

# AGRICULTURE AND WILDLIFE IN CALIFORNIA'S CENTRAL VALLEY: MUTUALLY EXCLUSIVE OR WIN-WIN?

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## ABSTRACT

Because of the importance of California's Central Valley and private lands to waterfowl, Ducks Unlimited (DU) increased its conservation effort on private lands in 1990. This private land effort, delivered from DU's Western Regional Office in Sacramento, is known as Valley CARE (Conservation of Agriculture, Resources, and the Environment). Valley CARE emphasizes agricultural enhancement and wetland restoration and enhancement conservation efforts among the three geographically distinct areas of the Central Valley: the Sacramento Valley, the Sacramento-San Joaquin Delta (Delta), and the San Joaquin Valley. From surveys conducted by DU of water districts in the Sacramento Valley, during 1993-94, rice growers winter-flooded at least 90,000 acres (36,423 ha) of harvested rice fields; during 1994-95, winter-flooded rice acreages increased to over 140,000 (56,658 ha); and during 1995-96, at least 100,000 acres (40,470 ha) of harvested rice fields were winter-flooded. DU also works with farmers in the Delta to winter-flood harvested corn and wheat for shorebirds, swans, geese, ducks, and other waterbirds. Cooperating landowners contributed nearly 17,000 flooded acres (6,880 ha) during 1994-95 and about 16,000 acres (6,475 ha) during 1995-96 to over 30,000 acres (12,141 ha) that were flooded in the Delta during those years. The expected agronomic values and economic benefits of agricultural enhancement appear to be as high as expected and the biological values are substantial. Close to 30% of all waterbirds using rice fields are non-waterfowl species and half of these are shorebirds. DU also has expanded the Valley CARE effort in the Central Valley to establish a series of permanent wetland restorations and enhancements along with the agricultural systems. This mosaic landscape approach is fundamental to the ongoing management efforts for migratory waterbirds in California's Central Valley. This program's results demonstrate what can be accomplished when private conservation groups and agricultural organizations work together and with traditional government wildlife agencies for the mutual benefit of agriculture and conservation.

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## INTRODUCTION

For the past 50 years the primary strategy for dealing with wetland losses and declining waterfowl populations has been to protect wetlands through land acquisition by state or federal agencies. In recent years it has become increasingly obvious that the acquisition strategy can be effective only if it is complimented by strong efforts to maintain wetlands and other waterfowl habitats on private lands (Payne and Wentz 1992). This is especially true in California's Central Valley, where >95% of the historic wetlands base has been lost or modified. Of the 285,000 acres (115,340 ha) of wetlands left in the Central Valley, two-thirds are privately owned and managed for duck hunting (Heitmeyer et al. 1989).

The Central Valley of California is 400 miles (644 km) long, lying between the Coast Range and the Sierra Nevada, and includes the Sacramento Valley, the San Joaquin Valley, and the Delta-Suisun Marsh complex. Historically, the Central Valley contained four million or more acres of natural wetlands and 6,000 miles (9,656 km) of stream, river, and associated riparian habitats. Today, fewer than 300,000 acres (121,410 ha) of wetlands and 950 miles (1,529 km) of riparian woodlands remain (Gilmer et al. 1982). The original wetlands, riparian areas, and associated habitats are known to have provided some of the continent's most important living space for neotropical migrant birds (especially shorebirds and wading birds), unique plants and insects, and a diversity of other wildlife. Today, the remaining wetlands and associated habitats host a number of federal and state listed threatened and endangered species. These wetlands also support large numbers of more common species, but in high densities. If more common species are to avoid declining numbers and endangered species are to maintain viable populations, we must reverse the decline of natural wetland and riparian habitats on which these species depend.

The remaining wetlands in the Central Valley, along with seasonally-flooded and non-flooded agricultural land, support up to 60% of all waterfowl wintering in the Pacific Flyway and 20% of those wintering in the entire U.S. (U.S. Fish and Wildlife Service 1978). Of particular importance, California winters >20% of all mallards, wigeon, green-winged teal, shovelers, canvasbacks, and ruddy ducks; >30% of all lesser snow geese and tundra swans; >50% of all pintails, white-fronted geese, and Ross' geese; >80% of all cackling and Great Basin Canada geese; and 100% of the Aleutian Canada and tule geese in the U.S. No other area in North America is as important for wintering waterfowl; ironically however, no other wintering area has undergone as great a wetland loss. It is apparent that because of limited wetland resources, waterfowl populations have supplemented foods obtained in wetlands with residual agricultural grains. The large waterfowl populations in California from the 1940s through the 1970s could not have been maintained without large areas of small grain crops (Heitmeyer et al. 1989). With only a fraction of the original wetland and

riparian habitat base of the Central Valley remaining, the diversity of migratory birds and other wildlife are dependent on certain types of agriculture, primarily small grains. Improved management of these lands to mimic wetlands could accommodate increased populations of threatened and endangered species, neotropical migrants, and migratory waterfowl.

Today even the farmlands of the Central Valley are under severe threat, exacerbating the problem of loss of natural habitat. The American Farmland Trust has identified the farmlands of California's Central Valley as the most threatened agricultural region in the United States (American Farmland Trust 1995). However, agricultural lands represent an excellent opportunity to initiate habitat restoration and enhancement efforts and a conservation ethic outside of government preserves (Ratti and Scott 1991).

In recognition of the importance of private lands to waterfowl in California's Central Valley, DU increased its efforts with farmers, ranchers, and private duck clubs in 1990. These efforts are designed to assist the private landowner's objectives, be they agricultural or wildlife, in addition to enhancing and restoring waterfowl habitat. This program, delivered from DU's Western Regional Office in Sacramento, is known as Valley CARE (Conservation of Agriculture, Resources, and the Environment).

#### VALLEY CARE - SPECIFIC OBJECTIVES AND PURPOSES

With support from the National Fish and Wildlife Foundation, The Hofmann Foundation, the California Wildlife Conservation Board, and others, DU's Valley CARE Program helped to provide solutions to many of the wetland conflicts that exist in California's Central Valley. Valley CARE enhances, protects, and restores wetlands on private land; adds to the public wetland base; enhances agricultural lands for a diversity of wildlife; provides education for a broad range of the public; and establishes new partnerships among the agricultural community, businesses, public agencies, and other conservation organizations.

Valley CARE focuses its conservation efforts on the three geographically distinct areas of the Central Valley: the Sacramento Valley, the Delta, and the San Joaquin Valley. Within each of these areas our primary efforts towards the private landowners are 1) agricultural enhancement, 2) wetland restoration and enhancement, and 3) communication and education. Valley CARE's goals for agricultural enhancement and wetland restoration and enhancement are based upon the goals of the Central Valley Habitat Joint Venture (CVHJV) Implementation Plan (CVHJV 1990). Throughout the nine basins of the Central Valley, CVHJV goals for agricultural enhancement through winter flooding of harvested agricultural fields is 249,215 acres (100,857 ha).

Wetland enhancement and restoration goals for the Central Valley total 411,555 acres (166,556 ha) (CVHJV 1990).

## AGRICULTURAL ENHANCEMENT

### Sacramento Valley

The Sacramento Valley of California is the major rice-producing area of the State. Rice has been an important crop in California since 1912 (Gilmer et al. 1982). Total rice base in the Sacramento Valley is about 600,000 acres (242,820 ha). Rice planted in the Sacramento Valley averaged 403,900 acres (163,458 ha) from 1981 to 1994 (California Department of Food and Agriculture, unpubl. rpts.).

After rice growers harvest the grain in the fall, they are faced with managing rice straw residue (up to 4 tons/acre [16,368 kg/ha]) in preparation for the following year's crop. The straw must be disposed of prior to planting to avoid a variety of seedling establishment and other agronomic problems. Rice straw is high in silica and other components that make it difficult to decompose, unlike the straw of wheat or other small grains. Burning historically has been the principal method of rice straw disposal; it is efficient, effective, and inexpensive. However, rice straw burning is being phased out in the Sacramento Valley under the Rice Straw Burning Reduction Act of 1991. Began with a 10% reduction of burning in 1992, burning will be banned or greatly reduced by 2000. As burning is being phased out, alternative methods of disposal must be found (Wrynski et al. 1995).

Because an average 346 lbs/ac (388 kg/ha) of rice seed remains in unburned fields after harvest (Miller et al. 1989), rice lands offer a unique opportunity to provide supplemental wintering habitat for many species of waterbirds. Research efforts to date have shown that there are substantial benefits to a broad variety of wildlife from the winter-flooding of rice lands. DU is involved in a wide-scale effort with rice growers, resource agencies, agricultural commodity groups, and other conservation groups to develop methods to winter-flood, in a proper manner, harvested rice fields (Payne et al. 1995).

Working with rice farmers, DU recently pioneered the use of rolling, crushing, and flooding rice stubble and straw as an alternative to burning the straw. Initial tests and operational practices demonstrate that the new practice is accomplishing the objectives of the rice grower to decompose waste straw, control weeds and disease, and provides winter habitat and food sources for waterbirds. The practice of rice straw rolling is proving cost effective in comparison to alternative agronomic methods, which do not have the same

wildlife benefits. The practice also eliminates air pollution created by the practice of burning, which is now tightly regulated (Wrynski et al. 1995).

In response to the Rice Straw Burning Reduction Act, some evidence exists that acreage estimates of winter-flooded rice fields have been increasing. Harvested rice fields in private duck club ownership are usually reflooded in the fall for waterfowl hunting. Some landowners lease their fields for hunting (Gilmer et al. 1982). During the late 1970s about 79,000 acres (31,971 ha) of harvest rice fields were flooded for waterfowl hunting (California Department of Fish and Game 1979). Winter-flooded rice acreages estimated from surveys conducted by DU of water districts in the Sacramento Valley have shown that during 1993-94, and the first year of the Valley CARE Program, rice growers in the Sacramento Valley winter-flooded about 90,000 acres (36,423 ha). During 1994-95, winter flooding of rice increased to over 140,000 acres (56,658 ha), with Valley CARE staff providing direct technical assistance to growers on 76,876 acres (31,112 ha) of rice ground (Ducks Unlimited 1995, Payne et al. 1995). During 1995-96, at least 100,000 acres (40,470 ha) of harvested rice fields were winter-flooded.

However, these survey estimates showing continued increases since the burning ban went into effect may be imprecise. Spell et al. (1995) used recent Landsat Thematic Mapper (TM) scenes of the Sacramento Valley to determine the change in winter-flooded rice fields between 1988 and 1993. Their results indicated that 133,000 acres (53,825 ha) of rice fields were flooded during the winter of 1988/89 and 142,000 acres (57,467 ha) were flooded in 1993/94. Currently, work is being conducted to use TM scenes from other years and months to determine if winter-flooding of rice fields has increased or the results of Spell et al. (1995) were an artifact of rainfall events prior to the acquisition of the TM scenes used in their study.

Many of the rolled, winter-flooded fields were developed as Valley CARE demonstration sites. Staff from DU and cooperating agencies and agricultural commodity organizations conducted field days and ranch tours for rice farmers, environmentalists, and others, who have interests in this approach. Cooperating groups included several Resource Conservation Districts, County Farm Bureaus, the Natural Resources Conservation Service, the California Rice Industry Association, as well as other organizations. DU provided funds, technical assistance, advice, and equipment to help create this landscape-scale change.

Using other funds (primarily from the U.S. Bureau of Reclamation), the University of California at Davis, National Biological Service, California Waterfowl Association, and the Point Reyes Bird Observatory (all under contract to DU) are conducting basic research into the biological and agronomic values and problems associated with the practice of winter flooding. Approximately \$2 million will be invested in this research effort by the

conclusion of the studies (Payne et al. 1995).

### Delta

The Delta encompasses the mid-portion of the Central Valley from Sacramento south to the Stanislaus River. The Delta was historically one of California's most significant waterfowl areas. Reclamation and development (i.e., agricultural, residential, and industrial) have eliminated wetlands from most of the region. Private duck hunting clubs consist primarily of post-harvest flooded corn fields. The major agricultural crops grown in the Delta are corn, winter wheat, tomatoes, sorghum, alfalfa, pasture, orchard fruits, and grapes (CVHJV 1990).

The Delta and adjacent Suisun Marsh are also focal areas for the Valley CARE Program. DU has worked with farmers in the Delta to winter-flood harvested corn and wheat fields for neotropical birds (especially shorebirds), swans, geese, ducks, and other waterbirds. Cooperating landowners contributed nearly 17,000 flooded acres (6,880 ha) during 1994-95 (Payne et al. 1995) and about 16,000 acres (6,475 ha) during 1995-96 to over 30,000 acres (12,141 ha) that were flooded in the Delta during those years. Our long term goal in the Delta is to establish a growers' management group that will continue this practice over the long-term with limited outside involvement.

Winter-flooding of Delta lands provides benefits to substantial numbers of migratory birds as well as private landowners. The practice provides winter water and food for waterbirds and it assists the farmer by slowing or preventing erosion and land subsidence, preventing weed growth, and reducing soil salinity. Valley CARE biologists provide guidance on timing, depth, and duration of flooding and other management techniques through formal planning with the landowner. Direct assistance also is provided through redesign of water delivery structures and other engineering services provided by DU engineers.

### San Joaquin Valley

The San Joaquin Valley is another of the three focal areas for the Valley CARE Program. The San Joaquin Valley includes the Grasslands Area and the Tulare Basin. Historically, more than one million acres (404,700 ha) of seasonal and permanent wetlands were located in the San Joaquin Valley. Today <5% of the original wetland base remains with private ownership representing >70% of the remaining wetlands. Resident and migrant waterbirds depend on these wetlands for survival and declining populations can be attributed to the lack of available wetland habitat (U.S. Fish and Wildlife Service 1978).

Agriculturally-based enhancement projects are at a premium in the San Joaquin Valley. Valley CARE's initial effort in the San Joaquin Valley has focused on livestock grazing within the existing wetland ecosystems, but future emphasis on the surrounding agricultural community should provide additional opportunities for agricultural enhancement. Increased presence in the region will help gain better understanding of the difficulties this region faces. Lack of water and "wildlife unfriendly" farming are the two most critical factors affecting enhancement or restoration activities. Future work will include working on proper water utilization and developing a working relationship with local farmers. Currently, we are working with rice farmers in the Grasslands Area to provide winter-flooded rice fields and cotton farmers in the Tulare Lake area of the Tulare Basin to develop winter-flooded wheat and safflower fields within their cotton farming rotations.

### "More Than Ducks"

The expected agronomic values and economic benefits of winter-flooding harvested small grain fields appear to be as high as expected and the biological values are substantial (Ducks Unlimited 1995). The results for migratory bird use of rice fields are very revealing. Winter-flooded rice fields are not only valuable for waterfowl but also neotropical migrants, wading birds, and shorebirds are just a few of the non-waterfowl species that benefit from the supplemental habitat promoted on agricultural areas (Payne et al. 1995).

In bird-use surveys conducted by Point Reyes Bird Observatory of wetlands in the Central Valley, rice fields held a substantial portion of all shorebirds surveyed at all times of the year. During the winter period, when cooperators were actively flooding rice lands, rice fields in the Sacramento Valley held 68% of all shorebirds surveyed. Of the total shorebirds, 85% of the dunlins, 70% of the dowitchers, 70% of the killdeers, 67% of unidentified small sandpipers, 53% of the yellowlegs, and 31% of the least sandpipers were found on flooded rice fields (Page et al. 1994).

In bird-use surveys conducted by the National Biological Service of both dry and flooded rice fields, 30% of birds using rice fields were non-waterfowl species. Of these, half were shorebirds. Of shorebirds, 75% were composed of dunlins and long-billed dowitchers. Sandhill cranes, white-faced ibis, and egrets predominated 70% of the wading birds using rice fields. For ducks, northern pintail, American wigeon, and to a lesser extent, mallards and northern shovelers accounted for 98% of the duck species using rice fields. White geese, snow and Ross', comprised over 70% of the geese surveyed with greater white-fronted geese accounting for >23%. Canada geese, mostly cackling Canada geese, which are in need of protection, accounted for about 3%, with tundra swans accounting for <3% of the total geese and swans surveyed (Bias

and Day 1995).

We conducted bird-use surveys of enhanced agricultural fields during 1994/95 in the Delta. Of the total birds counted during 1994/95, ducks comprised 87%, swans comprised 4%, cranes comprised 4%, shorebirds comprised 2%, and coots comprised 2% of the birds using enhanced agricultural fields. Of the ducks counted during 1994/95; 58% were pintails; 27% were mallards; 12% were shovelers; and the remaining 3% was comprised of gadwall, green-winged teal, cinnamon teal, American wigeon, ruddy duck, canvasback, and bufflehead. Of the shorebirds counted during 1994/95; 51% were dunlins; 27% were long-billed dowitchers; 9% were black-necked stilts; 7% were common snipe; and the remaining 6% was comprised of killdeer, long-billed curlew, willets, and greater yellowlegs (Bias et al. 1995).

We changed our survey protocol to include also bird-use of non-flooded agricultural fields during 1995/96 in the Delta. Of the total birds counted during 1995/96, ducks comprised 51%, swans comprised 18%, geese comprised 14%, coots comprised 10%, cranes and shorebirds each comprised 3%, and gulls comprised 1%. Pintails (60%) and mallards (29%) composed the majority of the ducks counted during 1995/96. Dunlins (56%), common snipe (36%), and long-billed dowitchers (6%) composed the majority of the shorebirds counted during 1995/96.

These results reflect the substantial value of enhanced agricultural fields for a broad diversity of wildlife. As the winter flooding practice increases and as we learn more about how to benefit wildlife from this effort, we anticipate the value of the practice will increase; thus, benefitting the continent's wildlife, especially migrant shorebirds and waterfowl.

#### WETLAND ENHANCEMENT AND RESTORATION

While conservation of waterfowl can be partly accomplished by manipulating factors that affect survival and recruitment (e.g., sport harvest, predator control, nest structures) or working within specific landscape types (e.g., agriculture), long-term solutions that will sustain desirable population levels of waterfowl must focus on protecting and restoring ecologically functional habitat complexes (Ducks Unlimited 1994). Therefore, Valley CARE focuses also its conservation efforts on enhancing and restoring natural wetland ecosystems. This mosaic landscape approach is fundamental to ongoing management efforts for migratory waterbirds in the Central Valley.

During 1994, DU's Valley CARE Program enhanced and restored 3,596 acres (1,455 ha) of wetlands among four private properties. Total cost of these projects was \$80,500 with Valley CARE contributing \$40,250. Other



cooperators on these projects were the landowners and the U.S. Fish and Wildlife Service's Partners for Wildlife Program.

Our private wetland enhancement and restoration program increased substantially during 1995. We completed 24 individual projects that affected 8,195 acres (3,317 ha) for a total cost of \$616,900, of which Valley CARE contributed \$116,000. Other cooperators on these projects were the landowners, the U.S. Fish and Wildlife Service's Partners for Wildlife Program, the California Wildlife Conservation Board.

To qualify for restoration assistance through the Valley CARE Program, private land must be enrolled in an easement program and the landowner must sign a long term site-specific agreement with DU in which the Valley CARE investment is protected. The landowner also must agree to follow a management plan, written by Valley CARE staff, which remains in effect for the length of the site specific agreement. Promoting these activities has helped DU biologists develop a positive rapport with the private lands community.

These private restored or enhanced wetlands, restoration and enhancements on federal refuges and state wildlife areas, and remaining agricultural lands are managed to provide year-round habitat for wildlife. Water management on these enhancements and restoration projects attempts to mimic the original, natural wetlands in the Central Valley. The resulting mosaic of habitat types support a greater diversity of species than a strict farming operation that floods seasonally for farming or hunting purposes.

## CONCLUSION

The success to date of the Valley CARE Program is substantial. Valley CARE is helping to change the landscape of California's Central Valley and leave a legacy of improved agricultural practices; provide increases of wetland and riparian habitat types; and benefit the continent's neotropical bird, waterbird, threatened and endangered species, and other wildlife populations (Payne et al. 1995). The Program's results demonstrate what can be accomplished when private conservation groups and agricultural organizations work together and with traditional state and federal wildlife agencies for the mutual benefit of agriculture and conservation. Further, the results of this paper show that agriculture and wildlife in the Central Valley of California can be a "win-win" situation.

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