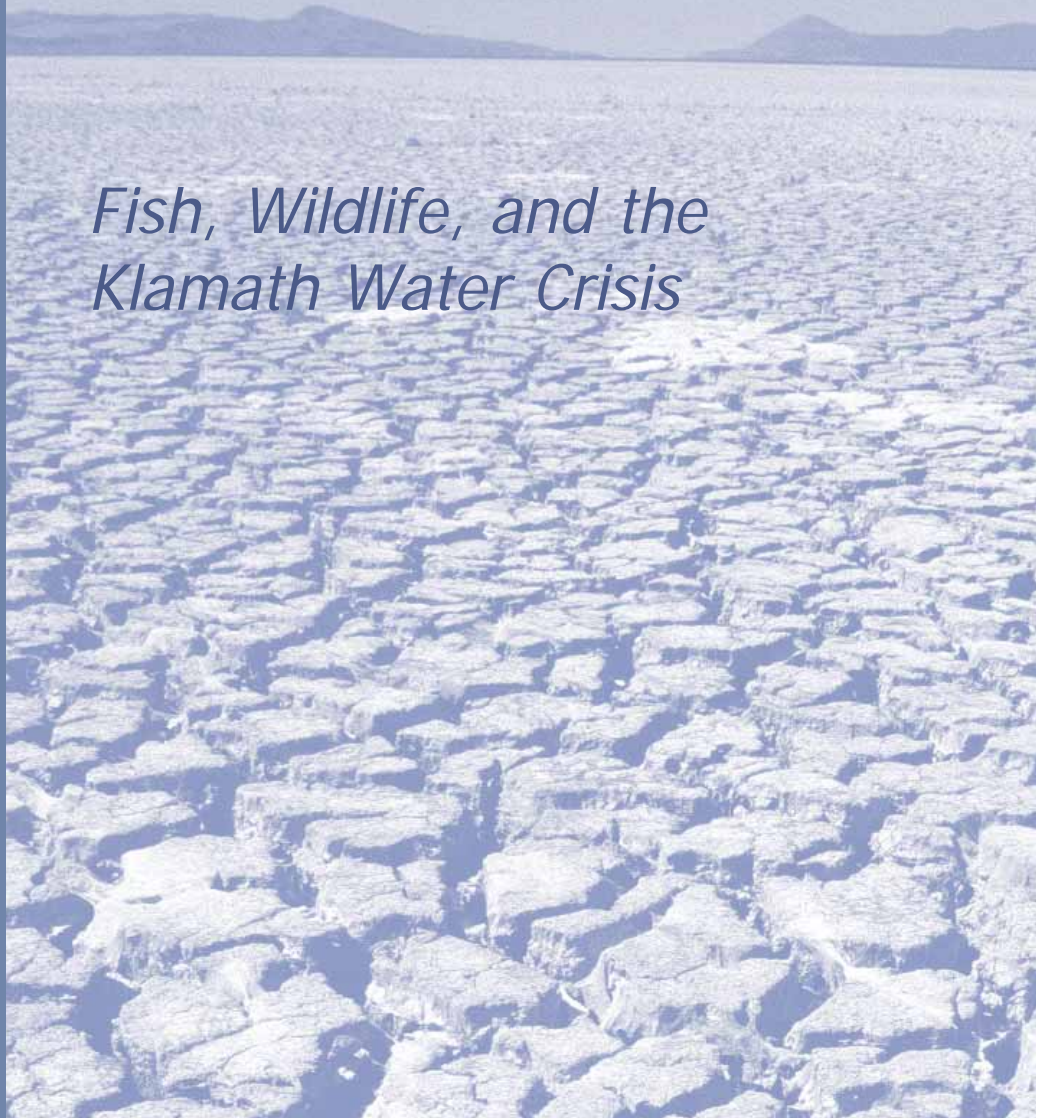




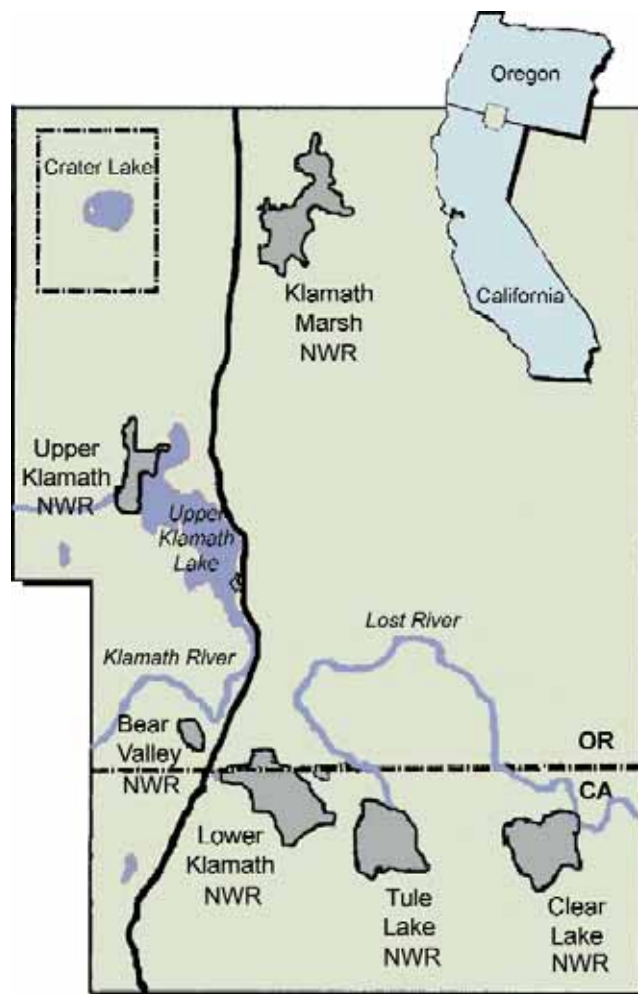
# REFUGES IN PERIL

*Fish, Wildlife, and the  
Klamath Water Crisis*



# Contents

Introduction .....	1
Chapter 1: Everglades of the West .....	2
Chapter 2: Settlement, Reclamation, and the Decline of Wildlife .....	3
Chapter 3: Crisis in the Klamath Basin .....	5
Chapter 4: The National Wildlife Refuges .....	8
Profiles of the Refuges .....	11
Solving the Klamath Crisis .....	17



The National Wildlife Refuges of the Upper Klamath Basin



USFWS

*Imagine a vast network of lakes, marshes, and rivers located in an isolated pocket of high desert along the Oregon and California border, teeming with an incredible variety of fish and wildlife. Each year, millions of migratory birds darken the sky as they move through the region, their thundering wing beats and echoing voices drowning out all other sound. Unique fish thrive in prodigious numbers in three massive freshwater lakes, and the third largest salmon run on the West Coast surges up over 250 miles of roaring river, returning from the Pacific Ocean to spawn beneath giant cottonwoods and ponderosa pines in mountain streams. Several Native American tribes make their homes along the region's waterways, and the abundance of fish and wildlife forms the cornerstone of their culture.*

One hundred and fifty years ago, this was the scene that greeted the first European settlers to arrive in the Klamath River Basin: a vast area stretching from the high desert of Southern Oregon to the foggy redwoods of Northern California. But today, these spectacular natural treasures are a shadow of their former splendor. A massive federal irrigation project aimed at bringing farming to the high desert has radically altered the natural balance in this region, and a century of mismanagement has drained and polluted rivers, lakes, and marshes while leaving fish and wildlife in critical condition.

The surviving fragments of marshland in the Klamath Basin are largely confined within the boundaries of six national wildlife refuges. Klamath Marsh, Upper Klamath, Lower Klamath, Tule Lake, Bear Valley, and Clear Lake refuges were each set aside to preserve the vanishing natural landscape of the region. As lakes and wetlands in other parts of the basin have been destroyed, these precious public lands have taken on an enormous importance for fish and wildlife.

But the Klamath Basin's national wildlife refuges are in serious trouble. So much water has been drained from the region's lakes, rivers, and wetlands that fish and wildlife populations have plummeted, with several species now on the brink of extinction. State and federal officials have promised more water for high desert irrigation than the environment can sustain. Even in good years there simply isn't enough to go around.

"Refuges in Peril: Fish, Wildlife, and the Klamath Water Crisis" highlights the enormous importance of the Klamath refuges. This report explores the history of these special public lands, their value, and the many problems they face. While the current picture is grim, "Refuges in Peril" also points the way to a better future by suggesting actions that can be taken today to restore and protect the amazing natural treasures of the Klamath Basin.



## Chapter 1: Everglades of the West

The Klamath Basin once contained over 350,000 acres of marshes, wet meadows, and shallow lakes, all threaded together by a network of rivers and streams. These extensive wetlands historically supported what may have been the largest concentration of waterfowl found anywhere in the world. A 1955 report estimated peak numbers of more than seven million waterfowl in Tule Lake and Lower Klamath National Wildlife Refuges alone.

Though approximately 80% of the basin's wetlands have been drained to provide land for irrigated agriculture, over three-quarters of the waterfowl in the Pacific Flyway still funnel through the basin each year during their spring and fall migrations. The wetlands of Lower Klamath and Tule Lake National Wildlife Refuges are especially critical resting and feeding areas for these migrating birds. Tens of thousands of white-fronted, snow, Ross' and Canada geese, tundra swans, northern pintails, mallards, American wigeon, and other ducks can still be seen during the peak of migration.



Snow geese are one of the major migrants in the Klamath Basin (Otis Swisher).

Because of the abundance of prey and prime roosting areas in Bear Valley National Wildlife Refuge, the basin supports the largest population of bald eagles in the lower 48 states during the winter, at times numbering more than 900. A large number of other raptors, including golden eagles, prairie falcons, northern harriers, short-eared owls, and rough-legged and red-tailed hawks can also be found in the refuges.

Klamath Basin refuges are also among the most prolific waterfowl and marsh bird nesting areas in the Northwest, producing thousands of ducks, geese, grebes, egrets, herons, ibis, avocets, and other water birds each year. Klamath Marsh National Wildlife Refuge is especially important for breeding sandhill cranes and yellow rails, while three of the West's last

surviving white pelican breeding colonies are located at Upper Klamath, Lower Klamath, and Clear Lake National Wildlife Refuges.

Upper Klamath Lake, Oregon's largest natural freshwater lake, is home to some of the largest rainbow trout found anywhere in the world. This blue ribbon fishery still produces trout of 15 pounds or more. The lake also once supported enormous populations of Lost River and shortnose suckers, known as Qapdo ("cup-to") and C'wam ("tshuam") to The Klamath Tribes and as mullet to early settlers. These rare fish are found only in the Klamath and Lost River Basins and can live for more than 30 years.



Rainbow trout thrive in Upper Klamath Lake (USDA).

Qapdo and C'wam were once an important food source to both The Klamath Tribes and early settlers, and as late as the 1950s the annual "mullet season" on Upper Klamath Lake drew recreational fishermen from all over Oregon. Qapdo and C'wam are still extremely critical to the culture and economy of The Klamath Tribes, who are working hard to recover fish populations to harvestable levels. Important nursery and feeding habitat for the fish are provided by the wetlands of the Upper Klamath National Wildlife Refuge at the northern end of the lake.

The Klamath River, a federally protected "Wild and Scenic River," was once the third most productive salmon and steelhead river in the West, surpassed only by the Columbia and the Sacramento. Its salmon runs are a central part of the culture and economy of several Native American Tribes. The river also serves as the nursery for the coastal fishing economy that stretches from Coos Bay, Oregon to Fort Bragg, California.

The Klamath Basin is also home to mule deer, elk, pronghorn antelope, cougar, black bear, and river otters. Over 430 wildlife species, including 263 bird species, have been observed in the basin. Dozens of these species are considered to be "of concern" or "at risk" by the US Fish and Wildlife Service and the states of Oregon and California due to habitat loss and declining populations.

Because of its importance to fish and wildlife, and the fact that it still represents the largest freshwater wetlands west of the Mississippi River, conservationists have long called the Klamath Basin the "Everglades of the West."

## Chapter 2: Settlement, Reclamation, and the Decline of Wildlife

### *The First People of the Klamath Basin*

The first people to make their homes in the Klamath Basin were Native Americans of the Klamath, Modoc, and Yahooskin Tribes, who all shared portions of the upper basin, as well as the Yurok, Karuk, and Hoopa Tribes in the lower basin. For thousands of years the basin's abundant fish and wildlife sustained their communities. Salmon were extremely important to all native people in the region, and Qapdo and C'wam were at the center of the culture of upper basin tribes. These tribal resources are dependent on the water flowing in the rivers, lakes, and marshes of the Klamath Basin.

Conflict with early explorers and settlers led to tremendous suffering and loss for the native people of the region. Treaties with the United States government reduced some of these conflicts, but denied the Tribes much of their traditional homelands. Most of the treaties did promise, however, that the hunting, fishing, and gathering rights needed to support their traditional way of life would be preserved. Recent court rulings have found that these treaties not only protect the rights to fish, but also the water needed to sustain them. However, for over a century state and federal officials have failed to protect the rights of Native Americans by giving irrigation the top priority for water.

### *Early Settlers*

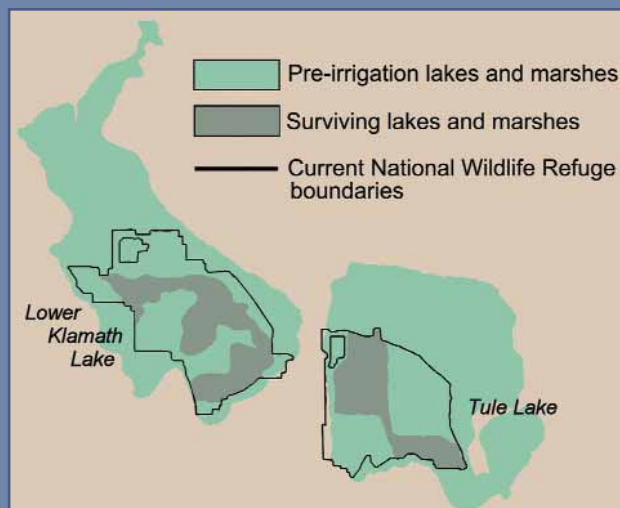
The first Europeans to reach the Klamath Basin arrived nearly 200 years ago. In the 1820s, fur trappers with the Hudson Bay Company harvested beaver, otter, and marten in the basin. Early explorers such as Peter Skeen Ogden and John C. Fremont also spent time in the region.

In the late 1800s, homesteaders making the long journey from cities in the East began to arrive. Cattle ranchers soon took advantage of the upper basin's open meadows and marshlands to graze livestock, and in 1868 two farmers dug the basin's first irrigation canal. But these early efforts had relatively little impact upon the land compared to the wholesale changes that were to come.

### *The Reclamation Era*

In 1902 the United States Congress passed the Reclamation Act, establishing an ambitious program aimed at bringing agriculture and settlement to the arid American West. Wild landscapes and the waters that flowed through them were to be "reclaimed" and put to good use. The survival of fish and wildlife, as well as the communities that depended on them, were often given little consideration in this process. At the time the thriving marshland areas of the Klamath Basin were viewed as worthless, and water left in rivers to reach the ocean as wasted.

With its high elevation, short growing season, and isolation from major markets, the Upper Klamath Basin would seem an unlikely place for a massive irrigation project. But the US Bureau of Reclamation



## VANISHING WETLANDS

The marshes of the Klamath Basin once spread across 350,000 acres, but a century of irrigation development has taken a heavy toll on these important wildlife areas. Only 20% of the basin's original wetlands remain.

Two of the region's most important wildlife areas—Lower Klamath and Tule Lakes—have been vastly reduced in size. What remains of the Lower Klamath marshes is less than a quarter of former size, while Tule Lake has been reduced to less than 15% of its historic size. In recent years the Bureau of Reclamation has failed to provide even the meager amounts of water needed to sustain these surviving fragments of marsh.

was undeterred by the harsh realities of the region's climate and, in 1905, chose the Klamath Project as the nation's second reclamation project.

The high desert surrounding the basin's lakes and marshes generally made poor farmland, but the soils beneath the wetlands were fertile. To make way for agriculture, the Bureau of Reclamation set out to drain vast areas of lake and marsh and re-plumb the region's rivers and streams.

Over the last century the Bureau was extremely effective in carrying out this task. Working in conjunction with a railroad project in 1917, the Bureau of Reclamation cut the natural flow of water to Lower Klamath Lake, drying up one of the most spectacular wildlife areas in North America. A series of dams and reservoirs on the Lost River diverted and evaporated billions of gallons of water, strangling flows to Tule Lake. This magnificent lake which once covered up to 100,000 acres has now been reduced to two wastewater sumps totaling some 13,000 acres.

As wildlife was displaced from the marshes of Lower Klamath and Tule Lakes, crops like potatoes and alfalfa took its place. To provide water for agriculture on the former lake beds the Bureau of Reclamation



These potatoes, growing in Tule Lake NWR, illustrate the conversion of refuge marshlands to commercial agriculture (USFWS).

blasted a hole in the natural reef that formed Upper Klamath Lake, replacing it with the Link River Dam. This dam did not raise the lake level, but instead allowed the Bureau to drain the lake well below natural levels. Today Upper Klamath Lake is the principal source of irrigation water for the Klamath Project.

Over the course of a century, the Bureau of Reclamation drained over 100,000 acres of wetlands and constructed a vast matrix of dams, diversions, canals, and pumping stations to deliver water to thirsty crops. What began as a tiny project irrigating a few thousand acres has grown into a massive complex with 185 miles of irrigation canals, 516 miles of lateral ditches, 728 miles of drains, 45 pumping stations, and 7 dams that irrigate over 200,000 acres. At the same time that the Klamath Project was replacing natural marshlands with commercial agriculture, state offi-



Most of the wetlands within Tule Lake NWR have been replaced by commercial agriculture (ONRC).

cial in Oregon and California encouraged settlement and agricultural development in other parts of the basin. State water rights were issued to divert additional water from the basin to irrigate another 200,000 acres of ranch and farmland.

As alfalfa and potatoes replaced tule reeds and ducks in the upper basin, six hydroelectric dams were constructed on the Klamath River. The lower four dams were constructed without any form of fish passage, thereby killing off much of the river's historic salmon run. Today they still block salmon and steelhead from reaching hundreds of miles of historic spawning streams in the upper basin.

### *Cost and Consequences*

A century of irrigation development has taken a terrible toll on the Klamath Basin's fish and wildlife, and on the communities that depend on them. Prior to the arrival of government engineers and land speculators, the upper Klamath Basin contained some 350,000 acres of shallow lakes, streams, and marshes. Today only about 75,000 acres remain. With the loss of the basin's marshes came severe declines in fish and wildlife populations, and the natural water storage and cleansing function of the wetlands was lost.

Lower Klamath Lake, which was once so large that a steamboat was used to transport people and goods across it, was drained completely dry for two decades, depriving millions of birds of critical habitat. In the 1940s Lower Klamath Lake was partially revived, but the natural tie between the lake and the Klamath River remains severed. The important buffer the lake provided against droughts and floods has been lost.

Tule Lake, which historically fluctuated from 50,000 to 100,000 acres in size, has been reduced to two managed sumps of approximately 13,000 acres. The Lost River, which fed the lake, now serves as an irrigation canal that sometimes backflows into nearby springs, polluting drinking water supplies.



So much water is drained annually from Upper Klamath Lake and agricultural return flows from ranching in the upper basin are so polluted that Oregon's largest lake is near ecological collapse. The lake suffers from annual algal blooms caused by pollution and low water levels that have sparked severe fish kills. The once massive numbers of Qapdo and C'wam of Upper Klamath Lake have all but vanished and, in 1988, both fish were listed as endangered under the federal Endangered Species Act (ESA). Water withdrawals from operation of the Klamath Project also drain wetlands along the lake's shore, often completely drying up all 14,000 acres of marsh in Upper Klamath Lake National Wildlife Refuge, as well as thousands of acres of other marsh lands around the lake.

The Klamath River suffers from much the same fate as Upper Klamath Lake. With the loss of natural wetland storage, excessive water diversions, and severe agricultural pollution, the river now suffers from poor water quality and chronic low water flows. These conditions result in fish kills, including the catastrophic fish kill of 2002 that claimed more than 34,000 adult salmon before they spawned. The six dams on the river, operated by Scottish Power, further add to the salmon's woes by blocking the fish from reaching their historic habitat in the upper



When water flow to the basin's wetlands and marshes is significantly reduced, "permanent marshes" can dry up (ONRC).

basin. Coho salmon that once spawned in prolific numbers in Klamath River tributaries were listed as a threatened species under the ESA in 1997.

The development of the Klamath Project also devastated many human communities. As agricultural productivity and the quality of life in the upper basin increased, the economic and cultural well-being of families that depended upon the fish and wildlife of the lower basin deteriorated. Commercial fishing fleets from Fort Bragg, California to Coos Bay, Oregon saw their fortunes decline as fish runs collapsed. In recent years, an estimated 6,870 fishing-dependent jobs, amounting to more than \$137 million in total personal income, have been lost as a result of Klamath River salmon declines.

Native American communities have also suffered severe losses. For Tribes like the Karuk, Yurok, and Hoopa, salmon are a way of life, both a source of food and the center of their culture. Treaty rights that promised native families healthy salmon runs were ignored in the construction and operation of the irrigation project. In the upper basin, The Klamath Tribes' treaty rights to salmon were violated by the Klamath River dams that cut off these magnificent fish from their upper basin spawning grounds. The plummeting populations of Qapdo and C'wam also hit The Klamath Tribes hard—the Tribes' cultural beliefs tie their own survival to that of the fish. Except for the ceremonial catch of two fish annually, The Klamath Tribes stopped harvesting Qapdo and C'wam in 1986.



Members of the Karuk Tribe fishing near the confluence of the Salmon and Klamath Rivers (Dylan Darling, H&N Photos).

## Chapter 3: Crisis in the Klamath Basin

### *Too many promises, too little water*

As construction of the Klamath Project began in 1905, the federal government launched a program to lure homesteaders to the region with the promise of abundant irrigation water. For over a century the states of Oregon and California did the same, granting water rights to irrigators outside the Klamath Irrigation Project. Over the years more rights to this precious resource were given away than the environment could sustain.

Water promised to the homesteaders by the federal and state governments had already been promised to the Native Americans of the Klamath, Karuk, Yurok, and Hoopa Tribes. The federal government also has a responsibility to ensure that the region's national wildlife refuges and endangered and threatened species receive the water they need to survive. Other legitimate claims to Klamath water also exist. The economic well-being of commercial fishing



communities on the California and Oregon coasts are closely tied to the fate of the river and salmon runs, as are the communities that depend on river recreation and tourism.

### *Running on Empty - The Crisis Comes to a Head*

For decades, whenever the demand for water exceeded supply, downstream communities, Native Americans, and national wildlife refuges were forced to make do with what was left after irrigation interests received their full share. Today this lop-sided policy has resulted in an ecological crisis.

Populations of Qapdo and C'wam in Upper Klamath Lake and salmon in the Klamath River have suffered enormous declines due to the irrigation project. Decimated fish runs have, in turn, fired outrage and anger among Native Americans, commercial fishermen, and other communities that depend on healthy rivers and streams. Throughout the 1990s lake and river dependent communities urged the Bureau of Reclamation to modify operations of the irrigation project to reduce its impact on threatened and endangered fish. But the Bureau instead focused on maintaining full water deliveries for irrigation.



Dwindling water supplies have taken a huge toll on wildlife in the refuges (Mary Paetzel).

In 2001, after years of legal battles, the Endangered Species Act finally forced the Bureau of Reclamation to provide more water for threatened salmon and the endangered Qapdo and C'wam. Unfortunately, at the same time the Bureau reluctantly began to deal with the fact that it had over-promised the region's water supplies, the Klamath Basin experienced one of the worst droughts on record. Much of the limited supply of water that was available was set aside for the survival of threatened and endangered fish, as well as for bald eagles.

This was the first time in the history of the Klamath Project that water supplies for irrigation were restricted in order to protect fish and wildlife. While this decision gave hope to salmon-dependent communities and wildlife advocates, it incensed irrigation interests. Irrigators embarked on a series of highly visible anti-government protests that lasted for several months.



Bald eagles who winter in the Klamath refuges managed to receive water during the 2001 drought due to citizen enforcement of the Endangered Species Act (Don Getty).

Some farmers did suffer substantial economic losses during the drought of 2001, but protesters' efforts to portray the situation as a total water shut-off were exaggerated. Roughly half of the irrigated lands in the basin, those located outside the Klamath Project, did not face any irrigation restrictions. Even on lands in the Klamath Project, farmers ultimately received more than 60% of normal water deliveries in 2001.

While threatened and endangered fish weathered the 2001 drought with bare minimum water levels, the Klamath wildlife refuges were not so lucky. Seasonal and permanent marshlands went dry, causing tremendous harm to breeding and migratory birds.

At first the refuges were not slated to receive any water for over-wintering bald eagles, but faced with an embarrassing court battle, the Interior Department agreed to provide minimal water for the majestic birds.

The ire over the 2001 drought and efforts to save endangered lake fish and coho salmon have sparked a backlash against the Endangered Species Act in Congress. But attacking the ESA and efforts to protect threatened fish ignores the core problem facing the basin—too much water promised to too many interests. Gutting the ESA or de-listing coho salmon will not solve the problems that led to their decline, and will only lead to further economic losses for the Native American, commercial, and recreational fishing communities that depend on them.



## *Tragedy On the Klamath River*

The conflict over scarce Klamath water supplies exploded again in 2002, when the Interior Department, under pressure from political appointees in the Bush administration, adopted a new operating plan for the Klamath Project that overturned fish restoration efforts. The plan favored irrigation interests over all other communities in the basin. The administration's plan relied on a 26-page "interim" report it commissioned from the National Research Council, while ignoring years of scientific research on Klamath fisheries, suppressing key scientific reports, and inappropriately pressuring federal biologists. The results were tragic for fish, wildlife, and the Native American, commercial fishing, and recreational fishing communities that depend on them.

During the first year of the plan, hundreds of threatened juvenile coho salmon were stranded and killed in the Klamath River when spring water flows were suddenly diminished. Marshes in the refuges were again left dry due to a lack of water, while adjacent refuge lands leased for commercial farming to grow potatoes, alfalfa, and other crops received full water deliveries. Upper Klamath Lake was drained dangerously low, drying up large areas of Upper Klamath National Wildlife Refuge and surrounding marshlands.



The Bush administration's decision to reduce flows to the Klamath River led to a massive fish kill and angry protests by Native Americans (Yurok Tribe).



Dead salmon litter the banks of the Klamath (H&N Photos).

## "Government Admits Role In Klamath Fish Die-Off

The U.S. Fish and Wildlife Service says diversions of water to farmers in 2002 helped create river conditions lethal to fish."

- *The Oregonian*  
November 19, 2003

But the greatest tragedy came in September of 2002, when the Bush administration's water plan reduced the amount of water entering the Klamath River from the upper basin to nearly half the 41-year average. Spawning chinook salmon were forced into overcrowded pools to escape the hot, shallow water. Disease outbreaks ensued, sparking a massive fish kill that claimed over 34,000 salmon before they could spawn. It was one of the largest adult fish kills in US history.

## *An Uncertain Future*

Court battles continue to rage over the scarce waters of the Klamath Basin. How these cases will play out is unknown, but one thing is certain: there is simply not enough water left in the Klamath Basin to honor all of the legitimate claims. If the conflict over water is ever to be solved, demand for this precious resource must be brought back into balance with what nature can sustain.



Tundra swans frequent the refuges of the Klamath Basin (USFWS).

## Chapter 4: The National Wildlife Refuges

The six national wildlife refuges that dot the upper Klamath Basin today are only fragments of the massive network of lakes, marshes, and rivers that once blanketed the area. As irrigation has expanded in the upper basin, these surviving wild lands have taken on enormous importance for fish and wildlife. Many species literally have nowhere else left to go.

The Klamath refuges are also special places for people. The spring and fall bird migrations offer a unique opportunity to connect with nature and observe these creatures on an awesome scale. The refuges provide many opportunities for outdoor recreation, from bird watching and canoeing to waterfowl hunting and hiking. The tourism generated by these special public lands has also become a major economic resource for the region.

But the national wildlife refuges of the Klamath Basin are in trouble. Problems stemming from the operation of the Klamath Project, uncertain water supplies, and commercial farming, grazing, and logging within their boundaries threaten their future.

### *The Nation's First Waterfowl Refuge*

The Klamath marshes first gained national attention in the late 1800s when biologists began to understand their value for fish, wildlife, and scenic beauty. But at the same time that news accounts began to



The wetlands of Lower Klamath NWR provide a haven for migratory waterfowl and other birds (scotthardingphoto.com).

circulate about the massive waterfowl migrations and enormous salmon runs, increasing numbers of commercial hunters and homesteaders were moving into the region. Market hunters were killing huge numbers of ducks, herons, grebes, egrets, and other birds for meat and plumes, while homesteaders were destroying marsh and meadow lands. When news of the destruction began to appear in newspapers around the country, the public demanded protection of these wild lands.

In 1908 President Theodore Roosevelt responded by setting aside 81,000 acres of marsh and open water in Lower Klamath Lake with the designation of one of our nation's first refuges for migratory birds: Lower Klamath National Wildlife Refuge.

### *Reclamation Versus Refuges*

President Roosevelt's effort to protect the birds of the Klamath Basin was a visionary step, but it collided with the push to "reclaim" the marshes for agriculture. In 1905, when the Bureau of Reclamation filed notice of its intent to develop a massive irrigation project in the basin, state and local officials, land speculators, homesteaders, and farmers embraced the proposal.

Roosevelt's fledgling refuge was devastated in 1917 when the Bureau of Reclamation, collaborating with a local railroad project, diked off the natural flow of water to Lower Klamath Lake. What was once an 80,000 acre mecca for wildlife and waterfowl soon became a dried out wasteland of alkali flats baking in the desert sun. Beginning in the 1920s, wildfires burned through the dried peat soils of the former lakebed, sending plumes of dust and ash into the sky and shutting down schools as far away as Klamath Falls.



The destruction of Lower Klamath Lake led photographer and former Oregon Game Commissioner, William Finley, to write in 1925: "Today, Lower Klamath Lake is but a memory. It is a great desert waste of dry peat and alkali. Over large stretches fire has burned the peat to a depth of from one to three feet, leaving a layer of white loose ashes into which one sinks above his knees. One of the most unique features in North America is gone. It is a crime against our children."



The sagebrush surrounding Clear Lake NWR shows the dry character of much of the Upper Klamath Basin (USFWS).

Lower Klamath National Wildlife Refuge would remain dry for two decades. Its size was also reduced by almost half to allow homesteading and agricultural development in what was supposed to have been a haven for wildlife.

Clear Lake National Wildlife Refuge, created in 1911, was radically altered when the Bureau of Reclamation installed a dam there. The dam flooded the lake to higher than natural levels during the winter months to provide water for summer irrigation, while holding back flow from the enormous Tule Lake. Natural water flows to Tule Lake were further reduced when the Bureau completed damming the Lost River in 1912. In 1917, the Bureau of Reclamation opened up portions of Tule Lake's drained bed to homesteading and irrigation.

In 1928, Tule Lake National Wildlife Refuge was established to preserve the remnants of this once vast lake. Some 10,300 acres were protected by this initial designation—a fraction of the lake's natural surface area of up to 100,000 acres. Conservationists argued that more of the area should be protected to offset the devastation of the Lower Klamath Lake National Wildlife Refuge. Their concerns prompted President Franklin D. Roosevelt to triple the size of Tule Lake National Wildlife Refuge to 37,000 acres.

Also in 1928, Upper Klamath National Wildlife Refuge was created on the shores of Upper Klamath Lake. The Bureau of Reclamation's desire

to use Upper Klamath Lake water for irrigation spared some of its marshes from homesteading; however, as water is drawn from the lake for irrigation, refuge wetlands along the shore are left high and dry. In some years, nearly all 14,000 acres of marsh within the refuge are drained completely dry by the operation of the Klamath Project.

As irrigation development in the Lost River area increased during the 1930s, so did the amount of water running off of farmlands. Much of this water seeped back into the river, where it flowed once again into Tule Lake. While Lower Klamath National Wildlife Refuge was bone dry, the remnants of Tule Lake were threatening to break out of the surrounding dikes and levees to flood the "reclaimed" land.

The Bureau of Reclamation engineered a complicated scheme to solve this problem by blasting a tunnel some 6,000 feet long through Sheepy Ridge and connecting the Lost and Klamath River Basins. In 1942, water from Tule Lake began to be pumped through the ridge and into Lower Klamath National Wildlife Refuge, bringing water back to the devastated refuge after twenty years of Bureau neglect.



Fragments of Lower Klamath Lake were revived when water was returned to them in the 1940s (USFWS).

But while Tule Lake irrigators and conservationists were pleased by the move, the solution created a whole new set of problems. Because of inadequate drainage, Lower Klamath Lake irrigators were flooded and the stagnant pools of water led to severe disease outbreaks that killed thousands of birds. The Bureau of Reclamation devised a second major engineering scheme to solve this problem. A new drain was constructed that allowed the now heavily polluted alkaline waters of Lower Klamath Lake to be dumped into the Klamath River. The refuges' water pollution woes were reduced, but at the cost of shifting the burden to the communities downstream.



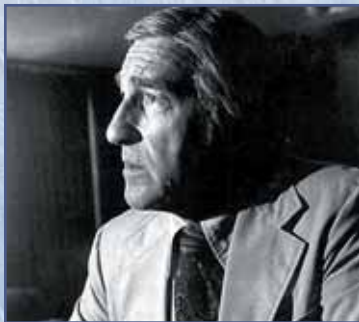
## *The Lease Land Farming Controversy*

The creation of Lower Klamath and Tule Lake National Wildlife Refuges was intended to preserve vital fragments of the once-vast Klamath marshlands. Unfortunately the protection these refuges offer for fish and wildlife has been severely undermined by the presence of commercial agricultural operations within their boundaries.

In the 1940s and 50s a combination of population growth, irrigation subsidies, and crop prices led to an increase in the demand for land within the Klamath Project. For decades portions of Tule Lake and Lower Klamath NWRs were leased for agriculture, but some irrigators were not satisfied. They argued the refuges should be opened up for permanent development and private ownership.

Conservationists strongly opposed any such move, and a fierce debate ensued. Some local irrigators portrayed the debate as "duck vs. farmer," foreshadowing future conflicts over water. Debate over the fate of the refuge lease lands would ultimately stretch all the way to the United States Congress.

Stewart Udall, Interior Secretary for President Johnson, came to the defense of the refuges, arguing that the remaining marshlands were simply too important to let slip from public ownership. A number of prominent irrigators testified in favor of draining the lease lands, contending that not doing so would violate



Stewart Udall was a firm supporter of preserving the refuges (Tom Dustin, Izaak Walton League).

the very purpose of the Klamath Irrigation Project. The conservation community ultimately prevailed, but it was not a complete victory.

The 1964 Kuchel Act settled the lease land issue by barring any future homesteading within the refuges. But it also allowed the practice of leasing nearly 22,000 acres of refuge land for commercial agriculture to continue as long as it remained compatible with refuge purposes. While termed a "compromise" in an attempt to preserve the already degraded marshlands, over time it has become increasingly evident that broad scale commercial farming can never be compatible with refuge purposes.

With most of the basin's historic marshland outside the refuges now destroyed, each acre of wetland within the refuges is of critical value for fish and wildlife. Yet commercial agricultural operations and crops such as potatoes, onions and alfalfa occupy public refuge lands. These crops provide little or no benefit to wildlife, and require pesticides harmful to native insects, birds, and fish. The lease land program also consumes an enormous quantity of water: nearly 16 billion gallons—water that could be used to restore wetlands, or to maintain river flows and lake levels needed by threatened and endangered fish.

Even some local landowners have begun to challenge the practice, arguing that leasing refuge lands unfairly competes with the rental of private property in the basin.

## *The Later Refuges*

Roughly 60 miles north of Upper Klamath Lake, a fifth National Wildlife Refuge was created in the Klamath Basin in 1958, the Klamath Marsh NWR. This large natural marsh, currently consisting of over 40,000 acres, provides important nesting, feeding, and resting habitat for waterfowl. The surrounding meadowlands are attractive nesting and feeding areas for sandhill cranes, yellow rails, various shorebirds, and raptors.

Klamath Marsh National Wildlife Refuge is not affected by the Klamath Project, but irrigation withdrawals from water rights issued by the State of Oregon curtail flows to the refuge wetlands. Refuge managers have allowed logging operations, extensive commercial hay growing, cattle grazing, and periodic pesticide use within the boundaries of this refuge.

Bear Valley National Wildlife Refuge was the sixth refuge created in the Klamath Basin, designated in 1978 to preserve an important roosting area for bald eagles. Over 900 eagles winter in the Klamath Basin, the largest population in the lower-48 states. Many of these majestic birds feed on waterfowl within the marshes of Lower Klamath Lake and Tule Lake NWRs, then return to this 4200-acre refuge to roost.

The failure to secure water for Lower Klamath and Tule Lake marshlands threatens the eagles that use this refuge. Additionally, conservationists have had to remain vigilant to ensure that over-zealous logging proposals do not harm the old growth ponderosa pines, cedars, and firs used by roosting eagles and other birds.

The followings are profiles of the six wildlife refuges in the Klamath Basin.





USFWS

# Lower Klamath National Wildlife Refuge

Established: 1908

Size: 53,600 acres

Landscape: Shallow freshwater marshes, open water, grassy uplands, and approximately 6,000 acres of land leased for commercial agriculture

Threats: Lack of secure and independent source of water, commercial agricultural operations on refuge lands, poor water quality, and lost productivity due to loss of wetlands

Lower Klamath National Wildlife Refuge protects remnants of Lower Klamath Lake, which once covered 80,000 acres before it was completely drained by the Bureau of Reclamation. The destruction of the lake took place after President Theodore Roosevelt designated it in 1908 as one of America's first refuges for waterfowl and other migratory birds.

Some water was returned to the refuge in the 1940s, and, though reduced in size, today the refuge is the single most important staging area for both fall and spring migratory waterfowl in the entire Pacific Flyway. The concentration of geese, ducks, and swans during the peak of migration is one of the nation's great wildlife spectacles. Lower Klamath



Lower Klamath NWR is important for birds like great blue herons (Don Getty).

also supports important breeding populations of ducks, herons, egrets, terns, avocets, white-faced ibis, and one of the last breeding colonies of white pelicans in the West. The still large numbers of migratory waterfowl attracted by

the marshes provide food for up to 900 threatened bald eagles each winter.

The operation of the Klamath Irrigation Project threatens Lower Klamath National Wildlife Refuge. Now cut off from the Klamath River's natural flows, the refuge is dependent upon the Bureau of Reclamation for water. Unfortunately its marsh-



Wildlife suffer greatly as agricultural water interests receive top priority (USFWS).

lands are last in line for this precious resource. Irrigation demand within the Klamath Project and elsewhere in the Klamath Basin has grown so large, that in most years there is not enough water left over to fully sustain the refuge's vital wetlands. What little water is received is often polluted agricultural runoff, contaminated with animal wastes, pesticides, and fertilizers.

In addition, approximately 6,000 acres of land within the refuge are leased for commercial agricultural operations. Land that was set aside for eagles and geese is instead managed for crops such as barley. Worse, land leased for commercial agriculture receives water before refuge marshlands. In low water years, fields of potatoes in nearby Tule Lake National Wildlife Refuge receive full water deliveries while marsh areas critical for wildlife are allowed to



Commercial agriculture on refuge lands often requires heavy machinery that can destroy nests and harm wildlife (ONRC).



USFWS

# Clear Lake National Wildlife Refuge

Established: 1911

Size: 46,460 acres

Landscape: Large open water surrounded by upland habitat of bunchgrass, low sagebrush, and juniper. Small rocky islands in the lake provide nesting sites for white pelicans.

Threats: Water diversions from Clear Lake, destruction of Native American cultural sites and artifacts, cattle grazing

native rainbow trout and other fish.

In 1911, Clear Lake National Wildlife Refuge was created from lands in the Klamath Irrigation Project. The natural habitat of Clear Lake was altered in 1910 when the Bureau of Reclamation Dam completed a dam to enlarge the desert lake and to increase the evaporation of water from its surface.



Clear Lake provides habitat for species like mule deer (USFWS).

The goal of this effort was to block water from flowing down through the Lost River system to massive Tule Lake, so that it

could be drained to make way for irrigated agriculture. Ironically, while the dam was first built to turn Clear Lake into a large "evaporation pond," today it is instead managed as a reservoir for irrigation of some Klamath Irrigation Project lands.

Clear Lake National Wildlife Refuge encompasses



Sage grouse are one of the signature species of Clear Lake NWR (USFWS).

some 20,000 acres of open water. Endangered Qapdo and C'wam still survive in Clear Lake, despite the Bureau of Reclamation's dam and extensive re-plumbing of the Lost River area. The sagebrush and juniper uplands provide habitat for pronghorn antelope, mule deer, and sage grouse. Several small islands in Clear Lake provide critical nesting areas for rare white pelicans and cormorants. While white pelicans once thrived throughout the Klamath Basin and much of the West, today only a handful of these colonies remain.

The most serious problem facing Clear Lake

National Wildlife Refuge is the lake's wildly fluctuating level. When Clear Lake falls below 4,522.5 feet elevation, all white pelican nesting islands on the refuge are connected to the mainland. If this occurs during the egg laying, incubation or early brooding period, predators such as coyotes can invade the island, destroying nests and killing young birds. Cattle grazing on and around Clear Lake NWR is another serious issue, greatly harming sage grouse and other wildlife the refuge is intended to protect.



Cattle grazing on Clear Lake NWR destroys habitat and disrupts native wildlife (Mary Paetzel).





ONRC

# Tule Lake National Wildlife Refuge

Established: 1928

Size: 39,116 acres

Landscape: Two managed open water sumps, small wetlands area, and 15,500 acres of land leased for commercial agriculture

Threats: Commercial agricultural operations on refuge lands, uncertain water supply, poor water quality, pesticide use, static water levels and the loss of wetlands

go dry in Lower Klamath National NWR.

Tule Lake National Wildlife Refuge protects remnants

of Tule

Lake, which

once was a

massive

body of

open water

and marsh,

varying in

size

between

50,000 and

100,000

acres before

being diked

and drained

to make way for the Klamath Irrigation Project.

Today all that is left of the giant lake are two managed

wastewater sumps covering roughly 13,000 acres.



Wildlife watching is a popular recreational activity throughout the Klamath refuges (USFWS).

The refuge was created in 1928 to protect the millions

of waterfowl that utilized what was left of the lake's

wetlands. Migratory waterfowl numbers at Tule Lake,

once the flagship of the entire NWR system, have

declined since the passage of the 1964 Kuchel Act.

These losses have been exacerbated by the loss of



Great egrets visit Tule Lake NWR (Lloyd Glenn Ingles, California Academy of Sciences).

habitat throughout the Pacific Flyway.

The greatest threat facing Tule Lake National

Wildlife Refuge is its exploitation for commercial

agriculture. Most of the refuge's land base, some

15,500 acres, is leased for commercial farming

rather than being managed for badly needed wet-

land habitat. The presence of commercial agricul-

ture on Tule Lake National Wildlife Refuge requires

refuge managers to keep water levels static, which

prevents them from managing much of the land

they do have as wetlands. The lease land program

also diverts scarce water to grow crops such as

potatoes and onions that have little or no wildlife

benefit and use pesticides known to be harmful to

birds and fish. During irrigation season farm

machinery, from combines to crop-dusters, further



Pesticide spraying causes serious problems for wildlife within Tule Lake NWR (USFWS).

disrupt wildlife.

Just like Lower Klamath National Wildlife Refuge,

the Tule Lake refuge currently relies on the

Klamath Project for water, and its marshes are

always last in line for this precious resource. Much

of the water the refuge does receive is contaminat-

ed farm runoff. If current commercial farming

leases were phased out at the end of their lease

terms, some of these refuge lands could be man-

aged as a deep-water marsh, which could store mil-

lions of gallons of water for both Tule Lake and

Lower Klamath refuges.



Ellen Morris Bishop

# Upper Klamath National Wildlife Refuge

Established: 1928

Size: 14,400 acres

Landscape: Hardstem bulrush and yellow water lily (wocus) marsh, and open water areas

Threats: Klamath Project water diversions from Upper Klamath Lake, water pollution and reduced water inflows due to irrigation in the upper basin

Established in 1928, Upper Klamath National Wildlife Refuge protects approximately 14,000 acres of the wetlands along the shore of Oregon's largest freshwater lake, Upper Klamath Lake.

The refuge's marshes provide excellent nesting and rearing habitat for waterfowl, bitterns, herons, and



C'wam, endangered Lost River suckers, are found in Upper Klamath NWR (USFWS).

countless other birds. Bald eagles and ospreys nest nearby and can be seen fishing over refuge waters. Two species of endangered fish, Qapdo and C'wam, also depend on the lake and the marshes of the refuge. Marsh areas provide critical habitat for young fish by offering them a place to escape predators.

The Bureau of Reclamation's operation of the Klamath Project causes tremendous harm to the Upper Klamath National Wildlife Refuge. Prior to the construction of the Klamath Project, Upper



Wocus lilies, which were once abundant in Upper Klamath Lake, were a staple food for the people of The Klamath Tribes (ONRC).



Marshes along the shore of Upper Klamath Lake dry up when the lake is drained below 4139 feet in elevation (ONRC).

Klamath Lake's natural water level fluctuated between 4,140 and 4,143 feet in elevation. After blasting a hole in the natural reef that forms the lake, the Bureau of Reclamation was able to drain the lake below natural levels. When water levels drop below 4,139 feet in elevation, all 14,000 acres of marshes in Upper Klamath National Wildlife Refuge are left completely dry. This has been a regular occurrence in recent years.

Water diversions and pollution from flood irrigation of lands above Upper Klamath Lake also



Algal blooms from poor water quality, exacerbated by agricultural operations, threaten many aquatic species in the refuges (ONRC).

contribute to the problems facing the refuge. Responsibility for managing irrigation in the headwaters of the basin, above the Klamath Irrigation Project, falls to the State of Oregon. Unfortunately the state has failed to do its job. Animal wastes and agricultural runoff from upper basin irrigation overloads the lake with phosphorous that at times sparks severe algal blooms. In past years these blooms have killed tens of thousands of endangered Qapdo and C'wam, as well as





Wendell Wood

# Klamath Marsh National Wildlife Refuge

Established: 1958

Size: 40,646 acres

Landscape: Hardstem bulrush and sedge marsh, open meadows, ponderosa pine forest, river areas

Threats: Upstream water diversions, commercial agricultural activities, proposed logging operations.

smaller diameter trees are logged.

The northernmost refuge in the Klamath Basin, Klamath Marsh National Wildlife Refuge preserves a diverse landscape of marshlands, ponderosa forests, and open meadowland. The refuge was created in 1958 from lands that were once part of the Klamath Indian Reservation. The refuge remains an important cultural resource to the tribes.

The Klamath Marsh NWR provides critical nesting, feeding, and resting habitat for waterfowl. The open meadows are important for sandhill cranes, with the sedge meadows supporting one of the West's largest populations of yellow rails. Bald eagles nest around the refuge's forest periphery and on adjacent Winema National Forest lands. Two open water bays provide



Loss of marsh areas has taken a heavy toll on species like spotted frogs (William Leonard, California Academy of Sciences).

habitats for nesting eared grebes and a variety of waterfowl, terns, and various shorebirds. Once thought to be extinct, Miller Lake lamprey have been located here, and in the near-by Williamson River. The pon-

derosa and lodge pole pine forests protected within the refuge also support diverse wildlife populations, including great gray owls and Rocky Mountain elk. The marshes are also among the last strongholds of the spotted frog, a candidate for future listing under the federal Endangered Species Act.

Upstream water diversions are a serious problem for Klamath Marsh, particularly in dry years. Refuge management is another problem: years of misguided fire suppression efforts have prevented the natural fires vital to healthy forests and meadows. Today

land managers have turned to logging to reduce fuel loads, but these programs have resulted in projects that have not only thinned undergrowth but also cut mature and old growth trees. Some logging opera-



The wetlands and meadows of Klamath Marsh NWR are an important haven for sandhill cranes (Don Getty).

tions within the refuge have been conducted without any public notice or required environmental reviews.

Similar lack of public oversight and environmental review recently created controversy when commercial hay cutting operations on the refuge were expanded from 500 acres to nearly 3,000 and refuge grazing has, in many years, exceeded levels previously approved. More troubling, refuge managers have proposed extensive pesticide spraying to kill clear winged grasshoppers, a native species that is valuable as a food source for wildlife, but worrisome to ranchers who graze cattle both inside and outside



Commercial agricultural operations, like hay cutting, are increasingly dominating the management of Klamath Marsh NWR (ONRC).



Otis Swisher

# Bear Valley National Wildlife Refuge

Established: 1978

Size: 4,200 acres

Landscape: Old growth ponderosa pine, incense cedar, white and Douglas fir

Threats: Decades of fire suppression, logging



Bear Valley NWR provides ideal habitat for bald eagles (USFWS).

Bear Valley National Wildlife Refuge was created in 1978 to preserve old growth and mature forest for threatened bald eagles. These majestic birds need tall, strong, old growth trees for roosting and nesting. The big trees also provide shelter from harsh winter winds. As many as 300 bald eagles have roosted in the refuge on a single winter night. They can be observed on their morning "fly out" to hunt ducks and other



Great horned owls are found in Bear Valley NWR (Otis Swisher).

waterfowl on Lower Klamath and Tule Lake refuges. Other raptors also depend on the habitat provided by Bear Valley National Wildlife Refuge, including the great horned owl and the Northern goshawk.

Only a handful of areas near the Tule Lake and Lower Klamath refuges receive enough moisture to support large trees. Decades of logging have taken a heavy toll on many such areas, and the old growth trees favored by eagles for roosting and nesting are now rare. Misguided fire suppression policies have made matters worse.

Fire is a natural part of healthy old growth forests, particularly for ponderosa pines. In recent years, conservation groups have supported a more responsible approach to fire reduction, focused on controlled burns and careful, selective thinning of fire-prone younger forests in Bear Valley National Wildlife Refuge.



Old, giant ponderosa pines are critical for nesting and roosting bald eagles (Gerard and Buff Corsi, California Academy of Sciences).

However, wildlife advocates have had to remain vigilant to see that only the



# Solving the Klamath Crisis

*It has taken a century to create the water crisis facing the Klamath Basin and its wildlife refuges, and it will take time to solve it. The good news is that steps can be taken today that will benefit fish and wildlife, while still preserving a sustainable agricultural economy in the basin.*

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the refuge's boundaries.

## ◆ **Balance the Demand for Water**

The central problem behind the water crisis in the Klamath Basin is that federal and state officials have simply promised too much water to too many interests. Even in good years there is not enough water to go around. No initiative to end the conflict in the Klamath Basin can succeed without reducing the demand for water.

One sensible and fair solution advanced by an alliance of conservation groups, commercial fishermen, and farmers is a voluntary program to buy back land and/or water rights from irrigators throughout the Klamath Basin. These water rights could then be retired, freeing up water for fish and wildlife, while at the same time providing more certainty over future water deliveries for the irrigators who choose not to sell.

## ◆ **Phase Out Commercial Agriculture Within the Refuges**

The most logical place to reduce irrigation demand is on land already owned by the public. Nearly 22,000 acres of Tule Lake and Lower Klamath NWR's is leased to commercial farming operations. Potatoes and onions occupy land that was set aside for eagles and waterfowl. Ending this harmful program would improve conditions for fish and wildlife and free up approximately 16 billion gallons of water

## ◆ **Restore Lower Klamath Lake and Portions of Tule Lake**

The open water and marshes of Lower Klamath Lake and Tule Lake National Wildlife Refuges represent only a fragment of what existed prior to the development of the Klamath Project. By ending the lease land farming program and purchasing land within the former lakebeds and restoring it to marshland, critical habitat for wildlife can be reclaimed while the natural pollution filtering action of the wetlands is restored. Flooding these areas with seasonally abundant water may also offer an opportunity to store water that could be used to

help sustain fish and wetlands in dry periods.

## ◆ **Keep Water in Upper Klamath National Wildlife Refuge**

Water for the marshes of the Upper Klamath NWR is tied directly to the level of Upper Klamath Lake. When the Bureau of Reclamation drains this shallow lake down below 4,139 feet in elevation, all 14,000 acres of marsh within Upper Klamath NWR are left dry. Low lake levels also increase the likelihood of fish-killing algal blooms in the lake further endangering Qapdo and C'wam. The Bureau should end the practice of draining the lake to these dangerously low levels.

## ◆ **Bring Back Upper Basin Wetlands**

Over the course of the last century many of the marsh areas north of Upper Klamath Lake have been destroyed and replaced by cow pasture and irrigated agriculture. Water that once flowed down important streams like the Wood, Williamson, Sprague, and Sycan is now diverted onto fields of alfalfa and other crops. Restoring upper basin marshlands could increase natural water storage, improve water quality, and provide important habitat to fish and wildlife. An aggressive program to measure water use, conserve water, and purchase and retire irrigation water rights could also restore wildlife and provide more water for all interests in the basin.



The future of the Klamath Basin National Wildlife Refuges depends on our willingness to protect them (Otis Swisher).



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