Upper Owyhee Watershed Assessment

VI. Irrigated Agriculture

Contents

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A. Importance of irrigation

The upper Owyhee subbasin is a semiarid cold desert (see background section) with agricultural production restricted to hay due to frost risks. Prior to the development of irrigation projects, agriculture was impossible due to arid conditions during the growing season. Early hay production was restricted to narrow strips of irrigated land along rivers.

B. Sources of information

Data about irrigation and irrigated agriculture that applies specifically to the upper Owyhee subbasin is difficult to locate. Much of the information available is aggregated for either Elko County in Nevada or Owyhee County in Idaho. This information may be applicable to the upper Owyhee subbasin qualitatively, if not quantitatively. Since a large section of Owyhee County borders the Snake and Bruneau Rivers, data for irrigated acreage and crops in Owyhee County may be overshadowed by information from properties receiving water from irrigation districts along these rivers.

C. History

1. Before 1890

Prior to the winter of 1889-90, most of the ranches had put up some hay for stock horses. Some of this hay was harvested from natural wetland meadows. Bancroft and Victor observed that “on all the creeks of the northern part of the state [Nevada] are extensive patches of rye-grass, which grows often six feet high, and makes excellent hay”.[1] Irrigated hayfields were confined to the small floodplains along streams where water could easily be diverted. Water diverted by rock dams near the upstream end of a claim could irrigate the lowlands along the streams. Flooding uncleared land killed the native desert shrubs. Although the land was not leveled, the irrigation created a wet meadow hayfield and native sedges and rushes invaded from the adjacent floodplain and established a native hayfield.[4,16]

2. Irrigated hayfields

The high mortality of cattle during the white winter of 1889-1890 was due to both a lack of available forage and the cold temperatures and "drove home the lesson that forage had to be conserved for wintering cattle on most of the sagebrush ranges."[16] Ditches were dug by ranchers to irrigate land farther from the immediate floodplain. Ranchers worked together "mucking" cooperative ditches in the spring. The sod in the bottom of the ditch was cut and lifted out. Generally the new native hay meadows were only flooded once each season in the spring. Low dams of earth or brush were used to keep the irrigation water on the land from one to four weeks. Until the rains of autumn, the native hay meadows didn't receive any more water.[5,16]

Ranchers were not choosy about what they cut as hay. During his 1901 examination of the forage conditions north of Winnemucca, among the species David Griffiths identified in hayfields were alkali bullrush, cattail tine, wire grass, squirrel tail, and spike rush. Although most hayfields were comprised of native species, where irrigation was practiced alfalfa fields were the most productive, possibly averaging 3 to 4 tons an acre where only two cuttings were made. In 1901, both redtop and timothy were being introduced in some areas. Griffiths considered creeping wildrye as one of the best and hence most important crops of the region.[5]

Early methods of harvesting a crop of hay were adapted to the handling of native hay which could withstand the rough treatment. These methods were hard on alfalfa which is a difficult hay crop to cure and handle properly. However, alfalfa produced with deliberate irrigation yielded three to four times as many tons per acre as wild hay irrigated by flooding. All of the hay raised was to support the ranching activities, not for sale to exterior markets.[1,5]

3. Expansion of hayfields

Today about 48 percent of the irrigated land in Elko County is in the upper Owyhee subbasin.[12] Assuming this percentage may have been similar over time, the figures given for Elko county are approximately double those applicable to the Nevada portion of the upper Owyhee subbasin section of Elko County.

In 1873 there were 15,000 acres of hayfields in Elko County.[11] By 1880 the irrigated land in Elko County had grown to 16,124 acres.[12] Not all of this irrigation was on hayfields as the county also produced small amounts of wheat, barley, oats, and potatoes. Combining irrigated and unirrigated hayfields, there were 16,000 acres of hay harvested in 1880.[11] After the winter of 1889-1890, the land under hay crops in Elko County increased to 239,000 acres and stayed about the same for the next fifty years.[11]

In addition to the hayfields in Elko County, some hay was produced in the Owyhee County section of the upper Owyhee subbasin. It is more difficult to estimate what percentage of the cultivated lands in Owyhee County were located in the upper Owyhee subbasin. An 1898 directory of the County stated that "Hay of all descriptions, mostly alfalfa, is produced in large quantities."[7] Early in the next century, Hiram French wrote "In the southern portion [of Owyhee County]. . . the waters of the streams have been diverted for irrigation and large crops, chiefly of alfalfa, are grown."[4] In the county

as a whole, in 1912, there were 13,384 acres planted to alfalfa and 13,812 acres of other hay harvested.[4]

D. Climate

The climatic conditions of the upper Owyhee subbasin have constrained the crops that can be grown on the irrigated land. High elevations and cold temperatures lead to a short growing season. The "average" last frost free date in the fall is the date when there is a 50% chance that frost will occur before that date. The "average" first frost free date in the spring is the date when there is a 50% chance that there will be no more frost after the given date. The frost-free season is considered to be the number of days in an "average" year when the minimum temperature is above freezing. This is defined as the period from the average date of the last frost in spring to the average date of the first frost in the fall.[2,3]

At Elko, south of the upper Owyhee subbasin, the average frost free period is from June 10 to September 9, or 91 days (Table 1, Figure 6.1). Longer frost free seasons are an advantage to the agricultural potential of an area.

Table 1. First and last frost dates at Elko, Nevada, elevation 5,050 feet.

Last Frost			First Frost		
10%	50%	90%	10%	50%	90%
May 16	June 9	July 2	August 25	September 10	September 26

Alfalfa and other hays grow with shorter frost-free seasons than many other crops. They have continued to be the primary crops grown on irrigated land in the upper Owyhee subbasin.[9,13,14] The majority of the irrigated fields are on private land and are used by ranchers to grow supplemental feed for the winter season. The forage produced on farms from irrigated acreage, both hay fields and irrigated pasture, is critical to the support of livestock operations in the surrounding uplands. Without irrigation, forage production on these lands would probably drop about 90%. Some of the lower lands with some natural water might produce one cutting of hay.[12]

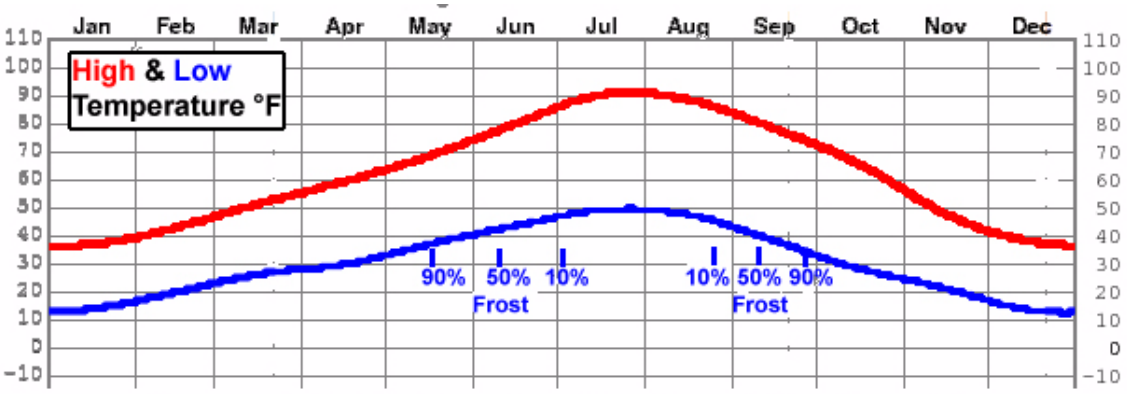


Figure 6.1. Distribution of frost-free days at Elko, Nevada.[3]

E. Areas under irrigation

The Bureau of Reclamation considers the 43,000 acres that receive natural flow diversion from the South Fork Owyhee River and the Owyhee River as a "natural flow irrigation service area" and the rough boundaries of this area are shown in Figure 6.2. Natural flow irrigation water users either divert or pump their own irrigation water supply from the natural flows of these rivers. Even in these areas, some landowners may also irrigate with water pumped from the groundwater.[12]

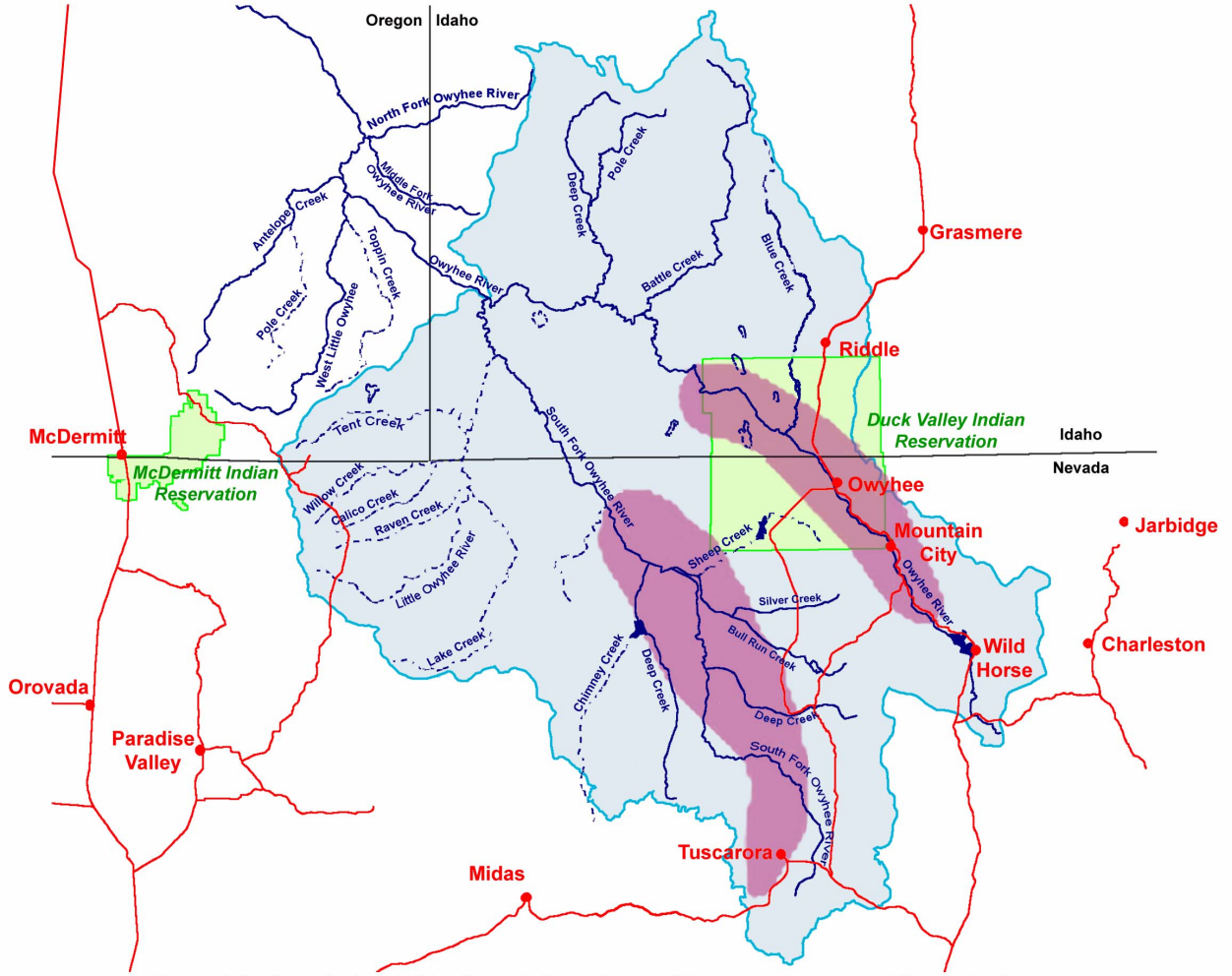


Figure 6.2. Area designated by the U.S. Army Corps of Engineers as a natural flow irrigation service area in the upper Owyhee subbasin.[12]

The irrigated areas in the upper Owyhee subbasin are usually located within the historic floodplains of stream corridors.[8] Since the irrigated land in the upper Owyhee subbasin comprises about 48 percent of the irrigated land in Elko County,[12] approximately 98,500 acres in Elko County in the upper Owyhee subbasin were irrigated in 2002.[9] Of this land, about 62,500 acres were used to grow alfalfa and other hay.[15] This acreage had diminished to around 57,400 in 2007. The irrigated acres not in hay crops are primarily pastures.

Photo 6.1 Irrigated hayfields in Independence Valley at the base of the Independence Mountains

Photo 6.2 Irrigated pasture below Wild Horse Dam in the upper Owyhee subbasin.

By contrast, in the Owyhee County section of the upper Owyhee subbasin, only 3,889 acres were under irrigation in 2003.[8] 1,493 acres were gravity irrigated and 2,396 acres were sprinkler irrigated.[8] Since most of the alfalfa and other hay grown in Owyhee County is on irrigated lands outside the subbasin, we do not know whether some of the irrigation within the subbasin was on pasture lands rather than hayfields.

Photo 6.3. Windrowed mown hay near Riddle, Owyhee County Idaho

Photo 6.4. Stacked hay near Riddle, Owyhee County Idaho.

The areas with irrigation in the upper Owyhee subbasin are shown in Figure 6.3. For the section of the subbasin in Owyhee County, the information was taken from the *Upper Owyhee Watershed Subbasin Assessment and Total Maximum Daily Load* study by the Idaho Department of Environmental Quality. The areas identified with irrigation in the Elko County section of the subbasin were taken from examination of the satellite images on Google Earth and in Google Maps.

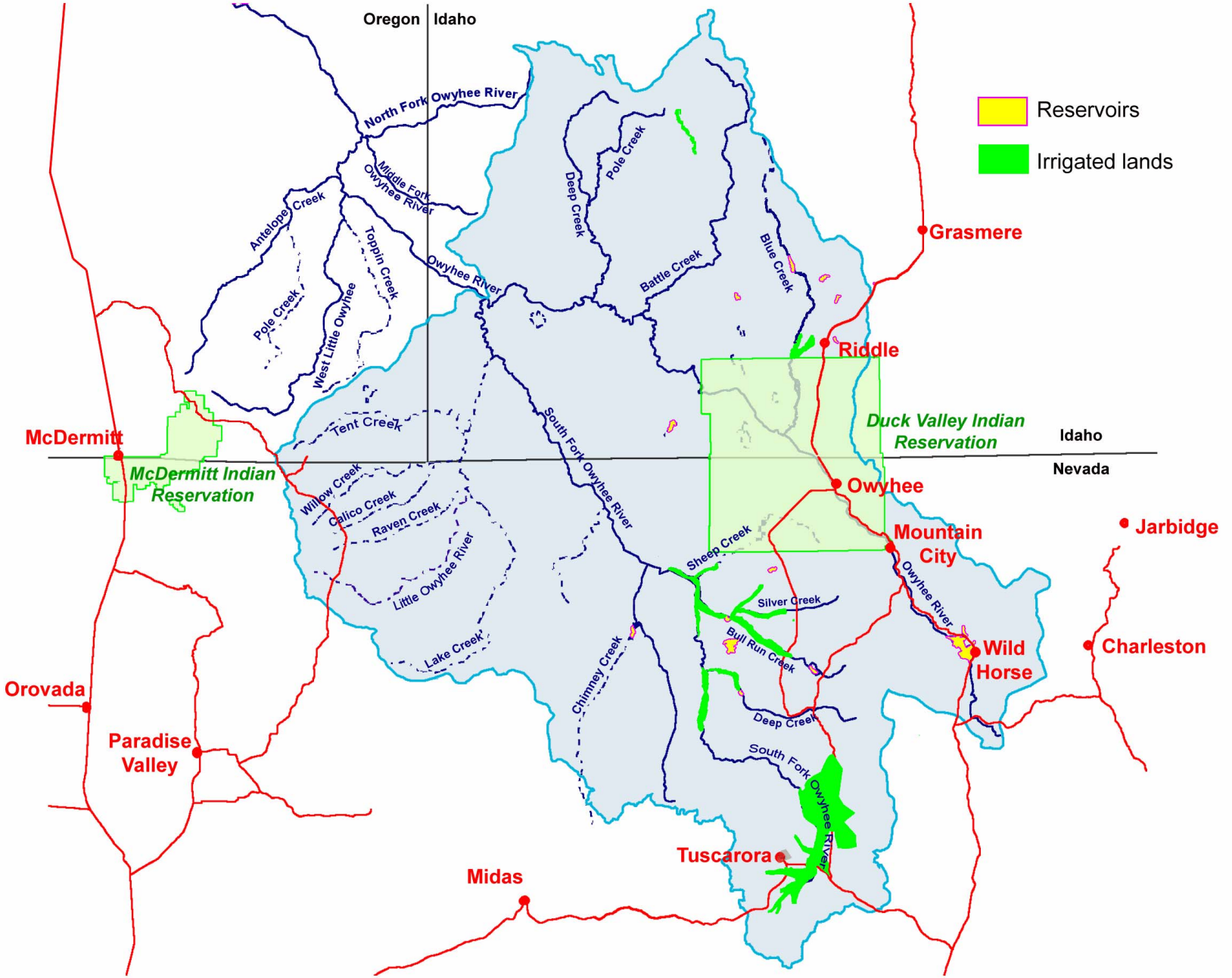


Figure 6.3. Irrigated lands in the upper Owyhee subbasin.

F. Changes in irrigation

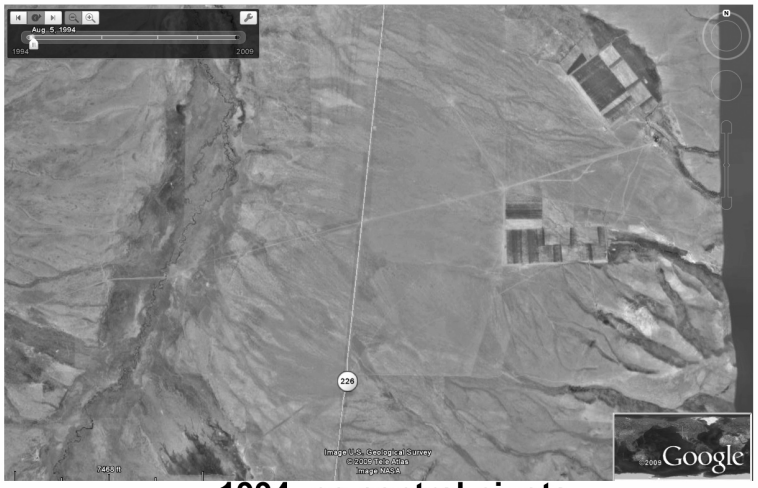
The original rock dams rebuilt each spring to divert water from streams and rivers onto floodplains to grow native hay gave way to more permanent structures and more elaborate ditch systems designed to deliver water to larger areas. The Petan Company of Nevada has some of the largest areas in the upper Owyhee subbasin under irrigation. Water stored in dams flows into ditches along both sides of Bull Run Creek and irrigates the land between the ditch and the natural course of the creek.

Photo 6.5. Irrigated land along a canal on the Petan Company land

One of the Petan Company's water rights from Bull Run Creek has a priority date of 1871. However, construction of the current dams dates to the 1940s. The company filed a water rights application for Rawhide Reservoir in 1940.[6] This application may be have been for a different dam than the dam proposed in 1941 for Bull Run Creek [possibly Bull Run Reservoir].[10]

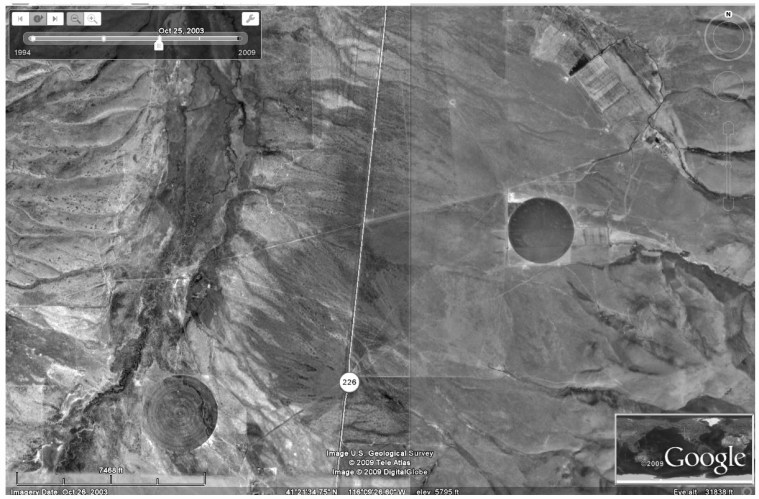
Although the dams and irrigation ditches used to deliver surface irrigation improved with time, flood irrigation of meadows and pastures dominated. The application efficiency of an irrigation system is measured by the quantity of water delivered to the crop root zone to meet crop water needs in relation to the amount of water applied to the field. Only water reaching the crop's roots can meet the plants' water needs. From surface irrigation with graded furrows the efficiency ranges from 50 to 80 percent with an average of 65 percent. For center pivot irrigation, the efficiency ranges from 75 to 95 percent with an average of 75 percent efficiency.[17] In the upper Owyhee subbasin, irrigation efficiency has recently been improved in some areas by the conversion from flood irrigation to center pivot irrigation.

In 1994, aerial photos along a section of the South Fork Owyhee River in the Independence Valley show two areas with furrow flood irrigation. Five years later in 1999, the irrigation of a large part of one these areas had been converted to center pivot. In 2003 another region had been brought into cultivation under a center pivot. By 2006, a third center pivot had replaced some of the remaining furrow irrigation (Figure 6.4).

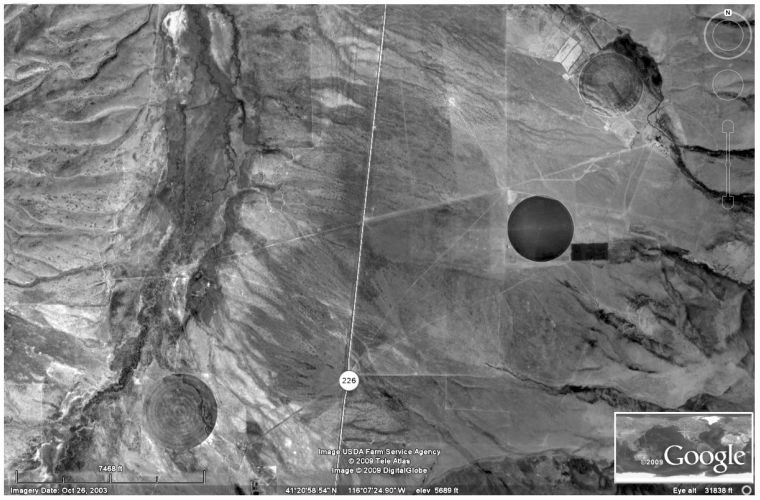


1994, no central pivots

1999, one central pivot



2003, two central pivots



2006, three central pivots

Figure 6.4. Evolution of irrigation systems in Independence Valley in the upper Owyhee subbasin.

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