticky Mouse-eared Chickweed
Carex praegracilis-Clustered Field Sedge
Carex nudata-Torrent Sedge
Carex vulpinoidea-Fox Sedge
Cyperus difformis-Small-flowered Cyperus
Cyperus erythrorhizos-Red-rooted Cyperus
Cyperus strigosus-False Nutsedge
Eleocharis macrostachya-Pale Spike-rush
Eleocharis obtusa engelmannii-Englemann's Spike- rush
Eleocharis quadrangulata-Square-stemmed Spike- rush
Scirpus acutus occidentalis-Hard-stemmed Tule
Scirpus maritimus-Saltmarsh Bulrush
Scirpus mucronatus-Rough-seeded Bulrush
Scirpus tuberosus-Tuberous Bulrush

ELANTINACEAE
Elantine heterandra-Variable-stamened Waterwort
Elantine rubella-Red Waterwort

EQUISTACEAE
Equisetum arvense-Common Horsetail
Equisetum laevigatum-Smooth Scouring-rush

EUPHORBIACEAE
Chamaesyce maculata-Spotted Spurge
Eremocarpus setigerus-Turkey-mullein

FABACEAE
Astragalus tener ferrisiae-Ferris' Milk-vetch
Glycyrrhiza lepidota-American Licorice

Lathyrus angulatus-Angular-seeded Pea
Lathyrus jepsonii californicus-California Pea
Lotus corniculatus-Bird's-foot-trefoil
Lotus purshianus purshianus-Spanish Lotus
Lotus wrangelianus-Wrangel Lotus
Melilotus alba-White Sweet-clover
Melilotus indica-Indian Sweet-clover
Robinia pseudoacacia-Black Locust
Trifolium bifidum decipiens-Deceptive Clover
Trifolium fragiferum-Strawberry Clover
Trifolium fucatum-Sour Clover
Trifolium hirtum-Rose Clover
Trifolium willdenovii-Tomcat Clover
Vicia benghalensis-Red-flowered Vetch
Vicia sativa satvia-Garden Vetch
Vicia villosa varia-Winter Vetch

FAGACEAE
Quercus lobata-Valley Oak

GENTIANACEAE
Centaurium muehlenbergii-June Centaury

GERANIACEAE
Erodium botrys-Long-beaked Stork's-bill
Erodium brachycarpum-Short-fruited Stork's-bill
Erodium cicutarium-Red-stemmed filaree
Erodium moschatum-White-stemmed filaree
Geranium dissectum-Cut-leaved Geranium

HYDROCHARITACEAE
Najas graminea-Ricefield Water-Nymph

JUGLANDACEAE
Juglans californica hindsii-Northern California Black Walnut
Juglans regia-English Walnut

JUNCACEAE
Juncus balticus balticus-Baltic Rush
Juncus bufonius bufonius-Common Toad Rush
Juncus bufonius congestus-Congested Toad
OLEACEAE
Fraxinus latifolia-Oregon Ash

ONAGRACEAE
Epilobium brachycarpum-Tall Annual Willowherb
Epilobium ciliatum ciliatum-Fringed Willowherb
Epilobium pygmaeum-Smooth Spike-primrose
Ludwigia peploides peploides-Yellow Waterweed
Oenothera elata hirsutissima-Hairy Evening-primrose

PLANTAGINACEAE
Lupinus bicolor tridentatus-Bicolored Lupine
Lupinus polycarpus-Small-flowered Lupine
Medicago arabica-Spotted Medick
Medicago polymorpha-Common Bur-clover
Medicago sativa-Alfalfa
Rush
Juncus effusus pacificus-Pacific Rush
Juncus oxymeris-Pointed Rush

LAMIACEAE
Lycopus americanus-Cut-leaved Bugleweed
Marrubium vulgare-Horehound
Mentha pulegium-Pennyroyal
Stachys stricta-Sonoma Hedge-nettle

LYTHRACEAE
Ammannia coccinea-Valley Redstem
Ammannia robusta-Robust Redstem
Lythrum hyssopifolium-Hyssop Loosestrife
Lythrum tribracteatum-Slender-fruited Loosestrife
Rotala ramosior-Lowland Toothcup

MALVACEAE
Abutilon theophrasti-Velvetleaf
Hibiscus lasiocarpus-California Hibiscus
Malva nicaeensis-Bull Mallow
Malva parviflora-Little Mallow
Malvella leprosa-Alkali-mallow

MARSILEACEAE
Marsilea vestita vestita-Hairy Water-clover

MARTYNIACEAE
Proboscidea louisianica louisianica-Common Unicorn-plant

MOLLUGINACEAE
Mollugo verticillata-Indian-chickweed

MORACEAE
Ficus carica-Fig
Plantago coronopus-Cut-leaved Plantain
Plantago lanceolata-English Plantain
Plantago major-Common Plantain

PLATANACEAE
Platanus racemosa-Western Sycamore

POACEAE
Agrostis avenacea-Avens Bentgrass
Alopecurus pratensis-Meadow Foxtail
Arundo donax-Giant-reed
Avena fatua-Wild Oat

Bromus diandrus-Ripgut Brome
Bromus hordeaceus-Soft Chess
Bromus madritensis rubens-Red Brome
Bromus racemosus-Smooth-flowered Soft Chess
Crypsis schoenoides-Swamp Pricklegrass
Cynodon dactylon-Bermuda-grass
Echinochloa colona-Jungle-rice
Echinochloa crusgalli-Watergrass
Elymus glaucus glaucus-Blue Wild-rye
Eragrostis hypnoides-Creeping Lovegrass
Eragrostis pectinacea pectinacea-Purple Lovegrass
Festuca arundinacea-Tall Fescue
Holcus lanatus-Common Velvetgrass
Hordum brachyantherum brachyantherum-Meadow Barley
Hordeum depressum-Low Barley
Hordum murinum leporinum-Hare Wall Barley
Leersia oryzoides-Rice Cutgrass
Leptochloa fascicularis-Bearded Sprangletop
Lolium multiflorum-Annual Ryegrass
Leymus triticoides-Alkali Reygrass
Muhlenbergia rigens-Deergrass
Panicum dichotomiflorum-Smooth Witchgrass
Paspalum dilatatum-Dallisgrass
Paspalum distichum-Knotgrass
Rumex conglomeratus-Green Dock
Rumex crispus-Curley Dock
Rumex obtusifolius-Bitter Dock
Rumex pulcher-Fiddle Dock

PONTEDERIACEAE
Heteranthera limosa-Marsh Mud-plantain

PORTULACACEAE
Calandrinia ciliata-Redmaids
Portulaca oleracea-Common Purslane

POTAMOGETONACEAE
Potamogeton foliosus foliosus-Leafy Pondweed
Potamogeton nodosus-Long-leaved Pondweed
Potamogeton pectinatus-Sago Pondweed

PRIMULACEAE
Anagallis arvensis-Scarlet Pimpernel

RANUNCULACEAE
Clematus ligusticifolia-Virgins'-bower
Ranunculus muricatus-Prickle-seeded Buttercup

ROSACEAE
Prunus cerasifera-Cherry Plum
Rosa californica-California Rose
Rubus discolor-Himalayan Blackberry
Rubus ursinus-California Blackberry
Phalaris aquatica-Harding-grass
Phalaris lemmonii-Lemmon's Canary-grass
Phalaris paradoxa-Paradox Canary-grass
Poa annua-Annual Bluegrass
Polypogon maritimus-Mediterranean Beardgrass
Polypogon monspeliensis-Annual Beardgrass
Setaria pumila-Yellow Bristlegrass
Setaria sphacelata-African Bristlegrass
Sorghum halepense-Johnsongrass
Vulpia bromoides-Six-weeds Fescue
Vulpia myuros hirsuta-Foxtail Fescue

POLEMONIACEAE
Navarretia leucocephala leucocephala-White-flowered Navarretia

POLYGONACEAE
Polygonum amphibium emersum-Swamp Smartweed
Polygonum arenastrum-Common Knotweed
Polygonum hydropiper-Water-pepper
Polygonum hydropiperoides-Mild Water-pepper
Polygonum lapathifolium-Willow-weed
Polygonum persicaria-Lady's-thumb
Polygonum punctatum-Dotted Smartweed

RUBIACEAE
Cephalanthus occidentalis californicus-California Button-willow
Galium aparine-Cleavers

SALICAEAE
Populus fremontii fremontii-Fremont's Cottonwood
Salix exigua-Sandbar Willow
Salix gooddingii-Goodding's Black Willow
Salix lasiolepis-Arroyo Willow

SCROPHULARIACEAE
Bacopa rotundifolia-Round-leaved Water-hyssop
Castilleja attenuata-Valley-tassels
Kickxia elatine-Sharp-leaved Fluellin
Lindernia dubia-False Pimpernel
Mimulus guttatus-Seep Monkey-flower
Mimulus pilosus-Downy Mimetanthe
Mimulus tricolor-Tricolored Monkey-flower
Verbascum blattaria-Moth Mullein
Verbascum thapsus-Woolly Mullein
Veronica anagallis-aquatica-Water Speedwell
Veronica peregrina xalapensis-Purslane Speedwell

SIMAROUBACEAE
Ailanthus altissima-Tree-of-heaven

SOLANACEAE
Datura wrightii-Thorn-apple
Nicotiana acuminata mutliflora-Many-flowered Tobacco
Nicotiana glauca-Tree Tobacco
Nicotiana quadrivalvis-Indian Tobacco
Physalis lanceifolia-Lance-leaved Ground-cherry
Solanum americanum-American Black Nightshade

TAMARICACEAE
Tamarix parviflora-Small-flowered Tamarisk

TYPHACEAE
Typha domingensis-Southern Cattail
Typha latifolia-Broad-leaved Cattail

URTICACEAE
Urtica dioica holosericea-Stinging Nettle
Urtica urens-Burning Nettle

VERBENACEAE
Phyla nodiflora rosea-Rosy Lippia
Verbena bonariensis-South American Vervain
Verbena hastata-Halberd-leaved Vervain
Verbena lasiostachys scabrida-Western Vervain
Verbena litoralis-Shore Vervain

VISCACEAE
Phoradendron macrophyllum-Big-leaved Mistletoe

VITACEAE
Vitis californica-California Wild Grape

ZANICHELLIACEAE
Zanichellia palustris-Horned Pondweed

ZYGOPHYLLACEAE
Tribulus terrestris-Puncture-vine

Appendix E: Habitat Maps of Sacramento River NWR

Appendix F: Wildlife Species of Sacramento River National Wildlife Refuge

Birds

Loons
- Common Loon

Grebes
- Pied-billed Grebe
- Horned Grebe
- Eared Grebe
- Western Grebe
- Clark's Grebe

Pelicans and Cormorants
- American White Pelican
- Double-crested Cormorant

Bitterns and Herons
- American Bittern
- Least Bittern
- Great Blue Heron
- Great Egret
- Snowy Egret
- Cattle Egret
- Green Heron
- Black-crowned Night-Heron

Ibises and Spoonbills
- White-faced Ibis

Waterfowl
- Tundra Swan
- Trumpeter Swan
- Greater White-fronted Goose
- Snow Goose
- Ross's Goose
- Cackling Canada Goose
- Aleutian Canada Goose
- Taverner's Canada Goose
- Lesser Canada Goose
- Western Canada Goose
- Wood Duck
- Green-winged Teal
- Mallard
- Northern Pintail
- Blue-winged Teal
- Cinnamon Teal
- Northern Shoveler
- Gadwall
- Eurasian Wigeon
- American Wigeon
- Canvasback
- Redhead
- Ring-necked Duck
- Greater Scaup
- Lesser Scaup
- Common Goldeneye
- Bufflehead
- Hooded Merganser
- Common Merganser
- Ruddy Duck

American Vultures
- Turkey Vulture

Osprey-Kites-Eagles-Hawks
- Osprey
- White-tailed Kite
- Bald Eagle
- Northern Harrier
- Sharp-shinned Hawk
- Cooper's Hawk
- Red-shouldered Hawk
- Swaison's Hawk
- Red-tailed Hawk
- Ferruginous Hawk
- Rough-legged Hawk
- Golden Eagle

Falcons
- American Kestrel
- Merlin
- Peregrine Falcon
- Prairie Falcon

Gallinaceous Birds
- Ring-necked Pheasant
- California Quail

Rails
- Virginia Rail
- Sora
- Common Moorhen
- American Coot

Cranes
- Sandhill Crane

Plovers
- Black-bellied Plover
- Semipalmated Plover
- Killdeer

Stilts and Avocets
- Black-necked Stilt
- American Avocet

Shorebirds
- Greater Yellowlegs
- Lesser Yellowlegs
- Solitary Sandpiper
- Willet
- Spotted Sandpiper
- Whimbrel
- Long-billed Curlew
- Marbled Godwit
- Western Sandpiper
- Least Sandpiper
- Pectoral Sandpiper
- Dunlin
- Short-billed Dowitcher
- Long-billed Dowitcher

Snipe
- Common Snipe

Phalaropes
- Wilson's Phalarope
- Red-necked Phalarope

Gulls and Terns
- Bonaparte's Gull
- Ring-billed Gull
- California Gull
- Herring Gull
- Caspian Tern
- Forster's Tern
- Black Tern

Pigeons and Doves
- Rock Dove
- Band-tailed Pigeon
- Mourning Dove

Cuckoos
- Yellow-billed Cuckoo

Owls
- Barn Owl
- Western Screech-Owl

Great Horned Owl
Burrowing Owl
Long-eared Owl
Short-eared Owl
Northern Saw-whet Owl

Goatsuckers
Lesser Nighthawk
Common Nighthawk
Common Poorwill

Swifts
Black Swift
Vaux's Swift
White-throated Swift

Hummingbirds
Black-chinned Hummingbird
Anna's Hummingbird
Rufous Hummingbird
Allen's Hummingbird
Western Kingbird

Larks
Horned Lark

Swallows
Purple Martin
Tree Swallow
Violet-green Swallow
Northern Rough-winged Swallow
Cliff Swallow
Barn Swallow

Jay-Magpies-Crows
Western Scrub Jay
Yellow-billed Magpie
American Crow
Common Raven

Chickadees and Titmice
Oak Titmouse

Bushtits
Bushtit

Nuthatches
White-breasted Nuthatch

Creepers
Brown Creeper

Wrens
Bewick's Wren
House Wren
Winter Wren
Marsh Wren

Kinglets-Bluebirds-Thrushes
Golden-crowned Kinglet
Ruby-crowned Kinglet
Blue-gray Gnatcatcher
Western Bluebird
Mountain Bluebird
Swaison's Thrush
Hermit Thrush
American Robin
Varied Thrush
Wrentit

Mockingbirds and Thrashers
Northern Mockingbird

White-throated Sparrow
Golden-crowned Sparrow
White-crowned Sparrow
Dark-eyed Junco

Blackbirds-Meadowlarks-Orioles
Red-winged Blackbird
Tricolored Blackbird

Kingfishers
Belted Kingfisher

Woodpeckers
Lewis' Woodpecker
Acorn Woodpecker
Red-breasted Sapsucker
Nuttall's Woodpecker
Downy Woodpecker
Hairy Woodpecker
Northern Flicker

Flycatchers
Western Wood-Pewee
Willow Flycatcher
Pacific-slope Flycatcher
Black Phoebe
Say's Phoebe
Ash-throated Flycatcher

Wagtails and Pipits
American Pipit

Waxwings
Bohemian Waxwing
Cedar Waxwing

Shrikes
Northern Shrike
Loggerhead Shrike

Starlings
European Starling

Vireos
Cassin's Vireo
Hutton's Vireo
Warbling Vireo

Warblers
Orange-crowned Warbler
Nashville Warbler
Yellow-rumped Warbler
Black-throated Gray Warbler
Townsend's Warbler
Hermit Warbler
MacGillivray's Warbler
Common Yellowthroat
Wilson's Warbler
Yellow-breaster Chat

Tanagers
Western Tanager

Grosbeaks and Buntings
Black-headed Grosbeak
Blue Grosbeak
Lazuli Bunting

Towhee and Sparrows
Spotted Towhee
California Towhee
Chipping Sparrow
Vesper Sparrow
Lark Sparrow
Savannah Sparrow
Grasshopper Sparrow
Fox Sparrow
Song Sparrow
Lincoln's Sparrow

Western Meadowlard
Yellow-headed Blackbird
Brewer's Blackbird
Brown-headed Cowbird
Bullock's Oriole

Finches
House Finch

Pine Siskin
Lesser Goldfinch
American Goldfinch
Evening Grosbeak

Weaver Finches
House Sparrow

Reptiles
Western Pond Turtle
Gopher Snake
Common Garter Snake
Giant Garter Snake
Western Yellowbelly Racer
Western Fence Lizard
Alligator Lizard
Common Kingsnake
Western Diamondback Rattlesnake

Amphibians
American Bullfrog
Pacific Tree Frog

Fishes
Chinook Salmon
Steelhead
Carp
White Catfish
Black Bullhead
Yellow Bullhead
Channel Catfish
Mosquitofish
Bluegill
Largemouth Bass
White Crappie
Sacramento Splittail
Black-tailed Deer
Beaver

Invertebrates
Cladocera
Cyclopoida
CalanoidaHydracarina
Hirudinea
Baeits spp.
Enochrus spp.
Hydrophilus spp.
Dytiscidae
Haliplidae
Gryinida
Corixida
Callicorixa spp.
Corissella spp.
Notonecta spp.
Zoniagrion sp.
Orthocladius spp.
Culicidae
Gerris spp.
Oligochaeta
Ostracoda
Planorbidae
Physa spp.
Chironomus spp.
Procladius spp.
Tanypus spp.
Goeldichironomus spp.
Anisoptera
Caenis spp.
Dolichopodidae
Ephydra spp.
Notiphila spp.
Tipulidae
Gizzard Shad
Hitch
Black Crappie
Green Sunfish
Inland Silversides
Fathead Minnow

Mammals
Opposum
Vagrant Shrew
California Myotis
Red Bat
Hoary Bat
Pallid Bat
Mexican Free-tailed Bat
Big Free-tailed Bat
Desert cottontail
Black-tailed Jackrabbit
Beechy Ground Squirrel
Botta Pocket Gopher
Western Harvest Mouse
Deer Mouse
Califonia Vole
Muskrat
Black Rat
Norway Rat
House Mouse
Coyote
Red Fox
Gray Fox
Ringtail
Raccoon
MinkWestern Spotted Skunk
Striped Skunk
River Otter

Ptychoteridae
Tabanidae
Trichoptera
Ceratopogonidae
Glyptotendipes spp.
Cricotopus sp.
Lepidoptera

Appendix G: Endangered, Threatened, and Sensitive Species of Sacramento River NWR

Species	Habitat[1]	Status[2]
Giant Garter Snake	W, U	FT, ST
Bald Eagle	W	FT, SE
Tricolored Blackbird	W, U	SC
Willow Flycatcher	R	SE
Bank Swallow	RV	ST
Burrowing Owl	U, AM	SC
White-face Ibis	W	SC
Greater Sandhill Crane	W	ST
Western Yellow-billed Cuckoo	R	ST
Swainson's Hawk	R, U	ST
Winter-run Chinook Salmon	RV	FE, SE
Spring-run Chinook Salmon	RV	FT
Steelhead (Central Valley/ESU)	RV	FT
Sacramento Splittail	RV	FPT
Northwestern Pond Turtle	W, RV	SC
Vernal Pool Fairy Shrimp	VP	FT
Vernal Pool Tadpole Shrimp	VP	FE
Valley Elderberry Longhorn Beetle	R	FT
Ferris's Milkvetch	VP, AM	SC

[1] W-wetland, U-various uplands, R-riparian forest, AM-alkali meadow, RV-riverine, VP-vernal pool

[2] FE-fenderal endangered, FT-federal threatened, FPE-federal proposed endangered, FPT-federal proposed threatened, FSC-federal species of concern, SE-state endangered, ST-state threatened, SR-state rare, SC-state species of concern

Appendix H: Historic Fire Occurrence and Fire Season Analysis Information for Sacramento NWR

Number of Wildland and Prescribed Fires and Acres Burned by Year				
	Wildland Fire		Prescribed Fire	
Year	# fires	# Refuge acres	# fires	# Refuge acres
1989	0	0	0	0
1990	0	0	0	0
1991	0	0	0	0
1992	1	5	0	0
1993	0	0	0	0
1994	0	0	0	0
1995	0	0	0	0
1996	0	0	0	0
1997	0	0	0	0
1998	1	0.5	0	0
1999	4	2.3	9	584
2000	1	4	9	679

Number of Wildland Fires and Acres Burned by Month												
	Ja	Fe	Ma	Apr	Ma	Jun	Jl	Aug	Sep	Oc	No	De
Number of Wildland Fires	0	0	0	1	0	1	0	5	1	0	0	0
Acres Burned	0	0	0	0.2	0	4	0	7.1	0.5	0	0	0

Appendix I: Current Positions and Qualifications
Sacramento National Wildlife Refuge Complex - Fire Staff

Position and Location:	**Grade:**	**Name:**	**Qualifications:**	**On the Job Training Needs:**
Fire Management Officer	GS 11	Perry Grissom	RXB2, RX12, ICT4, ENGB, FINV	STEN
Prescribed Fire Specialist	GS 7/9	VACANT		
Supervisory Firefighter (Station Foreman)	GS 7	Kipp Morrill	RXB3, RX12, ICT4, ENGB, PSDO, HECM, FALB, FFT1	HEMG, TFLD, STEN
Lead Firefighter (Engine Foreman)	GS 6	VACANT		
Firefighter (Squad Leader)	GS 5	Anthony Arendt	ENGB, FFT1, FALA	ICT4, CRWB
Firefighter (Squad Leader)	GS 5	Brian Combs	ENGB, FFT1, FALA	ICT4, CRWB
Firefighter (seasonal)	GS 3/4	VACANT		
Firefighter (seasonal)	GS 3/4	VACANT		
Firefighter (seasonal)	GS 3/4	VACANT		
Firefighter (seasonal)	GS 3/4	VACANT		

Appendix J: Delegation of Authority

Name of Incident Commander is assigned as Incident Commander of the ***Name of Incident***, Sacramento River National Wildlife Refuge for the US Fish and Wildlife, effective ***Time and Date.***

The Incident Commander has full authority and responsibility for managing the fire suppression activities within the framework of the law and Fish and Wildlife Service policy and direction as provided by this office. Habitat Management Plans and other appropriate documents will be provided by the Resource Advisor.

Names of Resources Advisors and contact Information are assigned as Resource Advisors. They or the Refuge Manager will be consulted in situations where natural resource decisions or trade offs are involved unless life safety issues require immediate attention and those actions will be documented.

Specific direction and fire suppression priorities for the ***Name of Incident*** are as follows, and are in priority order:

1. Protect human life and safety.

2. Use of minimal impact techniques should be employed to reduce habitat damage. Use natural barriers and roads if possible for burnout operations.

3. Use of dozers, tractors, foam, or retardant requires approval of the Refuge manager of their designate (resource advisors) prior to implementation EXCEPT TO PROTECT HUMAN LIFE.

Include other Standards or conditions as needed.

Turn Back Standards

1. All ***Name of Incident*** contracts, agreements, bills, medical problems, equipment repairs, and fire cache re-supply shall be closed out prior to team being released.

2. Road or levee damage during suppression efforts will be repaired prior to the team's departure.

3.Fire perimeter mopped-up ***Specify*** and all lines checked for heat and integrity.

4. Rehabilitation Plan will be completed in Coordination with the Refuge Biologists and resource Advisors.

5. Fire perimeter mapped by GPS and loaded into the Refuges GIS Database.

6. Tort claims reviewed by Refuge Manager or their designee.

The Deputy Refuge Manager or Fire Program Manager will represent the Refuge Manager on any occasion where Refuge Manager is not immediately available.

Refuge Manager, _____ Sacramento River National Wildlife Refuge,
Date and Time.

Appendix K: Memorandum of Understanding
Document Number: _____

MEMORANDUM OF UNDERSTANDING
BETWEEN THE
U.S. FISH AND WILDLIFE SERVICE
AND THE
***(DISTRICT NAME)* FIRE PROTECTION DISTRICT**

I. INTRODUCTION

The U.S. Fish and Wildlife Service (hereinafter referred to as the Service), an agency of the Federal Government is primarily responsible for the welfare and protection of lands, structures and wildlife within the boundaries of ***(NAME OF REFUGE)*** National Wildlife Refuge (hereinafter referred to as the Refuge). Because wildland fires sometime threaten to damage those resources, and local fire districts have historically provided fire protection assistance to the Refuges, the Service desires to enter an agreement with the ***(NAME OF DISTRICT OR DEPARTMENT)*** Fire Protection District (hereinafter referred to as the District) which will formalize responsibilities of both parties and provide for remuneration to the District for fire suppression services rendered.

II. AUTHORITY

The Service enters into agreement under the authority of the "Protection Act of September 20, 1922", (42 Stat.857; 16 USC 594), the "Reciprocal Fire Protection Act of May 27, 1955"60 Stat.66, 67; 42 USC 1856, 1856a and b" and 31 USC 6305 (Cooperative Agreements).

III. PURPOSE

The purpose of this agreement is to provide fire protection services to those portions of ***(REFUGE NAME)*** National Wildlife Refuge within the boundaries of the ***(NAME OF DISTRICT OR DEPARTMENT)*** Fire Protection District and to remunerate the District for costs incurred in providing fire suppression services to those lands.

IV. TERMS OF AGREEMENT

This agreement shall become effective upon being executed by both parties and shall remain in effect through December 31, ***(YEAR)***. This agreement terminates and supersedes any previous agreements between the District and the Service.

V. SPECIFIC OBLIGATIONS OF THE PARTIES

A. The Service shall:

1. Delegate authority to the District as necessary to put the Fire Chief or his delegate in Unified command of the fire fighting effort.
2. Provide manpower and/or equipment, as available, to assist the District in fighting fires on or adjacent to Service lands when so requested by the District.
3. Provide funds (as indicated in Section VII, herein) for fire suppression services.

B. The District shall:

1. Provide, as available, manpower and equipment necessary to suppress wildland and structural fires on Service lands within the District's jurisdiction.

2. Respond as quickly as possible when asked to suppress any such fire on Service lands.

VI. PROJECT OFFICERS

A. The Service's project officer shall be:

Refuge Manager -

B. The District's project officer shall be:

Fire Chief - Fire Protection District

VII. FUNDING

A. The Service agrees to pay the District for actual fire suppression costs incurred by the District while suppressing fires on Refuge lands. Reimbursement to be claimed by the District (as determined by the District and approved by the Service) shall include:

1. Salaries and wages for District personnel used to suppress a fire. Reimbursement for the salary or wage of any employee shall be computed on the direct daily or hourly wage of that employee, including both actual overtime payments and related employee benefit costs.

2. The actual cost to the District for use of personnel from other agencies, and for paid "pickup" labor used to suppress a fire.

3. The actual cost to the District for food services, transportation, and sleeping accommodations for personnel engaged in suppressing a fire.

4. The actual equipment operation costs expended by the District to suppress a fire. These costs shall be calculated using an hourly or mileage based rate for each class of equipment or vehicle.

5. The total cost to the District for equipment rented to suppress a fire.

6. Replacement or repair costs to the District for equipment and tools damaged, destroyed or lost as a result of a fire. However, any such claim shall be reduced by any salvage value and be based on the depreciated value of such equipment and tools prior to the fire, as determined by the District. Furthermore, the District shall eliminate from said claims any costs directly attributable to the negligence of District personnel operating the equipment or tool.

7. Costs will include direct expenditures, as well as fair and reasonable indirect or administrative costs not to exceed 20% of direct costs.

8. Fire Cost Reimbursement Tables for manpower and equipment are attached as Appendix A, and the District will update these costs annually.

B. Reimbursement to the District for fires which burn onto the Refuge from adjacent property shall be based on the percentage of the total acres burned that were actually within the Refuge.

C. Reimbursement to the District for fire suppression on lands in accordance with this agreement may not exceed $50,000 per response or $150,000 per fiscal year without further approval of the Refuge Manager .

D. The Service will make Reimbursement through issuance of a purchase order to the District within 60 days of receiving the District's invoice for suppression costs. Each payment will be made to the District at the address listed above.

E. All invoices prepared by the District should include the date and name of the incident and be submitted to the Refuge Manager at the address listed above.

VIII. SPECIAL PROVISIONS

A. This agreement shall not affect the rights of any party to recover suppression costs and/or damages sustained as a result of the negligent or willful act of any person causing a fire.

B. No party shall be liable to any other for loss, damage, personal injury or death occurring in consequence of the performance of this agreement, except as provided herein.

C. Both parties may work jointly on fire trespass investigations. Fire law enforcement reports may be prepared independently.

D. Copies of fire reports shall be mutually provided to the other agency as soon as possible.

IX. AMENDMENTS

Amendment to this agreement may be proposed by either party and shall become effective upon being reduced to a written document executed by both parties.

X. TERMINATION

This agreement may be terminated in whole or in part when all parties agree that the continuation of the agreement would not produce satisfactory results. The parties shall agree upon the termination conditions including the effective date and, in the case of partial terminations, the portion to be terminated. The parties shall not incur new obligations after the effective date of termination, and shall cancel as many outstanding obligations as possible. The Service shall allow full credit to the other parties for the Federal share of non-cancelable obligations properly incurred by the other parties prior to termination.

U.S. Fish and Wildlife Service - Sacramento National Wildlife Refuge Complex

_____ _____

Signature **Date**

_____

Title

Rural Fire Protection District

_____ _____

Signature **Date**

_____

Title

Appendix L. Dispatch Plan

FIRE DISPATCH PLAN

Sacramento National Wildlife Refuge Complex

1. When a report of smoke or fire is received the following information should be taken from the caller:
   - Location of smoke or fire:
   - Location of person reporting:
   - Name and telephone number of person reporting:
   - Size of fire:
   - Character of fire (running, creeping, direction, etc.):
   - Type of fuel:
   - Color of smoke:
   - Anyone fighting fire?:
   - Did they see anyone in vicinity or vehicles leaving area?:
   - Time since caller first noticed fire to time call placed:

2. Notify Refuge personnel in the following order:

Sacramento National Wildlife Refuge Complex Office (530) 934-2801 (8.00 am to 4.30pm)

FMO: Perry Grissom	Wk: (530) 934-2801 Pg: (530) 896-3210	Cell: (530) 510-6326 Hm: (530)
Supervisory Firefighter: Kipp Morrill	Wk: (530) 934-2801 Pg: (530)	Cell: (530) Hm: (530) 865-2208
Engine Boss: VACANT	Wk: (530) 934-2801 Pg: (530) 896-3211	Cell: (530) 510-6327 Hm: (530)

IF NO ANSWER ABOVE OR FIRE CREW NOT AVAILABLE NOTIFY:

Mendocino National Forest Dispatch: (530) 934-7758 or 7759

Have the following respond to the fire:

- Incident Commander
- Engines - From Local Fire Departments or Fire Districts (on file with Mendocino National Forest (MNF) and listed below) and from the MNF for Sacramento, Delevan, Colusa, and Sacramento River NWR(s).

Assistant Refuge Managers:

North Refuges - Steve Emmons	Wk: (530) 934-2801 Cell: (530) 510-6318	Hm: (530) 934-9641
South Refuges - Michael Peters	Wk: (530) 934-2801 Cell: (530) 510-6318	Hm: (530) 458-8613
Sacramento River - vacant	Wk: (530) 934-2801 Cell: (530) 510-6323	Hm: (530)
Deputy Refuge Manager: Greg Mensik	Wk: (530) 934-2801	Hm: (530) 934-2360
Refuge Manager: Kevin Foerster	Wk: (530) 934-2801 Cell: (530) 510-6317	Hm: (530) 899-8837

3. Dispatch Engine if :
   - Fire is on refuge property
   - Fire is threatening refuge property
   - if requested by Local Fire District for assistance.

4. Local Fire Departments and Fire Districts (by Refuge):

Sacramento NWR -	
Willows Fire Department (Glenn Co.):	(530) 934-3323
Maxwell Fire Department (Colusa Co.):	(530) 458-0200
Delevan NWR -	
Maxwell Fire Department (Colusa Co.):	(530) 458-0200
Colusa NWR -	
Williams Fire Department (West side):	(530) 473-2424
Sacramento River Fire Department (Colusa):	(530) 458-0200
Butte Sink NWR -	
Sutter County Fire:	(530) 673-2804
Sacramento River Fire Department (Colusa):	(530) 458-4994
Sutter NWR -	
Sutter County Fire:	(530) 673-2804
Sacramento River -	
Willows Fire Department (Glenn Co.):	(530) 934-3323
Orland Fire Department (North Glenn Co.):	(530) 865-1625
CDF - Tehama Co.:	(530) 527-2241
Butte County - CDF:	(530) 538-7823
Princton Fire Department	(530) 439-2424

5. Other contacts:

Zone FMO - Roger Wong	Wk: (209) 826-3508 Cell: (209) 777-4504	Hm: (209) 827-4390
Refuge Supervisor - Dave Paullin	(916)414-6464	
Regional Fire Management Coordinator (Pam Ensley or Andy Anderson)	(503) 231-6174 or (503) 231-6175	

6. Air Quality and Neighboring Landowners (see attached refuge maps):

Local Air Pollution Control District:

Tehama County	(530) 527-3717
Butte County	(530) 891-2882
Glenn County	(530) 934-6500
Colusa County	(530) 458-0590
Yuba & Sutter Co.	(530) 634-7659 (Feather River)

Cooperative Agreements and MOU's between Sacramento NWRC and other agencies:

Cooperating Agency	MOU/Coop Agreement Document Number	Project Officer	Phone Number
USDA Forest Service and USDI Fish and Wildlife Service	04A-05-FPM-HO		
Ord Bend Fire Protection District	1448-11620-1-K246	Fire Chief, Ord Bend FPD	530-934-3323
Glenn-Colusa Fires Protection District - Butte City	1148-11620-1-K131	Mike Shouten, Fire Chief, Butte City FD	530-982-2206
Hamilton City Fire Protection District	1448-11620-1-K128	Jose Puente, Fire Chief, Hamilton City FPD`	530-826-3355
Sacramento River Rural Fire Protection District	1448-11620-1-K243	Fire Chief, Sacramento River Rural FPD	530-439-2235
Willows City and Rural Fire Protection District	1448-11620-1-K245	Bradley Mallory, Fire Chief, Willows FPD	530-934-3323
Maxwell Fire Protection District	1148-11620-1-K130	David Well, Fire Chief, Maxwell, FPD	530-438-2428 (home) 530-701-2346 (cell)
Colusa Rural Fire Protection District	14-48-0001-95508 DCN-11620-5-0054	Jeff Winters, Fire Chief, Colusa FPD	530-458-0239
Williams Fire Protection District	14-48-0001-95509 DCN-11620-5-0053	Mark Marshall, Fire Chief, Williams FPD	530-473-2269
Bayliss Fire Protection District	1448-11620-1-K244	Fire Chief, Bayliss Fire Protection District	530-934-3323

Appendix M: Communications

Sacramento National Wildlife Refuge Complex - Interagency Contacts

FEDERAL AGENCIES:

U.S. Forest Service - Mendocino National Forest
825 N. Humboldt Ave.
Willows, CA 95988
(530) 934-7758, 934-7759

LOCAL AGENCIES:

Willows Fire Protection District
445 South Butte Street
Willows, CA 95988
(530) 934-3323

Maxwell Fire Protection District
P.O. Box 651
231 West Oak
Maxwell, CA 95955
(530) 458-0200

Maxwell Fire Protection District
P.O. Box 651
231 West Oak
Maxwell, CA 95955
(530) 458-0200

Sacramento River Rural Fire Protection District
750 Market Street
Colusa, CA 95(530) 458-4994

Williams Fire Protection District
810 East Williams
Williams, CA 95987
(530) 473-2424

Sacramento River Rural Fire Protection District
750 Market Street
Colusa, CA 95932
(530) 458-4994

Sutter County Fire Department
Sutter Branch
(530) 755-0266

Sutter County Fire Department
Oswald-Tudor Branch
(530) 673-2804

Other contacts:

Zone Fire Manager - Roger Wong
San Luis NWRC
947 W Pacheco Blvd - Suite C
POBox 2176
Los Banos, CA 93652
Wk: (209) 826-3508 Hm: (209) 827-4390
Cell: (209) 777-4504

Regional Fire Management Coordinator -
Pam Ensley or Andy Anderson
Eastside Federal Complex
911 NE 11th St
Portland, OR 97232 - 4181
(503) 231-6174 or (503) 231-6175

Refuge Supervisor - Dave Paullin (916)414-6464

Channel	Frequency		Description
	Transmit	Receive	
1	169.175	169.175	MNF DIRECT
2	169.975	169.975	MNF REPEATER
3	171.550	171.550	MNF FIRE
4	170.150	170.150	MNF REPEATER
5	171.700	171.700	FCSN ENGINE
6	172.400	172.400	FCSN REPEATER
7	168.200	168.200	TAC2 CREW
8	159.285	151.370	GLENN FIRE
9	154.070	171.550	CDF TEHAMA/GLENN

Appendix N: Request for Cultural Resource Compliance

Project Name:					**Program:** (Partners, Refuges, JITW, WSECP, etc.)	
State: CA, ID, HI, NV, OR, WA		**EcoRegion:** CBE, IPE,KCE, NCE			**FWS Unit:** **Org Code:**	
Project Location:	**County**	**Township**	**Range**	**Section**	**FWS Contact:** Name, Tel#, Address	
USGS Quad:					**Date of Request:**	
Total project acres/linear ft/m:		**APE Acres / linear ft/m (if different)**			**Proposed Project Start Date:**	

MAPS Attached	**Check below**		
Copy of portion of USGS Quad with project area marked clearly **(required)**			Project (sketch) map showing Area of Potential Effect with locations of specific ground altering activities **(required)**
Photocopy of aerial photo showing location **(if available)**			Any other project plans, photographs, or drawings that may help CRT in making determination **(if available)**

Directions to Project: (if not obvious)	
Description of Undertaking:	Describe proposed project and means to facilitate (e.g., provide funds to revegetate 1 mile of riparian habitat, restore 250 acres of seasonal wetlands, and construct a 5-acre permanent pond). How is the project designed (e.g., install 2 miles of fence and create approximately 25' of 3' high check dam)?
Area of Potential Effects (APE):	Describe where disturbance of the ground will occur. What are the dimensions of the area to be disturbed? How deep will you excavate? How far apart are fenceposts? What method are you using to plant vegetation? Where will fill be obtained? Where will soil be dumped? What tools or equipment will be used? Are you replacing or repairing a structure? Will you be moving dirt in a relatively undisturbed area? Will the project reach below or beyond the limits of prior land disturbance? Differentiate between areas slated for earth movement vs. areas to be inundated only. Is the area to be inundated different from the area inundated today, in the recent past, or under natural conditions? Provide acres and/or linear ft/m for all elements of the project.

Environmental and Cultural Setting:	Briefly describe the environmental setting of the APE. **A)** What was the natural habitat prior to modifications, reclamation, agriculture, settlement? **B)** What is land-use history? When was it first settled, modified? How deep has it been cultivated, grazed, etc.? **C)** What is land use and habitat today? What natural agents (e.g., sedimentation, vegetation, inundation) or cultural agents (e.g., cultivation) might affect the ability to discover cultural resources? **D)** Do you (or does anybody else) know of cultural resources in or near the project area?

Appendix O: Equipment Inventory
Sacramento National Wildlife Refuge Complex - Equipment List

Engines and Trailers

Engines:	**Type:**	**Year:**	**Make / Model:**	**Pump Type:**	**Foam: Y/N**	**Condition/ Remarks:**
E-22	6	1999	Ford / 450	BB-4	Y	Good
E-23	6	1991	Dodge / 350	BB-4	Y	Fair
E-24	patrol	1991	Chev / 3500	B1-11	N	Fair
Trailers:	(standard slip-on units mounted on trailers)					
Sacramento NWR			has foam proportioner			fair
Delevan NWR						poor
Colusa NWR						fair
Sutter NWR						good

Trucks, ATV's, and Misc Vehicles

Vehicle:	**Year:**	**Make / Model:**	**Condition/ Remarks:**
SUV (FMO)	2001	Ford / Explorer	Good
P/U (PFS)	1999	Dodge / Dakota	Good
P/U (Sup FF)	1991	Chevy / 3500	Poor
ATV	2000	Honda / 450	Good
ATV	2000	Honda / 450	Good
Utility Trailer	2000	6' x 12'	Good

Portable Pumps and Chain Saws

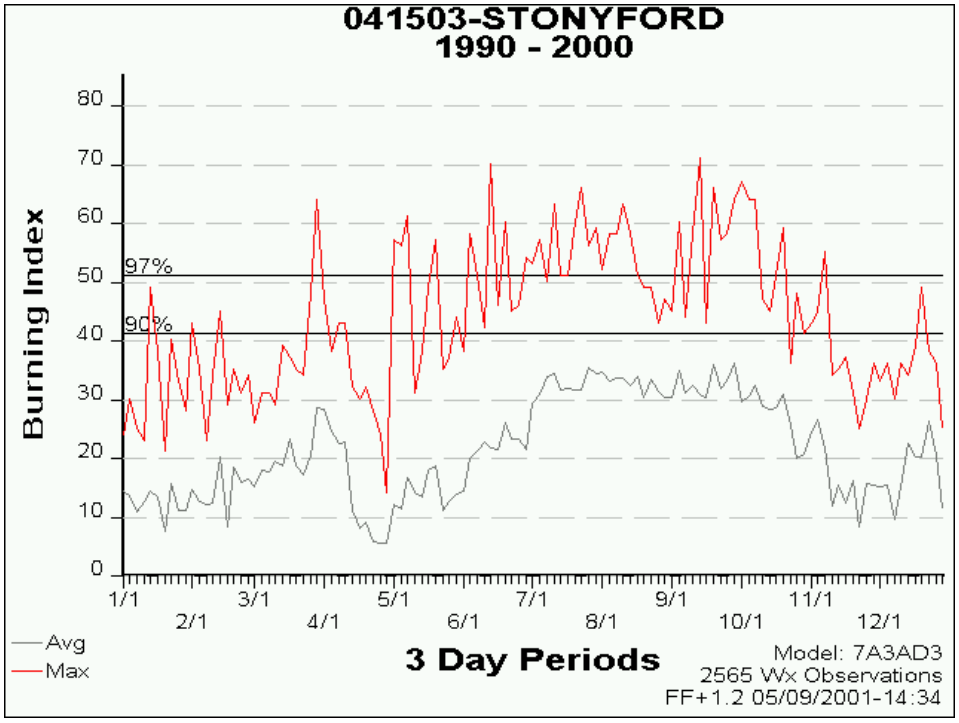
Equipment Type:	Make / Model:	Year:	Condition / Remarks:
Pump (Portable)	Wickman / 250	1999	Good
Pump (Portable)	Wickman / 250	1999	Good
Chainsaw	Sthil / 044	1990	Fair
Chainsaw	Sthil / 044	1999	Good

Computers

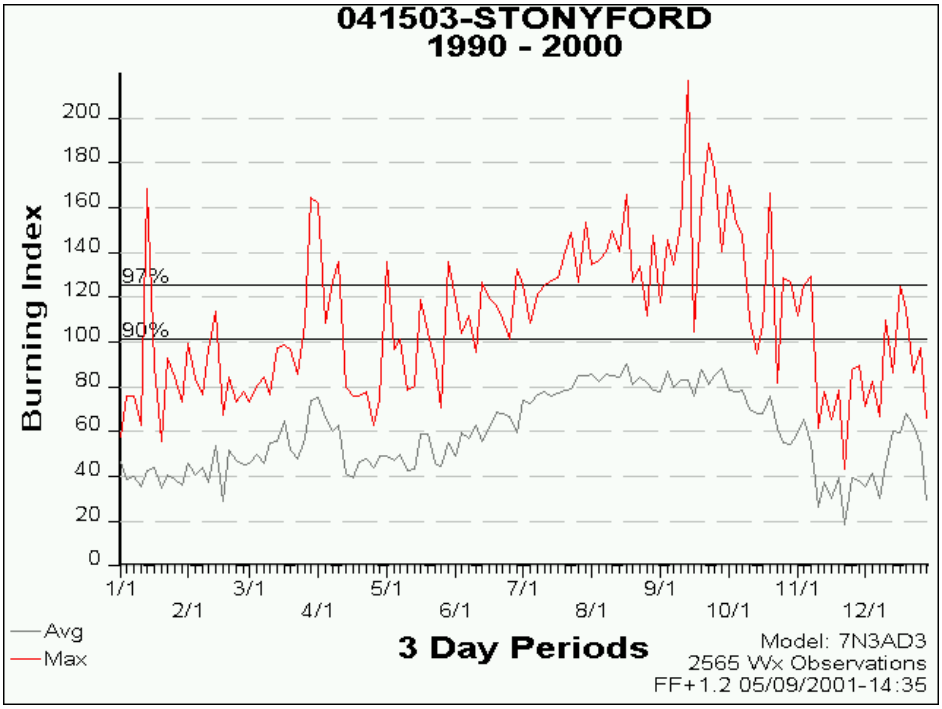
Computer:	Type:	Year:
Micron - Millennia	Desktop	1998
Micron - Clientpro	Desktop	2001
Micron - Clientpro	Desktop	2001
Micron - Clientpro	Desktop	2001
Micron - Transport XKE	Laptop	1997

Appendix P: NFDRS Data

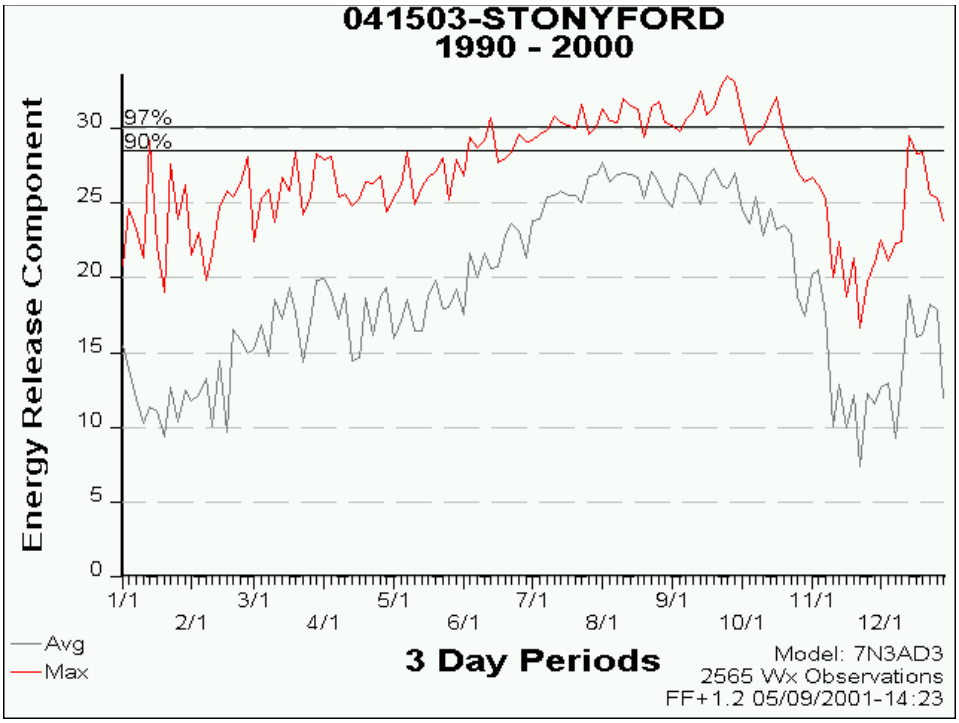
Stonyford Burning Index, Model A (short grass)



Stonyford Burning Index, Model N (sawgrass)



Stonyford Energy Release Component, Model N (sawgrass)



Appendix Q: Step-up Plan
STEP-UP PLAN FOR SACRAMENTO NATIONAL WILDLIFE REFUGE COMPLEX

The Step-up plan is designed to maintain adequate fire readiness during the year.

Staffing Level Definitions:

Following California Division of Forestry (CDF) definition of declared “fire season”
LOW - Declared non-fire season (late fall- winter).

MEDIUM - Declared fire season, normal summer weather and fuel conditions, drought or dry periods during the non-fire season (winter), and / or preparedness levels III (National or State / Local).

HIGH - Fire Weather Watch or Warning for high wind and / or low humidity as issued from the Redding Interagency Fire Weather Unit and / or National or State / Local preparedness levels are IV or V.

COMPLEX PREPAREDNESS ACTIONS	STAFFING LEVELS		
	LOW	MEDIUM	HIGH
FIRE STAFF			
Dress in nomex and boots, carry PPE while on duty, and maintain contact with headquarters		X	X
Maintain a minimum response time (with assigned engine at duty station) of:	1 hr	15 min	5 min
Remain with assigned engine at station or on patrol		X	X
Work weeks and/or tours of duty may be extended			X
REFUGE STAFF/COLLATERAL FIREFIGHTERS			
Carry PPE with them while on duty (Including Nomex and boots)		X	X
May be assigned to an engine at a station or patrol			X
Work weeks and/or tours of duty may be extended			X
PRESCRIBED FIRE ACTIVITY			
Prescribed Burning Allowed	X	X	
FIRE EQUIPMENT			
Engines in ready status	1	2	2
Reserve engine in ready status	0	1	1
FIRE PREVENTION ACTIVITIES			
Post fire danger signs at high public use areas			X
Restrict vehicles to paved/gravel parking areas or within boats and close select trails and public use areas			X
Review and consider limiting refuge operations that pose fire risk			X
MISCELLANEOUS EMERGENCY PREPAREDNESS ACTIONS			

Notify RFMC and open emergency preparedness account			X
Preposition USFWS and interagency resources as needed			X

WILDLAND FIRE SITUATION ANALYSIS

Incident Name: _____

Jurisdiction: _____

Date and Time Completed: _____

This page is completed by the Agency Administrator(s).

Section I, WFSA Information Page

A. Jurisdiction(s): Assign the agency or agencies that have or could have fire protection responsibility, e.g., USFWS, BLM, etc.

B. Geographic Area: Assign the recognized "Geographic Coordination Area" the fire is located in, e.g., Northwest, Northern Rockies, etc.

C. Unit(s): Designate the local administrative unit(s), e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.

D. WFSA #: Identify the number assigned to the most recent WFSA for this fire.

E. Fire Name: Self-explanatory.

F. Incident #: Identify the incident number assigned to the fire.

G. Accounting Code: Insert the local unit's accounting code.

H. Date/Time Prepared: Self-explanatory.

I. Attachments: Check here to designate items used to complete the WFSA. "Other could include data or models used in the development of the WFSA. Briefly describe the "other" items used.

I.	Wildland Fire Situation Analysis
To be completed by the Agency Administrator(s)	

A. Jurisdiction(s)	B. Geographic Area
C. Unit(s)	D. WFSA #
E. Fire Name	F. Incident #

G. Accounting Code:

H. Date/Time Prepared _____@_____

I. Attachments

- Complexity Matrix/Analysis * _____
- Risk Assessment/Analysis * _____
  - Probability of Success * _____
  - Consequences of Failure * _____
- Maps * _____
- Decision Tree ** _____
- Fire Behavior Projections * _____
- Calculations of Resource Requirements * _____
- Other (specify) _____

* Required

** Required by FWS

This page is completed by the Agency Administrator(s).

Section II. Objectives and Constraints

A. Objectives: Specify objectives that must be considered in the development of alternatives. Safety objectives for firefighter, aviation, and public must receive the highest priority. Suppression objectives must relate to resource management objectives in the unit resource management plan.

Economic objectives could include closure of all or portions of an area, thus impacting the public, or impacts to transportation, communication, and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire.

Other objectives might include legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints, such as public and agency cost, could be considered here.

II. Objectives and Constraints

To be Completed by the Agency Administrator(s)

A. Objectives (Must be specific and measurable)

1. *Safety*

   - Public

   - Firefighter

2. *Economic*

3. *Environmental*

4. *Social*

5. *Other*

B. Constraints

This page is completed by the Fire Manager and/or Incident Commander.

Section III. Alternatives

A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each alternative. Alternatives must meet resource management plan objectives.

B. Narrative: Briefly describe each alternative with geographic names, locations, etc., that would be used when implementing a wildland fire strategy. For example: "Contain within the Starvation Meadows' watershed by the first burning period."

C. Resources Needed: Resources described must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.

D. Final Fire Size: Estimated final fire size for each alternative at time of containment.

E. Estimated Contain/Control Date: Estimates of each alternative shall be made based on predicted weather, fire behavior, resource availability, and the effects of suppression efforts.

F. Cost: Estimate all incident costs for each alternative. Consider mop-up, rehabilitation, and other costs as necessary.

G. Risk Assessment - Probability of Success/Consequences of Failure: Describe probability as a percentage and list associated consequences for success and failure. Develop this information from models, practical experience, or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs, and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.

H. Complexity: Assign the complexity rating calculated in "Fire Complexity Analysis" for each alternative, e.g., Type II, Type I.

I. A map for each alternative should be prepared. The map will be based on the "Probability of Success/Consequences of Failure" and include other relative information.

III. Alternatives (To be completed by FMO / IC)			
	A	**B**	**C**
A. Wildland Fire Strategy			
B. Narrative			

C. Resources needed Handcrews Engines Dozers Airtankers Helicopters			
D. Final Size			
E. Est. Contain/ Control Date			
F. Costs			
G. Risk Assessment **- Probability of success** **- Consequence of failure**			
H. Complexity			
I.	**Attach maps for each alternative**		

This page is completed by the Agency Administrator(s), FMO and/or Incident Commander.

Section IV. Evaluation of Alternatives

A. Evaluation Process: Conduct an analysis for each element of each objective and each alternative. Objectives shall match those identified in Section II.A. Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change, or may be positive. Examples are: 1) a system which employs a "-" for negative effect, a "0" for no change, and a "+" for positive effect; 2) a

system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, - 100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values, this data is preferred. Use those methods which are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the resource management plan and consistent with prescriptions and objectives of the fire management plan.

Sum of Economic Values: Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of:
pluses (+) and minuses (-), numerical rating (-3 and +3), or natural and cultural resource values in dollar amounts. (Again, resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.)

IV.	Evaluation of Alternatives
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander	

A. Evaluation Process	**A**	**B**	**C**
Safety Firefighter Aviation Public			
Sum of Safety Values			
Economic Forage Improvements Recreation Timber Water Wilderness Wildlife Other (specify)			
Sum of Economic Values			
Environmental Air Visual Fuels T & E Species Other (specify)			
Sum of Environmental Values			
Social Employment Public Concern			

Cultural Other (Specify)			
Sum of Social Values			
Other			

This page is completed by the Agency Administrator(s) and Fire Manager and/or Incident Commander.

Section V. Analysis Summary

A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narrative could be based on effectiveness and efficiency. For example: "most effective and least efficient," "least effective and most efficient," or "effective and efficient." Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective." Use a system that best fits the manager's needs.

B. Pertinent Data: Data for this Section has already been presented, and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed in Section III.D. Complexity is calculated in the attachments and displayed in Section III.H. Costs are displayed on page 4. Probability of Success/Consequences of Failure is calculated in the attachments and displayed in Section III.G.

C. External and Internal Influences: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC Group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center, and is needed to select a viable alternative. Designate "yes," indicating an up-to-date weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "Other" category as needed by the Agency Administrator(s).

Section IV. Decision

Identify the alternative selected. Must have clear and concise rationale for the decision, and a signature with date and time. Agency Administrator(s) is mandatory.

V. Analysis Summary

To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander

Alternatives	A	B	C
A. Compliance with Objectives Safety Economic Environmental Social Other			
B. Pertinent Data Final Fire Size Complexity Suppression Cost Resource Values Probability of Success Consequences of Failure			

C. External / Internal Influences

National & Geographic Preparedness Level _____

Incident Priority _____

Resource Availability _____

Weather Forecast (long-range) _____

Fire Behavior Projections _____

VI. Decision

The Selected Alternative is: _____

Rationale:

_____ _____

Agency Administrator's Signature	Date/Time

This Section is completed by the Agency Administrator(s) or designate.

Section VII. Daily Review

The date, time, and signature of reviewing officials are reported in each column for each day of the incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed in Section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

Section VIII. Final Review

This Section is completed by the Agency Administrator(s). A signature, date, and time are provided once all conditions of the WFSA are met.

VIII. Daily Review

To be completed by the Agency Administrator(s) or Designate

Selected to be reviewed daily to determine if still valid until containment or control

Date	Time	By	PREPAREDNESS LEVEL	INCIDENT PRIORITY	RESOURCE AVAILABILITY	WEATHER FORECAST	FIRE BEHAVIOR PROJECTIONS	WFSA VALID

If WFSA is no longer valid, a new WFSA will be completed!

VIII. Objectives	Final Review

The elements of the selected alternative were met on: _____ _____
Date Time

By:_____
(Agency Administrator(s)

A GUIDE FOR ASSESSING FIRE COMPLEXITY

The following questions are presented as a guide to assist the Agency Administrator(s) and staff in analyzing the complexity or predicted complexity of a wildland fire situation. Because of the time required to assemble or move an Incident Management Team to wildland fire, this checklist should be completed when a wildland fire escapes initial attack and be kept as a part of the fire records. This document is prepared concurrently with the preparation of (and attached to) a new or revised Wildland Fire Situation Analysis. It must be emphasized this analysis should, where possible, be based on predictions to allow adequate time for assembling and transporting the ordered resources.

Use of the Guide:

1. Analyze each element and check the response "yes" or "no."

2. If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.

3. If any three of the primary factors (A through G) are positive responses, this indicates the fire situation is, or is predicted to be, Type I.

4. Factor H should be considered after all the above steps. If more than two of these items are answered "yes," and three or more of the other primary factors are positive responses, a Type I team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G), a Type II team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the fire.

GLOSSARY OF TERMS

Potential for blow-up conditions - Any combination of fuels, weather, and topography excessively endangering personnel.

Rate or endangered species - Threat to habitat of such species or, in the case of flora, threat to the species itself.

Smoke management - Any situation which creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.

Extended exposure to unusually hazardous line conditions - Extended burnout or backfire situations, rock slide, cliffs, extremely steep terrain, abnormal fuel situation such as frost killed foliage, etc.

Disputed fire management responsibility - Any wildland fire where responsibility for management is not agreed upon due to lack of agreements or different interpretations, etc.

Disputed fire policy - Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.

Pre-existing controversies - These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.

Have overhead overextended themselves mentally or physically - This is a critical item that requires judgment by the responsible agency. It is difficult to write guidelines for this judgment because of the wide differences between individuals. If, however, the Agency Administrator feels the existing overhead cannot continue to function efficiently and take safe and aggressive action due to mental or physical reasons, assistance is mandatory.

FIRE COMPLEXITY ANALYSIS

A.	FIRE BEHAVIOR: Observed or Predicted	**Yes**	**No**
	1. Burning Index (from on-site measurement of weather conditions). Predicted to be above the 90% level using the major fuel model in which the fire is burning.	___	___
	2. Potential exists for "blowup" conditions (fuel moisture, winds, etc.)	___	___
	3. Crowning, profuse or long-range spotting.	___	___
	4. Weather forecast indicating no significant relief or worsening conditions.	___	___
	Total	___	___
B.	RESOURCES COMMITTED		
	1. 200 or more personnel assigned.	___	___
	2. Three or more divisions.	___	___
	3. Wide variety of special support personnel.	___	___
	4. Substantial air operation which is not properly staffed.	___	___
	5. Majority of initial attack resources committed.	___	___
	Total	___	___
C.	RESOURCES THREATENED		
	1. Urban interface.	___	___
	2. Developments and facilities.	___	___
	3. Restricted, threatened or endangered species habitat.	___	___
	4. Cultural sites.	___	___
	5. Unique natural resources, special designation zones or wilderness.	___	___
	6. Other special resources.	___	___
	Total	___	___
D.	SAFETY		
	1. Unusually hazardous fire line conditions.	___	___
	2. Serious accidents or facilities.	___	___
	3. Threat to safety of visitors from fire and related operations.	___	___
	4. Restricted and/or closures in effect or being considered.	___	___
	5. No night operations in place for safety reasons.	___	___
	Total	___	___
E.	OWNERSHIP	**Yes**	**No**

1.	Fire burning or threatening more than one jurisdiction.	___	___	
2.	Potential for claims (damages).		___	___
3.	Conflicting management objectives.		___	___
4.	Disputes over fire management responsibility.		___	___
5.	Potential for unified command.		___	___
	Total		___	___

F. EXTERNAL INFLUENCES

1.	Controversial wildland fire management policy.	___	___	
2.	Pre-existing controversies/relationships.		___	___
3.	Sensitive media relationships.		___	___
4.	Smoke management problems.		___	___
5.	Sensitive political interests.		___	___
6.	Other external influences.		___	___
	Total		___	___

G. CHANGE IN STRATEGY

1.	Change in strategy to control from confine or contain.		___	___
2.	Large amount of unburned fuel within planned perimeter.		___	___
3.	WFSA invalid or requires updating.		___	___
	Total		___	___

H. EXISTING OVERHEAD

1.	Worked two operational periods without achieving initial objectives.		___	___
2.	Existing management organization ineffective.		___	___
3.	IMT overextended themselves mentally and/or physically.		___	___
4.	Incident action plans, briefings, etc., missing or poorly prepared.		___	___
	Total		___	___

Signature_____

Date_____ **Time**_____

Appendix S: Air Quality Districts and Fee Structures

Tehama County - Flat Fee (yearly - Jan)
PO Box 38
Red Bluff, CA 96080
(530) 527-3717

Glenn County - Flat Fee (yearly - Jan)
PO Box 351
Willows, CA 95988
(530) 934-6500

Colusa County - Yearly Fee plus acreage fees
100 Sunrise Bvld. Suite F
Colusa, CA 95932 - 3246
(530) 458-0590

Butte County - Yearly Fee (June) plus acreage fees
2525 Dominic Ave - Suite J
Chico, CA 95928
(530) 891-2882

Yuba & Sutter Co. (Feather River) - Yearly Fee (June) plus acreage fees
142 Garden Hwy
Yuba City, CA 95991
(530) 634-7659

Appendix T: Prescribed Fire Plan Format

Prescribed Fire Plan

Sacramento River National Wildlife Refuge
Tract _____

Approved By: _____ **Date:** _____
Refuge Manager

Prepared By: _____ Date: _____
Prescribed Fire Burn Boss

Reviewed By: _____ Date: _____
Refuge Fire Management Officer

Reviewed By: _____ Date: _____
Assistant Refuge Manager

Reviewed By: _____ Date: _____
Refuge Biologist

The approved Prescribed Fire Plan constitutes the authority to burn, pending approval of Section 7 Consultations, Environmental Assessments, or other required documents. No one has the authority to burn without an approved plan or in a manner not in compliance with the approved plan. Prescribed burning conditions established in the plan are firm limits. Actions taken in compliance with the approved Prescribed Fire Plan will be fully supported, but personnel will be held accountable for actions taken which are not in compliance with the approved plan.

Refuge: Sacramento River NWR

Name of Area:
Acres To Be Burned:
Legal Description:
State: California **County:**
Latitude: **Longitude:**
Township: **Range:** **Sections:**
Quad Map: USGS - **Series:** 7.5″ **Scale:** 1:24000

Is a Section 7 Consultation being forwarded to Fish and Wildlife Enhancement for review? **YES/NO**

Prescribed Fire Burn Boss/Specialist participated in the development of this plan? **YES/NO**

I. GENERAL DESCRIPTION OF BURN UNIT

Physical Features and Vegetation Cover Types (Species, height, density, etc.):
Elevation: ’ **Slope:** % **Aspect:**
Unit Description:
Vegetation:
Primary Resource Goals of Unit:.
Objectives of Fire and Acceptable Range of Results:
General Objectives:
1) Provide for Firefighter and Public Safety.
2) E.g., Reduce non-native plant cover
3) Minimize smoke impacts

Resource Objectives and Ranges:
1) e.g., Reduce or consume 1 hr fuels(jointgrass); 60 - 100%

II. PRE-BURN MONITORING

Vegetation Type	Acres	%	FBPS Fuel Model
_____	____	_____	Model _____
_____	____	_____	Model _____
_____	____	_____	_____
Total	____	100	

Habitat Conditions:
Type of Transects:

III. PLANNING AND ACTIONS

Complexity Analysis Results: Medium (see attached complexity sheet)

Prescribed Fire Organization:
Site preparation:
Who:
Time:
What is to be done:

Weather information required:
Instrument Location and Elevation (s): On site (wx kit)

Data Collected and Sampling Period: Temp, RH, Wind Speed and direction(mid flame). On site will be 1 day prior to burn.

Forecasts: Weather forecasts(general) will be monitored 2 - 3 days prior to burning. A spot weather forecast will be requested for the day of the burn via internet e-mail request. Forecast will be obtained from the local Fire Weather Unit: Sacramento Fire Weather Office, National Weather Service.

Safety considerations:
General:
Special Constraints and Considerations (Should be discussed with Burn Boss):
Special Safety Precautions Needing Attention:(Aerial ignition, aircraft, ignition from boat, etc.):
Public safety:
Safety Zones and Escape Routes: All areas will be identified in the pre-fire briefing....
Medical Facility: Minor injuries will be handled at the scene. Major injuries -
Adjacent Lands:
Adjacent Fuels:
To the north . To the east . To the south . To the west,.
Facilities:
Protection of sensitive features:
Endangered, Threatened, or Listed Species:
PROTECTION ACTIONS:
Sensitive or Species of Concern:
PROTECTION ACTIONS:
Archeological, Historical, or Cultural Areas:
PROTECTION ACTIONS:
COMMUNICATION:
Communication and Coordination on the Burn (Who will have radios, frequencies to be used, who will coordinate various activities.):
Media Contacts (Radio stations, newspaper, etc., list with telephone numbers):

IV. IGNITION, BURNING AND CONTROL

Ignition Technique:
Prescription monitoring: Fire behavior, weather, smoke, and effects will be monitored during the burn by . Duration will be a minimum of every 1 hour or sooner if needed or conditions start to change.

Sacramento River NWR - Tract __
Scheduling: Approx. Date(s):
Duration:

	Acceptable Range		
FBPS Fuel Model__	MIN	MAX	OPT
Temperature (degrees F)			
Relative Humidity (%)			
MF Wind Speed (sustained)			
Wind Direction			
Cloud Cover (%)			
Anticipated ENVIRONMENTAL CONDITIONS			
1 hr. Fuel Moisture			
10 hr. FM			
Live Fuel Moisture			
FIRE BEHAVIOR			
Rate of Spread (mph): Head fire Backing fire			
Flame Length(feet) Head fire Backing fire			

Cumulative effects of weather and drought on fire behavior:

Summer drought is normal for this region, and vegetation dries through the summer, peaking in August. Drought conditions are ... than normal so far this year. For stations in the general area, the Palmer drought index is currently ... and the Keetch-Byram drought index is ...

V. SMOKE MANAGEMENT

Permits:

Burn will be conducted on a declared "burn day" or as planned under a favorable 48 and 24 hour smoke forecast from the California Air Resources Board(ARB). A call will be placed at 8:30 a.m. the day of the burn to the Air Quality District for Burn Day status and to register the acres for the day.

Total Particulate Emissions Estimate(Tons):
FOFEM Generated -
PM 10:
PM 2.5:
Distance and Direction from Smoke Sensitive Area(s):
Interstate 5 -
Visibility Hazard(s) (Roads, airports, etc.):
Actions to Reduce Visibility Hazard(s):
Residual Smoke Problems:

VI. FUNDING AND PERSONNEL

Activity Code: 11710-9263-

VII. BURN-DAY ACTIVITIES

Contacts on Burn Day:
Crew & Equipment Assignments:
Crew Briefing Points: Area / unit overview, burn objectives, safety including escape and safety zones, weather, fire behavior, crew assignments, firing pattern and timing, holding concerns, communication, and contingency actions and responsibilities.

Firing Procedures:
Personnel Escape Plan:
Go-No-Go Checklist:(see Attached)
Holding Actions:
Critical Control Problems:
Water Refill Points:

Contingency Plan:
General plan for escapes into these areas:
To north:
Spot fire--. Escape--.
To east:
To south:
To west:

In the event of an escape or conditions become unfavorable(smoke, weather, fire behavior, and/or objectives not being achieved)the Burn Boss will declare the fire out of prescription or escaped (which ever is the situation) and will assume IC of the fire(until relieved by a higher rated IC). All new burning will stop unless needed to contain the RX or escaped fire. The holding crew will begin attacking the escape and the ignition crew will hold and work the RX fire until the RX fire is contained or is deemed as no threat.

If the fire exceeds the capability of the crews on hand a call will be placed for assistance from local resources through ... (phone). The contingency plan will be outlined in the briefing with procedures for activation of the contingency plan. Dispatch will be the ordering point for the

incident. If the escape fire exceeds more than 12 hours, a Wildland Fire Situation Analysis(WFSA) will be completed for the incident.

Minimum required on - site contingency resources and response times:

Minimum required off - site contingency resources and response times:

Mop Up and Patrol:
Rehabilitation Needs:

VIII. CRITIQUE OF BURN

Were burn objectives within acceptable range of results? (Refer to Section I):
What would be done differently to obtain results or get better results?
Was there any deviation from plan? If so, why?
Problems and general comments:

IX. POST-BURN MONITORING

Date:_____ Refuge Burn Number: _____
Length of Time after Burn: _____
Vegetative Transects:
Comments on Habitat Conditions, etc.:

Photo Documentation:

Other:

X. FOLLOW-UP EVALUATION

Date: _____ Refuge Burn Number: _____
Length of Time after Burn: _____
Vegetative Transects:
Comments on Habitat Conditions, etc.:
Photo Documentation:

Example Complexity Analysis
from FIREBASE

Score Score Criteria

Potential for Escape

5 Potential for multiple spot fires outside the burn unit totaling more than 1 acre, requiring greater than average holding capability along certain sections of burn perimeter. Additional holding resources may be needed to control if escape occurs. Fuel outside burn unit is continuous, with limited fuel breaks. Engines and heavy equipment are primary suppression tools.

Values to be Protected

3 Burn is in area occasionally visited by people, and may be adjacent to a primary field unit road. The burn unit contains structures, cultural resources, sensitive biological communities, or T&E habitat that must be protected from fire.

Fuels/Fire Behavior

3 Fuels within the primary model vary somewhat in loadings and arrangement, but are still well represented by one of the standard fire behavior fuel models. There may be small areas of secondary fuel types present, mostly away from the burn unit perimeter. The terrain contains low relief, and slope and aspect cause minor variations in fire behavior. The fire behavior variations present no difficulties in carrying out the burn, and the predominant fire behavior still can be predicted easily under most prescription conditions.

Fire Duration

1 Entire burn unit will be burned in one burning period. Some minor residual burning may continue inside the unit, but reuqires no continued resource commitment. Primarily 1-hour fuels.

Air Quality

3 If prescription parameters are not met one or more minor developments or visitor use areas may experience noticeably impaired visibility and increased particulate concentrations, but not in excess of secondary Federal standards. The impairment is expected to last no more than 3 days. No critical targets are present. There are no impacts to non-attainment areas.

Ignition Methods

3 Burn is ignited using simple ground methods or Terra Torch device (or equivalent). Ignition requires three to four personnel who may work in small teams igniting separate areas simultaneously. Ignition patterns may be complex enough to require detailed planning, but there is only minor chance of confusion. Ignition team is not expected to become involved in hazardous situations.

Management Team Size

7 Burn team consists of 10-12 personnel, including Burn Boss, Ignition and Holding Specialist, Aircraft Manager (aerial ignitions), and a Fire Weather Observer.

Treatment Objectives

1 Objectives are limited to fuel reduction or maintenance burning and are easily achieved (e.g., removing cured grasses from grasslands or field maintenance). Prescriptions are broad and encompass safe burning conditions.

Element	Weighting Factor	Rating	Weighted Value
Potential for escape	10	5	50
Values at risk	10	3	30

Fuels/fire behavior	5	3	15
Fire duration	5	1	5
Smoke/air quality	7	3	21
Ignition methods	3	3	9
Management team size	3	7	21
Treatment objectives	7	1	7
TOTAL			158

Total weighted score: 158, Medium Complexity, RXB2