

# Managing for Multiple Benefits: Farming, Flood Protection, and Habitat Restoration in the Yolo Bypass Wildlife Area

By Juliet Christian-Smith

***“Whether a farmer is driving the tractor or I am, we are both essentially land managers...Why not benefit from that capacity and expertise?”***

-Dave Feliz, Yolo Bypass Wildlife Area Manager

## Introduction

The Yolo Bypass is a 59,000-acre floodplain on the west side of the lower Sacramento River, straddling Yolo and Solano Counties. The Bypass is a primary component of the Sacramento River Flood Control Project, which carries floodwaters from several northern California rivers around several low-lying communities, including the state capitol, to the Sacramento–San Joaquin River Delta.

The area's once thriving wetlands supported an array of wildlife and birds. Shortly after the Gold Rush, settlers began reclaiming the land and in the process, much of the natural habitat was lost. Today, some of this habitat, critical to millions of migrating birds that travel along the Pacific Flyway, is being restored within the 16,000-acre Yolo Bypass Wildlife Area (Wildlife Area). On the Wildlife Area, wildlife, agriculture, and seasonal floods coexist, and it has been nationally recognized as an outstanding example of how public land can provide multiple public benefits, including flood conveyance for the Sacramento Valley, agricultural land for a variety of farming uses, and riparian and managed wetland habitats that are home to a wide range of species and serve as a resting spot along the Pacific Flyway. In the future, this type of multi-purpose, adaptive management will be increasingly important as we cope with the effects of climate change, particularly more frequent and intense flooding.

***“The [Yolo Bypass] Working Group envisions the Bypass as a mix of land uses, where agricultural economic viability, flood conveyance capacity, and fish and wildlife habitats can be balanced. The Bypass can be a place where landowners are fairly compensated for land use and flood conveyance changes. It can be a place where landowners need not be threatened by the presence of additional wildlife habitat and special-status species. It can be a place where realistic goals and objectives can be achieved, resulting in benefits for all parties involved.” (Jones and Stokes 2001).***

## Background

The Sacramento River is joined by the Feather and American Rivers just above the city of Sacramento. The water that these three rivers carries drains a large portion of the Northern Sierra Nevada mountain range, and the volume can be greater than 30 million acre-feet annually (Jones and Stokes 2001). Historical records have recorded flows up to 600,000 cubic feet per second from the mouth of the Sacramento River into the Suisun Bay. Thus, the region is prone to large seasonal floods in response to both winter rains and spring snowmelt.

The Yolo basin parallels the Sacramento River, encompassing over 100,000 acres including the areas around Woodland and Davis southward toward Rio Vista. In the 1800s, this basin filled with water from the three rivers for most of the winter months, forming a seasonal inland sea. The area supported a diverse tule marsh ecosystem and provided important winter bird habitat. Depending on the water year, the basin could be inundated for more than 100 days, limiting travel and access to the state capitol.

*“Soon after the Gold Rush which exploded in the late 1840s, thousands of the people who came to Central California followed a brief fling at the mines by moving down from the mountains to settle in the fertile Sacramento Valley. Here they shortly encountered a gravely threatening natural phenomenon. They discovered that during the annual winter cycle of torrential storms that for millennia have swept in from the Pacific, or in the season of the spring snow melt in the northern Sierra Nevada, the Sacramento River and its tributaries rose like a vast taking in of breath to flow out over their banks onto the wide Valley floor... For the better part of the next several generations, embattled farmers and townspeople struggled to get control of their great river system so that they might live in safety on the Valley floor and put its rich soils to the plow” (Robert Kelley, Battling the Inland Sea, 1989).*

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In 1911, Congress approved the Sacramento River Flood Control Project, which sought to divert these large flows through a series of weirs and bypass channels. The Yolo Bypass is one of two primary bypass systems constructed in the Sacramento Valley to attenuate flood flow. When flows on the Sacramento River exceed 60,000 cubic feet per second at the Fremont Weir, water begins to spill into the Bypass. This relieves pressure on the main levee system along the river channel.

The Bypass encompasses an area 3 miles wide and 40 miles long, extending from the confluence of the Feather and Sacramento Rivers to a point above the city of Rio Vista (Tokita and Cameron-Harley 1999), where it empties into the Delta. The Bypass is designed to withstand flows up to 500,000 cubic feet per second. When the Bypass is fully inundated, the wetted area of the Sacramento-San Joaquin Delta system approximately doubles (Smallling et al. 2005).

Beginning in 1989, the Yolo Basin Foundation, a non-profit community-based organization, began spearheading an effort to establish the Wildlife Area. In 1992, the California Department of Fish and Game began acquiring property within the Bypass. Over the last two decades, the Wildlife Area has grown to over 16,000 acres, and is one of the largest public-private restoration projects in the nation. At the 1997 dedication of the Wildlife Area, then-President Clinton

said, “We can do anything if we roll up our sleeves and get down to work and honestly listen to people who have different experiences, different perspectives, and different genuine interests. That’s what you’ve done here” (quoted in Feliz 2004). More than a decade later, the Wildlife Area is still thriving and has become a model of managing for multiple benefits.



**Figure 1. View of downtown Sacramento from Yolo Basin Wildlife Area**

Source: Dave Feliz, California Department of Fish and Game

## The Wildlife Area

California has lost approximately 95% of its wetland habitats over the past 150 years, making efforts to preserve what remains so critical (CDFG 2007). Over 8,000 acres of land in the Wildlife Area have been restored to wetlands and other associated habitats to support a wide variety of aquatic and avian wildlife (Figure 1). A complex system of pumps, canals, and water-control structures are utilized to flood and drain wetlands according to established prescriptions. These actions mimic the natural flooding and drainage that once occurred in the Yolo Basin. Today, the Wildlife Area provides vital habitat for hundreds of wetland-dependent species.

In addition, the Wildlife Area provides a mosaic of land uses and habitats, creating opportunities for agricultural production, wildlife habitat, environmental education, and recreation (Figure 2). The Wildlife Area continues to be actively farmed and agriculture is considered critical to maintaining the landscape values that the Wildlife Area was established to protect, and to ensure the long-term management of the property. Department of Fish and Game staff works with growers in order to develop cultivation and harvesting techniques that are beneficial to the farmer and to wildlife. Finally, the area still functions as a flood conveyance system as it was originally intended, diverting large flows around low-lying cities and towns in the region.

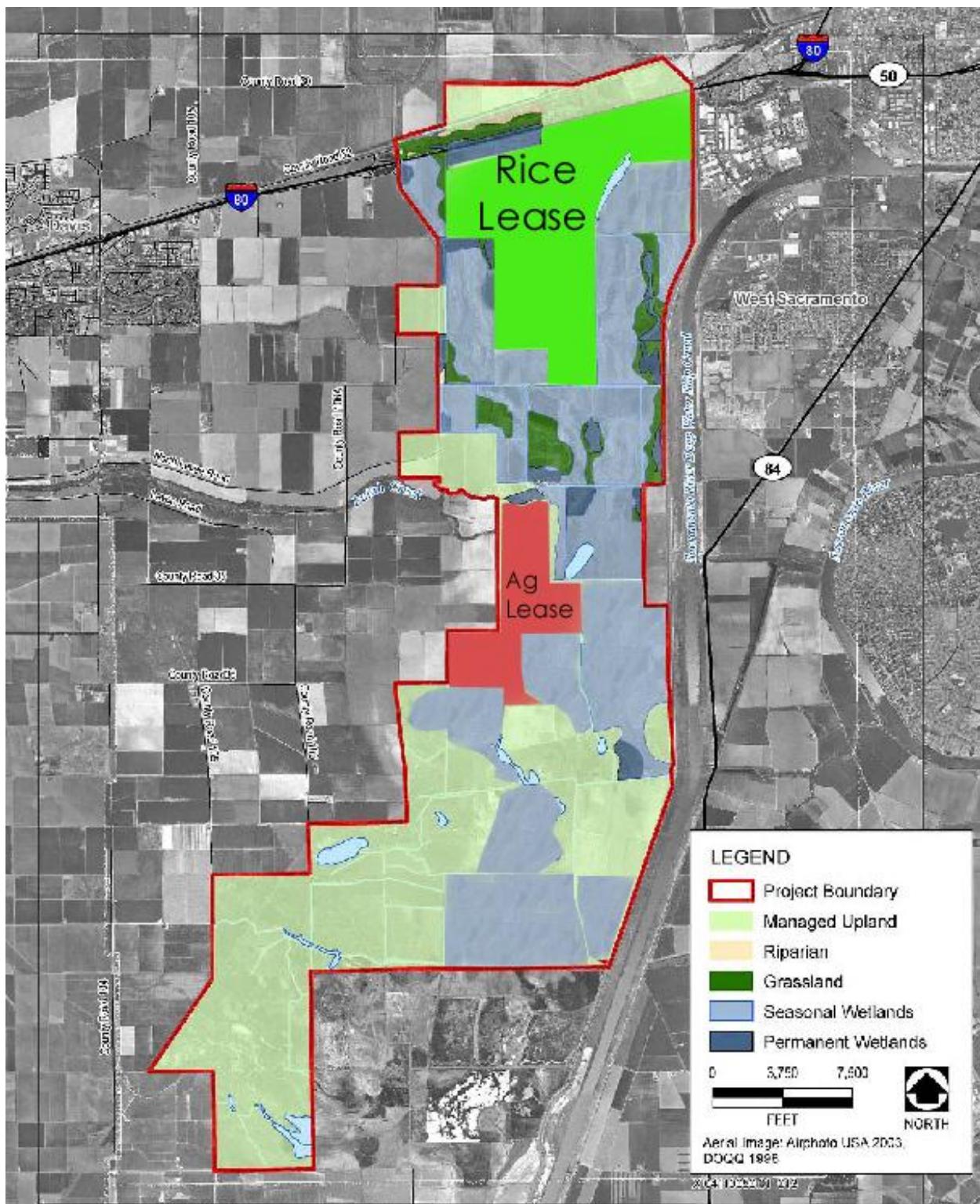


Figure 2. Yolo Bypass Wildlife Area managed permanent and seasonal wetlands, along with leased agricultural lands

## Agricultural Benefits

Through a unique partnership, the Department of Fish and Game (DFG) owns the land but leases it out to agricultural producers through the Dixon Resource Conservation District (RCD). The Yolo Wildlife Area is home to a variety of agricultural enterprises, primarily producing field crops, truck crops, and grains (Figure 3). There are three agricultural leases within the boundaries of the Wildlife Area.

These leases were obtained through an open bidding process, whereby potential lessees prepared production and management plans that explained not only the price they were willing to pay and the crops they expected to grow, but also methods for achieving wildlife habitat goals outlined by the DFG land managers.

In 2008, the combined agricultural rental income (from 163 acres of corn, 589 acres of tomatoes, 881 acres of irrigated pasture and 5,381 acres of dryland grazing) was \$379,000.



**Figure 3. Tomato harvesting in the Yolo Bypass Wildlife Area**

Source: Dave Feliz, California Department of Fish and Game)

Many innovative, natural-resource-compatible agricultural practices occur in the Wildlife Area that provide valuable habitat for a diverse assemblage of wildlife species (Table 1). Rice is grown, harvested, and flooded to provide food for thousands of waterfowl while aiding in the decomposition of the rice stubble. Corn fields are harvested to provide forage for geese and cranes. Crops such as safflower are cultivated and a portion of the crop is mowed to provide seed for upland species such as ring-necked pheasant and mourning dove. Much of the grassland in the southern portion of the Wildlife Area is managed with cattle grazing, controlling invasive plants and resulting in blooms of wildflowers during the spring months (CDFG 2007).

**Table 1. 2004-2008 Average yields and habitat benefits for crops in the Wildlife Area (prepared by the Yolo Basin Foundation)**

Crop	Yield Ranges 2004-2008	Habitat Benefits (achieved and potential)
<b>Corn</b>	4.5 to 5.3 tons/acre	Cover and food for upland game species during growing season and waterfowl habitat if flooded post-harvest.
<b>Safflower</b>	.69 to 1 tons/acre	Food source for mourning doves and pheasants; unharvested portions provide hunting opportunities.
<b>Sunflower</b>	1.1 to 1.3 tons/acre	Food source for tri-colored blackbirds and upland game species.
<b>Rice</b>	2.28 to 3.79 tons/acre	Spring breeding habitat for stilts and avocets; food source for egrets and ibis during growing season; wintering habitat for waterfowl and shorebirds during post-harvest flooding. In fallow years serves as year-round habitat and food for numerous wildlife species and if flooded in summer provides shorebird habitat while achieving weed control for subsequent crops. The rice irrigation infrastructure has proven versatile in providing options for wildlife habitat benefits. The flooded fields may also be providing food sources for the bat colony under the Causeway.
<b>Wild Rice</b>	.47 to .73 tons/acre	
<b>Annual Hay</b>	1.8 to 2.21 tons/acre	Irrigation and haying can provide food sources for egrets, herons, swainson's hawk, crows; depending on harvest timing can provide nesting habitat for waterfowl and upland game species.
<b>Tomatoes</b>	23.5 to 25.2 tons/acre	Field preparation exposes rodents and insects for raptors.
<b>Irrigated Pasture</b>	.8 to 7.9 aum/acre	Food source for geese when pasture is sprouting; depending on timing can provide nesting habitat for pheasants and mallards.
<b>Dryland Grazing</b>	.2 to 1.1 aum/acre	Control of weeds and non-native vegetation to encourage desirable plant and animal species in wetland, upland, and vernal pool habitats as well as in hunting areas with too much vegetation. Cattle have also been used as a non-mechanical means of clearing an area prior to habitat construction and as a tool in managing mosquito-inducing vegetation in wetlands.

Wildlife Area Manager Dave Feliz sees agriculture as a critical part of maintaining important habitats (many of which are associated with agricultural production) and providing revenue for continued restoration and general operation of the Wildlife Area (D. Feliz, California Department of Fish and Game, personal communication, February 2, 2010). In cooperation with local farmers, he has focused on finding practices that maximize benefits to both the farmer and the environment; identifying these co-benefits has been key to the project's success. In addition, both the agricultural production and associated revenue have helped to ensure that the area is actively managed even when the state is financially constrained. In an era of land acquisition and conservation easements, it may be difficult for public land trusts and conservancies to fund the long-term management and monitoring of lands held in trust. Agriculture is increasingly seen as an opportunity for on-going management that can maximize co-benefits.

## Wildlife Benefits

Over 280 terrestrial vertebrate species are known to use the Wildlife Area at some point during their annual life cycles, some 95 of which are known to breed in the Wildlife Area (CDFG 2007). In addition, the Wildlife Area provides habitat for special-status wildlife species including fairy shrimp, giant garter snake, northwestern pond turtle, snowy plover, grasshopper sparrow, great blue heron, bald eagle, and many more species that are locally rare or have specialized habitat requirements.

*“The Central Valley of California is one of the premier wintering areas in the world for waterfowl. We annually host over five million ducks and geese in the Valley. This is about 60% of the total waterfowl in the Pacific Flyway.”*

— Dave Feliz, Wildlife Area Manager

During the winter and early spring of some years, flooding of the Yolo Bypass brings dramatic changes to the Wildlife Area. The floods provide large expanses of aquatic habitat, a phenomenon capitalized upon by several native fish species that prey on the vast numbers of invertebrates, and birds that prey on the fish, invertebrates, and agricultural residue. The Wildlife Area takes an ecosystem management approach that maximizes benefits for the full range of species as opposed to management at the single-species level. As such it has been nationally recognized by The National Audubon Society as a Globally Important Bird Area. It supports globally significant numbers of waterfowl; continentally significant numbers of northern pintail (*Anas acuta*) and least sandpiper (*Calidris minutilla*); and nationally significant numbers of American white pelican (*Pelecanus erythrorhynchos*; canvasback (*Aythya valisineria*); and dunlin (*Calidris alpina*) (CDFG 2007).

## Flood Protection

The Wildlife Area is managed so as to enhance the high productivity of seasonal wetlands. These wetlands undergo a dry period during the summer when annual plants germinate and set seed, which is an important food source for migratory waterfowl. However, if not managed correctly, this vegetation can slow the movement of flood water through the Yolo Bypass. Since flood control was the original purpose of the Bypass and is critical to the safety of surrounding communities, it is imperative to not compromise this function. Agreements with the Sacramento Valley Flood Protection Board have set detailed limitations on the amount of both emergent vegetation and riparian habitat on the Wildlife Area. In addition, studies have been done to ensure that the area has a zero net impact on the flood conveyance capacity of the Bypass. Through careful, adaptive management, the Wildlife Area is striking a balance between providing flood protection, agriculture, and habitat benefits.

## **Conclusions**

The Yolo Bypass Wildlife Area offers an example of how to manage land and water flexibly and for multiple benefits. The Wildlife Area increases the Central Valley's ability to handle floods, while permitting agricultural production and wildlife to coexist and even thrive. The project has been nationally recognized as an outstanding example of multi-purpose, adaptive management that will be increasingly important as we cope with the effects of climate change.

As we look toward the future, climate change is already altering the timing and availability of water in California. Climate change studies indicate increased extreme weather events—including more frequent and intense winter runoff, especially in the Sacramento River region, compounded by changes in snowpack and snowmelt. It will be increasingly important to learn how to farm with both floods and droughts, while continuing to provide for critical environmental needs, and the lessons learned at the Yolo Bypass Wildlife Area can offer a template for other vulnerable areas of the Central Valley.

## References

- California Department of Fish and Game (CDFG). 2007. Notice of Determination for the Yolo Bypass Wildlife Area Land Management Plan in Yolo County, California. Retrieved on February 5, 2010 from <http://www.dfg.ca.gov/lands/mgmtplans/ybwa/index.html>.
- Feliz, D. February 2, 2010. Yolo Bypass Wildlife Area Manager, California Department of Fish and Game. Personal Communication.
- Feliz, D. 2004. "Yolo Fly By." *Outdoor California*. September/October, Vol. 65, No. 5.
- Kelley, Robert. 1989. *Battling the Inland Sea: Floods, Public Policy, and the Sacramento Valley*. Berkeley: University of California Press.
- Smalling, K. L., J.L. Orlando, and K.M. Kuivila. 2005. Analysis of Pesticides in Surface Water and Sediment from Yolo Bypass, California. 2004–2005: U.S. Geological Survey Scientific Investigations Report 2005–5220, p. 20.
- Jones & Stokes. 2001. A Framework for the Future: Yolo Bypass Management Strategy: (J&S 99079.) August. Sacramento, CA. Prepared for Yolo Basin Foundation, Davis, CA.
- Tokita, J. and J. Cameron-Harley. 1999. "Beneath the Flood." Department of Water Resources News. Retrieved on February 11, 2010 from [http://geography.sierra.cc.ca.us/booth/california/9\\_water/yolo\\_bypass.htm](http://geography.sierra.cc.ca.us/booth/california/9_water/yolo_bypass.htm)