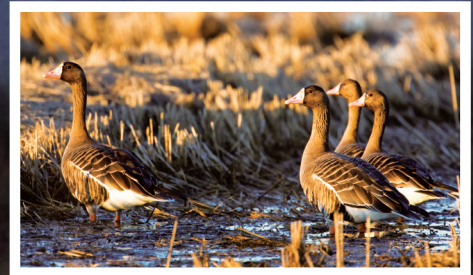
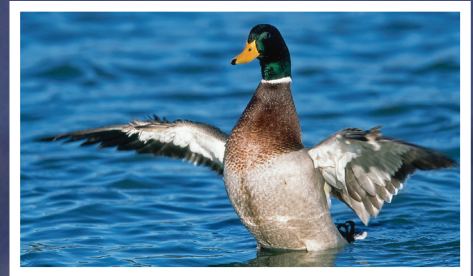
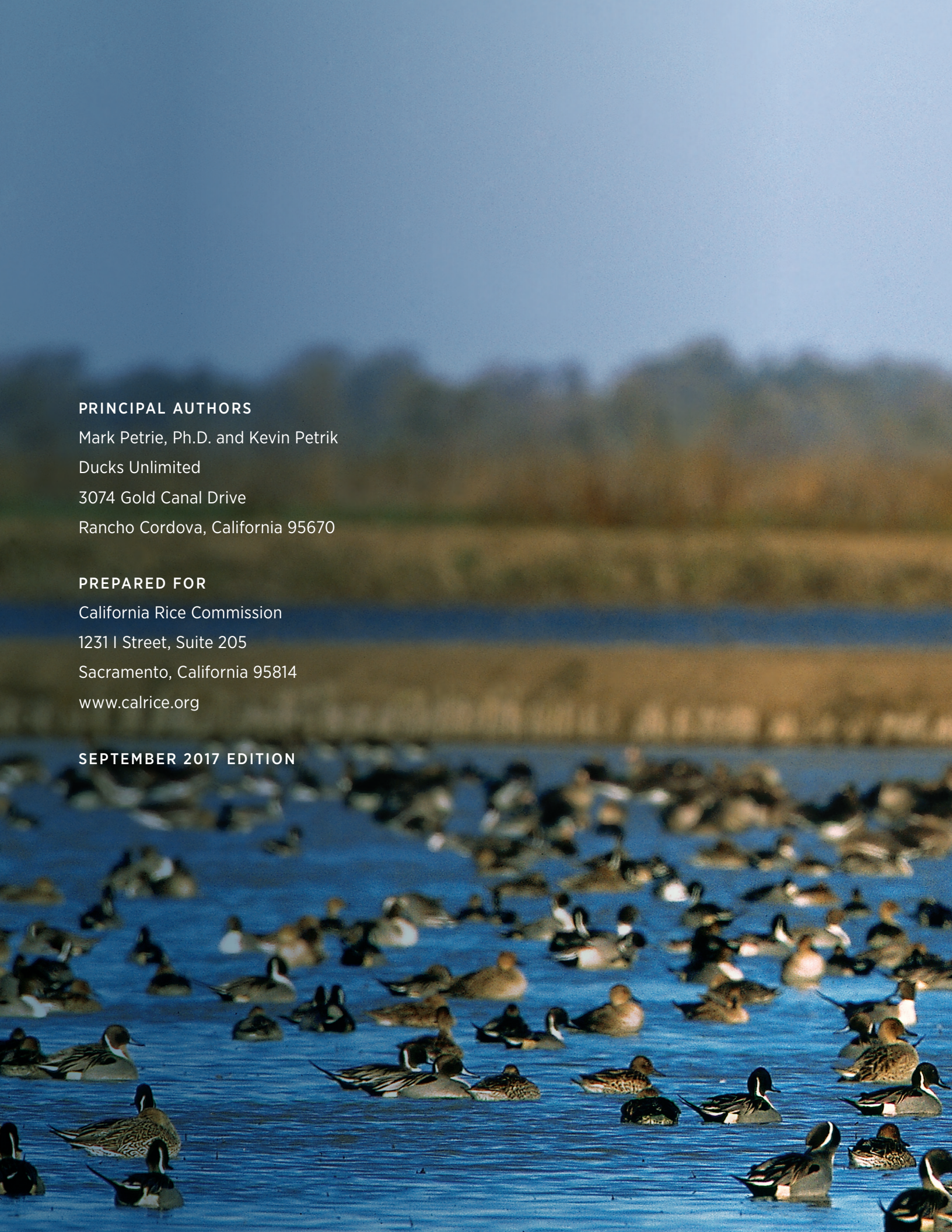


# ASSESSING WATERFOWL BENEFITS FROM WATER USED TO GROW RICE IN CALIFORNIA



Report Prepared By



A large flock of ducks is swimming in a blue body of water. The ducks are of various species, including mallards and green-winged teals, and are scattered across the water. The background shows a clear blue sky and a distant shoreline with trees and grass.

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**SEPTEMBER 2017 EDITION**

## INTRODUCTION

**Prior to the Gold Rush of the mid-1800s,** the Central Valley of California contained more than 4 million acres of wetlands and supported over 20 million waterfowl during fall and winter. Today only five percent of the valley's wetlands remain, yet the region still supports one of the highest concentrations of waterfowl on earth. During winter, as many as seven million ducks and geese, or ten to fifteen percent of all North America's waterfowl call the Central Valley home. This includes a third of all pintails, and almost the entire continental population of Tule White-fronted Geese and Aleutian Canada Geese."

### WINTERING WATERFOWL

The Central Valley continues to be the most important waterfowl wintering area in the Pacific Flyway because of the remarkable partnership between wetland managers and rice producers. While most of the valley's remaining wetlands are managed to the benefit of waterfowl, many of the wildlife values wetlands once provided are served by rice fields. Without these agricultural habitats, the number of birds using the Central Valley would be greatly diminished.

### THREATS TO RICE AND WATERFOWL

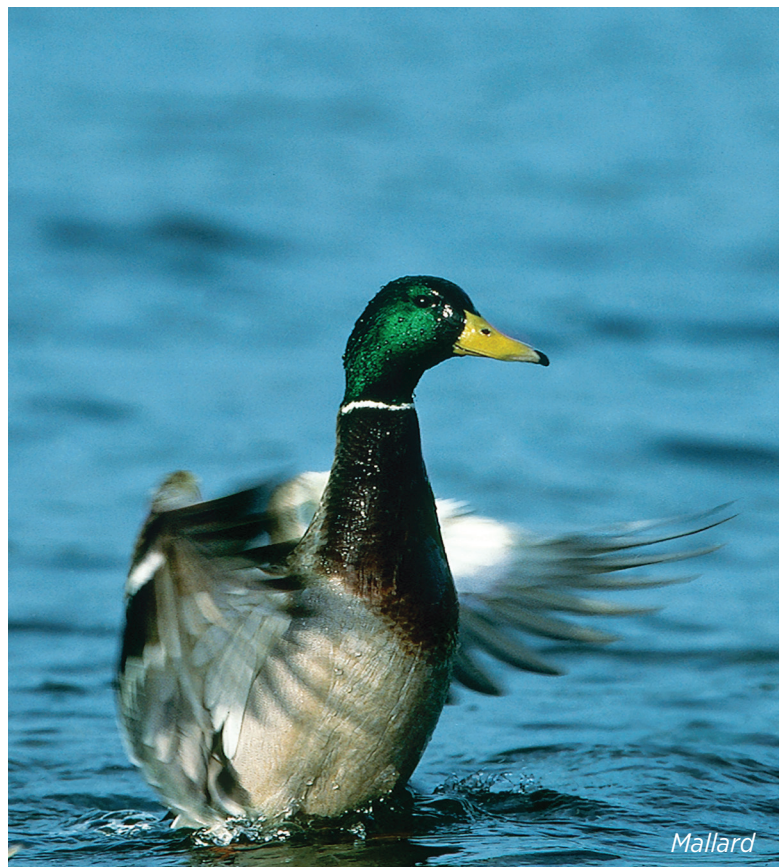
There are several threats to the California rice industry looming on the short and long-term horizons, including drought and urban expansion into agricultural areas. The purpose of this report is to answer certain questions as they relate to the need for a reliable water supply for rice production. It is important to understand that it is not just rice that grows in these fields. California ricelands are used by 230 species of wildlife, including about seven million waterfowl, several hundred thousand shorebirds and wading birds, and endangered Giant Garter Snakes. With every acre of lost production due to inadequate

water supplies both for growing rice and flooding the fields in winter, there is a corresponding impact on these species.

Due to the efforts of the Central Valley Joint Venture partners, good information on the importance of rice fields to waterfowl exists. This analysis by Ducks Unlimited evaluates how duck populations would be affected if rice water supplies were reduced by 25 and 50 percent, respectively. Please note that this analysis includes just one category of waterbirds – ducks. However, it is believed that shorebird and wading bird populations would also be similarly affected by a decline in rice water supplies.

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## THE VALUE OF RICE FIELDS TO WATERFOWL

Most waterfowl in the Central Valley obtain their food from managed seasonal wetlands, harvested rice, and cornfields. The relative contribution that each of these habitats (Figure 1) makes to the total food resources available for waterfowl is dependent on the number of acres in each habitat, the amount of food in each acre, and the nutritional value of the foods in each habitat.

### RICE & WATERFOWL FOOD RESOURCES

In years of normal rainfall an average of 550,000 rice acres are planted in the valley.

Most of these acres provide food for ducks and geese once the rice is harvested in early-fall. Managed seasonal wetlands in the Central Valley total about 200,000 acres. Most harvested cornfields that are important to waterfowl are found in the Delta Basin and total about 30,000 acres. Based on this breakdown, rice fields provide over 60 percent of all waterfowl food resources in the Central Valley.

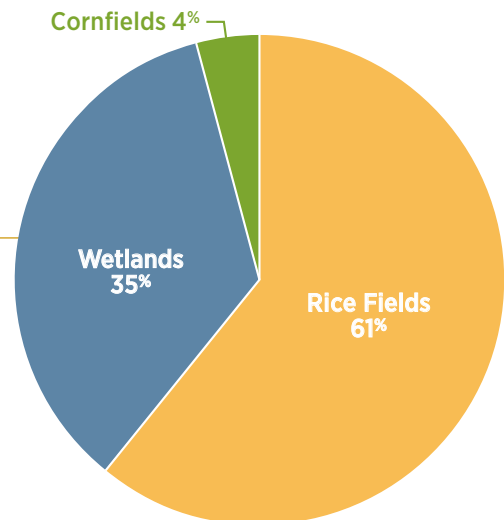
*Four Sacramento Valley drainage basins where rice is grown account for only 25 percent of the Central Valley's landmass, but provide habitat for 50 percent of all waterfowl including 85 percent of all geese.*



FIGURE 1

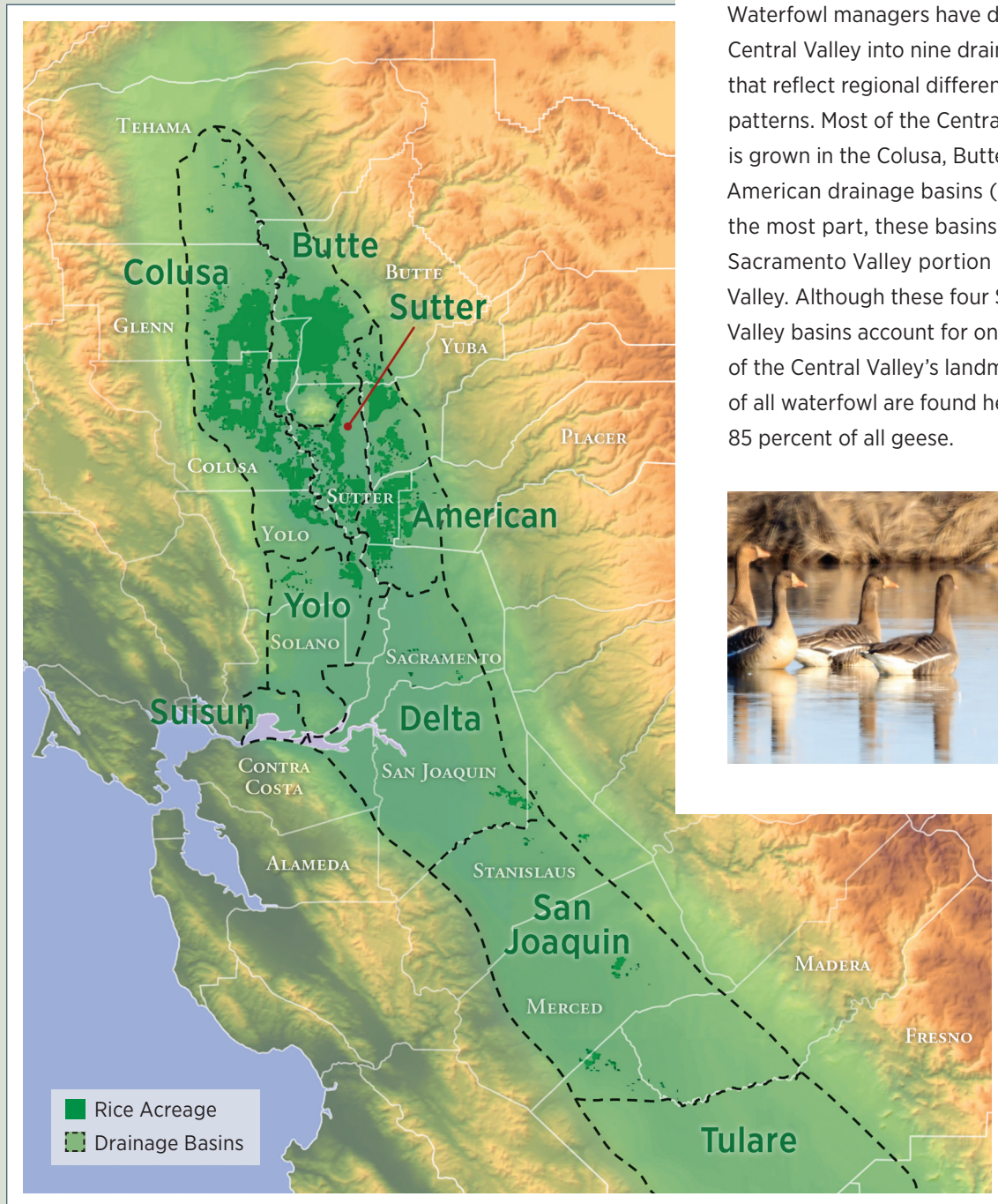
### Percentage of Food Resources for Waterfowl Provided in the Central Valley

*Rice fields provide over 60 percent of all the food resources available to ducks and geese in the Central Valley, with wetlands and harvested cornfields providing the rest.*



# Central Valley Rice Production

Source: DWR Land Use Survey



## DRAINAGE BASINS

Waterfowl managers have divided up the Central Valley into nine drainage basins that reflect regional differences in drainage patterns. Most of the Central Valley's rice is grown in the Colusa, Butte, Sutter, and American drainage basins (Figure 2). For the most part, these basins make up the Sacramento Valley portion of the Central Valley. Although these four Sacramento Valley basins account for only 25 percent of the Central Valley's landmass, 50 percent of all waterfowl are found here including 85 percent of all geese.



**FIGURE 2**

Most of the Central Valley's rice is grown in four drainage basins. Although these basins account for only 25 percent of the Valley's landmass, half of all waterfowl winter there.

### **RICE TAILWATER FOR SEASONAL WETLANDS**

Although rice fields and managed wetlands provide different kinds of food for waterfowl, these two habitat types are often linked by a shared water resource. Rice fields are drained prior to harvest and this drain water or “tailwater” provides an important source of water for nearby wetlands. In 2008, private and public wetland managers were surveyed to gather information on the use of rice tailwater in flooding managed seasonal wetlands in the Sacramento Valley. Depending on weather conditions and harvesting schedules, the use

of tailwater for flooding seasonal wetlands can begin in August and last through September.

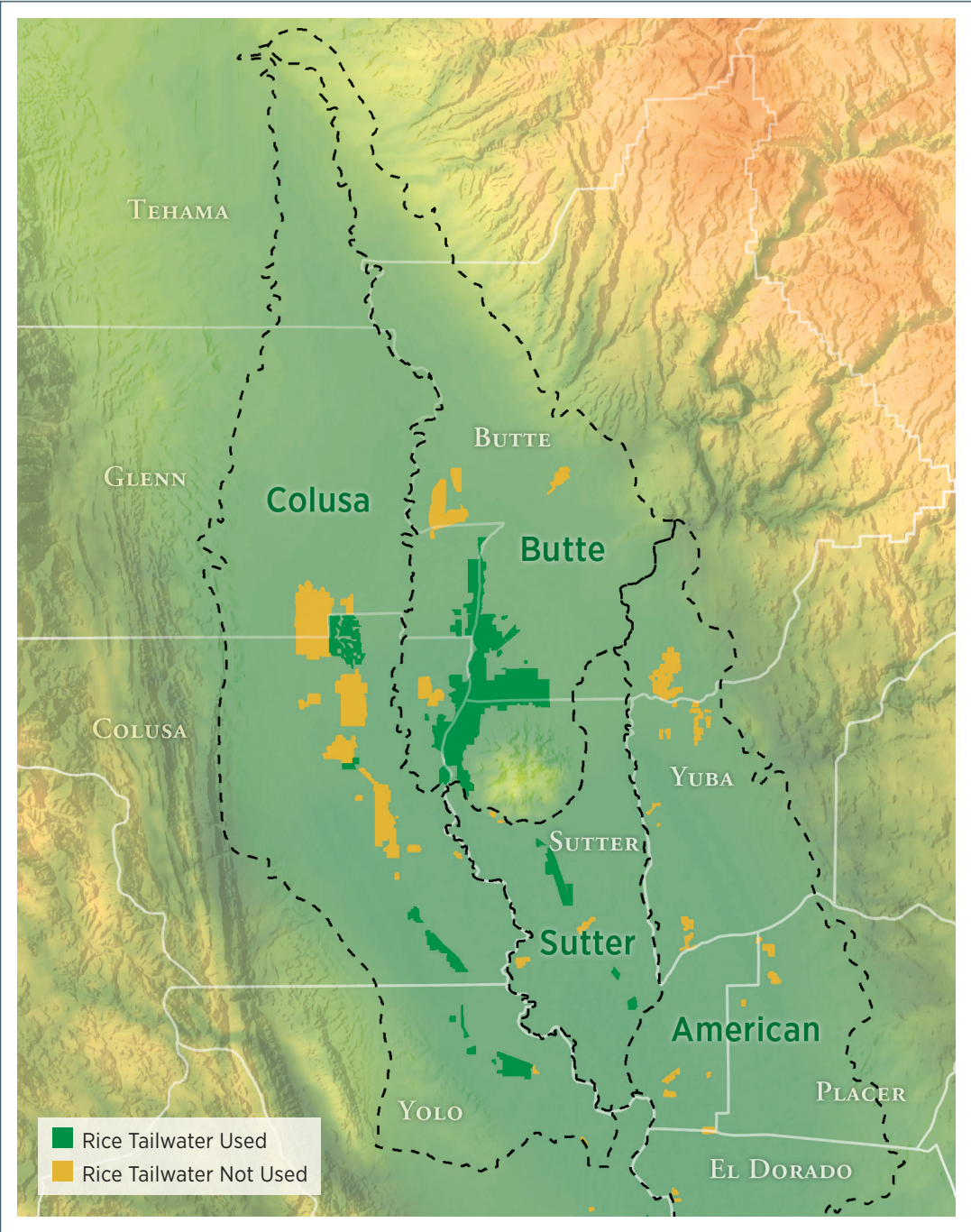
Results of the survey indicate that rice tailwater represents an important water source for many private and public owned wetlands in the Sacramento Valley. An estimated 56 percent of seasonal wetlands (nearly 45,000 acres) in the Sacramento Valley use tailwater for fall flooding (Figure 3). Rice not only provides the majority of food resources available to waterfowl, it also represents an important source of water for many of the Central Valley’s wetlands.

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*Rice not only provides the majority of food resources available to waterfowl, it also represents an important source of water for many of the Central Valley’s wetlands.*



# Wetland Use of Rice Tailwater



**FIGURE 3**

*Rice provides an important source of food for waterfowl and an important source of water for many wetlands. It is estimated that 56 percent of all seasonal wetlands in the Sacramento Valley use rice tailwater for fall flooding.*



*Great Blue Heron*



*Cinnamon Teal*



*Juvenile White-Faced Ibis*

*Rice fields provide over 60 percent of all waterfowl food resources in the Central Valley.*

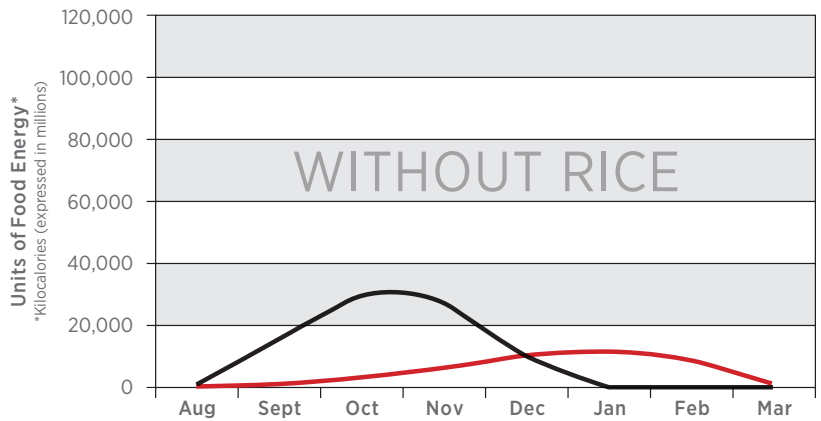
**WHAT IF RICE FIELDS WERE NO LONGER AVAILABLE TO WATERFOWL?**

One way to appreciate the importance of rice is to ask what would happen if rice were no longer available? Waterfowl managers have established monthly population objectives for ducks and geese in the Sacramento Valley, where most of the state’s rice is grown. We can use these population objectives to estimate how much food waterfowl need and what might happen in the absence of rice. In Figure 4, we use population objectives and the daily energy need of a single bird to generate a “population food energy demand curve” for ducks between fall and spring. We also generated a “population energy supply curve” that reflects the food resources that are available to ducks in the Sacramento Valley. In this case, it was assumed that no rice was grown and that birds had to rely exclusively on wetland food sources.

As illustrated in Figure 4, the population energy demand increases from August through January as birds migrate into the Sacramento Valley, and then it declines as birds begin their spring migration north. Food supplies increase from August to October as managed wetlands in the Sacramento Valley are flooded up. However, as bird numbers build and population energy demand increases, these wetland food supplies become quickly exhausted. In fact, food supplies are predicted to run out even before peak duck numbers occur in the Sacramento Valley if no rice is grown.

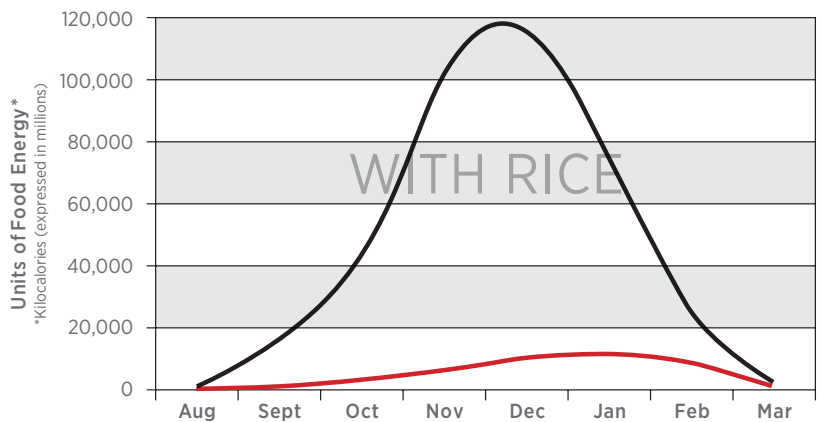
In contrast, Figure 5 shows how the normal baseline levels of winter flooded rice enable the duck population and food availability curves to align, demonstrating that the valley has enough food to support wintering duck populations as long as rice is grown. These same rice fields also support nearly two million geese.

**FIGURE 4**  
**Population Energy Supply Curve**



*Population food energy supply (black) vs. population food energy needs (red) for ducks in the Sacramento Valley if no rice is available. Under these conditions, food supplies run out even before peak bird numbers occur in the Sacramento Valley.*

**FIGURE 5**  
**Population Energy Supply Curve**



*Population food energy supply (black) vs. population food energy needs (red) for ducks in the Sacramento Valley if rice is available. Under these conditions, food supplies are sufficient while peak bird numbers occur in the Sacramento Valley.*

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*A 50 percent decrease in the number of acres in rice production would result in a loss of capacity to support about 1 million ducks.*



*Northern Pintail*

#### **LOSS OF SOME RICE HABITAT**

It is unlikely that all rice production will disappear from the Central Valley, at least in the foreseeable future. However, a possible scenario is that rice production declines from its current level because of limited water supplies that result from drought conditions, lack of additional water supply improvements and/or competition for the water currently used in California ricelands. Considering this possibility, an important question is how many fewer ducks could use the Central Valley if rice production was reduced? What if the reduction was 25 percent or 50 percent, for example?

For planning purposes, waterfowl managers assume that migrating and wintering ducks rely on the Central Valley for about 225 days (basically mid-August to late-March). Under current conditions, a 50 percent decrease in the number of acres in rice production would result in a loss of capacity to support about 1 million ducks over this entire 225 day period (1 million ducks x 225 days = 50 percent of the duck use days now provided by rice). Accordingly, a 25 percent reduction in the number of acres in rice production would result in a loss of capacity to support about 500,000 ducks over the same period.

**FIGURE 6**  
**Rice Loss & Duck Population**



*A 25 percent loss of rice acreage would reduce the capacity to support duck populations by about 500,000 birds. A 50 percent loss would double that figure to 1 million ducks.*





*There are about 380,000 acres of winter-flooded rice (both intentional and natural flooding) in the Central Valley. In terms of waterfowl food, this equates to about 255,000 wetland acres.*

### **WATERFOWL FOOD IN RICE FIELDS**

One acre of rice provides about two-thirds of the waterfowl food that is provided by one acre of managed wetland. There are about 380,000 acres of winter-flooded rice in the Central Valley. Of this 380,000 acres, approximately 75 percent is intentional winter flooding and the remaining 25 percent is natural flooding from rain events.

In terms of waterfowl food, this equates to about 255,000 wetland acres (380,000 x 2/3). Wetland restoration costs in the Central Valley, including the costs of land purchase, average about \$11,000 per acre. Replacing the food now provided by rice with wetland-based foods would total nearly \$2.8 billion.

### **GROWING SEASON HABITAT**

While the value of harvested rice fields to wintering and migrating waterfowl is widely recognized, rice also provides important waterfowl habitat during the growing season. Rice fields provide important habitat for breeding mallard pairs and ducklings from April through August when most seasonal wetlands in the Central Valley are dry. Mallards that breed and are raised in the Central Valley now make up to 20 percent of the total duck harvest in California and this local production has become increasingly important to hunter success. Most private wetland owners in the Central Valley manage their lands for the dual purpose of providing habitat for wintering waterfowl and opportunity for hunting of

waterfowl. These private wetland owners supply and manage nearly 70 percent of all wetlands available to waterfowl and incur substantial costs in doing so. Providing a reasonable level of hunter success is critical to this continued private investment in maintaining wetlands for waterfowl. Rice fields that support breeding waterfowl in the Central Valley ultimately contribute to hunter success and thus encourage future investments in wetlands.

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*Replacing the food now provided by rice with wetland-based foods would total nearly \$2.8 billion.*



*Shorebirds such as the Long-billed Curlew thrive in California ricelands.*

## CONCLUSIONS

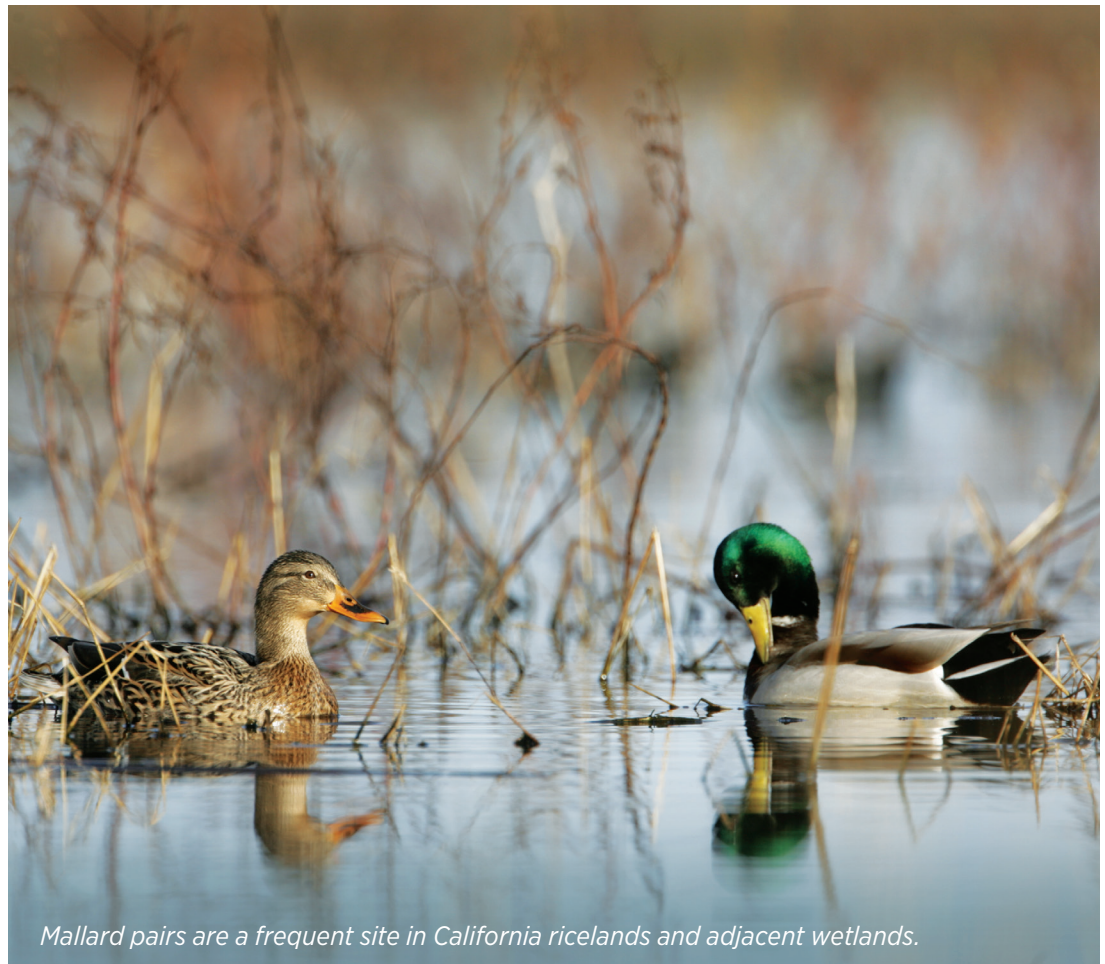
This report describes a clear link between working ricelands, managed in a wildlife-friendly manner, and the wildlife that use them. Millions of waterfowl and scores of other wildlife species in California lose critical habitat if fewer acres of rice are planted. In this report the effect of rice acreage losses on just one group of waterbirds has been evaluated. The results demonstrate that, if the California rice industry shrinks by one-half, the capacity to support over one million ducks simply disappears. If a similar analysis was done for other waterbirds, an even greater impact on total waterbird numbers would be demonstrated.

### ECOSYSTEM SERVICES PROVIDED BY WINTER FLOODED RICE

The economic value of the “ecosystem services” provided by winter flooded rice is also well described. Offsetting the loss of California ricelands by acquiring and restoring wetlands would cost nearly \$2.8 billion. This does not include the benefits provided to nearly 45,000 acres of managed wetlands that rely on rice tailwater for early flood up. As long as water continues to flow through California rice fields and these family farms remain viable, these ecosystem services will continue to be provided to the benefit of wildlife and California’s citizens.

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*The results demonstrate that, if the California rice industry shrinks by one-half, the capacity to support over a million ducks simply disappears.*



*Mallard pairs are a frequent site in California ricelands and adjacent wetlands.*



