OVERVIEW OF IRRIGATED AGRICULTURE IN FERRY COUNTY

Abstract

Ferry County in northeastern Washington has various natural and socioeconomic challenges and limitations to agriculture and efficient irrigation. The county is also a food desert, with 17.98% of households receiving food assistance in 2019 (WA OFM 2019), underscoring the need and potential for productive agriculture to support local food systems. Data-driven irrigation management can improve irrigation efficiency and profit local agriculture. Seeking to address the existing void in data, WSU WISE (Water and Irrigation Systems Efficiency) is a project funded by a United States Department of Agriculture Conservation Innovation Grant (USDA CIG) to evaluate irrigation system efficiency for five counties across Washington State. This publication is part of a series resulting from WISE and provides an overview of irrigated agriculture in Ferry County. It is intended for producers, agencies (including irrigation districts), and other stakeholders. Most of the data analyses provided are based on data published by the USDA National Agricultural Statistics Service (USDA-NASS) and the Washington State Department of Agriculture (WSDA).

Introduction

Ferry County is located in northeastern Washington and contains two major north–south mountain ranges in the Okanogan Highlands, the Nespelem Range and the Kettle River Range, the latter dividing the county in two and ranging from 5,000 to over 7,000 feet (Figure 1). The Kettle River is a major tributary of the Columbia River which originates in British Columbia, crosses the county's northern border twice, and flows into the Columbia River at Kettle Falls in Ferry County. This river system defines the county's eastern and southern borders. The county occupies the Kettle River, Sanpoil, and Upper Columbia watersheds:

> ". . . the Upper Columbia consists of those streams on the eastern slope of the Kettle Range, south of the Kettle River, which drain into the Columbia. The San Poil drains the western slope of the Kettle Range. Ultimately, all the surface water within . . . [Ferry County] flows into the Columbia (Lake Roosevelt)" (Ferry Conservation District, n.d.).

Agriculture in Ferry County is limited by zoning, climate, soil, and topography:

> "Large tracts of national forest in the northern half of the district [Colville National Forest], along with the Colville Indian Reservation to the south, limit the amount of privately owned land to 15%. Ferry County has a[n] [extremely] short growing season and is [significantly] lacking in areas with highly productive soils. This fact, along with a terrain of rugged forest, limits most agricultural production to [alfalfa and] the raising of livestock" (Ferry Conservation District, n.d.).

Figure 1. Ferry County, Washington.

Microclimates further complicate growing and negatively impact consistent production and yields. The sparse cropland in Ferry County is found on "Floodplains and terraces of recent alluvium and higher terraces of glacial outwash and glacial lake sediment [which] flank the rivers and most of the major creeks" (USDA NRCS 2002), which mostly run in a north–south direction. Many of these agricultural soils have a loess component, and common to northeastern WA, "much of the . . . soil is volcanic, the ash blown . . . by prevailing winds, from the volcanoes of the Cascades, St. Helens, Baker, [and] Glacier Peak" (Steury 2011).

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Irrigated cropland soils include the Phoebe-Garrison-Cedonia soil association along the Columbia and Sanpoil Rivers, with well-drained loam, silt loam, sandy loam, loamy sand, and coarse sand (USDA NRCS 2002), and the Malo-Ret association in the floodplain of the Sanpoil and Kettle Rivers consisting of loam, sandy loam, and silt loam (Zulauf and Starr 1979). Flooding and poor drainage of certain soils types have necessitated artificial drainage of pasture and hay crops in the North Ferry County region (Zulauf and Starr 1979). Agricultural production is also limited by lack of additional unappropriated irrigation water. Climate change could be another limiting factor if groundwater is reduced via decreased snowpack or increased summer heatwaves and drought (WECY 2008, 2012), which in the past has led to increased wildfire. If climate change increases the growing season without reducing ground and surface waters, it could have a positive impact because of the short growing season and cold winters that most of Ferry County faces. Nevertheless, the uncertainty of climate change in addition to other constraints calls for irrigation efficiency.

Given the various challenges and limitations to agriculture in Ferry County, data-driven irrigation management is crucial. Precise information on irrigation timing and water quantity is essential to maximize crop yield, and an irrigation method based on the weather-plant-soil interactions would help producers obtain good irrigation management and increase yields and profitability. This in turn could support local food systems and change the county's current status as a food desert.

Climate Summary

Ferry County has a continental climate with short, extremely hot, dry summers. Weather data for 2000–2020 were acquired from the National Weather Service Forecast (NOAA) station in Republic, Washington, and analyzed. The average annual rainfall was 17.4 inches. Figure 2 shows the monthly average air temperature and precipitation (excluding snowfall) over 2000–2020. The growing season in Ferry County is very limited, typically lasting around four months, from approximately May 16 to September 24 as recorded at the Republic station (NOAA 2021).

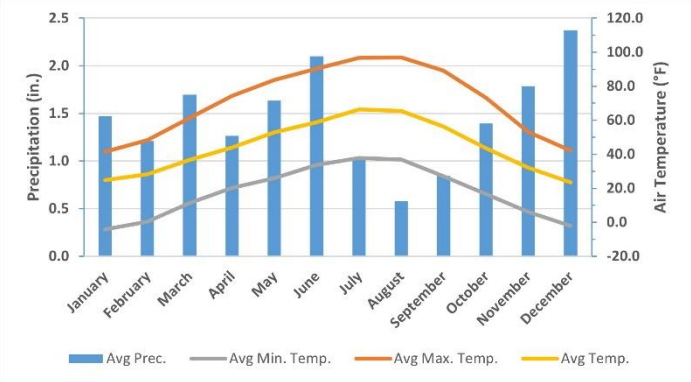

Figure 2. Monthly average air temperature and precipitation, Republic, Ferry County, 2000–2020.

Irrigated Land Survey

Ferry County is classified as Range Area in all except for two small regions (WSU Ferry County Extension 2012), making the total farmland acreage relatively high. As of 2017, Ferry County had a total of 252 farms (USDA-NASS 2017a), a 1% decrease from 2012. In 2017, the number of irrigated farms was 78 with a total irrigated land area of 2,831 acres, of which 2,604 were harvested cropland and 227 were pastureland and other land (USDA-NASS 2017b), as shown in Table 1. The total irrigated land and the number of irrigated farms by farm size is shown in Figure 3. Irrigated land in orchards was estimated at a total of 167 acres across ten farms in 2012, which decreased to only four farms by 2017 (USDA-NASS 2017a).

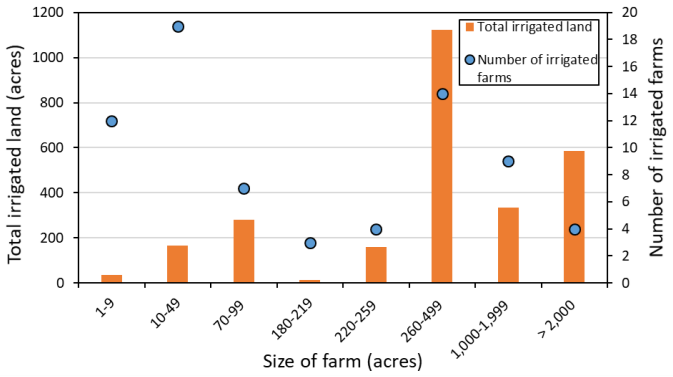

Figure 3. Total irrigated land and number of irrigated farms by farm size, Ferry County, 2017.

Table 1. Total and irrigated farmland acreage, Ferry County, 2017.

		% of Total Farmland
Total Farmland	788,660 acres*	-
Irrigated Farmland	2,831 acres	0.36%
Harvested Cropland	2,604 acres	0.33%
Pastureland and Other Land	227 acres	<0.01%

Source: USDA-NASS (2017b).
*Including USFS and tribal lands leased for grazing.

Crop Status

As of 2020, excluding 8,116.2 acres in pasture, the major crop in Ferry County was hay or silage at 6,121.7 acres. Total acreage of crops grown in Ferry County in 2020 is shown in Table 2.

Table 2. Crops grown Ferry County, 2020.

Crop	Acreage
Alfalfa Hay	1177.2
Alfalfa/Grass Hay	1166.2
Apple	25.3
Apricot	1.9
Barley Hay	375.8
Cherry	4.1
Grass Hay	2769.6
Green Manure	16.7
Hay/Silage, Unknown	26.8
Hemp	49.1
Marijuana	2.0
Market Crops	4.0
Nectarine/Peach	0.5
Oat Hay	118.5
Pasture	8116.2
Pear	9.9
Rye Hay	293.8
Triticale Hay	193.9
Wheat	422.5
Wheat Fallow	116.0
Wildlife Feed	10.5

Source: WSDA (2021).

Market Value of Crops

In 2017, Ferry County ranked 38th of 39 counties in the state in market value of total sold agricultural products at $3,914,000 (USDA-NASS 2017a), a 27% decrease from 2012. According to the Washington State Office of Financial Management (WA OFM), the agriculture, forestry, fishing, and hunting industries comprised less than 4% of total wages in covered employment in 2018 (WA OFM 2019). In terms of sales and production, one of the top crop categories in Ferry County in 2017 was fruits, tree nuts, and berries at $162,000. Other major categories included vegetables, melons, potatoes, and sweet potatoes at $94,000, and nursery, greenhouse, floriculture, and sod crops at $49,000.

Irrigation Systems

According to a U.S. Geological Survey report, in 2015 the total withdrawals for irrigated crops in Ferry County were 2.41 Mgal/d, of which 1.79 Mgal/d were surface freshwater and 0.62 Mgal/d were groundwater (Dieter et al. 2018). The total consumptive use of water for irrigated crops was estimated at 1.95 Mgal/d. Water consumption is the portion of the withdrawn water no longer available due to evaporation, transpiration, or uptake by plants. Zero reclaimed wastewater was reported for agricultural use in Ferry County in 2015. As of 2020, the most common sprinkler irrigation systems in the county were center pivot (Figure 4), followed by sprinkler and wheel line center pivot (Figure 5) (WSDA 2021). Figure 6 shows the total irrigated acreage for Ferry County in relation to a particular irrigation system.

Figure 4. Center pivot system. (Photo by A.Z. Mohamed.)

Figure 5. Wheel line, Ferry County. (Photo by K. Seymour.)

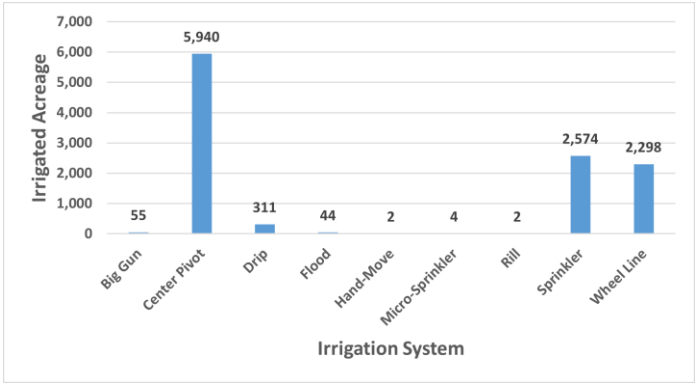

Figure 6. Irrigated acres by irrigation system type in Ferry County, 2020 (WSDA 2021).

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