Irrigation Case Study - Andy Jones, Intervale Community Farm
Summer 2017

Name:	**Intervale Community Farm**
Type:	Certified organic vegetable farm
Location:	Winooski floodplain, Burlington, VT
Size:	25 acres under cultivation in 2017

In business since 1990
Farm Manager: Andy Jones

Introduction

The Intervale Community Farm (ICF) is one of Vermont's oldest and largest community supported agriculture (CSA) farms. E the silty soils drain and reduce saturation, which can lead to root rot and other moisture-induced diseases. In these beds ICF plants cucurbits (e.g., cucumbers, squashes, pumpkins and melons) and vine crops with similar requirements that may be prone to moisture-related diseases.

Irrigation not only enables ICF to grow a greater variety of crops on its land, but also helps to increase the yields and quality of these crops. The direct economic value of irrigation may be difficult to measure since almost all of ICF's crops are sold as fixed price CSA shares at the start of the season, which spreads the risk of any future crop failure to members. However, it is likely that higher yielding and better quality crops lead to higher customer retention from year to year and the ability to add additional members.

This case study explores the benefits and costs of adding irrigation to ICF's production practices in order to reduce the risk of lower vegetable crop yields and quality.

Methods

Andy provided actual annual vegetable revenue and irrigation-related purchase records over the past 11 years. Additional costs were estimated such as operation and maintenance, pumping (primarily diesel fuel and related labor), For each year, depending on the “precipitation” classification, Andy provided a percentage of avoided crop loss (Table 1). This factor was applied to annual vegetable revenues to reflect the benefit side of the analysis. These percentage factors were based on Andy’s experience with variable weather at ICF throughout the growing months and ICF’s use of irrigation over the past 11 years. Over time, ICF has been experiencing hotter summers and longer dry periods with the existing soil moisture evaporating and the plants transpiring more. This has driven the need for irrigation to achieve annual production goals. The CSF Calculator accounts for historic climatological data including rainfall and modelled evapotranspiration and is based on location, soil type and crop type. Results from the calculator verified Andy’s experience with irrigation needs at ICF.

Table 1. Assumed vegetable yield loss due to irrigation according to average growing season precipitation.

Precipitation Classification	% avoided loss
Wet	5%
Average	15%
Avg/Dry	20%
Dry	25%

Based on the CSF Calculator outputs, itTf1 0 n TJETQEMQm0 g1b9>BDC 00912 0 612 792 reW*n/F2 12(se)4

2014	15	AVG
2015	16	AVG
2016	23	AVG/DRY

It's important to note that the number of irrigation days was estimated based on the practices of ICF in recent years and then correlated and calibrated with the water deficit outputs of the CSF Calculator over historic years in the analysis. The ICF Calculator does not recalculate any historic day-to-day change in water deficit due to water added irrigation. In other words, the days in each plant stress category would have been less if actual irrigation days were accounted for retrospectively in the ICF Calculator. Therefore the estimated irrigation days may result in overestimates during dry periods, this results in higher irrigation costs and thus lower net benefits in this case study.

For each irrigation day, operating costs were estimated based on Andy's direct experience with irrigating. Andy estimated that for each day he irrigated, he ran the tractor power take off driven pump for 6 hours, using 3 gallons of diesel per hour. Andy provided information on his investment in irrigation equipment including both old and new equipment purchased over the past 15 years, and he provided estimates of the labor required to install and manage the equipment through the season. Additional costs estimated included the equipment operation and maintenance expenses and waste disposal of plastic mulch and tubing. Although the irrigation equipment could be expected to last about 20 years, the equipment life was not amortized over a lifespan beyond 2016. This results in a more conservative estimate of net income than could otherwise be expected, i.e., the estimated net present value is based upon historical use of irrigation as opposed to total expected useful life of the irrigation equipment.

2013	$1,106	$153	$211	$172	$8	$543	$

Table 4. Intervale Community Farm Irrigation Partial Budget in 2016 dollars (average $/acre/year)

Increases in Net Income		Decreases in Net Income
Average Increase in Income		**Average Increase in Cost**
Item		

So what would be the break

Agricultural Production in an increasingly uncertain weather-future

In planning ahead for irrigation on farms, it's important to revisit how the Northeast climate has already changed and how it's projected to change in the future. Between 1958 and 2010, the Northeast experienced more than a 70% increase in the amount of rain falling in very heavy events (defined as the heaviest 1% of all daily events). Between 1895 and 2011, temperatures in the Northeast increased by almost 2