



Chapter 5 Human Environment

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Background

This chapter covers topics and the current status (as of 2011) of programs associated with the human environment. This includes cultural resources and history; infrastructure and administrative facilities; and programs associated with wildlife-dependent recreational uses (the “Big Six”): wildlife observation, wildlife/nature photography, interpretation, environmental education, hunting, and fishing. Other related activities, such as non-priority uses, illegal uses, and area outdoor recreational opportunities and trends are also included. Some of the facilities and wildlife-dependent recreational uses are shown on Map 3a. Finally, the chapter also includes socioeconomic data for local, regional, and State areas.

Note that some program offerings, areas open, and facilities available will change under the management direction described in Chapter 2. This chapter is a complete description of the current management situation as it stands in 2011.

5.1 Cultural Resources

Archaeological and other cultural resources are important components of our nation’s heritage. The Service is committed to protecting valuable evidence of plant, animal, and human interactions with each other and the landscape over time. This may include previously recorded or undocumented historic, cultural, archaeological, and paleontological resources as well as traditional cultural properties and the historic built environment. Protection of cultural resources is legally mandated under numerous Federal laws and regulations. Foremost among these are the National Historic Preservation Act (NHPA) as amended, the Antiquities Act, the Historic Sites Act, the Archaeological Resources Protection Act (ARPA) as amended, and the Native American Graves Protection and Repatriation Act (NAGPRA). The Service’s Native American Policy (1994) articulates the general principles guiding the Service’s relationships with tribal governments in the conservation of fish and wildlife resources. Additionally, refuges seek to maintain a working relationship and consult on a regular basis with the tribes that are or were traditionally tied to lands and waters within refuges.

This cultural history provides an overview of the known archaeological, ethnographic, and historical uses of Malheur National Wildlife Refuge.

5.1.1 Native American Overview

General Prehistory of the Harney Basin

The profusion of wildlife and plants found in the Harney Basin provided Native Americans with an abundance of food and resources for over 11,000 years. Use of the area was greatly influenced by climatic changes, some lasting one or two centuries. In turn, these changes altered the range of plants across the basin, influencing both wildlife and human use. In particular, the archaeological record documents how cyclical fluctuations of water levels have dictated the types of resources available in the wetlands and have affected human settlement and resource-gathering patterns.

Archaeological research shows that people were using the area now managed by the Refuge by 9,800 years ago. At that time, the Harney Basin contained a huge lake that covered 255,000 acres. These early inhabitants used plants and animals found along the edge of this vast lake and in the surrounding uplands. Hunters used spears to hunt large game animals. Ground stone tools used to process plants, such as grass seeds and roots, have been found from this period, but are not abundant and suggest that plant foods were not as highly processed as in later periods. Abundant plant

resources also meant that materials used to fashion baskets were readily available. It is around this time that twined bags, mats, burden baskets, and trays begin to appear in the archaeological record of the Northern Great Basin (Adovasio 1986).

The climate then became progressively drier, lowering lake levels (Wigand 1987). The shallower lake meant that the marsh covering Malheur Lake actually increased in size and supported more plants and wildlife. Eventually the dry climate caused the marsh to shrink and then disappear, limiting the resources available to both people and wildlife. Evidence of Native American use of the immediate area decreases as the climate became drier, and the inhabitants of the area focused their activities around higher elevation springs (Fagan 1973). Stone tools show that animals continue to be hunted in the area, and there is a gradual change from the use of spears to the atlatl and dart. The atlatl consists of a piece of wood shaped with a handle on one end and a hook on the other end. It is used to hurl a light spear (dart) through the air with more accuracy than that of a hand-thrown spear.

Use of the Refuge increases around 6,000 years ago, when climatic conditions became wetter and marsh resources increased. The first documented use of the spring at Refuge Headquarters begins at this time and continues into the historic period (Aikens and Greenspan 1988; Raven and Elston 1992). Inhabitants of the Headquarters site were fishing for tui chub, suckers, and squawfish, and were hunting ducks, antelope, mountain sheep, coyote, muskrat, and bison. It is during this time period that the historical pattern of seasonal movements to resource areas becomes more apparent in the prehistoric record.

Small villages appear along the edge of the lakes, the Blitzen Valley marshes, and the Donner und Blitzen River around 3,500 years ago. These sites include either stone ring structures or house pits. Three sites excavated in the Blitzen Valley show increased use of marsh and river resources, and a stable way of life. At one of these early villages, rabbit, fish, and large game animals were being eaten; grass and juniper seeds were being harvested; and conifer and sagebrush were being used to fuel fires (Musil 1990, 1991). Unfortunately, the inhabitants of this village were forced to abandon their homes when volcanic cinders from an eruption at Diamond Craters blanketed the landscape.

Projectile point styles indicate that the bow and arrow was being used by 2,500 years ago. This new technology greatly increased a hunter's accuracy. Modifications to arrows included blunting the end so waterfowl could be hunted with the bow and arrow. Before the introduction of the bow and arrow, waterfowl hunting was limited to capturing ducks and coots in long twined nets strung across narrow areas of the marsh. Large numbers of birds could be herded into the nets in the late summer when they molted their flight feathers.

Around 1,400 years ago, the lakes and marshes shrank again as a drought hit the area (Wigand 1987). Smaller wetlands meant fewer resources for people, so they used the area less. The subsequent return of moist conditions brought an abundance of lake, marsh, and upland resources—and people. As resources increased, so did the number of sites around the lakes, in the Double-O area and in the Blitzen Valley. This may be the period of most intensive use of resources in the basin.

Geomorphic data from the Headquarters site suggests that the lake rose significantly 1,050 years ago and again flowed into the Malheur River for a short time before it shrank to its current size (Dugas 1996). This rise in lake levels forced the inhabitants of the area to move to higher ground around the lakes including shorelines created during older high lake stands. As the lake grew deeper the size of the marsh decreased when the water became too deep to support marsh plants. Conversely, as water

levels decreased, a greater abundance of marsh resources again became available for humans and wildlife.

But the cycle of wet and dry was to continue. A drought around 700 years ago and then another around 500 years ago again briefly limited the resources available to inhabitants of the basin. As conditions improved, people increased their use of the area, living in stone ring villages in the valley or house pits on the lakes. At the Headquarters site, a cache pit filled with seeds from wapato (Indian potato), bulrush, and goosefoot attests to the harvest of important plant foods around 400 years ago (Raven and Elston 1992). The presence of the cached seeds suggests that the site was occupied continuously for several years. Fish bones were found in two fire hearths from this time period, as well as charred sagebrush and willow.

Mat-covered shelters, known as wickiups, have been documented during this late period. In historic times these structures were used from late spring through early fall as the Northern Paiute Indians moved to different resource areas to harvest plants and animals. Of particular interest during this late occupation of the basin is the harvest of tui chub at Harney Lake, where roasting pits and garbage piles filled with thousands of fish bones have been excavated. All of similar size, the tui chub were caught in gill nets and then roasted, which preserved them for long-term storage (Raymond 1994).

Burns Paiute elders recall the continuation of a seasonal round into historic times. They talk about gathering plants, hunting, and fishing as foods became abundant in the rivers, lakes, marshlands, and uplands of the Harney Basin. Spring was a time for gathering roots and fish, which they dried and stored away. Tui chub were harvested in Harney and Malheur lakes, and salmon were procured from the Malheur River (Burns Paiute Tribe; Couture 1978; Soucie n.d.).

In the summer they traveled around their territory, gathering seeds and berries and hunting game. In the autumn, they harvested the tiny black seeds of wada (*Sueda depressa*), a plant that grows along the shores of Harney Basin lakes. (The term Wada'Tika [the Paiute name for the Burns Paiute Tribe] refers to the Paiutes living in the Harney Basin and literally means "wada eaters.") Fall was also a time for hunting waterfowl, jackrabbit, bighorn sheep, and antelope. Families came together in the fall for communal antelope and rabbit drives. Fall was also an important time for collection of plant materials to be used for manufacture of sandals, baskets, and clothing during the winter (Burns Paiute Tribe; Couture 1978; Soucie n.d.).

During the winter they retrieved their supplies of dried food and erected houses of tule (bulrush) mats near springs in the wetlands around Malheur, Mud, and Harney lakes. While the rest of their territory lay frozen, the wetlands offered fresh plants, waterfowl, and mammals to supplement their stored food (Burns Paiute Tribe; Couture 1978; Soucie n.d.).

Many of these important resources are still harvested today by the Burns Paiute Tribe at a variety of locations in the basin. Members of the Tribe continue to harvest important plants on the Refuge as they seek to sustain and share their cultural traditions of basket weaving, and tule mat and duck decoy construction with tribal youth.

5.1.2 Euro-American Overview

Fur Trapping Expedition

In 1826 French-Canadian fur trapper Peter Skene Ogden led a large expedition of trappers from the Hudson's Bay Company into the Harney Basin. The fur trappers were looking for beaver, river otter, and other fur-bearing animals. On November 1, 1826, as Ogden reached the north side of Malheur Lake, he described the lake portion of the Refuge, including the separation of Harney and Mud lakes by the large lunette dune and the salty nature of the water in both lakes. He also described in very brief detail the shrub component surrounding the lakes and mentioned the presence of bison skulls on the surface (Elliott 1909).

Ogden and his company of trappers remained on the north side of the lakes. However, had they gone to the south side of Malheur Lake, they would have found fresh water at the spring near today's Refuge Headquarters and the abundant plant and animal resources of the Blitzen Valley.

During their late fall arrival, they encountered Northern Paiute Indians camped along the shore of the lakes. The Hudson's Bay Company frequently expected local tribes to supply food for their large expedition groups. Unfortunately, the Paiutes were entering the winter season after a very unproductive summer and were unable to help the explorers with food.

On November 3, Ogden documents his company's hardships and provides a description of the Paiutes and their small villages (Elliott 1909). He also describes the hardships the Indians were enduring because of a lack of food:

From 4 a.m. snow has fallen. This will make it difficult for my 2 express men from Ft. Vancouver to find our tracks though every precaution was taken making marks at different camps; if only the Indians do not destroy these marks. It is incredible the number of Indians in this quarter. We cannot go 10 yds. without finding them. Huts generally of grass of a size to hold 6 or 8 persons. No Indian nation so numerous as these in all North America. I include both Upper and Lower Snakes ... They lead a most wandering life. An old woman camped with us the other night; and her information I have found most correct. From the severe weather last year, her people were reduced for want of food ... Unfortunate creatures what privations you are doomed to endure; what an example for us at present reduced to one meal a day, how loudly and grievously we complain; when I consider the Snake sufferings compared to our own! Many a day they pass without food and without a murmur. Had they arms and ammunition they might resort to buffalo; but without this region the war tribes would soon destroy them. This country is bare of beaver to enable them to procure arms. Indian traders cannot afford to supply them free. Before this happens a wonderful change must happen. One of Mr. McKay's party was sent back to request us to raise camp and follow his tracks. A chain of lakes [most likely the springs in the Double-O area] was all they had seen, no game. Truly, gloomy are our prospects (Laut 1905).

The lack of available food and a scarcity of fur-bearing animals around the lakes led Ogden to write the name "Malheur," the French word for misfortune, on his maps of the area. From that time on, the area would be identified as Malheur Lake. Ogden mistakenly believed the lake was connected with

the Malheur River, thus providing the river with its name. It would be nearly 20 years before the next significant presence of Euro-Americans in the Basin.

Wagon Trains

The 1845 Meeks Wagon Train represented the next major entry of non-natives into the area. Convinced by Stephen Meek, who claimed that he knew a shorter route to the Willamette Valley, nearly 800 pioneers followed Meek across Oregon's high desert. As the wagon train entered the Harney Basin, their primary concerns were finding water and feed for their livestock. Water and grass had not been particularly abundant since the wagon train turned off the established Oregon Trail, and livestock were beginning to suffer. Under the direction of Meek, they arrived in the northern portion of the Harney Basin and then, in search of water, detoured south to the lakes. They camped along Malheur and Harney lakes but found that the water, because of its alkaline nature, was not fit for humans or animals. The ill-fated wagon train eventually made their way to The Dalles, but not before suffering from the deprivations of the high desert. In his diary, Eli Casey Cooley (Cooley and Cooley 2004) talks about the wagon train's entrance into the Harney Basin and their travels along the north side of the lakes to Silver Creek, where they encountered the first potable water after leaving the Silvies River.

In September 1853, the "Lost Wagon Train" led by Elijah Elliot, seeking a shorter route to the Willamette Valley, followed the route of the Meeks Wagon Train into the Harney Basin. Upon entering the Basin, Elliot decided to detour around the south side of Malheur Lake, where the group encountered marshy areas that were difficult to traverse. The wagon train forded the Blitzen River and, in doing so, left behind one of the most reliable sources of fresh water in the area. The wagon train continued around Mud and Harney lakes until they reached the springs in the Double-O area. Many members of the wagon train believed they were hopelessly lost, but riders from Central Oregon eventually located the wagon train many miles west of the Double-O area and led them to safety (Bassett et al. 1998; Gibson n.d.).

Military Expeditions

Various military expeditions ventured into the area in the late 1850s, and several military camps were established in the Harney Basin in the 1860s, including a camp near the tip of Wrights Point and another at Fort Harney. Many local landmarks received their names during these expeditions. Harney Lake received its name in 1859 in honor of General William S. Harney after he ordered an expedition through the basin in search of a reliable route to the Snake River. Steens Mountain is named after Major Enoch Steen, who led an expedition to survey a military road through the area in 1860.

Many early bird observations were recorded in military journals from these expeditions. The first published descriptions of waterfowl and wildlife in the area occurred in 1874, when Captain Charles Bendire wrote about the birds found in the vicinity of Malheur Lake (Bendire 1875-1976). Bendire made additional observations about pelican nests on islands in Malheur Lake, as well as a large cormorant colony and Western gull and Forster's tern colonies. This information would later attract feather hunters to the area and eventually bring about the establishment of the Refuge.

Ranching in the Blitzen Valley

It took 10 years after passage of the 1862 Homestead Act for settlers to arrive in the Blitzen Valley. Dr. Hugh Glenn of California took advantage of the Act to begin building a vast cattle empire in

southeastern Oregon. In 1872 he sent Peter French with 1,200 head of cattle, six vaqueros, and a cook to Oregon. French used the Act to claim 160 acres at the south end of the Blitzen Valley for his boss. Using this as headquarters for the ranch he managed for Glenn, French continued to acquire land over the next 25 years using not only the Homestead Act, but also the Swamp Land and Desert Acts. French eventually managed a ranch that encompassed more than 140,000 acres including the Blitzen, Diamond, and Catlow valleys.

Under each of the Acts, applicants were required to make “improvements” to the land for agricultural purposes; this could include improvements for livestock grazing. As a result of these stipulations, the Blitzen Valley and surrounding areas underwent a transformation from the more natural conditions attributed to pre-European contact to the highly altered landscape of today. Roads were constructed; water was directed into ditches to drain or irrigate areas; streams were impounded to control the direction and velocity of flow; meadows were hayed; and uplands were grazed.

After French’s death in 1897, the ranch was managed as the French-Glenn Livestock Company until debts forced the sale of land in 1907 to Henry L. Corbett and C.E.S. Wood of Portland. They formed the Blitzen Valley Land Company under the management of area rancher William Hanley. The goal of the company was to restore the property to a successful working ranch. To accomplish this, the company needed to improve water distribution in the valley. Between 1907 and 1913, the company channelized 17½ miles of the Donner und Blitzen River to improve drainage of adjacent wetlands. They also authorized the construction of 8 miles of the Busse Ditch and 4 miles of the Stubblefield Ditch to improve distribution of water in the north end of the valley.

In 1916, the company was reorganized as the Eastern Oregon Livestock Company (EOLC). Louis Swift of the Swift Packing Company of Chicago purchased 46 percent of the company under this reorganization. The construction of a Union Pacific rail line from Ontario to Crane in 1916 made shipping livestock to market easier. Swift was interested in the thousands of feral pigs in the Blitzen Valley, as well as the cattle raised on the ranch. Under his direction the pigs were rounded up and herded to Crane, where they were loaded on stock cars and transported to his Chicago meatpacking plant.

In 1920, the company established the Blitzen River Reclamation District. Tracts of 160 acres were laid out and leased in a sharecropping arrangement. Several dairies were established on these tracts, and the EOLC used the railroad at Crane as a venue for shipping dairy products out of the county. The EOLC also established a hotel and store at Frenchglen in the mid-1920s. In 1918, an irrigation ditch was constructed from Page Springs along the west side of the valley to what is now known as Krumbo Lane. In 1928, Swift bought out Corbett’s controlling shares in the company and owned the ranch until 1935 when he sold it to the U.S. Government.

Settling the South Side of Malheur Lake

Sometime after Bendire’s 1874 spring ornithology visit to the south side of Malheur Lake, Peter Stenger began using the area for summer livestock grazing. He constructed a small sod structure for shelter at the location of today’s Refuge Headquarters. This “sod house” provided intermittent shelter over the years and was used to describe the area from that time onward.

Eventually Peter French expanded the French-Glenn Livestock Company holdings to the south side of Malheur Lake. He established a sub-headquarters at Sod House Ranch to maintain control of land at the north end of the ranch. Continued expansion of the ranch eventually created conflicts between

homesteaders on Malheur Lake and the ranch. As the ranch expanded northward in the 1880s, more and more water was diverted from the Donner und Blitzen River via in-stream impoundments to irrigate hay meadows, and water was also being diverted along the Silvies River. This resulted in diminishing quantities of water reaching Malheur Lake and a corresponding change in the high meander line of the lake. The ranch claimed ownership of all land up to the high meander line, but with diminished lake levels the area between the former high meander line and the actual lake was undefined. Settlers claimed it was new public domain land available for settlement, but the ranch claimed it was just an extension of their original riparian claim. The State of Oregon claimed that the land belonged to them under the provisions of the Swamp Land Act.

By the late 1880s settlers were building shacks on any available high spot on this newly exposed land. They farmed and grazed the adjacent ground until water levels became too high, but eventually water levels would decrease and they were in business again. Eventually French was pressured into filing lawsuits against “squatters” on the south side of the lake by Glenn’s heirs. While the lawsuits worked their way through the court system, the settlers became increasingly hostile toward French and the ranch holdings. Fences were cut and stores of winter hay were burned by angry settlers. Eventually these hostilities culminated in the death of Peter French. On December 26, 1897, French was shot by Ed Oliver, one of the homesteaders, while he was moving cattle near Sod House Ranch. Oliver was eventually acquitted of murder.

French’s demise did not end the conflict. Settler Sarah Marshall won her case against the French-Glenn Livestock Company, when appeals in the case reached the U.S. Supreme Court. The Court ruled in 1901 that the lands were not part of the Company’s original claim based on their riparian rights, and awarded the property to Marshall as a claim on the public domain. This decision by the Court also gave the President a legal basis for declaring unclaimed land around the lakes federal property, thus providing an opportunity for establishment of the Refuge 7 years later.

A Ranch on the West Side of Harney Lake

In 1875, the partnership of Amos W. Riley, Colonel James A. Hardin, and John Taylor established a ranch on the west side of Harney Lake. Already owners of extensive holdings in Nevada, they claimed the springs at today’s Double-O Ranch, as well as the area around the outlet of Silver Creek at Harney Lake and land bordering Silver Creek, as part of their Oregon ranch. Centered on the productive springs of the Warm Springs Valley, cattle from the ranch had access to plentiful native grasses and reliable water.

The Double-O Ranch was seriously impacted in 1878 during a raid led by Bannock Indians. The ranch had been abandoned as the crew fled to Fort Harney for protection. All of the buildings at the ranch were destroyed and most of the ranch’s cattle and horses were herded west to the Wagontire area where they were slaughtered. Reconstruction began immediately, and the ranch recovered to become the third largest ranch in Harney County.

In 1890, Taylor dropped out as a partner and Hardin sold his half interest in 1892 to Riley. Beginning with a mere 1,200 acres, the ranch grew to over 8,600 acres before being sold to William Hanley in 1903. Hanley combined the Double-O property with his larger Bell-A Ranch holdings, creating the second largest cattle operation in Harney County.

In 1909, irrigation ditches were constructed from the springs to various areas of the ranch. With the addition of irrigation water, the ranch grew ample amounts of winter feed for ranch livestock and for

sale to neighboring ranches. Many of these irrigation ditches are still used today to move spring water and Silver Creek water around the Double-O Unit.

When Hanley died in 1933, his wife, Clara, continued operation of the ranch. The deepening nationwide depression and the ongoing drought forced reductions in the number of cattle the land could support. Mrs. Hanley sold 14,751 acres of the Double-O area to the U.S. Government in 1941 for \$116,143, and the land was added to the Refuge.

Plume Hunters

In the late 1880s, plume hunters were decimating North American bird populations in the name of fashion. The hunters were collecting breeding feathers for the hat industry, where the latest fad included wearing part or all of a bird on ladies hats. Shorebirds and colonial nesting birds suffered the most as hunters targeted large flocks, injuring birds indiscriminately and orphaning chicks. In an era when an ounce of breeding feathers was worth more than an ounce of gold, it's not surprising that plume hunters sought to make a fortune by hunting birds on Malheur Lake.

On a trip to Harney County in 1908 to photograph nesting white herons (later renamed great egrets) on Malheur Lake, wildlife photographers William L. Finley and Herman T. Bohlman learned that most of the white herons had been killed in 1898 by plume hunters (Finley 1910). After 10 years the white heron population had still not recovered.

Outraged by their observations, they presented the situation to fellow members of the Oregon Audubon Society. Facing similar circumstances at Klamath Marsh, the Society pushed for designation of both areas as wildlife refuges. As President of the Society, Finley approached President Theodore Roosevelt with the proposal. Already familiar with Finley and Bohlman because of their involvement in the establishment of Three Arch Rocks Refuge in 1907 on the Oregon Coast, Roosevelt was amenable to Finley's proposal.

The Lake Malheur Reservation was established on August 18, 1908, by executive order of President Theodore Roosevelt. Roosevelt set aside unclaimed government lands encompassed by Malheur, Mud, and Harney lakes "as a preserve and breeding ground for native birds." The newly established "Lake Malheur Reservation" was the nineteenth of 51 wildlife refuges created by Roosevelt during his tenure as president. At the time, Malheur was the third refuge in Oregon and one of only six refuges west of the Mississippi.

Managing the New Bird Reservation

Management of the new Lake Malheur Reservation was given to the Department of Agriculture's Bureau of Biological Survey. Oversight was provided by the Washington D.C. Office, but the Reservation remained unstaffed until 1911. In 1910, the Oregon Fish and Game Commission was created to oversee hunting and trapping in the state. In 1911 William L. Finley, one of the main proponents for establishing the Refuge, was appointed State Game Warden. Concerned about the continuing illegal activities on the new bird reservations, Finley appointed state game wardens to enforce the no-hunting ban and to monitor trapping activities at the Malheur and Klamath Marsh Reservations. The new game wardens were paid by the Bureau of Biological Survey, but were selected by the State Game Commission and enforced state game laws.

The drought years of the 1930s would also have a profound effect on the bird reservation. Lake levels shrank with the decrease in flows from the rivers and creeks that fed the lakes. Without a permanent fence around the bird reservation, the Refuge game warden, George Benson, was tasked with keeping adjacent land owners from using lands within the reservation for agricultural purposes. His log books and letters to his supervisors document his frustrations with the new task facing him. Resolution did not come until the Blitzen Valley was added to the bird reservation.

William L. Finley again played an integral part in the purchase of the Blitzen Valley as an addition to the reservation. Finley worked closely with J.N. “Ding” Darling, Chief of the Bureau of Biological Survey at the time, and later with Ira Gabrielson, first Director of the U.S. Fish and Wildlife Service (USFWS), to purchase the Valley. The purchase would include acquiring the water rights held by the ranch for waters flowing from Steens Mountain. Control of the river would allow the reservation to restore water to the lakes by releasing water held behind ranch dams.

The 64,717-acre Blitzen Valley portion of the Refuge was acquired from the Eastern Oregon Land and Livestock Company for \$675,000 in 1935 using funds designated for national unemployment relief (e.g., the Civilian Conservation Corps [CCC]) and added to the Lake Malheur Reservation under an executive order signed by President Franklin D. Roosevelt. The order specified that the land was for use “as a refuge and breeding ground for migratory birds and other wildlife.” At the same time, the name of the reserve was changed to Malheur Migratory Bird Refuge. With the addition of the Blitzen Valley, the Refuge grew to encompass 146,503 acres of habitat for native birds and other wildlife.

The Bureau of Biological Survey continued managing the Refuge, and George Benson remained the Refuge Protector. However, Refuge Superintendent Stanley Jewett was appointed to oversee all aspects of Refuge development. Jewett’s first priority was to establish CCC camps on the Refuge to begin working on Refuge projects, including construction of a boundary fence around the Refuge.

In 1940, the Migratory Bird Refuge was renamed Malheur National Wildlife Refuge after the Bureau of Biological Survey was combined with the Bureau of Fisheries in 1939 to become the U.S. Fish and Wildlife Service.

Civilian Conservation Corps

The Great Depression severely impacted the country, with economic turmoil and rampant unemployment throughout the nation. In an effort to revive America, President Franklin Delano Roosevelt in 1933 created the CCC. This action would ultimately have a profound effect on Malheur Refuge.

Roosevelt’s plan was to recruit thousands of unemployed young men, enroll them in a peacetime army, and send them to do battle (or to wage war) against destruction and erosion of our natural resources. This young, inexperienced, \$30-a-month labor force met and exceeded all expectations. Enrollee families received \$25.00 of the enrollee’s monthly wage. The economic boost provided by this money was felt in cities and towns all across the nation. Between 1933 and 1942 three million young men worked on CCC projects across the United States; more than 1,000 young men would complete projects during this time at Malheur Refuge.

With the purchase of the Blitzen Valley portion of the Eastern Oregon Land and Livestock Company holdings, the Refuge became an ideal location for CCC projects (CCC 1935-1942), hosting three

CCC camps. A seasonal camp was built near today's Refuge Headquarters during the spring and summer of 1935. The first permanent camp was established at Buena Vista Station in October 1935. Large camps were located at Refuge Headquarters, Buena Vista Station, and Five Mile Lane, north of Frenchglen. A small side camp was set up at Ewing Springs on Malheur National Forest to cut timber for work projects on the Refuge. The last camp was closed in 1942 with the start of World War II. Little evidence remains of the camps, as the wood buildings associated with the camps were dismantled by the army and moved to Alaska to serve as barracks during construction of the Alaskan Highway.

In communities close to the camps, local purchases averaging about \$5,000 monthly staved off the failure of many small businesses. Each of the three camps sent trucks to Burns for food and other provisions at least weekly, if not daily. This, in addition to local hires, contributed about \$15,000 per month to the Harney County economy. Skilled local men were hired by the CCC and the Refuge to teach enrollees a variety of tasks including carpentry, heavy equipment operation, surveying, and concrete construction techniques. In addition to classes offered at the camps, the enrollees learned many life skills from these men in the course of their interactions and many used them to develop careers later in life. The Biological Survey, which later became the U.S. Fish and Wildlife Service, selected work projects, while the Army ran the day-to-day operations of the camps.

Construction materials could not always be purchased from local businesses, so these items were often manufactured by CCC enrollees on-site or at other locations. The stone blocks used to construct the buildings at Headquarters were quarried near Buena Vista Station, while the basalt used for the house at Buena Vista Station was transported from the Diamond Craters area. Willow stays, used for fence construction, were cut from the banks of creeks in the Blitzen Valley. Procuring these materials often meant moving equipment and enrollees closer to the needed resources.

The three CCC camps on Malheur Refuge left behind an incredible legacy of infrastructure that remains today. Initial projects undertaken by the camps included fencing over 200 miles of the Refuge boundary; some of this fence is still in use today. Cattle guards were installed at all access points to the Refuge to prevent trespass by adjacent cattle. At Refuge Headquarters, work began on construction of four stone buildings (two residences, an office, and a barn) to better manage the Refuge. The CCC also extended the telephone lines from the Narrows to Refuge Headquarters, and then on to the communities of Diamond and Frenchglen.

The telephone lines followed improved or new roads. Major portions of Highway 205 south of the Narrows were surveyed and constructed by enrollees from all three camps. This not only improved access to the camps and made transportation of materials more efficient, but also enhanced the transportation network used by Refuge neighbors. The enrollees also improved access to the community of Diamond as bridges were constructed across the Donner und Blitzen River. Along portions of the river channelized by the Eastern Oregon Land and Livestock Company in the early part of the century, enrollees used dozers to sculpt the dredge piles into a network of roads that would traverse the center of the valley. Over 35 miles of road would provide access to the center of the Refuge for better management of the newly acquired lands. Seven bridges were constructed by the CCC along this newly created Center Patrol Road.

As work progressed over the next 7 years, the CCC enrollees constructed five concrete diversion dams on the Donner und Blitzen River. Several of these dams replaced existing smaller wood structures left over from the ranching days. All five dams improved diversion of irrigation water along hundreds of miles of new or revamped irrigation ditches. Major diversion ditches, including

the Buena Vista Canal, the East and West Canals, Ram Ditch, and the Stubblefield Canal, increased the amount of water that could be diverted over a greater distance in the Blitzen Valley. Much of this water was directed to new ponds (the Buena Vista Ponds, Wrights Pond, the Knox Ponds, and Boca Lake) that were crafted from the valley floor.

As transportation improved across the Refuge, the CCC also made significant improvements elsewhere on the Refuge. Two large shop buildings and a residence were constructed at Buena Vista Station to facilitate management of the north end of the valley. At the south end of the valley, major renovations were made to Peter French's White House to improve living conditions for new Refuge employees. Existing ranch buildings at the P Ranch were modified for new Refuge uses. An addition was also added to the back of the Frenchglen Hotel, which became part of the Refuge with the purchase of the Blitzen Valley.

The improved access throughout the valley and better distribution of irrigation water led to increased public use. Four lookout towers were constructed in the last years of the CCC improvements. Two metal towers and two wood towers were placed at strategic locations across the valley for fire and wildlife observation. The most famous of these towers is the metal tower at P Ranch, which is a favorite roost for scores of turkey vultures. The CCC was also responsible for early development of camping facilities at Page Springs Campground.

As the involvement of the United States in World War II loomed, the CCC camps began closing on the Refuge. Young men who served with the CCC at Malheur enlisted in the armed forces and served across the world as the war escalated. Many of the very skilled men from the camps became civilian employees of the military and worked under contract throughout the South Pacific.

5.1.3 Current Knowledge of Local Cultural Resources

Malheur Refuge contains over 300 recorded prehistoric sites and 21 historic sites in a wide variety of habitats. Two prehistoric sites (35HA403 and 35HA1038) and three historic sites (Sod House Ranch, Double-O Ranch, and P Ranch) are listed in the National Register of Historic Places (NRHP). Generally, CCC sites and structures meet the eligibility requirements for inclusion in the NRHP, and three CCC-constructed dams (Sodhouse, Busse, and Page Springs) have been determined eligible for inclusion in the NRHP by the State Historic Preservation Office, though they have not been formally nominated. Prehistoric sites on Malheur, Mud, and Harney lakes in combination are eligible for listing as an Archaeological District in the NRHP. This is also true of prehistoric sites in the Double-O Unit and the Blitzen Valley; however, additional research and investigations would be needed to determine the full extent of their importance before nomination to the NRHP.

Cultural resource inventories began on Malheur Refuge in the early 1970s and have continued into the present. While the protocols used to conduct prehistoric site inventories have varied over the decades, even the earliest work provides important information on the types of prehistoric and historic resources that are, and may be, located on the Refuge. Prehistoric sites vary in age from 9,800 years old to just 120 years old. A variety of site types occur and range from winter villages, summer villages, rock art sites, burial sites, and quarries to small campsites and food processing locales. The locations of these sites indicate that a wide variety of resources in a broad range of habitats were being used for thousands of years by Native Americans before Euro-Americans entered the Harney Basin.

Three historic ranch sites, P Ranch, Sod House Ranch, and Double-O Ranch, provide excellent examples of early ranching (1870-1900) in the Harney Basin. The P Ranch and Sod House Ranch were part of the large French-Glenn Livestock Company holdings and are associated with ranch manager Peter French. The Double-O Ranch was owned and operated by William Hanley, and while only two buildings remain from the ranch era, many of the early ditches used to divert water for livestock grazing and hay operations are still in use today and are moving water to ponds and meadows for wildlife uses. The foundations of six homesteads can be found at various locations on the Refuge. Information is sparse about this period of history on the Refuge. The first recorded homestead claim occurred in the 1860s near Refuge Headquarters, and other claims were deeded to various landowners until the early 1900s.

The Refuge hosted three CCC camps and numerous buildings and infrastructure were constructed by enrollees between 1937 and 1942. The CCC camp sites, buildings, and selected infrastructure (bridges, rubble structures, towers, dams, etc.) are now eligible for listing in the NRHP. Benson Pond has a variety of infrastructure (bridge, rubble structure, ditches, and stone well house) that are excellent examples of CCC work, and mature trees planted by CCC, which, when combined, make the area eligible for listing in the NRHP. The exteriors of the CCC-constructed buildings at Refuge Headquarters and at Buena Vista Station are also eligible for listing. The four CCC-constructed lookout towers have been listed in the National Historic Lookout Register and are also eligible for listing in the NRHP.

5.1.4 Investigations

Archaeological Investigations

Portland State University (PSU) conducted a 3-year project involving survey and limited excavations on the Refuge between 1972 and 1974. Over the course of three summers, Refuge staff identified areas with known but unrecorded archaeological resources, and then PSU conducted surveys of these areas. Over 200 sites were recorded across the Refuge during this phase of investigation.

Headquarters Area: Prehistoric site 35HA403, the Headquarters Site, was listed in the NRHP in 1979 after initial test excavations (Benson n.d.; Thomas 1979,). Since listing, six archaeological investigations have been conducted at the site (Aikens 1983; Aikens and Greenspan 1986; Campbell n.d.; Dugas and Bullock 1994; Minor and Greenspan 1985; Minor and Toepel 1988) as mitigation for a variety of sewer, water, sprinkler, and building relocation projects. Two investigations, Thomas (1979) and Benson (n.d.), were conducted specifically for installation of the existing water system. In 1985, Aikens and Greenspan (1986) examined a series of trench profiles excavated in conjunction with the placement of a new sewer system at Refuge Headquarters, in the vicinity of the maintenance shop. They found that artifact densities increased westward from this area (Aikens and Greenspan 1986:44-45). Test excavations conducted by Intermountain Research in 1993 (Dugas and Bullock 1994) also indicate that artifact densities are higher in the central and western portions (both areas are at higher elevations) of the site. Several features were identified by Intermountain Research during their investigations in the western portion of the site. Radiocarbon dates (Dugas and Bullock 1994) from excavations at the Headquarters site show an early occupation at 4,760 years ago, another period of occupation between 1,040 and 960 years ago, and a more recent occupation around 400 years ago. The presence of storage pits and a wide range of artifacts and other cultural materials indicates intensive occupation of the site during these three time periods. Dugas and Bullock (1994:25) also documented the presence of a wave-cut scarp and beach deposits at an elevation of 4,113.77 feet, indicating a high lake level around 1,000 years ago.

Buena Vista Area: The Buena Vista Site (35HA988), a large habitation site with associated petroglyphs (35HA987), is north of the substation buildings. Ground leveling activities conducted by the CCC during construction of the station may have impacted portions of 35HA988. Auger tests performed in 1979 (Kent 1979) in advance of the installation of a new residential water cistern did not encounter subsurface cultural resources in the project area; however, sparsely distributed surface artifacts were noted at that time at the base of the hill below the residential water cistern. An Earthwatch Field School was conducted by the Service in 1997 to record the extensive petroglyph panels at 35HA987 and to map and excavate stone ring features at 35HA988.

Krumbo Area: As mandated by Section 106 of the NHPA, archaeological investigations must be conducted in advance of realty actions when lands will be transferred out of federal ownership. In 1981, an intensive survey of 1,320 acres (Buck 1981) was conducted for the proposed Krumbo Land Exchange. Sixteen prehistoric sites were identified during this survey. They consisted of low-density lithic scatters representing either hunting camps or stone tool manufacturing sites in advance of hunting expeditions; extensive lithic scatters representing multiple occupations for the purposes of large game hunting and stone tool manufacturing; and small and large sites with ground stone implements. The smaller sites represent seasonally occupied sites used for the exploitation and processing of locally available plants, while the larger sites appear to be multi-purpose areas, occupied seasonally over many years for the collection and processing of plant resources, as well as hunting. This pattern corresponds with the ethnographic pattern of seasonal exploitation of resources at various places in the Harney Basin by the Wada'tika Paiute.

Diamond Swamp Area: Surveys conducted for the 1,220-acre Proposed Dunn Land Exchange (Musil 1990, 1991; Toepel and Minor 1983) in the Diamond Swamp area identified six archaeological sites and two historic sites. Both historic sites consist of house foundations, likely dating from 1892 and 1910, and represent either homesteads or small ranches. Two sites, 35HA1261 (the Dunn Site) and 35HA1263 (the McCoy Creek Site), underwent archaeological excavations to determine NRHP eligibility and were subsequently placed in the NRHP.

The Dunn Site contains three occupation levels. The earliest may date from 7,000 to 10,000 years ago and represents a sparse deposit of artifacts. The next occupation consists of a semi-subterranean house pit dating to 3,255 years ago. The house pit included a central hearth, storage pits, and postholes along the edge of the structure. Cinders from an adjacent eruption at Diamond Craters buried the site around 3,200 years ago. The site was reoccupied between 3,000 and 500 years ago. The Dunn Site house pit is the earliest occurrence of a semi-sedentary occupation site in the Harney Basin and suggests intensification in the exploitation of resources in nearby Diamond Swamp during a period of greater effective moisture in the region.

Three cultural components were identified during excavations at the McCoy Creek Site (35HA1263) (Musil 1991). Component I at the site represents a tool manufacturing site and dates to the early Holocene. Component II is a dense artifact assemblage associated with a series of house floors. This component dates between 1,900 and 900 years ago. The presence of ground stone in this component of the site again reflects an intensification of plant resources usage from the adjacent Diamond Swamp. Bone and shell artifacts include both utilitarian and ornamental items. Aquatic and terrestrial fauna are broadly represented. This component represents a semi-sedentary, if not sedentary, village at the site. Component III, the most recent occupation at the site, consists of the floor of a wickiup structure (a conical shelter constructed from willow poles and covered with brush) dated to 480 years ago and associated artifacts. Wickiups are described in the ethnographic record for the Great Basin and at this site suggest a more mobile occupation with limited use of the site.

Eagles Nest Burn Area: Rehabilitation of lands impacted by a wild land fire in 1983 led to an intensive survey of 775 acres by Heritage Research Associates within the Eagles Nest Burn area. Fourteen sites were identified during the survey and projectile points found within the burn area indicate occupation of the area beginning as early as 7,000 years ago, with an intensification of use around 4,000 years ago.

Lakes Area: Extensive flooding of Malheur, Mud, and Harney lakes began in 1985 and continued into the early 1990s. This precipitated a series of surveys and data recovery projects on the lakes as illegal artifact collection and looting began to occur on sites. Heritage Research Associates conducted archaeological surveys in 1988 and 1989 as islands began to emerge from inundation. Twenty-eight archaeological sites were located and recorded on the Refuge during the surveys. Extensive mapping and artifact collections were conducted at each of the sites, and fourteen sites were revisited for additional artifact collections. Possible house floors and depressions were found at two sites, and a hearth with an associated activity surface was found in a cutbank at a third site. The density and variety of cultural materials at the newly exposed sites was impressive. A total of 1,940 artifacts were collected, including 593 classifiable points and 43 large obsidian biface blades. Partially exposed human burials were located and documented. The distribution of projectile points suggests that widespread occupation of the lakes may not have begun until after 4,000 years ago, and then intensified around 2,000 years ago as semi-sedentary groups focused on resources associated with the lakes and associated marsh.

Excavation and collection of the exposed human remains began in 1989 as illegal looting activities increased on the lakes. Heritage Research Associates was contracted to remove and perform analysis of the remains. All analysis was coordinated with the Burns Paiute Tribe, and only limited invasive analysis was permitted.

Intermountain Research was contracted by the Service in 1991 to undertake geomorphological and archaeological investigations at selected locations on Malheur Lake. The work was intended to establish a conceptual framework for understanding the history of human occupation in the region and to develop baseline data to determine how human use was influenced by the geomorphic and hydrologic history of Harney Basin. Backhoe trenches were excavated at the Harney Lake Dune and at two archaeological sites on Malheur Lake to recover data about the paleoenvironmental history of the area. The stratigraphic profiles of the trenches show a complex history of interbedded layers of lacustrine deposition, soil formation, and eolian deposition, often with substantial gaps between depositional episodes. While showing very ancient lacustrine deposits (120,000-130,000 years old), the trenches also revealed an intermittent record of post-Pleistocene lake stands, and at one site the occurrence of a previously unrecognized deep water stand between 7,400 and 8,400 years ago. This site also contained cultural material that accumulated around the time of this deep water episode.

In 1992, Intermountain Research returned to focus on the excavation of four sites on Malheur Lake. Their investigations showed that sites on eastern islands are younger than sites on northern islands. Differences in faunal assemblages among the four sites also seem best explained by geographical position. Rabbits were more abundant on the site located closest to the lake shore, while muskrats, coots, and fish were more abundant at sites in the lake interior.

In 1994, an Earthwatch Field School was conducted by the Service (Raymond 1994) at sites on the dunes bordering Harney Lake. The field school focused on surveying the entire face of the dune, mapping cultural resources, systematic surface collections, and later limited excavations of tui chub

roasting pit features. The excavations and subsequent radiocarbon dates showed that the sites containing roasting pits were in use around the time of contact with Euro-Americans.

Intermountain Research conducted excavations at the Stubblefield Lookout Tower Site (35HA53) in 1994 to assess the potential of the site to address research issues of cultural sequence, subsistence, seasonality, lithic technology, raw material use, and the record of geomorphic processes and environmental change. The investigations identified a geomorphic and stratigraphic sequence that began with a large paleolake phase and the deposition of beach sediments, followed by a series of soil forming intervals interspersed with lacustrine beach depositions and the accretion of dune sediments. The earliest human occupation of the site occurs around 8,000 years ago during the early Holocene in dune sediments. Two episodes of intense use of the site occurred around 4,500 years ago and again between 600-1,500 years ago when inhabitants of the site were hunting and processing plants at the site.

5.1.5 Looting of Archaeological Resources

The first documented looting of archaeological resources on the Refuge occurred in 1979, soon after the passage of the [Archaeological Resources Protection Act \(ARPA\) of 1979](#), although anecdotal evidence suggests that it occurred for many years prior to passage of the Act. Refuge law enforcement records indicate an ongoing problem that escalated in the mid-1980s as water levels rose on Malheur Lake and inundated islands and uplands around the lake and expanded into Mud and Harney lakes. Vast expanses of vegetation were removed or eroded from archaeological sites, exposing artifacts, features, and human burials. The Service contracted archaeological survey and scientific collection efforts to salvage scientific data from the sites before they were illegally removed. In 1992, the Refuge hired its first full-time law enforcement officer to address this problem. This full-time presence has resulted in the conviction of a number of individuals under ARPA, but the problem continues and escalates when lake levels fluctuate and inundate archaeological sites.

5.1.6 Historic Resources

Historic sites and features on Malheur Refuge include buildings, corrals, fences, and other features at the NRHP-listed Sod House Ranch, Double-O Ranch, and P Ranch; homestead sites at Brenton Cabin, Wrights Pond, two locations on South Malheur Lake, Rock Island, and Oliver Springs; a line shack at the South Center field; four CCC-constructed lookout towers; CCC buildings at Buena Vista Station and Refuge Headquarters; three CCC camp locations (Headquarters, Buena Vista, and Five Mile); intact CCC-constructed fences; CCC infrastructure: four dams, rubble structures on Stubblefield Canal, East Canal, along the Blitzen River, a CCC-constructed bridge and stone well house at Benson Pond; and historic stands of mature trees at Benson Pond, Refuge Headquarters, Sod House Ranch and P Ranch.

Stabilization and Restoration Needs

Stabilization and restoration plans have been developed and implemented for the P Ranch Long Barn and the Sod House Ranch Long Barn. Deteriorated support posts and beams were repaired or replaced at each barn to stabilize the structures. Repairs were made to doors and gates. A cable system was installed in each barn to prevent further structural movements associated with moist soil conditions, snow loads, and prevailing winds. While the two barns are now structurally sound, minor

repairs will continue to be needed and both barns will require new roofs within the next decade to protect the structures from further decay.

The Buckaroo Bunkhouse at Sod House Ranch has also undergone stabilization and restoration work, and with only minor ongoing repairs will remain in good condition. Similar work is needed at other buildings at Sod House Ranch and at the Double-O Ranch site. The beef wheel and hay derrick at P Ranch also require stabilization and limited restoration work to preserve their integrity. Stabilization and Restoration Plans will be required prior to the initiation of repairs to these buildings.

Minimal repairs and restoration have occurred to the exteriors of the CCC-era buildings at Refuge Headquarters and Buena Vista Station. Lead paint was removed from the exteriors of the buildings at Headquarters in 2003 because of health and safety concerns. Minor structural repairs were made to exterior wood elements at the time of lead removal. Missing terra-cotta roof tiles were also replaced at this time. New casement windows, which match the look of the original CCC windows, were installed on the sunroom at the Buena Vista residence as part of these repairs. The interior wood work, walls, and ceilings at Buena Vista were also stripped of lead paint and returned to their original appearance as part of this project. Kitchen cabinets and light fixtures matching the original plans for the structure were installed to bring the structure back to its original appearance in coordination with the State Historic Preservation Office.

Aluminum and vinyl windows in the CCC-era buildings at Headquarters and Buena Vista were replaced with wood casement windows in 2010 as part of an energy efficiency project. Original CCC-constructed windows on the horse barn and old warehouse were not replaced as part of this project. Exterior doors matching originally constructed doors replaced warped wood CCC doors on several buildings. The restoration activities that have occurred on the exteriors of these CCC buildings have returned them to a condition that makes them eligible for inclusion in the NRHP.

All CCC-era buildings will require periodic maintenance and repair to maintain their historic and structural integrity. CCC-era buildings located at Refuge Headquarters include the main office building; the fire office; the old warehouse building, which houses the Law Enforcement, Archaeology, and Fisheries programs; the conference room building; and the horse barn. At Buena Vista Station, the shop building and house are of the CCC-era, as is the stone well house at Benson Pond. All buildings will require exterior painting and, in some cases, minimal structural stabilization to maintain the integrity of these historic buildings. The stone well house at Benson Pond will require a new wood shake roof and repairs to the window and door.

Historic CCC-constructed Refuge infrastructure remains at several locations on the Refuge. This includes the bridge and rubble structure at Benson Pond, several rubble structures along the East Canal and one along the channelized portion of the Blitzen River, three of the four CCC-constructed diversion dams (Sodhouse, Busse, and Page Springs dams), and the four lookout towers. Care should be taken to preserve these excellent examples of CCC construction techniques and periodic maintenance, and limited restoration and stabilization will be necessary to maintain the integrity of these structures. Mature stands of trees originally planted by the CCC at Benson Pond and Refuge Headquarters are also of importance from a historical perspective and should be preserved through careful trimming to maintain the vigor of the trees.

5.1.7 Museum Property

Archaeological investigations have generated important collections. Over 7,000 artifacts and scientific samples have been accessioned and are curated at the Museum of Natural and Cultural History at the University of Oregon in Eugene. These artifacts and samples were collected between 1970 and 1990 as the result of archaeological investigations carried out on the Refuge. An additional 4,000 artifacts are internally curated at the Refuge and are from archaeological investigations conducted after the 1980s floods and from other small projects conducted by Refuge staff.

Several items related to Peter French's management of the Blitzen Valley portion of the Refuge came into Refuge ownership when the Valley was added to the Refuge. In 1981, these items were loaned to the Harney County Historical Society (HCHS) Museum for display. They include a large safe, hall tree, five framed photos of wildlife, and possibly some other pieces of furniture. They remain in the possession of the HCHS today.

The Benson Memorial Museum at Refuge Headquarters contains an important collection of 100 taxidermy bird mounts and an egg collection that predates the use of DDT in the United States.

5.2 Refuge Facilities

5.2.1 Boundary Fences and Markers

Barbed wire fencing delineates and protects most of the Refuge's 187,756-acre boundary. Where possible, the Refuge has posted boundary signs. Portions of the Refuge where it is transected by public roads (State Highway 205, State Highway 78, Sodhouse Lane, Diamond Lane, P Lane, and Double-O Ranch Road) are fenced, with boundary signs at main entrances or on barbed wire fences delineating the Refuge boundary. The Boundary Hunt Unit is adjacent to Bureau of Land Management (BLM) land, and, because of the rugged landscape and presence of rimrock, marking the Refuge boundary is difficult or impossible, making this area difficult to manage.

5.2.2 Entrances and Access Points

There are nine year-round entrances located on the Refuge: four in the Buena Vista Unit, three in the P Ranch Unit, and two in the Double-O Unit. Five of the year-round entrances in the Buena Vista and P Ranch units are marked with large entrance signs. The eastern entrance to the Double-O unit is marked with an entrance sign.

In the three hunt units (Malheur Lake, Buena Vista, and Boundary hunt units), seasonal entrances or access points are provided. The Malheur Lake Hunt Unit has three entrances: 1) on State Highway 205 near the Narrows pull-out; 2) off State Highway 78 at Lawen, and 3) on the Saddle Butte access. The Boundary Hunt Unit is accessible from numerous points along State Highway 205; however, hunters must access the portion of the Boundary Hunt Unit located southeast of Krumbo Reservoir via the BLM's Moon Hill Road. The Buena Vista Hunt Unit can be accessed from the Center Patrol Road, Sodhouse Lane, Diamond Lane, and State Highway 205.

Fishing access points are provided in the P Ranch Unit from the Center Patrol Road and from the P Ranch along the river dike. The Bridge Creek portion of the fishing area is accessible by pedestrians on the East Canal Road and from the Center Patrol Road at Bridge Creek.

Gates are located at five entrance areas along the Center Patrol Road, three in the Buena Vista Unit and two in the P Ranch Unit. Gates have been installed to minimize impact and disturbance when road conditions are poor, yet allow Refuge staff access for maintenance purposes or wildfire suppression. A gate has also been installed at the Krumbo Reservoir entrance to allow seasonal use for anglers and visitors, and to reduce wildlife disturbance. The gate is open from the fourth Saturday of April until October 31.

5.2.3 Roads and Parking Areas

State Highway 205 bisects the Refuge at the Narrows, continues south through the Blitzen Valley, and crosses through portions of the Refuge's western boundary. Two paved county roads (Diamond Lane and Sodhouse Lane) transect east-west through the Refuge. The Refuge is also crossed by two gravel roads (the Double-O and P Lane roads); the first is maintained by the county and the second by the Refuge. All remaining roads are gravel, Service owned, and maintained by the Refuge. These include the Center Patrol Road, Buena Vista Lane, P Lane, the East Canal Road, the Headquarters road complex, and Malheur Lake access roads. All other motorways are dike tops and unimproved two tracks.

Power line corridors are generally along road rights-of-way or adjacent to them. A major 115 kV transmission line owned by Harney Electric Cooperative bisects Refuge lands at the Narrows and continues to cross portions of the western boundary of the Refuge the length of the Blitzen Valley. State and county roads crossing the Refuge have smaller capacity power lines feeding homes, ranches, irrigation wells, and Refuge facilities.

Approximately 60 miles of unpaved roads are maintained for public access on the Refuge. Most of the unpaved roads are gravel, but small sections are natural dirt surfaces. Mileages are based on the Refuge Road Inventory, and this does not include maintenance roads or dikes that are not open to public access.

There are a variety of parking areas on the Refuge. Five parking areas are routinely maintained and are located at Refuge Headquarters, Sod House Ranch, Buena Vista Overlook, Krumbo Reservoir, and P Ranch. A small parking area for four vehicles at Refuge Headquarters and the Krumbo Reservoir main parking area are paved. Both parking areas are compliant with the Americans with Disabilities Act (ADA). Most parking areas (2-3 vehicle lengths) that are not routinely maintained are associated with wildlife observation and wildlife/nature photography, hunting, and fishing programs. They are located on Center Patrol Road and P Lane, in the Malheur Lake hunt unit (three), and in the Boundary hunt unit southeast of Krumbo Reservoir (one). One vehicle pull-off that can be occupied by at least five vehicles is located on State Highway 205 at the Narrows pull-out.

5.2.4 Trails

There are 10 designated hiking trails throughout the Refuge, which provide over 20 miles for visitors to explore and learn about wildlife and the Refuge, including the nationally recognized Desert Trail.

The Refuge has a Memorandum of Understanding with the Desert Trail Association for the establishment of and maintenance of a hiking trail corridor across the Refuge. This segment of the National Desert Trail runs through the western desert areas of the United States from Canada to Mexico and connects with adjacent segments on BLM-administered areas.

Most of the trails are undeveloped spur trails (≤ 1 mile), and are signed and mapped. Refuge staff, Youth Conservation Corps (YCC), and volunteers maintain three of the 10 hiking trails. Other hiking trails at Benson Pond, Bridge Creek, P Ranch/River Trail, and East Canal are located on maintenance roads and are mowed seasonally. Others, which are not routinely maintained, include the Krumbo Reservoir fishing trail and the National Desert Trail segment.

5.2.5 Administrative Facilities

Administrative facilities located at Refuge Headquarters on the south side of Malheur Lake, 32 miles south of Burns, consist of offices, a small visitor center and gift shop, the George Benson Memorial Museum, a conference room/library, a maintenance shop, and storage areas for maintenance and fire equipment. Five of the buildings at Refuge Headquarters and two buildings at the Buena Vista substation were built by the CCC.

Other buildings located at Refuge Headquarters include public restrooms, hazardous materials storage space, fuel tanks space, and residential housing. Residential housing includes a two-bedroom house for seasonal staff, a fire bunkhouse, a three-bedroom volunteer bunkhouse, a volunteer/RV Park common room, and a laundry and shower/restroom facility.

Government-owned living quarters for Refuge staff are located at the three substations (Buena Vista, P Ranch, and Double-O units). In addition to residences, a maintenance shop, storage areas for equipment, and fuel tanks can be found at the main substation areas. Government-owned housing for the P Ranch substation is located at the South Place maintenance area. A three-bedroom volunteer bunkhouse, equipment storage areas, and fuel tanks are located at the P Ranch proper.

5.2.6 Easements and Rights-of-Way

The Refuge is either adjacent to or bisected by public roads and state highways. Existing and relocated rights-of-way for electric transmission and phone lines, gas lines, and access roads are located throughout the Refuge.

The Saddle Butte access on the north side of Malheur Lake provides access to the Malheur Lake hunt unit. This access is an easement across private property, and public access is only permitted during the state waterfowl season. The condition of the access route significantly changes from year to year due to fluctuating lake levels, making the route tenuous and maintenance of the road difficult.

5.2.7 Dikes, Irrigation, and Water Control Structures

There are hundreds of miles of earthen dikes throughout the Refuge, including water control structures that control water levels for habitat management. Wildlife observation, wildlife/nature photography, interpretation, and environmental education are secondary benefits on some of the dikes accessible to the public (East Canal Road, Bridge Creek fishing access, Brenton Cabin Road, and the River Dike Road).

5.3 Public Use Overview

5.3.1 Open and Closed Areas

The Refuge is open to the public year-round from sunrise to sunset on designated roads and trails. The Center Patrol Road, the Refuge's 42-mile auto tour route, provides the main access to the Blitzen Valley, the most frequently visited portion of the Refuge. Access to the Center Patrol Road is provided at Refuge Headquarters, at the Malheur Field Station, at Buena Vista Station and Diamond Lane, via Krumbo Lane, and at the P Ranch. The Double-O portion of the Refuge is accessed from the North Harney Lake Road and the Double-O Road from State Highway 20.

Most dikes/maintenance roads on the Refuge are closed to public access to reduce wildlife disturbance; however, the public are allowed to use the East Canal Road, the Bridge Creek fishing access, the Brenton Cabin Road, and the River Dike Road for pedestrian access for fishing.

Seasonal wildlife-dependent recreational uses are associated with the historic Sod House Ranch, and the hunting and fishing programs. Sod House Ranch is seasonally open from August 15 to October 15 for historic interpretive and wildlife-viewing purposes. It is closed the remainder of the year to meet wildlife objectives associated with the heron and cormorant rookery nesting in the cottonwood trees.

Hunting and fishing programs are open in designated areas and seasons. Malheur Lake and the Boundary hunt units follow Oregon State seasons, and the Buena Vista hunt unit opens on the third Saturday of November until the end of Oregon State pheasant season. Fishing opportunities at the south loop of the upper Blitzen River, the southern portion of East Canal, and Mud and Bridge creeks are available year-round with special regulations. Krumbo Reservoir is seasonally open to anglers and visitors from the fourth Saturday of April to October 31. Krumbo Reservoir is closed outside of the fishing season to reduce wildlife disturbance.

5.3.2 Annual Recreation Visits

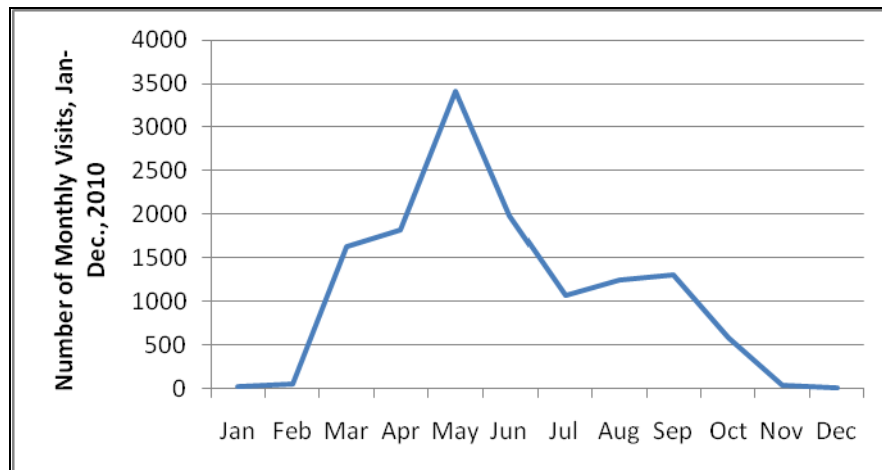
During the 12-month period starting December 1, 2009, and ending November 30, 2010, an estimated 65,600 total daily visits were made to the Refuge. This is not a sum of visits by visit category; this is an estimate of total visits to the Refuge based on door and vehicle counts at the Refuge headquarters, adjusted using mean group size and mean length of visit. Since the average visitor spends almost three days at the Refuge (see discussion below), this would translate into roughly 22,600 visitors at the Refuge per year.

Data Sources Used in Calculating Refuge Visits

During 2010-2011, the Refuge engaged in a set of integrated efforts to better estimate Refuge visitation. These included a door counter, automated vehicle counter, and vehicle counts at hunt sites. Visitor characteristics were deduced from a survey conducted by U.S. Geological Survey (USGS). Each of these sources is described below.

Door Counter at Visitor Center: The Refuge maintained a door counter on one visitor center door at the Refuge headquarters for a full year (January-December 2010). Door counts during this period are shown in Figure 5-1. Door counts were not used directly because of the possibility that counts were

under-estimated or over-estimated (one count could let in multiple visitors, visitors could use different doors, etc.). However, the pattern of door count fluctuation over the year was instructive and was used in conjunction with the vehicle count sample to estimate vehicle counts by month.



Source: Refuge Headquarters door counter records.

Figure 5-1. Monthly visits recorded in Refuge Headquarters visitor center with door counter, January to December 2010.

Headquarters Road Car Counter: A car counter was placed underneath the entrance road to Refuge headquarters. Although the car counter was only operational for about two months, it provided valuable baseline data on total vehicle traffic that could be correlated with the visitor center door counts. Car counts were halved (so that entries and exits were not double counted), and adjusted to subtract staff, volunteer, and contractor entries and exits. Vehicle counts were estimated for the months in which they were not measured, by applying the pattern of Refuge door counts to the adjusted vehicle count data.

Vehicle Counts at Hunt Sites: During the 2010-2011 upland game hunt season, vehicles parked at hunting sites were counted on the opening weekend of the upland game hunt season at the Buena Vista Unit, as well as on nine other days of the hunt season. Opening weekend counts were adjusted based on the judgment of the law enforcement officer that vehicle counts were about half the “normal” activity for opening weekend.

Observation efforts at Malheur Lake Unit and Boundary Hunt Unit were insufficient to use in calculations of upland game hunt visits. Staff was consulted about the approximate number or percent of hunters thought to use these hunt areas, and these were added to the Buena Vista total for the upland game hunt visit estimate.

Waterfowl hunt visits were similarly estimated based on staff consultation rather than vehicle counts.

Visitor Characteristics: At least two studies have been made of Refuge visitors over the years. A study of the economic impact of ecotourism and the demographics of ecotourists was conducted on the Refuge from June 1993 to May 1994 (Kerlinger 1994). A total of 481 questionnaires were completed by visitors. Kerlinger examined visitor demographics (gender, age, income) and activities preferred, as well as the amount of money spent on a visit.

A similar study was completed in 2010-2011 (Sexton et al. 2011) as described above. The USGS partnered with the Refuge System in 2010-2011 to conduct a standardized national survey of visitors at 50 refuges across the country, including Malheur Refuge (Sexton et al. 2011). The goal of the survey was to provide refuge managers, planners, and visitor services specialists with reliable baseline data about refuge visitors and their experiences. Visitor opinions about their visit and various topics of interest were also gathered and analyzed. Some findings from the study are presented in Table 5-1. The full study report can be found in Appendix Q of this CCP.

At Malheur, 273 visitors completed the survey for an 88 percent response rate and ± 6 percent margin of error. Two different sampling periods were used; the first extended from August 28, 2010, till September 11, 2010. The second extended from May 21, 2011, until June 4, 2011. Survey data yielded valuable information on parameters of visitation, including percent of local and non-local visitors, average group size, the percent of visitors who reported having visited the visitor center, activities visitors engaged in during the previous year while visiting the Refuge, etc. These are summarized in Table 5-1.

Because the survey did not occur during hunting season, it is considered to provide limited information about hunting visitors. In addition, the spring sampling season occurred during a period of time when portions of the Refuge were inundated with unusually high water. This likely drove the percent of visitors using the Auto Tour Route down to below-normal levels.

In addition to the activities reported by Refuge visitors in the USGS survey, a study conducted in 1994 on the Refuge (Kerlinger 1994) found that the “typical” Refuge visitor is also interested in scenery; geology; hiking; and botany. As reflected in Figure 5-1, visitors engage in these activities primarily in the spring, summer, and fall; May is the busiest month of the year.

Table 5-1. 2010-2011 Survey Data: Key Parameters Used in Calculating Refuge Visits

Parameter	Result
Percent non-local visitors	96%
Percent local visitors	4%
Percent of visitors with a group	73%
Percent alone	15%
Mean group size (for those in a group)	5
Mean group size (overall)	3.9
Percent of visitors using visitor center	92%
Mean days per visit	2.9
Visitor Self-Reports: Activities Engaged in at Refuge During Previous 12 Months	
Bird watching	93%
Wildlife observation	87%
Auto tour/driving	62%
Photography	60%
Interpretation	47%

Parameter	Result
Hiking	45%
Environmental education	8%
Fishing	6%
Bicycling	4%
Non-motorized boating	3%
Migratory bird/waterfowl hunting	1%
Special event	1%

Source: Sexton et al. 2011.

Integration of Data in Calculating Current Refuge Visits

The above data sources were used in conjunction to calculate overall visits to the Refuge, per year as well as visits by activity. To calculate Refuge visits per year, the following formula was used.

$$\begin{array}{rcccl}
 \text{Total} & & \text{Monthly visitor} & & \\
 \text{Refuge} & & \text{vehicle counts at} & & \\
 \text{visits per} & = & \text{headquarters} & * & \text{Mean} & * & \text{Mean} & / & \text{Percent of} \\
 \text{year} & & \text{(empirical or} & & \text{group} & & \text{days per} & & \text{visitors} \\
 & & \text{estimated from door} & & \text{size} & & \text{visit} & & \text{who visit} \\
 & & \text{count pattern)} & & \text{(overall)} & & & & \text{the visitor} \\
 & & & & & & & & \text{center}
 \end{array}$$

To calculate Refuge visit by activity, the percent of visitors reporting that they had engaged in that use was used as the primary parameter. This percent was multiplied by the total Refuge visits per year to estimate visits per year, by activity.

Upland game hunt visits were calculated by estimating visits for opening weekend and adding these to estimated mean visitor activity on weekdays and weekends, over the total season. Waterfowl hunt visits are currently estimated as 10 percent of upland game hunt visits. Table 5-2 shows the 2011 number of Refuge visits by key activity.

Table 5-2. Current Number of Refuge Visits Per Year, by Key Activity*

Activity	Current Refuge Visits (2011)
Consumptive Use	
Hunting visits: waterfowl	85
Hunting visits: upland game birds	850
Hunting visits: big game	40
Fishing visits	1,300
Non-Consumptive Use	
Pedestrian visits; hiking and walking	28,000

Activity	Current Refuge Visits (2011)
Auto tour visits	61,000
Boat trail/launch visits	400
Bicycle visits	2,600
Photography visits	52,000
Environmental education visits (non-local visitors)	6,700
Environmental education visits (local)	700
Interpretation visits	52,000
Wildlife observation visits	61,000
Commercial activities	1,000

*Visits are counted per separate visit. Each day of an extended visit is counted as a separate visit.

5.3.3 Accessibility of Recreation Sites and Programs for People with Disabilities

The Refuge provides some accessible facilities for persons with disabilities participating in programs associated with wildlife observation, wildlife/nature photography, interpretation, environmental education, and fishing. Related activities, such as welcome and orientation and the volunteer program also have limited ADA-accessible facilities.

ADA parking is provided at Refuge Headquarters and provides access to the Visitor Center and gift shop, the George Benson Memorial Museum, and public restrooms. Accessible public restroom facilities are also available at Buena Vista, Krumbo Reservoir, and the P Ranch. Other accessible opportunities include an accessible interpretive trail at the Sod House Ranch, an accessible viewing overlook at Buena Vista, and an accessible fishing pier and boat dock at Krumbo Reservoir.

At Refuge Headquarters the volunteer program provides ADA-accessible facilities at the three-bedroom volunteer bunkhouse, the volunteer RV Park common room, and the RV Park laundry and shower/restroom facilities. The fire bunkhouse is also ADA-accessible and serves as overflow housing for temporary staff and volunteers as needed.

5.3.4 Law Enforcement

One full-time law enforcement officer provides law enforcement coverage for the Refuge. Law enforcement officers from other refuges and agencies assist with patrols during periods of high visitation including the opening weekend of pheasant hunting, the opening weekend of fishing at Krumbo Reservoir, and on holiday weekends.

5.4 Wildlife-Dependent Public Uses

The National Wildlife Refuge System Improvement Act passed by Congress in 1997 identified six wildlife-dependent uses (wildlife observation and photography, interpretation and environmental

education, and hunting and fishing) as priority public uses for the National Wildlife Refuge System. These uses are explored below.

5.4.1 Wildlife Observation and Wildlife/Nature Photography

Program Offerings

The cornerstone of the public use program and one of the most popular activities on the Refuge is the wildlife observation and wildlife/nature photography program. Beginning to advanced bird watching is the most common activity under this program because of the diversity and abundance of birds (320 species) and wildlife (58 mammal species) on the Refuge. Rare and incidental bird species are common during the spring migrations and are the main focus for advanced birders. Areas preferred for viewing rare and incidental bird species include Refuge Headquarters and other historic landscapes where cottonwood trees and other non-endemic trees and shrubbery are present, such as Sod House Ranch, Benson Pond, Witzel Homestead, Barnyard Springs, and P Ranch.

Docent-led tours for wildlife observation and wildlife/nature photography occur in conjunction with the annual John Scharff Migratory Bird Festival held in April. Four to six tours are provided by the Refuge's friends group, the Malheur Wildlife Associates, or by volunteers. These tours provide 20-35 festival participants with an opportunity to learn about and experience the Refuge in greater detail. Most of the tours access areas normally closed to the public. The Refuge is also a stop for other tours led during the festival weekend by the Malheur Field Station, the Burns Llama Trailblazers, and other tour operators.

Independent visitors and groups from Audubon chapters and other organizations, such as the Malheur Field Station (see Environmental Education), also organize visits for wildlife observation and wildlife/nature photography on the Refuge, especially during the spring and fall. These informal wildlife observation and wildlife/nature photography opportunities are available on designated roads and hiking trails (see Trails) on the Refuge.

Facilities

Several facilities to assist the wildlife observation and wildlife/nature photography programs are available throughout the Refuge. Located at Refuge Headquarters, an exterior deck, an indoor telescope, and an overlook are available for visitors to view wildlife and the landscape. Another viewing overlook at Buena Vista also provides enhanced views of the surrounding landscape and improves visitor experiences. The Refuge does not have elevated viewing platforms or photography blinds.

The Refuge's 42-mile Blitzen Valley auto tour route (Center Patrol Road) has six designated sites for viewing wildlife: Refuge Headquarters, Buena Vista Ponds and Overlook, Krumbo Reservoir, Benson Pond, Knox Pond, and P Ranch. A number of vehicle pull-offs for viewing wildlife are also available at small ponds, marshes, and impoundments along the Blitzen Valley auto tour route.

5.4.2 Interpretation

Program Offerings

Interpretive features and programs are another popular activity on the Refuge. Visitors have expressed an interest in learning more about the Refuge. Key interpretive themes relevant to the Refuge include the significance of the Refuge for breeding and migratory birds; pre- and post-contact historic events; wilderness; geology; aquatic health; the importance of water; resource challenges faced by management; and the role of the National Wildlife Refuge System. Many of these themes have been emphasized as part of the Refuge’s interpretive features and programs. With the use of traditional and modern media, special events, public presentations, and outdoor interpretive panels, visitors are enlightened and connected with the places and resources the Refuge protects.

A variety of interpretive brochures (e.g., the Blitzen Valley Auto Tour Route Self-Guided Interpretive Brochure) are available at the Refuge Headquarters Visitor Center and at five brochure boxes at the Buena Vista and P Ranch unit entrances.

The Refuge also maintains a website (www.fws.gov/malheur) where information about the Refuge can be obtained, including information associated with key interpretive themes, recreational opportunities, and management issues. The most visited web pages on the site are associated with wildlife viewing, recreational opportunities, hunting, and planning a visit to the Refuge, followed by links providing information about where to stay near the Refuge. The Refuge’s website statistics are displayed in Figure 5-2 and Table 5-3.

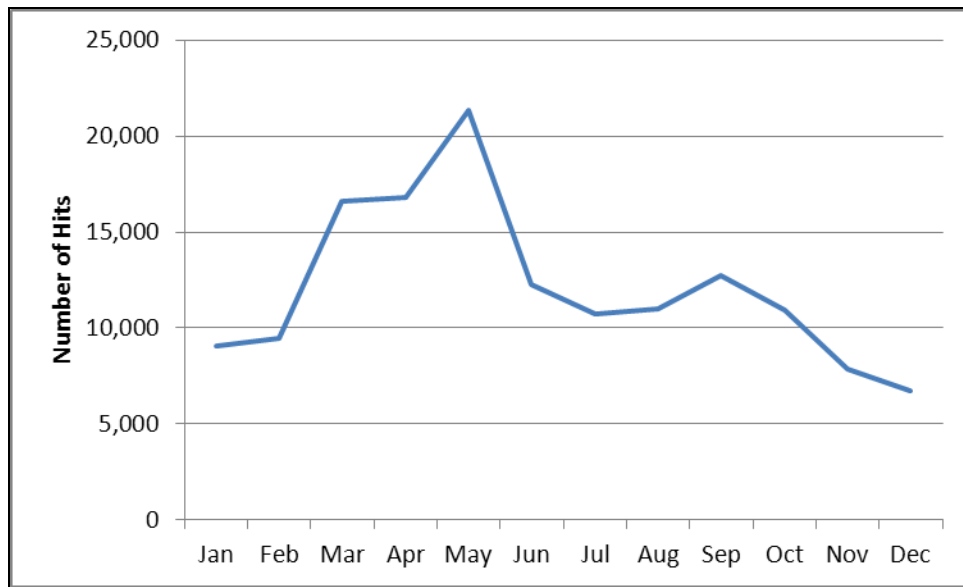


Figure 5-2. Website statistics for monthly visits to the Refuge’s website, January to December 2010.

Table 5-3. Website Statistics for Most Popular Pages Viewed by Visitors, January to December 2010

	Top Page	Second Page	Third Page	Fourth Page
Jan	Wildlife	Plan Your Visit	Recreation – Main Page	Bird List
Feb	Wildlife	Recreation – Main Page	Plan Your Visit	Where to Stay
Mar	Recreation – Main Page	Plan Your Visit	Wildlife	Bird List
Apr	Plan Your Visit	Wildlife	Recreation – Main Page	Where to Stay
May	Wildlife	Plan Your Visit	Recreation – Main Page	Where to Stay
Jun	Wildlife	Recreation – Main Page	Plan Your Visit	Where to Stay
Jul	Recreation – Main Page	Wildlife	Plan Your Visit	Where to Stay
Aug	Wildlife	Plan Your Visit	Recreation – Main Page	Where to Stay
Sept	Plan Your Visit	Wildlife	Recreation – Main Page	Where to Stay
Oct	Wildlife	Recreation – Main Page	Plan Your Visit	Hunting
Nov	Hunting	Wildlife	Recreation – Main Page	Plan Your Visit
Dec	Hunting	Recreation – Main Page	Wildlife	Plan Your Visit

The Refuge is involved with and participates in four local special events on and off-Refuge: the John Scharff Migratory Bird Festival (April), Free Fishing Day (June), Invasive Carp Awareness Day and Ranching Heritage Day (August), and the Harney County Fair (September). During these events, docent-led tours (see Wildlife Observation and Wildlife/Nature Photography), booths, and educational materials that connect visitors with places and resources on the Refuge are available.

Public presentations are also given by Refuge staff and volunteers to a variety of visiting groups. Public presentations are scheduled upon request by visiting groups, and are primarily requested between April and October. Four to five staff presentations are requested each year for high school and university classes, and reach about 200 visitors.

Facilities

Refuge Headquarters is the top “wildlife experience point,” as nearly all visitors use the facilities and spend time experiencing wildlife present at the site. The small Visitor Center and gift shop is staffed by Refuge staff and volunteers and provides interpretive brochures and other information. The George Benson Memorial Museum, also located at Refuge Headquarters, aids visitors in the identification of wildlife found on the Refuge using 200 mounted bird specimens.

To enhance visitors’ experiences and address key interpretive themes relevant to the Refuge, outdoor interpretive panels are provided at Refuge Headquarters and throughout the Refuge. Other outdoor interpretive panels are located at the Narrows pull-out, Sod House Ranch, the Buena Vista Overlook, the River Trail, and the P Ranch.

5.4.3 Environmental Education

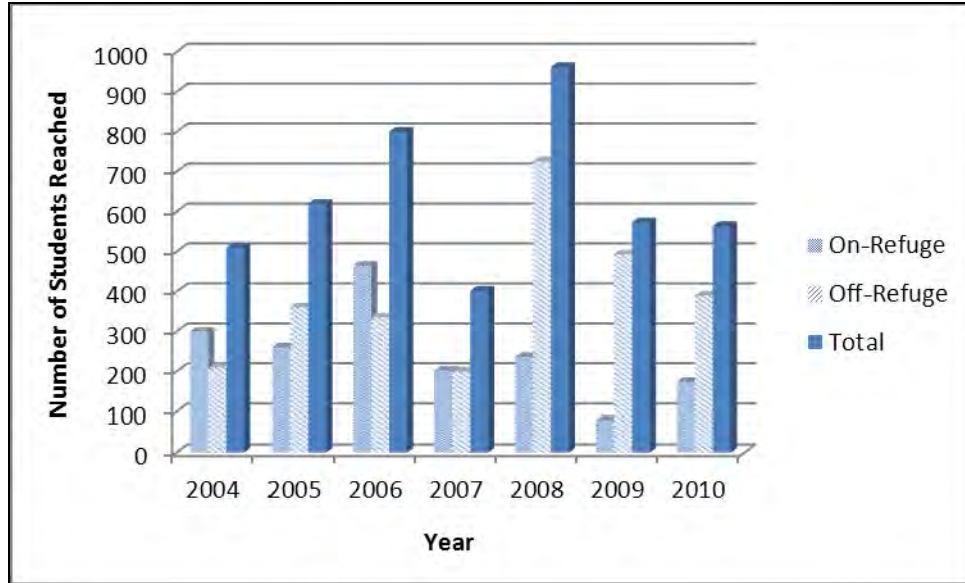
Program Offerings

The environmental education program is based on strategic use of Refuge staff and volunteer time, and Refuge resources. The small environmental education program is conducted on- and off-Refuge to promote an understanding of wildlife, habitat, and resource management objectives and issues. The environmental education program makes every effort to correlate activities with the State Educational Standards and local district curricula for elementary levels as illustrated in Table 5-4.

Table 5-4. Typical Lesson for Students in Grade 1

Subject	Goal	Content	Statement	Performance
<ul style="list-style-type: none"> • Life Science: Understand structure, functions, and interactions of living organisms and the environment 	<ul style="list-style-type: none"> • Begin to identify what habitats and ecosystems are 	<ul style="list-style-type: none"> • Describe the characteristics, structure, and function of organisms • Explain and analyze the interdependence of organisms in their natural environment 	<ul style="list-style-type: none"> • Recognize similarities and differences between organisms • Describe the basic needs of living things • Describe a habitat and the organisms that live there 	<ul style="list-style-type: none"> • Identify living and non-living things (Grade K-1) • Identify what living organisms need to survive (Grade K-3) • Recognize that the population of a given organism affects its habitats (Grade 1)

The environmental education program also uses existing curricula, such as that provided for International Migratory Bird Day and the Connecting Children with Nature initiative, by using hands-on learning (e.g., photography, painting/drawing). Special events, such as the annual John Scharff Migratory Bird Festival Nature and Heritage Fun Fair, “Conservation through the Arts,” and Free Fishing Day, reach over 500 students. Class sizes and activities are dependent on Refuge staff, volunteer, and educator time, and transportation funding. The number of student visits on- and off-Refuge is shown in Figure 5-3.



Source: Refuge records. In 2008, the Refuge celebrated its centennial with an emphasis on reaching out to more students.

Figure 5-3. Number of student visits for environmental education, on- and off-Refuge, 2004 to 2010.

The majority of classes reached by the Refuge are local elementary classes with an emphasis on first and third grades. Visits to the Refuge and special events are primarily conducted between April and June, although the Refuge has at least one class visit at other times of the year from non-local educational organizations. In addition to the Refuge’s environmental education program, the Refuge coordinates and assists with local environmental education initiatives as requested.

Malheur Field Station, operated by the non-profit Great Basin Society, has offered educational opportunities and adventures since 1971 and operates an educational and research facility on Refuge lands under a Cooperative Agreement. The facilities of the Malheur Field Station are owned and managed by the Great Basin Society. Malheur Field Station is dedicated to learning in and about the northern Great Basin and offers a variety of educational programs to individuals, families, informal groups, K-12 school groups, colleges, and universities.

Facilities

The Refuge has limited environmental education facilities. Most environmental education activities occur outdoors on the exterior deck and lawn at Refuge Headquarters. The environmental education program also uses the conference room, which can accommodate 20 students, and the George Benson Memorial Museum. Malheur Field Station accommodations include a variety of lodging options, a natural history museum, and classrooms.

5.4.4 Upland Game Hunting

Areas currently open to upland game hunting are described below.

Malheur Lake Hunt Unit

This area consists of 18,000 acres on the north side of Malheur Lake. It is open during the Oregon State pheasant season and according to limits set by the state.

Buena Vista Hunt Unit

This area consists of 22,000 acres in the Buena Vista Unit. It is open from the third Saturday of November to the end of the Oregon State pheasant season and according to limits set by the state. The opening date has been designed to minimize conflicts with fall-staging sandhill cranes.

Upland game in the Buena Vista hunt unit is one of the Refuge's most popular hunts. Ring-necked pheasants, an introduced species, provide quality hunting opportunities on the Refuge; opportunities off-Refuge in the surrounding area are limited. The Refuge has no maintenance or production objectives for exotic species, and pheasants are not stocked.

Boundary Hunt Unit

This area includes Refuge lands located on the west side of State Highway 205 and several small tracts of Refuge lands southeast of Krumbo Reservoir in the vicinity of Krumbo Creek. This area is open during the Oregon State pheasant season and according to limits and regulations set by the State.

Facilities

No facilities are maintained or managed expressly for this program. The Saddle Butte access road, four parking areas, and various vehicle pull-offs (see Infrastructure and Administrative Facilities) are used during the hunting season on the Refuge.

5.4.5 Waterfowl Hunting

Areas currently open to waterfowl hunting are described below.

Malheur Lake Hunt Unit

Eighteen thousand acres on the north side of Malheur Lake are open during the Oregon State waterfowl season and according to limits set by the State. Seasonal closures can occur to protect waterfowl populations when water levels drop and the lake acreage falls below 10,000 acres. Non-motorized or electric boats are permitted during the hunt season.

Invasive carp have become successfully established in Malheur Lake and in the Blitzen and Silvies river systems. Their feeding behavior has eliminated or severely reduced an important waterfowl food source (sago pondweed), and as a result waterfowl use on Malheur Lake has been reduced. The Refuge's waterfowl hunt is perceived as being of poor quality.

Boundary Hunt Unit

The area west of Highway 205 and the Krumbo Creek area are open during Oregon State waterfowl season, according to the limits and regulations set by the State.

Facilities

No facilities are maintained or managed expressly for this program. Saddle Butte access road, four parking areas, and various vehicle pull-offs (see Infrastructure and Administrative Facilities) are used during the hunting season on the Refuge. Temporary hunting blinds may be constructed, but must be removed daily.

5.4.6 Other Hunting

In addition to upland game and waterfowl hunts, the Boundary Hunt Unit is open to deer, pronghorn, coyote, and rabbit hunting. This unit, west of Highway 205 and the Krumbo Creek area, is open during the Oregon State seasons and according to limits set by the State. The Boundary Hunt Unit is adjacent to BLM land, and, because of the rugged landscape and presence of rimrock, marking the Refuge boundary is difficult or impossible, making this area difficult to manage. Hunters may take all State-allowed species.

Facilities

No facilities are maintained or managed expressly for this program. Hunters access this area via State Highway 205 or via BLM-administered roads.

5.4.7 Fishing Program

Areas currently open to fishing are described below.

South Fishing Loop

Located in the south part of the Blitzen Valley, this area includes the Blitzen River from below the Page Springs Dam to the confluence of Bridge Creek with the River, the southern portion of East Canal to Bridge Creek, and Mud and Bridge creeks. The loop is open year-round to pedestrian access. This fishery has special trout regulations per the State of Oregon.

The south fishing loop is a popular fly-fishing area for native redband and naturalized rainbow trout, and fishing is typically desirable when sediment in the water coming from Steens Mountain settles and the water column becomes clear.

Krumbo Reservoir

The Krumbo Reservoir is open from the fourth Saturday of April until October 31 for drive-in access. Non-motorized or electric boats are permitted during the fishing season. Closure for the remainder of the year eliminates conflicts with management objectives by limiting wildlife disturbances.

The Krumbo Reservoir fishery was established in 1959 as a two-story fishery consisting of largemouth bass and rainbow trout. Triploid rainbow trout are stocked twice a year by the Oregon Department of Fish and Wildlife (ODFW). The Reservoir provides a reliable fishing opportunity in Harney County and is perceived as a quality fishing opportunity by the local community and out-of-area anglers. On average, 12- to 24-inch rainbow trout are caught, and anglers are known to be successful. As is typical of desert lakes, fishing is best in spring and fall when the weather and water are cool.

Facilities

South fishing loop: No facilities are maintained or managed expressly for this program. A public restroom and parking are available at P Ranch. Walk-in access is via East Canal Road to the convergence of Bridge Creek with the East Canal, and along the River and Bridge Creek trails.

Krumbo Reservoir: One ADA-accessible fishing pier, a concrete boat ramp, two vault toilets, a floating boat dock, one paved and one gravel parking lot, and two covered picnic tables are located at the Reservoir. The launch and parking area has capacity for 24 boat trailer parking spaces, one ADA-accessible boat trailer parking space, nine single parking spaces, and one single ADA-accessible parking space.

5.5 Other Refuge Uses

5.5.1 Hiking, Horseback Riding, Bicycling, and Cross-Country Skiing

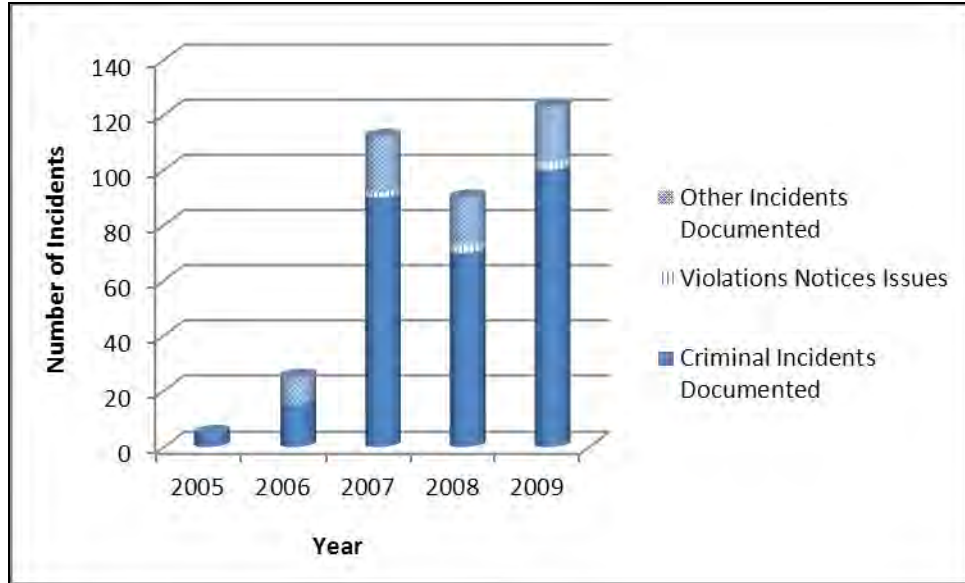
Hiking occurs regularly on the Refuge trails identified in Section 5.2.4. Horseback riding, bicycling, and cross-country skiing occur infrequently. These activities are currently allowed only on Refuge roads open to vehicular traffic.

5.5.2 Commercial Public Use

Commercial public uses include those activities where monetary gain is realized through recreational activities. These uses occur occasionally on the Refuge and include commercial photography and commercial guided tours and trail ride operations. These activities are generally limited to portions of the Refuge already open to the public, such as designated roads, trails, and hunting and fishing areas. The scale of commercial activities conducted each year on the Refuge is currently unknown. Commercial outfitters are required to obtain a special use permit, but the Refuge has been unable to enforce this provision because of the large size of the Refuge and multiple access points.

5.6 Illegal Uses

The Refuge has been affected by wildlife poaching, off-road vehicle use, trespassing cattle, looting of archaeological sites, and fishing and hunting violations. Target shooting and vandalism of entrance, boundary, and directional signs is also a problem. Over 1,300 law enforcement field hours were documented in the 2009 RAPP Station Report. Cooperative relationships with other law enforcement organizations have improved the effectiveness of law enforcement on the Refuge. Violations, criminal incidents, and other incidents are shown in Figure 5-4.



Source: Refuge records.

Figure 5-4. Violation and incidents documented, 2005 to 2009 RAPP Station Report.

5.7 Area Outdoor Recreational Opportunities and Trends

5.7.1 Nearby Recreational Opportunities

The BLM manages about 60 percent of the lands within the county, and the USFS manages an additional 20 percent. Forests in the northern part of the county, the Refuge in the middle of the county, Steens Mountain and the associated Steens Mountain Wilderness Area (SMWA) to the south, Diamond Craters Outstanding Natural Area, several wild and scenic river (WSR) segments (e.g., the Donner und Blitzen WSR), and several scenic byway tour routes provide a wide variety of recreational opportunities for the county’s residents and visiting recreationists.

Recreational opportunities and activities include hunting, fishing, camping, picnicking, wildlife/landscape viewing, geological sightseeing, horseback riding, biking, cross-country skiing, snowmobiling, high-altitude running, historic buildings, and hot springs. Over 300 species of birds migrate through the county each spring and their importance is acknowledged with the annual John Scharff Migratory Bird Festival, held in April. In addition, Harney County is known for having some of the lowest levels of ambient light in the nation, which provides excellent star-gazing opportunities (Harney County Chamber of Commerce [HCCC] 2010).

The Steens Mountain Cooperative Management and Protection Area, managed by BLM, draws an estimated 44,000 visitors to the area each year. Popular activities include camping, picnicking, sightseeing, and exploring the open country on foot and horseback. Bicycling, fishing, and hunting are also popular. Cross-country skiing, snowshoeing, and limited snowmobiling are winter favorites. Some activities within the Cooperative Management and Protection Area, such as motorized access for winter recreation and organized group functions, may require a special use permit from BLM.

BLM provides a popular campground at Page Springs along the boundary of the southern part of the Refuge, as well as dry camping on lands adjacent to the Refuge. Several local businesses provide camping and lodging near the Refuge.

In addition to the recreational activities mentioned above, a private hunt club is located adjacent to the Refuge, and private outfitters/guides offer opportunities for personalized tours or other activities. ODFW also manages a hunter access program on private lands adjacent to the Refuge that is open according to state regulations for hunting and fishing.

5.7.2 Regional and State Recreation Factors and Trends

Oregon Parks and Recreation Department (OPRD) began an Oregon Statewide Comprehensive Outdoor Recreation Plan (SCORP) planning process in September 2005 (OPRD 2008). OPRD has taken a more proactive approach in addressing a limited number of previously identified and defined issues. Key findings from the 2003-2007 SCORP and the 2005-2014 statewide trails planning efforts identified a number of important demographic and social changes facing outdoor recreation providers in the coming years, including:

- Rapidly aging Oregon population
- Fewer Oregon youth learning outdoor skills
- Increasingly diverse Oregon population
- Oregon’s physical activity crisis

Following completion of the research studies, key recommendations were divided into two categories: statewide recommendations and local recommendations. Statewide recommendations are relevant for all recreation providers across the State of Oregon as described in Table 5-5. Local recommendations apply to those high-priorities counties and/or cities identified in SCORP research projects.

Table 5-5. 2008-2012 Oregon SCORP Statewide Recommendations

Rapidly Aging Oregon Population	Fewer Oregon Youth Learning Outdoor Skills	Increasingly Diverse Oregon Population	Oregon’s Physical Activity Crisis
<ul style="list-style-type: none"> • Develop a trails website to facilitate recreational trail use • Develop a marketing plan to encourage outdoor recreation participation of baby boomers • Create an interagency 	<ul style="list-style-type: none"> • Develop a youth outdoor programming framework and funding source to focus youth programming efforts toward set key objectives • Develop a menu of after-school programs that are linked to current education standards and key 	<ul style="list-style-type: none"> • Encourage organizational cultural change within public recreation agencies and organizations to effectively address the diversity issue • Create a pilot project to identify how to increase under-represented population access 	<ul style="list-style-type: none"> • Develop a marketing plan to encourage Oregonians to become physically active by using park and recreation facilities and services • Develop and institutionalize the statewide trails website and add information about physical activity–related recreation programs and facilities following completion of the recreational trails work • Work with medical community to get outdoor recreation

Rapidly Aging Oregon Population	Fewer Oregon Youth Learning Outdoor Skills	Increasingly Diverse Oregon Population	Oregon’s Physical Activity Crisis
<p>volunteer information website or other communications medium to match boomer volunteers with recreation or natural resource projects</p> <ul style="list-style-type: none"> • Facilitate the development of local senior walking clubs • Identify ways to fund accessible trails in remote settings 	<p>objectives in the youth outdoor programming framework</p> <ul style="list-style-type: none"> • Develop a “Let’s Go Camping” marketing campaign targeting adults with children to get parents outdoors with their children • Create a new Outdoor Recreation Section within the Oregon Recreation and Park Association 	<p>to outdoor sports fields</p> <ul style="list-style-type: none"> • Develop recommendations for addressing language barriers to encourage under-represented populations’ use of outdoor recreation facilities and programs • Create a customer service training module related to serving the outdoor recreation needs of an increasingly diverse population 	<p>participation information into medical offices and physician referrals</p> <ul style="list-style-type: none"> • Identify ways to fund recreation maintenance and facility development on school grounds • Develop a strategy to strengthen the role of parks and recreation agencies in the state’s Safe Routes to Schools grant program • Create a pilot program to identify how to increase under-represented populations’ access to outdoor sports fields • Identify ways to fund and maintain bicycle trails on Oregon Department of Transportation rights-of-way

5.8 Social/Economic Environment

Much of the socioeconomic data presented in this chapter is derived from data compiled for the 2010 North Steens 230-kV Transmission Line Project Draft Environmental Impact Statement (TLDEIS) prepared by the Burns District BLM (BLM 2010). A portion of that project includes Malheur Refuge, making information contained in the TLDEIS relevant to this CCP.

5.8.1 Environmental Justice

In February 1994, President Clinton issued [Executive Order 12898](#), requiring that all Federal agencies seek to achieve environmental justice by “identifying and addressing ... disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations.” Environmental justice is defined as the “fair treatment for people of all races, cultures, and incomes, regarding the development of environmental laws, regulations, and policies.”

Additional guidance from the President’s Council on Environmental Quality (CEQ) clarifies that environmental justice concerns may arise from effects on the natural and physical environment that produce human health or ecological outcomes, or from adverse social or economic changes.

The evaluation of environmental justice issues is mandated and regulated at the Federal level, and compliance with the National Environmental Policy Act (NEPA) requires analysis of environmental justice effects. As such, environmental justice is considered part of the NEPA process.

The key social and economic parameters addressed here are race/ethnicity and measures of social and economic well-being, including per capita income, poverty rates, and unemployment rates. Each of these is addressed in the sections below.

5.8.2 Regional Economic Setting

Malheur Refuge is located in southeastern corner of Oregon in Harney County. Towns located near the Refuge include the agricultural communities of Diamond (15 miles distant), Frenchglen (immediately adjacent), and Crane (40 miles distant), and Burns/Hines (35 miles distant).

The economics of the area are evenly divided between private industry (livestock production, tourism, retail, transportation, etc.) and government (federal, state, and local) employment.

5.8.3 Population and Income

Population

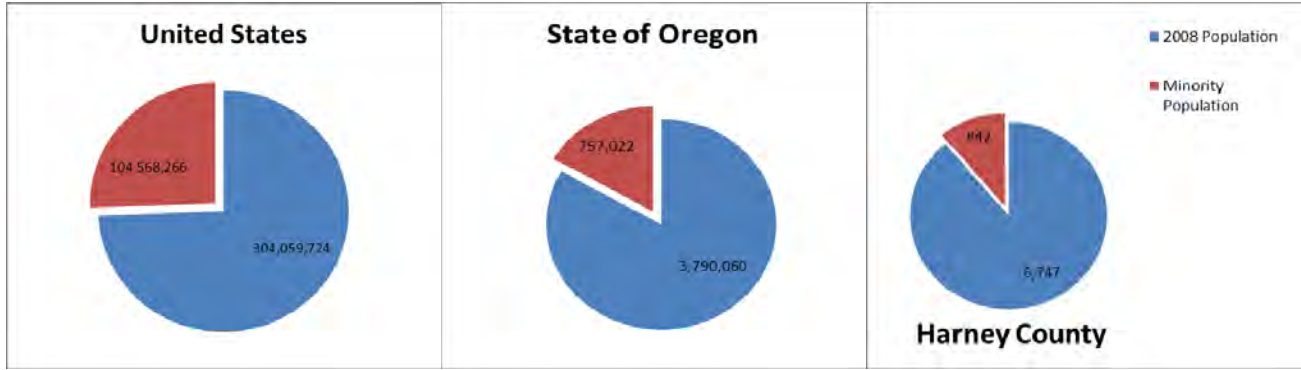
Table 5-6 shows the population estimates and past trends for Harney County, as well as the Burns and Hines communities. As shown in Table 5-6, the 2010 population of Harney County accounts for only a fraction of a percent of the population of Oregon. The two cities of Burns and Hines house the majority of the county’s population.

Table 5-6. Local and Regional Population Estimates and Characteristics

	Residents	Persons per Square Mile	Population Percent Change 2000-2010
State of Oregon	3,831,074	40	12%
Harney County	7,422	>1	-2.5%
Principal towns near Refuge			
Burns	2,806	N/A	
Hines	1,563	N/A	

Source: U.S. Census Bureau 2011.

Minority Populations: Figure 5-5 presents relative population and minority percentages for the county, state, and nation based on 2008 population estimates by the U.S. Census Bureau. In 2008, Harney County’s minority population was 842 residents and represented 12 percent of the total population. The Harney County minority population continued to reflect relatively fewer minority residents compared to Oregon, which was comprised of 20 percent minorities in 2008, and the United States, comprised of 34 percent minorities in 2008.



Source: U.S. Census Bureau 2008.

Notes: Minority is defined as Black and African American, American Indian and Alaskan Native, Asian, Native Hawaiian and Other Pacific Islander, Hispanic/Latino, or any person of two or more races.

Figure 5-5. Regional minority composition.

Personal Income

Median Family Income: The U.S. Department of Housing and Urban Development defines low income as less than 80 percent of the median family income for the area, subject to adjustment for areas with unusually high or low incomes or housing costs.

The median household income documented in 2007 for Oregon was \$35,143, whereas the median household income for Harney County was \$28,238, which is approximately 80 percent of the statewide level.

Per Capita Income: As presented in Table 5-7, per capita income in Harney County is about \$7,000 less than that in Oregon and \$10,000 less than that in the United States. This low per capita income indicates the presence of low-paying employment opportunities in the county.

The annualized rate at which per capita income grew between 2001 and 2007 within the county (5%) is greater than the state or national rate of 3.9 percent and 4.4 percent, respectively (U.S. Bureau of Economic Analysis 2009). A low per capita income in a community indicates the presence of low-paying employment opportunities.

Table 5-7. Per Capita Personal Income

	2001	2007	Annualized Rate of Change (%)
Harney County	21,706	28,238	5.0%
Oregon	28,530	35,143	3.9%
United States	30,582	38,615	4.4%

Source: U.S. Bureau of Economic Analysis 2009.

Poverty Rates: Poverty rates represent the percentage of an area’s total population living at or below the poverty threshold established by the U.S. Census Bureau. Based on 2000 Census data, the poverty rate was 11.8 percent in Harney County and 11.6 percent in the State of Oregon (13.4

percent based on 2008 estimates). According to the 2000 Census, the poverty rate for children aged 17 years or less in Harney County was 12.9 percent (Table 5-8).

Table 5-8. Poverty Rates at Local, County, and State Scales

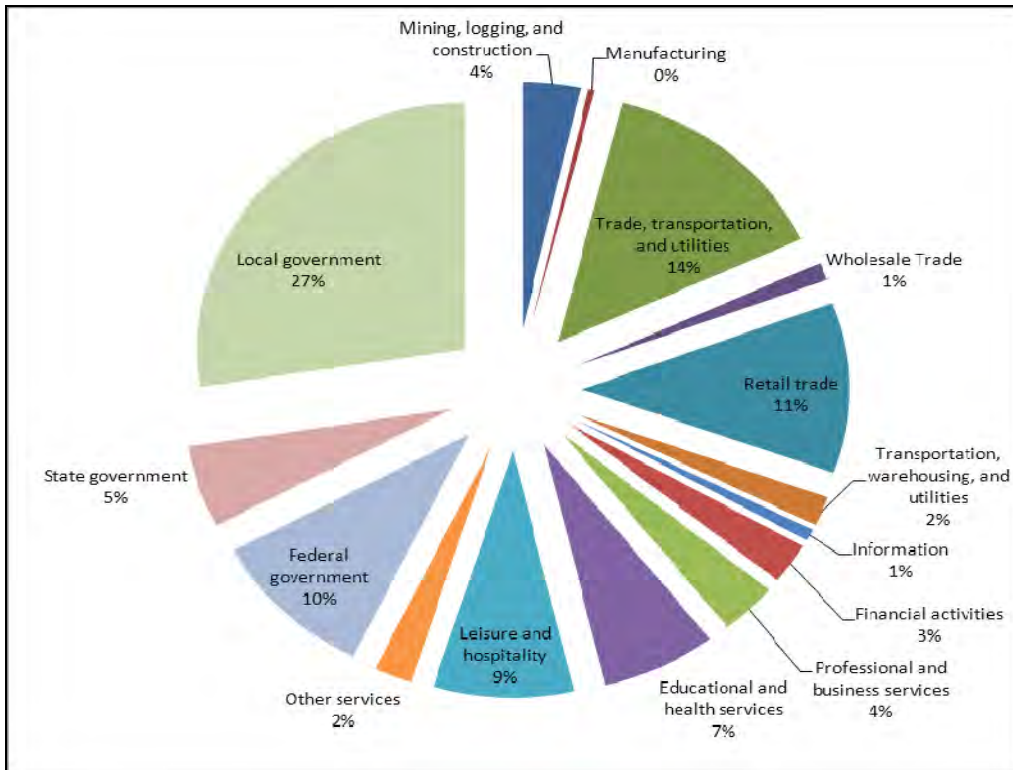
Area	Per Capita Income	Median Household Income	Poverty Rate	Child Poverty Rate	% Difference in Poverty Rate Compared to Harney County	% Difference in Child Poverty Rate Compared to Harney County
Burns City	\$20,756	\$34,105	12.3%	8.7%	4.2%	-32.5%
Hines City	\$20,192	\$52,347	9.9%	10.7%	-16.0%	-16.9%
Harney County	\$20,673 (\$21,706 in 2001) (\$28,238 in 2007)	\$39,605	11.8%	12.9%	0.0%	0.0%
State of Oregon	\$26,789 (\$28,530 in 2001) (\$35,143 in 2007)	\$52,346 (\$49,863 in 2008)	11.6% (13.4% in 2008)	14.7%	-1.4%	14.0%

Sources: Unless otherwise stated, the source of data presented in this table is the 2000 Population and Housing Census (U.S. Census Bureau 2000a, 2000b, 2000c). For the sake of consistency, all dollar values in this table are converted to 2009 dollars, such as the values for per capita income and median household income.

Other sources: U.S. Bureau of Economic Analysis 2009; U.S. Census Bureau 2009.

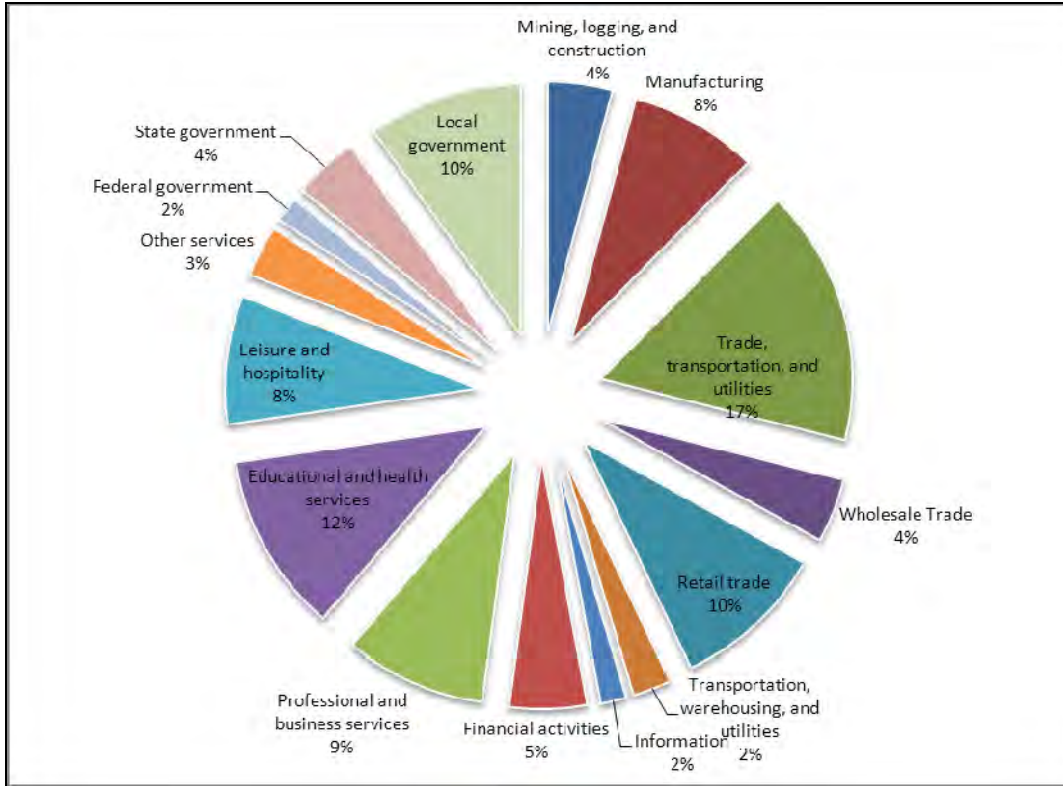
5.8.4 Employment and Business

Jobs by Industry and Sector: Industry-specific employment information provides an important insight into the makeup of a regional economy. Total nonfarm employment in Harney County was 2,220 jobs in November 2009 (Oregon Employment Department 2009). Nonfarm employment in the county is evenly divided between private employment (50 percent) and government employment (50 percent). Comparatively, private employment constitutes 81 percent of Oregon’s nonfarm employment, with government accounting for only 19 percent of Oregon’s nonfarm employment. The industrial category employing the most people in Harney County is local government with 32 percent of the workforce, compared with only 12 percent statewide. The trade, transportation, and utilities industry is the largest private employer in Harney County with 370 employees constituting 17 percent of the employment countywide. Figures 5-6 and 5-7 show the relative contributions of each industry to total employment for Harney County and the State of Oregon, respectively.



Source: Oregon Employment Department 2009.

Figure 5-6. State of Oregon non-farm employment.



Source: Oregon Employment Department 2009.

Figure 5-7. State of Oregon nonfarm employment.

Job Trends: Statewide, a 25 percent decrease occurred in the manufacturing industry, though at a significantly lower rate than in Harney County (96 percent) (Oregon Employment Department website). Other industries experiencing significant losses or gains are presented in Table 5-9 below.

Table 5-9. Nonfarm Employment Trends by Industry, 2001 to November 2009

	Harney County			Oregon		
	2001	Nov 2009	% Change	2001	Nov 2009	% Change
Total nonfarm employment	2,580	2,220	-14%	1,605,500	1,626,800	1%
Total private	1,380	1,110	-20%	1,323,700	1,321,500	0%
Mining, logging, and construction	90	90	0%	89,800	83,300	-7%
Manufacturing	240	10	-96%	215,700	162,800	-25%
Trade, transportation, and utilities	430	370	-14%	320,800	320,100	0%
Wholesale trade	30	30	0%	74,800	75,300	1%
Retail trade	340	290	-15%	189,200	190,900	1%
Transportation, warehousing,	50	50	0%	56,800	53,900	-5%

	Harney County			Oregon		
	2001	Nov 2009	% Change	2001	Nov 2009	% Change
and utilities						
Information	40	20	-50%	39,900	34,700	-13%
Financial activities	70	70	0%	95,200	93,200	-2%
Professional and business services	70	90	29%	177,100	180,600	2%
Educational and health services	160	180	13%	178,800	229,200	28%
Leisure and hospitality	230	220	-4%	149,600	160,300	7%
Other services	50	60	20%	56,700	57,300	1%
Government	1,200	1,110	-8%	281,800	305,300	8%
Federal government	260	260	0%	30,000	29,000	-3%
State government	160	140	-13%	72,500	79,900	10%
Local government	770	710	-8%	179,400	196,400	9%

Source: Oregon Employment Department 2009.

In addition to a changing industry profile, Harney County has faced a reduction in jobs. Between 2001 and November 2009, 360 jobs were lost in Harney County, a decrease of 14 percent. In comparison, the number of state jobs increased by 1 percent, or 21,300 employees, over the same time period (Oregon Employment Department 2009).

Although not classified as a separate industry, there are numerous businesses in the retail and services sectors in Harney County that serve the tourism and recreation economy. In particular, the accommodation and food services, and the arts, entertainment, and recreation sectors are supported by the spending of recreation visitors. As indicated in Table 5-10, the Oregon Employment Department does not report the individual total employment in these industries, instead presenting the combined data for these two industries. In November 2009, an estimated 220 employees were employed in the Harney County leisure and hospitality sectors. Employment in these sectors has remained fairly constant in the county, fluctuating between 220 and 260 employees since 2001. Tourism is also important to the Harney County economy.

Earnings by Industry: Federal non-military government employment accounts for the highest per employee earnings of any industry in Harney County with an average earning of \$85,141 per industry employee (earnings include wage and salary disbursements, supplements to wages and salaries, and proprietors' income) (U.S. Bureau of Economic Analysis 2009). This figure trails State and national per employee earnings for the industry by \$8,423 and \$13,703, respectively. With the average State/local government employee earning \$43,552 in the county, the industry is the second highest earning industry per employee. The county employee earnings in state and local government also trail the state and national earnings. Detailed information on employee earnings by industry is presented in Table 5-10.

Employees residing in Harney County earn less than similar employees in every industry elsewhere in the state or nation. The differences can be substantial, ranging up to \$55,771 for finance workers. State and local government is the greatest employer in the county and accounts for the greatest total employee earnings of any industrial category in the county. Due to undisclosed data at the county level, it is impossible to compare employee earnings by industry across the county, state, and national levels in all industries in 2007. At the state and national level, the highest employee earnings are in the utilities industry, with average earnings of \$141,268 per employee and \$157,166 per employee, respectively. Employment and earnings in the utilities industry are not disclosed at the county level (U.S. Bureau of Economic Analysis 2009).

Table 5-10. Employment and Earnings by Industry for Harney County and Oregon

Industry	Harney County			Oregon		
	Earnings (\$1,000s)	Employees	Per Employee Earnings	Earnings (\$1,000s)	Employees	Per Employee Earnings
Farm earnings	\$9,738	877	\$11,104	\$1,192,358	67,660	\$17,623
All nonfarm earnings	\$113,161	3,574	\$31,662	\$97,541,631	2,252,383	\$43,306
Forestry, fishing, related activities, and other	\$2,814	177	\$15,898	\$1,448,996	35,770	\$40,509
Mining		<10		\$226,283	3,681	\$61,473
Utilities	(D)	(D)		\$701,752	4,964	\$141,368
Construction	(D)	(D)		\$6,745,644	150,561	\$44,803
Manufacturing	(D)	(D)		\$14,437,333	217,114	\$66,497
Wholesale trade	\$1,343	54	\$24,870	\$6,378,920	89,537	\$71,243
Retail trade	\$9,050	493	\$18,357	\$6,885,871	255,349	\$26,967
Transportation and warehousing	(D)	(D)		\$3,392,809	68,813	\$49,305
Information	\$1,333	39	\$34,179	\$2,816,534	42,724	\$65,924
Finance and insurance	\$1,774	67	\$26,478	\$4,930,999	85,602	\$57,604
Real estate and rental and leasing	\$1,707	87	\$19,621	\$1,915,803	89,921	\$21,305
Professional, scientific, and technical services	\$2,571	103	\$24,961	\$6,942,550	128,427	\$54,058
Management of companies and	\$0	0		\$2,755,874	31,849	\$86,529

Industry	Harney County			Oregon		
	Earnings (\$1,000s)	Employees	Per Employee Earnings	Earnings (\$1,000s)	Employees	Per Employee Earnings
enterprises						
Administrative and waste services	\$873	98	\$8,908	\$3,388,650	125,923	\$26,910
Educational services	(D)	(D)		\$1,011,154	50,770	\$19,916
Health care and social assistance	(D)	(D)		\$10,645,180	242,233	\$43,946
Arts, entertainment, and recreation	(D)	(D)		\$773,380	51,204	\$15,104
Accommodation and food services	(D)	(D)		\$3,021,903	161,529	\$18,708
Other services excluding public administration	\$3,194	205	\$15,580	\$3,080,219	125,347	\$24,574
Federal, non-military government	\$20,519	241	\$85,141	\$2,725,141	29,126	\$93,564
Health care and social assistance	(D)	(D)		\$10,645,180	242,233	\$43,946
Military government	\$732	19	\$38,526	\$548,005	12,378	\$44,272
State and local government	\$34,537	793	\$43,552	\$12,768,631	249,561	\$51,164

Source: U.S. Bureau of Economic Analysis 2009.

5.8.5 Local Tax Revenues

The principal sources of tax revenue in Harney County are income taxes and property taxes. Oregon does not collect sales taxes. The total employment income for Harney County in 2006 was \$91,948,000, generating \$4,741,000 in state income taxes. Over \$90 billion in total income in Oregon in 2006 generated over \$5 billion in tax revenues for the state (State of Oregon 2010). Income and income tax statistics for Harney County and Oregon are presented in Table 5-11.

Property assessed value and tax revenues are presented in Table 5-11. The property tax rate in Harney County is over 1 percent lower than the Oregon average rate. Harney County generated over \$5.5 million in property tax revenue from total assessed property value of \$382 million in the county ([State of Oregon website 2009](#)).

Table 5-11. Regional Income and Income Tax Statistics

	Harney County	Oregon
Total income	\$91,948,000	\$90,213,382,000
Total income taxes	\$4,741,000	\$5,150,942,000
Overall income tax rate	5.2%	5.7%
Net assessed value of properties	\$382,191,276	\$271,355,283,098
Total property taxes	\$5,547,000	\$4,279,042,000
Property tax rate	14.51%	15.77%

Source: Oregon Department of Revenue.

Refuge Revenue Sharing Act

Counties receive payments in lieu of taxes from the USFWS under the Refuge Revenue Sharing Act. Payments are determined based on two criteria:

1. On acquired land, the greatest amount calculated on the basis of 75 cents per acre, three-fourths of 1 percent of the appraised value, or 25 percent of the net receipts produced from the land, and
2. On land withdrawn from the public domain, 25 percent of net receipts and basic payments under Public Law 94-565, payment in lieu of taxes on public lands.

Table 5-12 shows the in lieu of taxes payments to Harney County between 2002 and 2010.

Table 5-12. In Lieu of Taxes Payments to Harney County, 2002 to 2010

Payment Year	Tax Year	Paid to Harney County
2002	2001	\$93,449
2003	2002	\$46,106
2004	2003	\$79,443
2005	2004	\$89,719
2006	2005	\$83,038
2007	2006	\$80,295
2008	2007	\$75,842
2009	2008	\$75,842
2010	2009	\$75,842

5.8.6 Lifestyle and Social Values

Harney County was incorporated in 1889 and is very rural. The county was first explored by fur trappers and traders, and was then settled by cattle ranchers who were attracted to the abundance of

bunchgrass for grazing. Many of the area ranches are still owned by members or descendants of the original homestead families, and cattle ranching, raising sheep, and hay production remain important parts of the economy in the county. An important part of the rural lifestyle and community identity is derived from the undeveloped and open landscape of much of the county.

5.8.7 Refuge Impact on the Local Economy

Visitors to Malheur Refuge spend money on food, lodging, equipment, transportation, and other expenses, which creates jobs within the local economy.

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