

# The Wine Grape Industry at Lake Chelan, Washington

**April 2002**

*A discussion of the  
agricultural traits, markets,  
business issues and  
strategies influencing the  
potential success of the  
viticulture and enology  
industry in the  
Lake Chelan Valley*

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*Unabridged Version  
April 2002*

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# EXECUTIVE SUMMARY

The emergence and expansion of a wine grape and winemaking industry in the Lake Chelan area is promising. Recent plantings, and investments in vineyards and winery planning suggest the industry's physical presence will soon be undeniable. Research conducted for this study suggests the area is currently capable of supporting the cultivation of approximately 200 acres of premium wine grapes<sup>1</sup>, and the profitable operation of five to nine small "boutique" wineries<sup>2</sup>.

The cultivation of premium wine grapes and production of premium wines provides the greatest opportunity for the emergent industry in the Lake Chelan area, based on a review of market conditions, economics, statewide industry positioning, and the limited availability and high value of most land within the Lake Chelan Area. Premium wines are a growth sector in the wine market, generate the highest profit per bottle, and are the preferred niche for small wineries.

Wineries enjoy the greatest profit margins from direct-to-consumer sales of wine from their tasting rooms; a venue that appears to be particularly well suited to the ambience of Lake Chelan and the volume and type of visitors attracted to the area. Small wineries can be very profitable when they provide a unique tasting room experience centered on a quality wine product. Wineries can begin production immediately with imported grapes, then phase in the utilization of local grapes as they mature, eventually promoting the region's unique grape-growing attributes or *terroir*.

The wine grape industry requires long-term investment in crops that take years to mature and perfect, and wineries that require significant start-up capital. Wine grape production provides an opportunity for diversification of the existing agricultural economy in the Chelan area. Wineries will provide a new type of year-round attraction for visitors, expanding the tourism sector of the Lake Chelan economy. The anticipated, collective economic impacts of the forecasted wineries on the local community warrant supportive involvement from local government, public agencies, and business development organizations.

Based on research focused on the Lake Chelan environment, potential wine grape market, premium wine market, financial analyses, and other factors, the following key findings are presented:

- 1. It is feasible to grow wine grapes in the Lake Chelan Valley.** Climate data indicates the base line weather station at Chelan is classified as Region II according to the California grape classification method (2,500 to 3000 annual degree days). Climate risks are generally associated with the potential for severe cold weather damage to plants, especially at sites in higher elevations. Year 2001 annual accumulation of 2,900 degree days was slightly above the forty year average of 2,687 degree days. Therefore, vineyard location is very important.

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<sup>1</sup> See Appendix A, page 9

<sup>2</sup> See Section III, "Production and Market Forecast"

- 2. State-wide annual production of wine grapes will continue to increase through at least 2005.** Of the 24,000 acres of wine grapes planted in Washington by 1999 just 70 percent or 17,000 acres were of bearing age. The remaining 7,000 acres, plus an additional 5,000 acres that were planted during 2000 and 2001, will be reaching maturity and increasing crop yield each year until 2005. The competition for market share in Washington will continue to grow.
- 3. Quality of wine grapes is a major factor in determining price.** In general, wineries in Washington State are seeking grapes with quality sufficient to produce premium, super premium and deluxe wines. To obtain the desired quality wineries are increasing their participation in the operations of vineyards and will generally specify viticultural practices and require quality assurances. A successful grower must consistently deliver a product that meets or exceeds the quality desired by the winery.
- 4. Establishing a vineyard will cost approximately \$15,000 per acre and \$3,000 to \$4,000 per acre per year to operate.** Vineyard establishment costs are spread over four years, the time required to plant and maintain the vines until plant maturity. Operating costs to produce wine grapes are about \$2,000 per acre plus overhead, financing, land and equipment, profit, management fees, and other fixed costs. Good financial management is critical to a successful operation.
- 5. Conversion of land from orchards to vineyards will be strongly influenced by economic factors.** Growers should consider planting wine grapes if the return on the new investment is likely to exceed their present returns from tree fruits. Availability of financing to establish a vineyard is an important constraint. Obtaining financing will be easier for those growers who have contracts with wineries for the crop. A successful farm conversion from tree fruit orchard to vineyard will require growers to invest in education and training.
- 6. Successful early crop marketing may be difficult for Lake Chelan grower.** Without an actual crop to sell, initial marketing efforts will rely on selling the potential of a specific site to produce the desired varieties with the required quality. When vineyards that have already been planted reach maturity, and Lake Chelan wine products are produced with those grapes, the region's potential will be "proven".
- 7. Small wineries have the greatest potential for profitability and sustainability in the Lake Chelan area.** In general, wineries producing from 2,000 – 10,000 cases annually are more profitable than larger wineries, in spite of their higher per unit cost of production. Wineries producing approximately 5,000 cases per year appear to yield the best returns, shortest equity payback period, and quickest debt recovery period.
- 8. The wine industry at Lake Chelan will begin with the construction of at least two wineries by 2003 and total five by 2006.** A small number of entrepreneurs are now financially invested and actively engaged in developing vineyards at Lake Chelan. Lake Chelan Winery plans to produce its first bottling from locally grown grapes in 2002. Another winery is in the final stages of design and permitting for a south shore

location along Hwy 97A. Several other groups are in various stages of planning and development, and three additional parties are considering entry into a winery business. Assuming the first couple of wineries are successfully launched and perform profitably, they will likely provide a catalyst for investments from entrepreneurs who are presently “waiting in the wings.”

- 9. A regional reputation for quality wines will be critical to profitability of all local wineries.** Wine sales data and financial analysis shows that higher quality wines account for a majority of sales revenue and profits of small wineries. Quality wines will generate customer satisfaction and repeat customers. “Word of mouth” recommendations from satisfied customers will encourage others to visit Lake Chelan wineries.
- 10. A high percentage of sales through tasting rooms will be key to initial sales and long-term profitability. Visitor demand is estimated to be adequate for supporting sales in as many as nine tasting rooms.** Along with quality wine and strong pricing, a key to achieving the highest profitability among Lake Chelan area wineries will be their ability to maximize the percentage of direct sales to consumers. Wineries sell directly to consumers through their tasting rooms; increasing tasting room sales significantly increases the bottom line. A growth in the number of “serious wine consumers” visiting the Lake Chelan area will directly impact the percentage of sales through local tasting rooms. The rate of this growth, although subject to many external factors, can be directly influenced by effective marketing strategies.
- 11. An active local wine industry organization and a supportive public sector can facilitate the start-up and long-term success for a Lake Chelan wine grape industry.** The Lake Chelan (Wine) Grape Growers Association has a leadership role in the development and long-term success of the local wine industry. The organization has (and will continue to) provide: forums for growers and vintners to communicate with each other; educational workshops and information specific to the region; opportunities for sharing equipment; cooperative-marketing programs to promote local wines and wine tourism; and a single-point-of-contact for related business organizations and policy makers, elected officials, educational institutions, and other wine industry associations (e.g., Washington Association of Wine Grape Growers). The public sector (e.g., Chelan Chamber of Commerce, Chelan County Port District, Wenatchee Valley College, WSU and Cooperative Extension, etc.) may support private industry initiatives through a variety of means, including: education and training; participation in special events and marketing; research; strategic planning; and business incubation services.

# I. GRAPE/WINE INDUSTRY OVERVIEW

The wine grape industry is vertically integrated; vineyards (growers) provide the raw material and wineries produce the value-added product. Typically, wine is sold directly to consumers through winery tasting rooms, and also sold through a distribution network to retailers. Wine grape growers have two basic choices: either market their produce by contracting directly to a winery, or establishing a winery themselves to utilize their grapes. Although many wineries raise some of their own grapes, they also diversify their supply chain by purchasing additional grapes. Diversification helps to spread risk of crop losses or to fulfill needs for varieties that the winery needs to obtain in additional volume, or for unique qualities. There is a limited spot market for excess grapes if they are of good quality, and in a niche where wineries are short of required supply.

## Wine Market Conditions

Conditions of the global wine grape industry will affect the Lake Chelan markets through competitiveness and increasing the complexity of wine marketing. Growers face increased competition as wineries have more vineyards from which to obtain a supply that meets their specific needs. Consumers have more choices in regional and imported wine products available at competitive prices.

During 2000, a strong U.S. dollar relative to European currencies contributed to an increase in imported wines. Importation of Italian wines increased by 23 percent, French wine imports increased by 12 percent, Australian wine imports were up by 40 percent and Chilean wine sale increased 17 percent. Concurrently, the export of wines (mostly from California) declined (cawg.org, 2000).

Another factor in global competition is that other countries have increased or are replanting vineyards to more popular varieties. European countries are expected to increase production of high quality premium wine grapes by 15 percent. This is a significant amount when considering that Europe produces about two-thirds of the world's wine. These upgraded vineyards should start reaching maturity in 2003 (Economist, 1999).

In 2002, California, which produces 90 percent of all U.S. wines, experienced a decrease in wine sales. While still reaching record sales of \$6.5 billion, table wine sales increased by only 2.9 percent, the slowest in over ten years. Causes for the change in sale were attributed to the weaker U.S. economy, not only from job cuts but from reduced spending on business entertainment and increased sales of imported wines. Imported wines now hold a 23 percent share of U.S. markets (Appel, 2002).

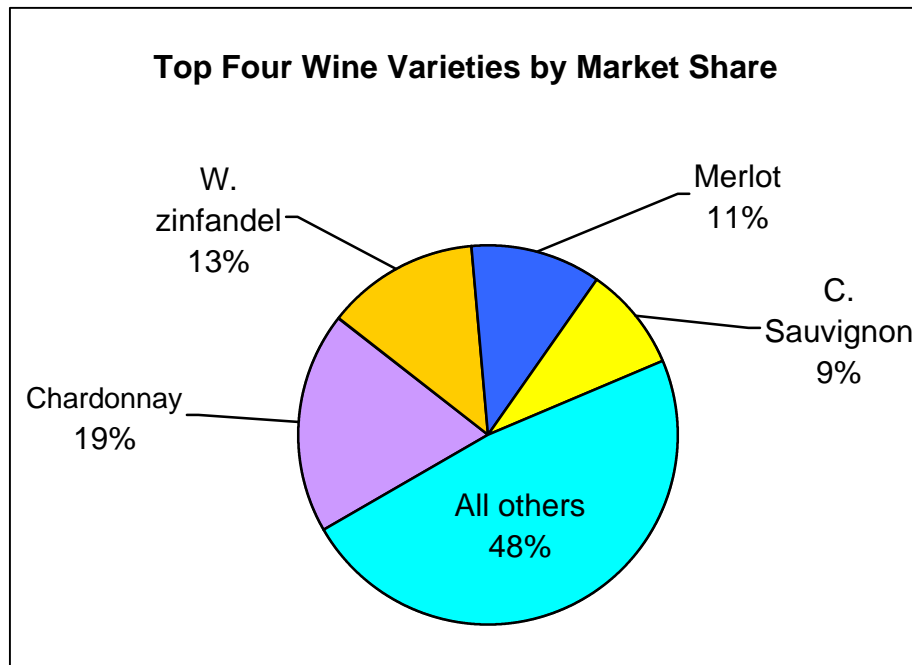
Competition from other beverages is also increasing. Flavored malt coolers (with the introduction of ready to drink products from Smirnoff, Bacardi, Skyy, Stolichnaya and Sauza) are targeted at 20 and 30 year old women, traditionally wine drinkers, and pushed by huge advertising budgets.

Recent reports by the Wine Market Council suggest that growth of the United States wine industry during the 90's is attributed to a strong economy with associated increases in disposable income and to recent increases in advertising expenditures by the major brands. By comparison to other beverage industries (beer, soda pop, and designer water) the wine industry has not invested in creating market awareness of its products.

Markets for wine products are segmented by price and the quality reputation earned by winning tasting awards and the image as projected by a winery's marketing strategy. Price generally provides an indicator of quality where image differentiates one winery's products from their competitor's. Starting at the low product price range, wines are classified as "economy," "sub-premium," "premium," "super-premium" or "deluxe" and finally "ultra-premium". Wine grapes grown for the highest quality wines are most often in high demand and receive prices well above average.

In terms of product preference four varietals wines account for 52% of all wine sold in the United States, Figure 1. These are Chardonnay presently leading with 19% market share, White Zinfandel (13%), Merlot (11%) and Cabernet Sauvignon (9%). While consumers continue to prefer white wines, the red varieties are increasing in consumer appeal and demand for blush wines have decreased.

**Figure 1**  
A C Nielsen/Adams supermarket scanning data, 2001 at wineinstitute.org.

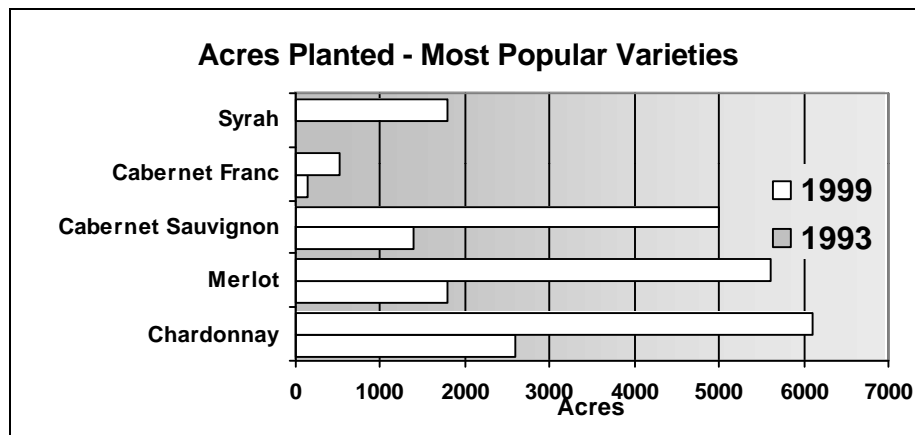


## Regional Competitive Forces

As of 2001 there are 29,000 acres of wine vineyards in the State of Washington, a record 100,000 tons of wine grapes were utilized, a 9% increase over the 2000 harvest (Washington State Agricultural Statistics Service, 2001 harvest results). About 20% of the total acreage has not yet reached bearing age and harvest levels can be expected to increase until these vineyards reach maturity.

During the 90's strong prices for wine grapes resulted in more than doubling of the acreages of vineyards in Washington State from 11,000 acres to an estimated 24,000 acres in 1999 and increasing to 29,000 acres by 2001. During the 90's the total acres of white wine grapes increased by 80 percent and red wine grapes increased by 338 percent. Leading varieties planted are Chardonnay, Merlot Cabernet Franc and Cabernet Sauvignon Figure 2. While these increases are in response to demands for wine grapes it will be important to avoid over planting which could result in depressed prices.

**Figure 2 1999 Washington Wine Grape Acreage Survey**  
Washington Agricultural Statistics Service



Competition can also result in new opportunities. Reputation for quality in Washington wines has attracted the attention of several large national corporate wineries. Canandaigua and Vencor the second and fourth largest wine producers in the United States have purchased wineries in Washington and are marketing these wine labels on a National level as premium products. This national marketing should lead to increased recognition of Washington as a wine growing region, increase sales of Washington wines and therefore increase the need for wines and grapes.

Lake Chelan wine products will be in competition for market share with all other wines available. Hence the consumer has the power to purchase based on quality, price, brand familiarity, reputation, past experience, and novelty. Because most wine in the U.S. is sold in grocery stores, it is reasonable to assume that competition in the Lake Chelan market for

local residential customers will include imported wines, California wines and other Washington Wines. This competitive factor may be somewhat offset if a significant number of local residents adopt a “buy local” preference, and or choose to purchase their wine directly from the local wineries.

## **Industry Advertising**

Growth in the sales and consumption of wine since 1994 has been encouraging. However, year 2000 sales of 565 million gallons have not matched the high point 587 million gallons seen in 1986. A recent Wine Marketing Council report indicates that consumption decreases in the late 1980’s occurred during a period of rising per capita disposable income. Decreases in consumption were preceded by reduction in advertising which peaked at \$115 million in 1980 (a rate of 76 cents per case) and dropped to a low of \$23 million in 1994 (a rate of just 15 cents per case). Advertising expenditures began to rise again in 1995, and has grown to \$87 million by 1999.

## **Grape Production and Wine Sales Trends**

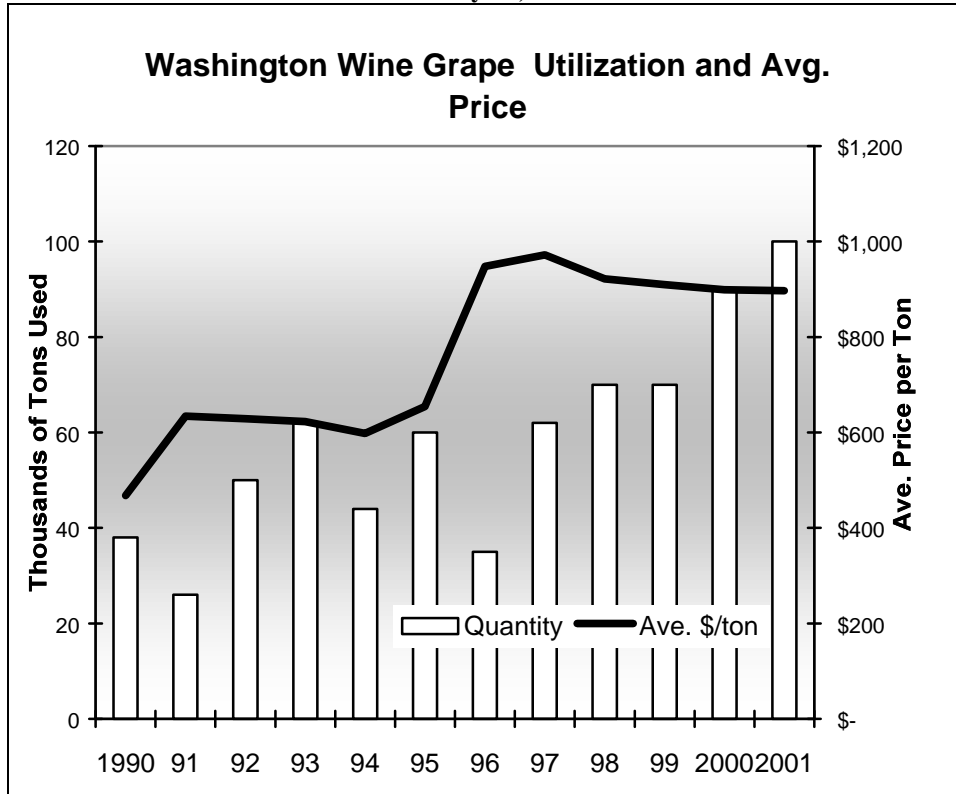
### ***Wine Grape Production***

Production of wine grapes will continue to increase in Washington State as existing acreage continues to mature. A 1999 crop survey indicated only 70 percent of wine grape acreage was of bearing age. Given the four to five years required for a vineyard to reach maturity, it will be 2003 before all of the (1999) acreage is in full production. Additionally another 5,000 acres of vineyards were planted in 2000 and 2001. These will mature in 2004 and 2005. As demonstrated by Figure 3 the volume of wine grapes utilized has increased over the last six years, while average price has slowly decreased. The 1996 jump in prices resulted in a shortage of wine grapes after winter freezing temperatures damaged many vines.

Prices reflect the balance between supply and demand. High prices occurred in those years where demand exceeded supply. Prices drop as grape production continues to increase without a corresponding increase in wine sales. In order to remain competitive as supply starts to exceed demand, growers will need to work with wineries to select varieties, quantities and qualities that will have a commercial value five or more years in the future.

In addition to market demands, another limiting factor to sales of wine grapes is the capacity of wineries to hold and process grapes. Crop production may be greater than the volume utilized to make wine. This constraint can influence a winery’s buying decisions. With limited storage capacity a winery may be more selective as to which grapes it purchases, particularly in a year where harvest volume exceeds storage capacity.

**Figure 3. Washington State Agriculture Statistics Grape Report  
January 23, 2001**

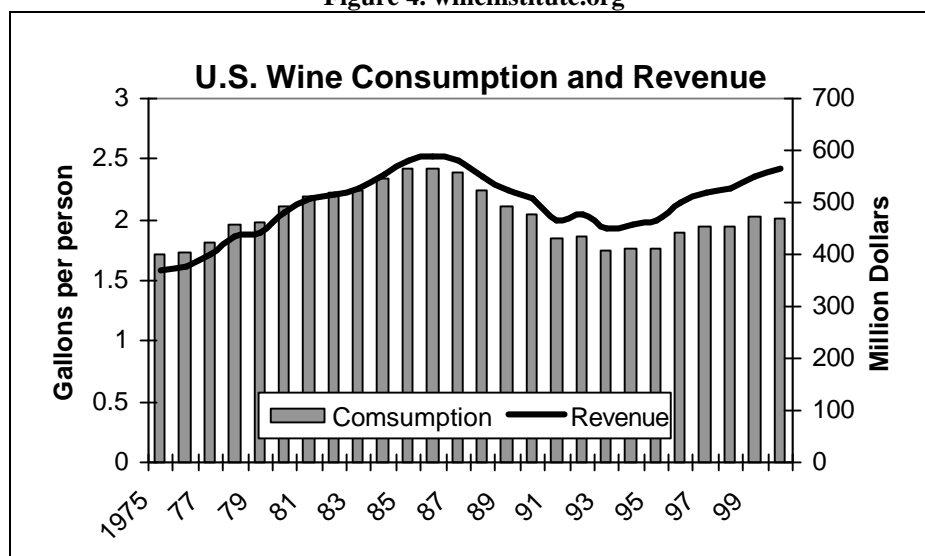


**Wine Sales**

According to the California Wine Institute the total U.S. wine sales of domestic and imported wines have increased from 368 million gallons in 1975 to 565 million gallons in 2000, Figure 4. Individual wine consumption during that same period increased from 1.71 gallons per person in 1975 to a high of 2.58 gallons per person in 1982 but then dropped to 2.01 gallons in 2000.

Analysis of California wine sales during 1999 indicated that premium wines held 23% of the market share but resulted in 52% of the total revenue. Super premium wines held a 16% market share with 27% of the revenue, and deluxe wines just a 7% market share with 25% of the revenue. Wines in the sub-premium and economy classes held 77% of the market share but only 48% of the total revenue. (Wine institute, 1999) A recent analysis indicates that consumer preferences may be shifting as sales of sub-premium and economy wines, priced below \$8, are down by 3 percent while wines premium priced wines \$8 to \$15 have increased by almost 13 percent (Moran, 2002).

Figure 4. wineinstitute.org

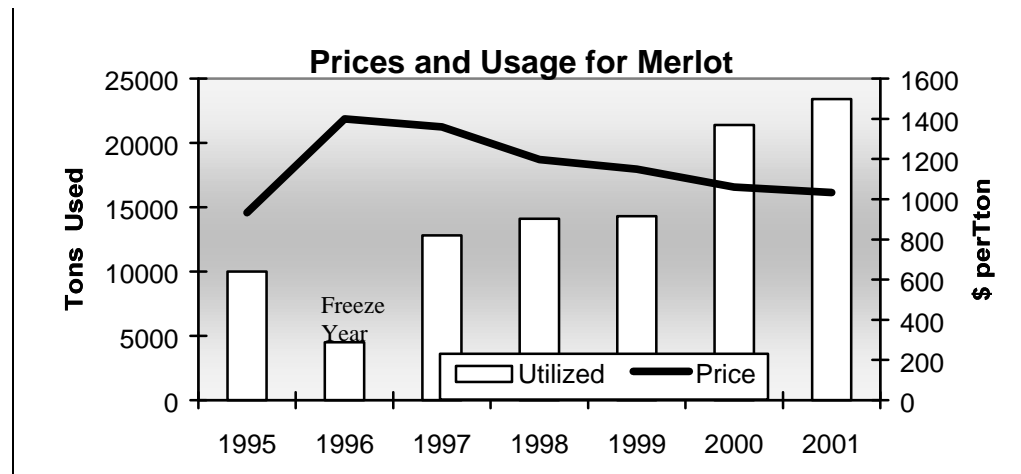
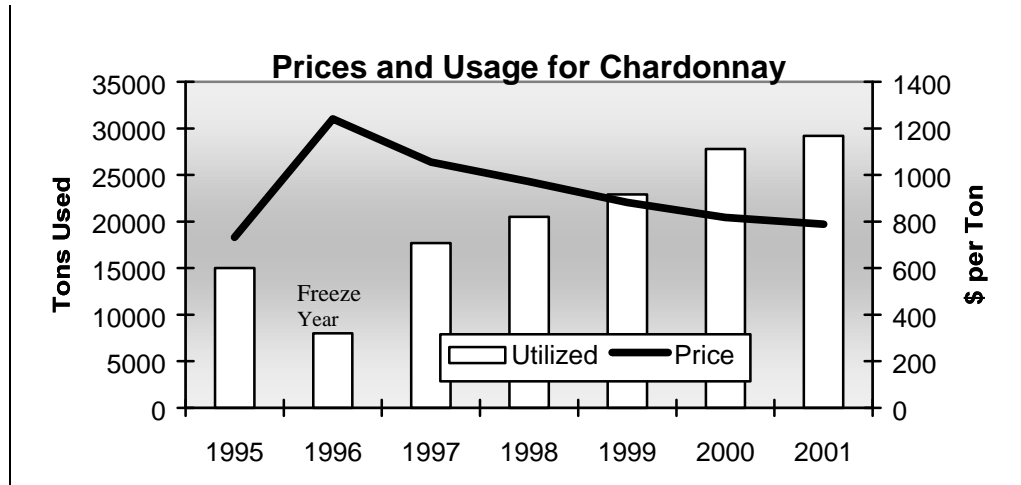


In considering product mix, Lake Chelan winery managers should understand that while low-priced economy wines may account for 62 percent of all sales these products only represents 32 percent of the industry’s revenue. Premium wines, super-premium, and ultra-premium wines represent a smaller 37 percent of wine sales, but generate 67 percent of the industry’s revenue. This reinforces the concept that quality is more profitable than quantity.

Prior to 2001, sales of Washington wines were growing at a rate of 12% per year (Washington Wine Commission). During 2001 table wine sales continued to increase, but at a much lower rate of less than 3%. In comparison to sales of other beverages, wine products appear to be much more sensitive to economic conditions. One reason for this economic sensitivity is a result of the lower demand in the travel and entertainment markets for ultra and luxury priced wines, which may be closely linked to reduced business spending on travel and entertainment (Franson, 2001, Appel 2002).

Sales of wine grapes are also influenced by the quantity of supply. Figures 5A and 5B demonstrate how the prices for Chardonnay and Merlot grapes have responded to increased production since 1995. A severe freeze in 1996 resulted in significant crop loss and a shortage in supply that resulted in a rapid increase in prices. Since 1996 average prices paid for wine grapes has become lower while production increases. Figures 5 A & B show how average prices paid for Chardonnay and Merlot wine grapes have decreased from 1997 to 2001 while tones of wine grapes utilized has increased. Average prices paid in 2001 are now near the values paid in 1995.

**Figure 5**  
**Washington Agriculture Statistics Service Grape Reports**



### Regulatory Issues

A variety of federal, state and local regulations affect the wine industry. Regulations include taxes, bottling and labeling rules, sales restrictions, and zoning that restricts land use.

**Federal Bureau of Alcohol, Tobacco and Firearms (BATF)** Requires a license for all manufacturers of alcoholic beverages and regulates labeling of bottles. BATF regulations recognize a "viticultural area" as one of several kinds of appellations of origin for U.S. and imported wines. Appellations of origin are used on wine labels to denote the geographic origin

of the grapes used to produce the wine. BATF regulation authorizes several ways to denote this geographic information. Table 1 lists designations and their respective requirements that are relevant to growers and winemakers in the Lake Chelan area.

**Table 1. Federal Labeling Regulations**

<b>To use the Appellation Name</b>	<b>BATF Requires the following:</b>
To label with the name Chelan County “County Designation”	At least 75% of the grapes used to produce the wine must be from the labeled county. NOTE: "Napa County" is a county designation. "Napa Valley" is a viticultural area,
To label with Lake Chelan Valley “Viticultural Area Designation”	At least 85% of the grapes used to produce the wine must be from within the confines of the viticultural area stated on the label
Washington State “State Designation”	At least 75 percent of the grapes used to produce the wine must be grown in the state indicated on the label.
Estate Bottled	The winery must be located in, and gets all of its grapes to produce a particular wine from, a common viticultural area and from vineyards that it owns or controls,
Proprietor Grown or Vintner Grown	May be used when the winery and its vineyards are nor all in the same viticultural area.

**Washington State Regulations** are administered by the Liquor Control Board, Department of Revenue, Department of Labor and Industries, and Wine Commission. Many other state regulations for environmental protection, water rights, fish and wildlife, chemical applications will be similar to those presently affecting existing agricultural practices.

- The Washington State Liquor Control Board requires domestic wineries, wine growers, and wine distillers to apply for and purchase licenses and permits to operate.
- Washington State assesses taxes on sales of alcoholic beverages. There are a number of regulations affecting the sales of alcoholic beverages.
- Washington Wine Commission collects an annual assessment of \$6 per ton on vineyards and \$0.04 per gallon on wineries. This assessment is used by the Commission to achieve its mission and goals for promoting the Washington Wine Industry.

### **County and City Regulations**

Many good vineyard and winery sites are located along the north shore of Lake Chelan. Much of this area is also located within the City of Chelan urban growth boundary. Urban growth

areas tend to be residential or are intended to become residential. Additionally some higher density commercial uses are allowed. It is highly probable that, over time, any vineyards located within the urban growth boundary will need to contend with an increase in non-agricultural land uses in their neighborhood. Additionally, land will become more valuable for residential development than for agricultural uses.

Wineries will also need to address land use issues if they are to locate in settings outside of commercially zoned areas of the City or County. While a winery is an agricultural based activity, it is also a commercial activity and may, depending on zoning, need to obtain land use permit approvals. A winery will be attracting customers and therefore traffic. Additional traffic on rural or residential roads is often perceived by neighbors as a negative impact on their lives and property - resulting in controversy about land use decisions and possible delays in permit approvals.

Chelan County has proactively reviewed and adjusted its development codes to facilitate economic revitalization via agricultural tourism, direct marketing of farm produce, wineries, and other emergent economic activities. The code amendments, consistent with the county's Comprehensive Plan and compliant with the Growth Management Act, were adopted in January 2002. The amendments allow for the establishment of wineries as permitted uses, outright, in some zones; and require conditional use permits in other zoning districts. The net effect of these codes is that winery developers have clear guidelines and processes that will allow them to evaluate the legal parameters of a project on a given site in a timely manner, and to begin the permitting process if required.

## II. WINE GRAPE PRODUCTION AT LAKE CHELAN

It is estimated that by the end of 2002 there will be about 60 acres of wine grapes, many of which are in the immature stage of production.<sup>3</sup> It is further estimated these acres will mature by 2006 and yield 240 to 270 tons of wine grapes if not affected by severe winter conditions. The dominant varieties planted are Riesling and Merlot.

At present, a local winery market for Lake Chelan grape production is limited. However, a cursory survey of members of the Lake Chelan Grape Growers Association in 2001 indicates that at least five entities are in various stages of developing small wineries with a production range of 2,000 to 10,000 cases annually. Until wine grapes and wine is commercially produced in the Lake Chelan Area, there can be no assessment of the “terroir” of the area. At present there is no local commercial wine available for quality testing. However, some Lake Chelan vineyards should have fruit suitable for wine production and quality testing with the 2002 crop.

The following assessment of the conditions for producing quality wine grapes in the Lake Chelan area shows no major site limitations to growing *vinifera* (wine grapes), other than periodic winter damage. It should be noted, however, that a more formidable limitation to future production may be the \$15,000 per acre estimated cost to establish a vineyard. This expense will be incurred over the four to five year start-up period when there will be immature production and minimal ability to generate revenue from crop sales.

### Physical Assets

Initial efforts to secure a contract from a winery will be assisted by selling the vineyard site’s potential. Each proposed vineyard site has unique assets in the form of its combination of soil, slope, elevation, microclimate, solar aspect, slope, water/irrigation and other micro site attributes (collectively referred to as “terroir”). A grower will need to discuss the site specific qualities with potential customers (winemakers). They will evaluate the site, looking for a combination of elements that suggest a “terroir” capable of producing a quality wine.

### Climate

Eastern Washington’s Columbia Basin has proven itself as one of the premier grape growing areas in the world. Can the lands of the Lake Chelan area in the higher latitudes of north central Washington be a part of this success? To answer this question, one must address the fact that

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<sup>3</sup> Several local growers estimate that as many as 100 acres of wine grapes will be planted by the end of the year (2002)

experience shows the limiting factor for producing a consistent high-quality grape crop in Washington is cold injury.

Many cultural and/or agronomic practices take this cold injury limitation into consideration. The following discussion is focused on the basic commercial viticulture practices employed in eastern Washington, with special attention applied to avoiding cold injury for an emerging grape growing industry in the Lake Chelan Area. Other cultural and/or agronomic practices that are key to grape production in the Lake Chelan Area are also discussed.

Generally, grapes grow best between the 35<sup>th</sup> and 50<sup>th</sup> latitudes in the northern hemisphere; the Lake Chelan Area is located at approximately 48<sup>o</sup> north latitude. Within these latitudes the common factor for quality wine grape growing sites is the availability of moderate and uniform amounts of water, at least during the maturation period of the grapes. For the Lake Chelan Area, water control through irrigation is very important to meet this requirement. In the case of the northern latitudes (above 50 degrees north) the colder climate prevents grapes from assimilating sufficient sugar for full ripeness, leading to tart, over-acid wines.

A specific site's "effective latitude", however, may be modified by the slope of the land, providing the opportunity to grow a range of varieties with different climatic requirements all within the same region. For example, lands on a gentle south slope may have an "effective latitude" several degrees lower and warmer than a level surface and grape plants with higher heat requirements will respond accordingly.

From a wine grape growing perspective, the best wines are produced from grapes that just achieve maturity in a given site; a long, slow even ripening of the grapes imparts the maximum flavor, balance and concentration to the resultant wine.

In eastern Washington, there are three primary criteria applied to determine the suitability of climate for grape production (Watson 1999). The first criterion is the length of growing season. Within the 45<sup>o</sup> to 48<sup>o</sup> latitude region of Washington, midseason ripening grapes require 130 to 170 days to mature. The average growing season in the Lake Chelan basin below 1,500 feet elevation is about 200 days. Additional time is required after harvest for vines to achieve dormancy. If a killing frost should occur in the spring, fruit buds could be lost and the crop production may be significantly reduced. Frost occurring in the fall before vines go dormant curtails photosynthesis and the natural dormancy process, making vines more susceptible to winter injury.

The second criterion is the accumulation of heat throughout the growing season. This heat summation, expressed as degree-days (heat units), is measured by taking the average of the maximum and minimum daily temperature in degrees Fahrenheit and subtracting 50 degrees. Daily heat units are added throughout the growing season to obtain a total for the year. Total heat units should be in excess of 1,700 to allow grapes to ripen (Winkler 1974). If accumulated heat units exceed 3,500 grapes tend to be low in acid and quality can suffer.

Weather data was collected for several sites in the Lake Chelan area by Wilbur-Ellis Co. using technology that performed continuous temperature recordings, allowing calculations of growing degree days every fifteen minutes when temperatures were above 50 °F, between March 1 and

October 31. It is shown in Table 2 that degree day calculations for each site using this ‘Adcon’ method were greater than was calculated using the average daily temperature method. Thus, to avoid errors when comparing degree day data it will be important to ensure that all the data was calculated using the same method.

**Table 2. Comparison of Heat Unit Calculations**  
(Source: Wilbur-Ellis, Adcon and NWS; all data is for year 2001).

<b>Comparison of Heat Units (Degree Days) calculation Methods</b>				
Weather Station	Elevation above sea level	Adcon Method	Average Daily Temperature Method	Variance
2885 - Col. River	685 ft.	3,058	2,719	339
2971 – Chelan View	1,342 ft.	2,622	2,279	343
2978 – Howard Flat	1,234 ft.	2,916	2,553	363
3248 – Manson	1,178 ft.	3,040	2,717	323
4328 – Bear Mt.	1,367 ft.	2,956	2,717	239
9947 – Apple Eye	1,599 ft.	2,676	2,402	274
Chelan NWS	1,110 ft.	ND	2,908	

National Weather Service (NWS) data recorded between 1948 and 2001 shows mean heat units of 2,677 with a range between 1,918 and 3,343 for the Lake Chelan area. Almost one-half of the accumulated annual heat units were between 2,529 and 2,825. This indicates the Chelan NWS weather station would be classified as a region II by the California grape classification method. Table 1 also demonstrates how the seven sites monitored compared to each other with Chelan appearing to be the warmest location. Comparative data was only available for the 2001 growing season.

Although an average heat accumulation requirement is discussed here, there is a relative difference in heat unit requirements among wine grape varieties as shown in Table 3. Matching the proper variety with the site specific growing conditions will have an effect on the ability to produce a high quality wine grape in sufficient volume to be profitable.

**Table 3.**  
**Relative Heat Unit Requirements of Grapes**  
**Grown in Eastern Washington (Wolfe 1999).**

<b>HEAT UNIT REQUIREMENTS</b>		
Low	Moderate	High
Riesling	Chardonnay	Cabernet Sauvignon
Gewurztraminer	Lemberger	Cabernet Franc
Pinot Noir	Syrah	Sauvignon Blanc
Pinot Gris	Merlot	Sangiovese
Pinot Blanc		Chenin Blanc

The third criterion is severely cold winter temperatures. Well-hardened grape vines can usually withstand temperatures around 0° F without injury. At temperatures below –10° F, bud and wood loss can be expected. Should warm temperatures occur just before a severe cold period, vines are de-hardened by the warmer weather and become more vulnerable to cold injury. One of the more severe wood losses, particularly on the southwest side of trunks, occurs when direct

or snow-reflected sunlight warms grape trunks during cold spells. When the sun sets, temperatures drop rapidly, and trunk tissue becomes very susceptible to cold damage.

Although Lake Chelan provides moderation, it is not unusual for winter cold snaps to drop below 0° F for a few days each winter and occasionally below –10°F. The coldest weather occurs with outbreaks of cold arctic air. Thus, grape wood loss can be expected in the Lake Chelan area some years. Although the minimum temperatures may vary in the Lake Chelan region it should also be kept in mind that there is a relative cold hardiness among varieties as shown in Table 4.

**Table 4. Relative Cold Hardiness of Grapes Grown in Eastern Washington (Wolfe 1999).**

<b>RELATIVE COLD HARDINESS</b>		
Low	Moderate	High
Merlot	Sauvignon Blanc	Riesling
Sangiovese	Lemberger	Chardonnay
Sermillon	Cabernet Sauvignon	Gewurztraminer
Syrah	Cabernet Franc	Pinot Noir
Viognier		Pinot Gris
		Pinot Blanc

Although the Lake Chelan area’s climate can result in cold injury to vines, it provides favorable conditions to potentially grow high quality grapes. Warm sunny days and cool nights characterize the growing season and provide an excellent balance to grape sugar and acid. The local arid conditions reduce disease problems associated with high rainfall and high humidity. Finally, because of the northerly latitude of the Lake Chelan area, summer days are relatively long, compensating for area’s growing season (shorter than experienced in lower latitudes) and heat units (generally lower than experienced in more southern latitudes). It is important to note, however, that micro climates have been shown to vary greatly, and collecting site-specific degree days data is necessary to select the proper variety of wine grape and the proper viticulture practices.

### **Soils**

Grapes can be grown successfully under many soil conditions, as demonstrated by the variety of sites producing grapes in the Pacific Northwest (Stevens 1999). Soil conditions, however, may play an important role in determining the cost of establishing and maintaining a successful vineyard. The “ideal” soil for a vineyard has been described as being a deep, well-drained soil of medium or medium to light texture with no layers that restrict the movements of water or root growth. Wine grapes, with proper management, can be grown in soils that significantly deviate from this “ideal” soil. (Klock, 2002)

As more emphasis is placed on the quality of grapes produced, the uniformity of the vineyard becomes even more important than when just the volume of production is the basis for measuring success. The soil properties and topography will play an important role in how uniform the production and quality is across a vineyard. Factors such as soil texture and depth

will influence soil moisture levels, thus affecting how the crop matures and its cold hardiness in different areas. Viticulturists recognize that the variation in soil properties must be known and understood to maximize the quality and quantity of grapes grown on a given landscape. This is particularly true in the Lake Chelan area

The most prevalent and capable soils for growing grapes in the Lake Chelan area is the Chelan series, namely the Chelan gravelly sand loams on 0 to 45 percent slopes. The Chelan series consists of well-drained, moderately coarse textured soils that formed in pumice, volcanic ash, and loess over non-sorted, gravelly, cobbly, or bouldery deposits of ablation glacial till (Soil Survey of Chelan Area, Washington, u.d.). These soils range in elevation from 1,200 to 1,800 feet; the upper elevations are likely inhospitable for grape growing because of cold winter conditions. The average annual precipitation is 10 to 15 inches, average annual air temperature is about 50° F, and the frost-free season is 180-200 days. Chelan soils are currently used for orchards, pasture, range, wildlife habitat and small grain.

Other soils series besides the Chelan series could support grape production in the Chelan area. Total gross acreage for these soils in the Lake Chelan grape growing area is about 3,500 acres. Urban and other land uses appears to have, or soon will, take about 1,500 acres out of production, thereby leaving about 2,000 acres of production land over the next ten years. Based on information from a recent survey of land use by farmers in the Lake Chelan area, it is unlikely that more than 10 percent or 200 acres might go into grape production in the next ten years. Most *vinifera* production would be expected along the southern slopes of the north shore of Lake Chelan. This estimate is based on year 2001 agricultural economic conditions, particularly in the tree fruit industry, and may vary considerably in the future.

## **Marketing Wine Grapes**

Growing wine grapes is a custom production operation. The harvest must satisfy the wine maker's demands if the grower is to achieve the desired crop prices. A business/marketing plan should identify the market segment in which the grower intends to compete and indicate the ability of the grower to work with the wine maker. The grower needs to understand all factors that bear upon a winery's demands for variety and quality (e.g., market forces that will influence trends in wine sales, varieties of wine sold, and prices received for wine).

The largest market segment for Washington wine grapes are makers of premium wines. Although higher quality wines represent a smaller market share of the total wine market, they generate the greatest profit per bottle. Wineries in the super and deluxe quality segments will require fewer grapes, but will pay higher prices for those grapes; they will demand the highest possible quality and they will be active participants in the vineyard operation.

To become successful growers will need to focus on one core strategy: To produce the highest quality wine grapes possible. To implement this strategy the vineyard will need to vertically align production with Lake Chelan boutique wineries, and to vertically integrate with wineries

outside of the Lake Chelan area to diversify the risk and obtain capital and expertise from additional sources.

Alignment with a winery that intends to produce a top quality, award winning product will increase the reputation of the vineyard whose grapes made that wine. The old adage 'the proof is in the pudding' applies to the wine industry as top prices are paid for those grapes that produce the best wines. Recognition of quality through reviews, competitions and customer choice can be a useful marketing tool.

## **Customer Targets**

Vineyards have a limited number of customers to target. Many of the wineries in Washington produce at least part of the grape supply they need. Initially the most likely target customers will be wineries in the Lake Chelan Valley. Chelan growers will need to seek out other wineries that need new suppliers or are intending to expand product line. Finding these customers could be a considerable task. Suggestions for narrowing the search include networking with winemakers at Washington Wine Grape Growers Association meetings, or other associations and the use of internet to learn about a winery, its wine maker and products. Another strategy is to target wineries in Western Washington where growing conditions limit the production of quality grapes. (During 2001 Eastern Washington vineyards produced record harvests yet Puget Sound area vineyards had crops that did not receive sufficient degree days to fully ripen.)

In Washington State there are now over 170 wineries (potential customers), most of which are independently owned and operated. When entering into a contract it is important for the grower to understand the winery's needs and intentions. Will the winery need grapes only until their own grapes mature, to diversify their risk of weather related damage, to obtain a variety that they may not be able to grow with the desired quality or to obtain a long term secure supplier of quality wine grapes? Moreover, will the winery be producing premium, deluxe or super premium wines and how will that decision influence the quality and price of wine grapes?

As wineries seek a higher quality of wine grapes, they also seek a greater level of control over the crop, dictating viticultural practices and closely monitoring aspects of grape maturity. Growers will need to please their customer by providing a wine grape that meets or exceeds the quality demanded for the wine products produced. Growers will need to invest in cultivating their relationship with the winery just as they cultivate the crop. Both will require a long term commitment to obtain the desired returns.

At present, a local winery market for the Lake Chelan grape production is limited. A cursory survey of members of the Lake Chelan Grape Growers Association in 2001 indicates that at least five entities are in various stages of developing small wineries with a production range of 2,000 to 10,000 cases annually. Until wine grapes and wine is commercially produced in the Lake Chelan area, there can be no assessment of the "terroir" of the area. At present there is no local commercial wine available for quality testing. However, some Lake Chelan vineyards should have fruit suitable for wine production and quality testing with the 2002 crop.

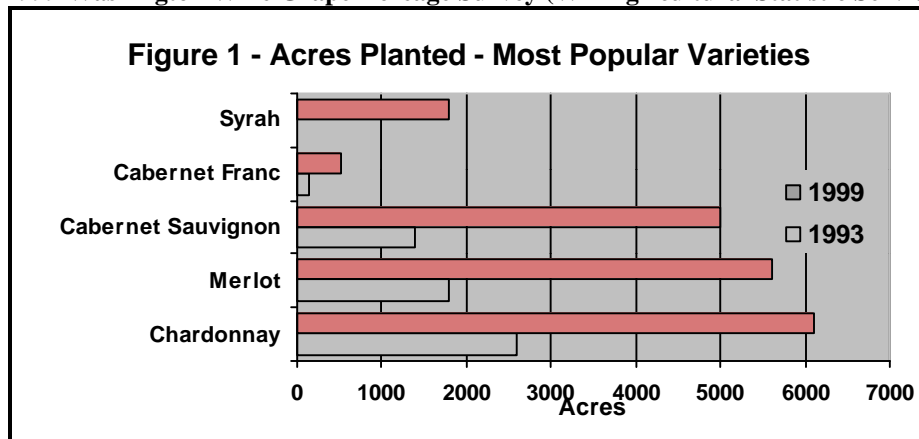
## Competitors

There are currently 29,000 acres of wine grape vineyards in the State of Washington. The Washington State Agricultural Statistics Service published their 2001 harvest report showing that a record 100,000 tons of wine grapes were utilized, an increase of 9% over the 2000 harvest. This production will be used to make 4.9 million cases of wine with an estimated retail value of \$576 million. (Ashton, 2001). About 20% of the 29,000 acres has not yet reached bearing age and harvests should be expected to increase until at least 2004.

From 1993 to 1999 the acreage planted to white wine grapes expanded from 7,100 acres to 10,500 acres, a 48 percent increase. Red wine varieties jumped from 4,000 acres to 13,500 acres or 338 percent. Leading varieties planted during this period are Chardonnay, Merlot, Cabernet Franc and Cabernet Sauvignon (Figure 6).

The reputation for quality among Washington wines has attracted the attention of several large national corporate wineries. Candaigua and Vincor, the second and fourth largest wine producers in the U.S.A., have joined Stimson Lane as purchasers of several Washington wineries; they are now marketing these wine labels on a national level as premium products. National marketing of Washington wines should hopefully increase sales of Washington wines and thereby increase the need for wine grapes.

**Figure 6**  
**1999 Washington Wine Grape Acreage Survey (WA Agricultural Statistic Service)**



## Pricing

Pricing for wine grapes must cover, at a minimum, the cost to produce the crop. This should include recapture of the establishment cost; overhead costs; financing; and expense incurred for acquisition of land or equipment.

Growers should be cautious about using the statistical average price paid for each variety of grapes. This average price reflects past activities not current trends and may not account for other economic considerations such as cost of technical assistance or financing assistance.

Winemakers will ultimately determine the quality of the grapes they want to buy based on what aspects of the grape they want to use in producing their style of wine. Quality is therefore a somewhat subjective value determined by the buyer. For example one of the indicators of quality is the °Brix (weight of sugar to volume of water). The °Brix enters into the decision as to when to harvest the crop. The amount of Brix desired by the winemaker will determine when to harvest.

Understanding this relationship of yield to quality is relevant to the decision about how much a crop can/should yield. If a grower is paid on a per ton basis, then dropping a portion of the crop in order to increase the °Brix could lead to serious financial problems.

Wine grape quality is judged on a number of factors that could influence pricing. These factors include a uniform berry size and consistency among the grapes, shape and color, flavor, balance, structure and texture, maturity of tannins, pH, tartaric acid and other fruit conditions. Thus, a good working relationship between the winemaker and grower is very important when all these wine grape quality factors are considered in the production of a fine wine and returning a reasonable profit to the grower

Growers should also understand the various issues of contracting sales. It is extremely important for the grower to know the winery's goals, products and financial strength as well as the market segment the winery is pursuing. These variables influence the type and quality of grape needed. A winery that has financial strength may be able to offer financing assistance or other important technical assistance to the grower. The basic contract pricing formulas are:

- **Per ton pricing** tends to emphasize yield over quality. On a per ton basis growers may have difficulty in covering their costs especially if a winemaker wants the yield reduced to improve grape quality.
- **Per acre/block pricing** sets a price that will be paid for the grapes from a specific area. This gives the grower fixed revenue regardless of how many tons are produced.
- **Performance standards** such as °Brix (sugar) content give rewards/penalties for performance. These performance standards need to be based on a history of that vineyard. A performance standard can encourage quality in the attributes measured.
- **Bottle price multipliers** sets the price paid for the grapes as a function of the price paid for the wine. This can help the vineyard and winery share the profits or losses of the wine. The grower must clearly understand how the bottle price is determined when making the calculations for payments.

## **Promotion**

Promoting a particular vineyard's wine grapes will be accomplished, in part, by development of good quality wines. Reputation for quality and consistency will be necessary to develop new markets for grapes. The marketability of Lake Chelan grown grapes will be strongly influenced by the quality of wine produced. As the quality of the wine improves, the reputation of the vineyard also increases. To begin promoting a vineyard and/or site, growers may consider inviting winemakers to tour the site, offer site specific data about growing conditions, and provide samples of grapes grown in the area.

## **Implementation Strategy**

It is recommended that growers contract with wineries on a per block or per acre basis, specifically designating which vines are under contract to that winery. This allows the winemaker to monitor their grapes and direct actions to get the quality they want. By working with more than one winery the grower can diversify risk, and will learn a variety of methods for producing a quality crop.

Initial marketing efforts will need to demonstrate that the growing conditions at Lake Chelan are equal to or superior to other proven growing areas. One useful tactic is to describe site specific growing conditions, soils, irrigation supply, freeze protection, and heat units<sup>4</sup>.

### ***Entry into the Wine Grape Market***

A penetration strategy is intended to help introduce a new product to potential customers. Once the market is aware of the product, strategies are modified to increase market share. Three basic entry strategies are identified below:

Establish an experimental crop to demonstrate the vineyards "terroir." Produce a small crop of several varieties of wine grapes to demonstrate the potential to your customers. The goal is to establish a risk-free trial relationship with winemakers, showing that desired results can be achieved. The next step would be to expand the vineyard/crop to meet the customer's demands.

Accept lower prices to attract interest from wineries. With an unproven crop the winery will be taking a risk in purchasing the grapes and the price will be lowered accordingly. After the vineyard has demonstrated its ability to consistently produce a quality grape, the price structure can be adjusted.

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<sup>4</sup> Note: Chelan has an accumulation of heat units that is similar to Walla Walla, Sunnyside, and Prosser.

Vertical alignment with the winery to merge efforts, share risk, and essentially become a partner with the winery. The winery may be able to provide technical expertise to help the grower reduce the learning curve, becoming a quality producer in a shorter period of time.

## **Production Forecast**

At present there are about 60+ acres of wine grapes planted or that will be planted by spring 2002. Most of these vines will reach maturity in 2003-2004. In order to produce a high quality product, full production of wine grapes will probably not exceed 4 to 4.5 tons per acre and may be 2 to 3 tons per acre at sites with cooler temperatures. Therefore, based on existing acres of vineyards, wine grape production at Lake Chelan in five years (2006) could reach about 200 to 240 tons. This production is likely to be sufficient to meet the initial demands of the estimated five small wineries that may be established at Lake Chelan. However, the existing local acreage may not be sufficient to fulfill the demands if all five planned wineries reach full production.

Forecasting production for a ten year horizon is dependent on how the market for Lake Chelan wine grapes materializes during the next few years. If the early vineyards prove their ability to produce a wine grape that has the attributes desired by wineries, then demand will encourage growers to plant more acres of wine grapes. If demand is low, then it is anticipated that only an additional 60 to 80 acres of wine grapes may be planted. Hence by 2001 production should range from 400 tons to 530 tons, adequate to meet the demands of five local wineries. Interest from wineries in other areas should increase as quality issues are addressed.

## **Financial Analysis**

The estimated cost to establish a vineyard ranges from \$12,000 to \$15,000 per acre, incurred over a four year start-up period. Variables in the budget include quantity and quality of vines, type of trellising, land acquisition costs, and the interest for financing the project. Table 5 lists start -up expenses necessary to plant and maintain the wine grapes up to the year they reach maturity/full production.

Annual operating costs to produce wine grapes shown in Table 6 are estimated at \$2,000 per acre, depending on viticulture practices. These costs are those that are incurred by production activities such as labor, operation of equipment, fertilizers, pesticides, pest control, freeze prevention, irrigation, laboratory testing, crop insurance and maintenance of plants and trellises.

In addition to operating costs are the overhead costs for financing the vineyard establishment, land acquisition, construction of buildings, buying equipment, and property taxes. Overhead costs can add from about \$500 to \$2,000 per acre to the cost of a crop. The grower should also include an allowance to cover their minimum required return on investment. This minimum return should be no less than what the grower could have made on some other investment with similar risks.

**Table 5. Adopted from Establishment and Annual Production Costs  
for Washington Wine Grapes (Gebers, etal. 1997)**

<b>Estimated Cost to Establish a Vineyard</b>				
	First Year	Second Year	Third Year	Fourth Year
Site Preparation	400			
Planting (5 X 10) =968 vines	2000			
Trellising (2 wire)		2000		
Mowing & Weed Control	700	350	350	350
Fertilization	100	80	80	80
Disease & Insect	100	200	200	200
Canopy Management		300	250	250
Dormant Pruning	240	100	300	300
Replanting		50	50	50
Net Harvest cost (revenue)			100	200
Total Operating Expenses	3,540	3,080	\$1,330	\$1,430
Financing @ 8%	140*	460**	710**	920**
Overhead (prorated capital costs for land, equipment, irrigation, buildings, mgt fees, etc.	500	500	500	500
Total Cost To Establish	\$4,180	\$4,040	\$2,540	\$2,850
Accumulative Total	\$4,180	\$8,220	\$10,760	\$13,600

\* financed for 1/2 year, \*\*1/2 of current year financing plus previous years

**Table 6 Adopted from Establishment and Annual Production Costs  
for Washington Wine Grapes (Gebers, etal. 1997)**

<b>Example operating budget at full maturity – Riesling</b>			
	Year 5	Year 6	Year 7
Weed Control Mowing	250	250	250
Fertilization	125	125	125
Disease & Insect	50	50	50
Canopy Mgt.	200	200	200
Pruning & Training	120	120	120
Replanting	50	50	50
Harvest @ 3.5 tons/acre	525	525	525
Total Operating	1,420	1420	1420
Overhead (includes establishment financing @ 8% x 20yrs)	1,495	1,495	1,495
Total Cost of Crop	\$2,915	\$2,915	\$2,915

Understanding the full and accurate costs of producing a wine grape crop is necessary for the grower to understand the minimum price for the crop. Appendix D contains a spread sheet to assist growers in accurately identifying all of their costs. Many industries have learned that

failure to implement accurate cost accounting can lead to errors in product pricing and eventual financial problems.

### III. WINE PRODUCTION AT LAKE CHELAN

#### Production & Market Forecast

A survey of members of the Lake Chelan Grape Growers Association indicates that at least five individuals/partnerships are in various stages of planning or developing small wineries in the range of 2,000 to 10,000 cases per year. Many of these entrepreneurs have agricultural backgrounds and management experience. If all of these wineries materialize the combined volume of production in 2006 will be in the range of 18,000 to 27,000 cases per year.

Proving the quality of locally produced wines will influence the future demand and, therefore, production of wines in the Lake Chelan region. Proving quality is a years-long process that involves winning awards at tasting competitions, favorable reviews by professional wine tasters, favorable reviews from wine club tastings, and generating publicity from those reviews. Once the quality has been established, the wines can be more profitably priced and effectively marketed. Winemakers can begin now to prove their ability to produce quality wines by utilizing imported grapes and, where available, local grapes from experimental vineyards and hobby growers.

Lake Chelan Grape Growers Association members who are actively involved in viticulture and winery development are very aware of the unique quality positioning of Washington wines, and the importance of establishing a reputation for quality wine production. Several of these emergent winemakers have hired professional winemasters and wine consultants to ensure their ability to produce wines of premium quality and shorten the “learning curve” for local growers and winemakers.

Two factors could delay the establishment of five wineries by 2006:

- o If the current economic recession results in lowering the volume of wine sold and/or reduces the number of visitors to Lake Chelan, then the industry’s development may be slower than expected (impeded by the tightening of credit and financial resources, as well as a more cautious attitude among the people who are considering entering the business).
- o If, for whatever reasons, the first couple of wineries to open fail to meet their sales projections, suffer obvious financial and/or operational setbacks, the second tier of entrepreneurs may delay, or abandon their commitment to fully implement their plans.

#### *How many wineries will the market support in the Lake Chelan area?*

Fluctuating global, national, and state economic conditions, wine production, and consumer trends will impact the market demand for wines produced in the Lake Chelan area, just as they will for all wineries, regardless of size or location. However, an underlying distinction between small, boutique wineries (like those targeted for Chelan) and larger ones is the importance of tasting room/cellar door sales of wine.

To be successful, small wineries must sell as much of their wine as possible out the cellar room door, directly to consumers at retail prices. It follows, then, that an estimate of the potential consumer demand for wine from Chelan area winery cellars would help to determine, approximately, how many wineries might be viable in the area. Because the resident population of the Lake Chelan area is relatively small, an estimate was generated based on the number of visitor trips to Lake Chelan. The narrative below summarizes the methodology, assumptions, and conclusions derived from a forecasted estimate of the tourist/visitor demand for wines purchased directly from the tasting rooms and cellar doors of Lake Chelan wineries.<sup>5</sup>

A review of Chelan County visitor demographics strongly suggests that a majority of the annual visitors to Lake Chelan appear to have very much the same demographic profile as “Wine Consumers” (Table 7). It seems that Chelan’s popularity as a tourism destination has a special appeal to people who are also more likely to purchase premium wine than the average person. Based on currently available data<sup>6</sup>, it is estimated that within 5 years (by 2006), approximately:

- o 460,000 visitor trips will be made to Lake Chelan
- o 75,000 of these trips (16% of all visits) will include visits to area wineries / tasting rooms
- o 59,000 tasting room visitors (78% of all tasting room visitors) will purchase wine
- o 118,000 bottles (9,800 cases) of wine will be sold out of Chelan area tasting rooms to visitors<sup>7</sup> amounting to approximately \$1,770,000 in total sales (assuming average sale price is \$15 per bottle)

The purchase of 9,800 cases of wine would theoretically fulfill the tasting-room-sales percentage requirement for approximately eight wineries of the 5,000 case production level (25% of sales) , or nine wineries of the 2,000 case production level (55% of sales).<sup>8</sup> (Note/reminder: This sales volume estimate is based solely on a conservative approximation of visitors to Lake Chelan. It does not include potential tasting room sales to local residents.)

With regard to the five wineries projected to be in operation by 2006, the above referenced forecast of tasting room sales bodes well. The 9,800 cases that assumedly will be purchased by visitors represents 36% of all wine (27,000 cases) to be produced by the five wineries. This well exceeds the tasting-room-sales percentage requirement for the five wineries, combined (24% or 6,350 cases). This means that the area’s five forecasted wineries, as a group, have a good potential to meet, if not exceed, the levels of profitability identified in the financial analysis, at least in the area of cellar-door sales (Section III, Financial Analysis; and Appendix E). The success of individual wineries, however, will still be subject to many factors, not the least of which will be profitably selling the balance of their wine production into wholesale markets.

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<sup>5</sup> Additional explanatory data is provided in Appendix F.

<sup>6</sup> Caution should be exercised in reference to these estimates. When more precise or current data becomes available, it should be substituted for the figures provided.

<sup>7</sup> On average, two bottles of wine are purchased by buyers of wine in tasting rooms (Folwell, 1989)

<sup>8</sup> The tasting-room-sales percentage “requirement” as used here refers to the percentages applied by size of winery to satisfy the assumptions in the financial analyses for this study (Section III, Financial Analysis; and Appendix E).

## **Marketing for Wineries**

Wineries may sell their product directly to consumers or to retail outlets; they also may sell through an intermediary wholesale distributor. Consideration of the needs of each of these target customer groups is critical to the creation of a marketing strategy, and should govern the products, packaging, pricing, and promotions employed by winery. Marketing approaches for individual Lake Chelan wineries should fully embrace and link to efforts by state and regional wine industry associations.

Large wineries producing generic wines are, for the most part, locked into the three-tier system of distribution that governs the cost of getting wine to market. They have the product volume and marketing budgets to get their low-priced wines on the shelves of grocery stores, nationwide, where most wine in the U.S. is purchased. Small premium wineries also market and distribute their (higher-priced) wines in this arena. However, their limited volume, narrower market, and higher prices (which must be maintained to offset their higher cost per unit) limit their access into this system.

Small wineries do, in fact, have a variety of complementary and other unique marketing approaches and venues available to them. Success for a small winery in the Lake Chelan area will be dependent on market diversification, reaching consumers through as many different channels as possible. The following describes several marketing venues for the two primary categories of sales: retail (direct to consumer from the winery); and wholesale.

### **Recommendations for Regional Marketing**

It is in the best interest of the industry, statewide, for vineyards and wineries to establish and maintain a reputation for producing only premium and ultra premium wines, as stated by the Washington Association of Wine Grape Growers and the Washington Wine Commission. This goal will allow the industry to remain competitive in a global and national market place that has an increasing number of wine products. This goal must be embraced by the Lake Chelan area vintners.

Everyone involved with the Lake Chelan wine grape industry will need to help establish and maintain a collective identity to distinguish the region in this increasingly competitive business. Individually, each Lake Chelan vineyard and winery must strive to present a product that supports the image of the entire region. This collective branding effort will help to build customer awareness and familiarity, increasing the likelihood that consumers will purchase a Lake Chelan wine instead of another (e.g., California or Yakima Valley wine product).

Branding as a marketing tool needs to start as soon as possible, and should not wait for an AVA (appellation) designation from the Bureau of Alcohol, Tobacco, and Firearms (BATF). To identify a wine product as originating from the Lake Chelan area, while preserving a winery's individual identity, bottle labels may: state the winery's address; feature a common graphic symbol; or include wording such as "produced and bottled at". Once AVA designation is obtained then branding can be moved to the front label. Strong branding has been associated

with increased product awareness and sales, customer loyalty, and higher levels of customer satisfaction (Bond, 2001), The Lake Chelan Wine Grape Growers should make establishment of a Lake Chelan brand, and AVA designation, a high priority.

### **Recommendations for Marketing Individual Wineries**

Each business must create a cohesive visual and verbal message that is portrayed on all products, packaging, advertising, tasting rooms etc. Within the Lake Chelan area each vineyard and winery will need to establish their own brand, consistent with the overall Lake Chelan image yet unique to the individual business product lines.

Be consistent from year to year in producing a high quality wine. Consumers must be won and kept through invariably good products and service. Establish strong customer relations by building and maintaining a customer database that facilitates direct marketing through wine clubs, e-mail and direct mail.

## **Market Channels**

### **Retail Sales Venues**

#### *Tasting Rooms/Cellar Door*

Retail sales are the most profitable for the winery, avoiding the discount necessary when selling wholesale (e.g., a case of wine that sells for \$180 in the tasting room may sell to a wholesale buyer for \$120 who then marks it up for the consumer). To achieve profitability small wineries depend heavily on offsetting their high per unit investment and operation costs by selling a high percentage of their wine at retail prices. The primary venue for retail sales is the winery itself – through its tasting room, cellar door, or gift shop. As a percentage of total sales, tasting rooms account for 15% to 55% of all sales in the assumptions for this report’s financial analysis. Individually, however, some very small wineries may regularly achieve 80% of total sales via their tasting rooms. The importance of this venue to the profitability of boutique wineries and the exceptional potential it presents for wineries in the Lake Chelan area is significant. For that reason, a more detailed analysis of tasting rooms and recommendations for their management is included later in this section.

#### *Farmers Markets*

Although not currently an option, there is an organized effort to legitimize the sale of wine by licensed vintners at Farmers Markets throughout Washington State. This effort could significantly extend the direct-to-consumer reach and sales for boutique wineries.

## **Wholesale Venues**

### *Restaurants/hotels*

Restaurants and hotels (conferences) that offer bottled (aka non-house) wine are key customers of boutique premium wineries, or the distributors that handle a small winery's product. Approximately 13 percent of all wine is consumed in restaurants. Some small winery owners, in fact, target restaurants exclusively in their wholesale marketing strategy, and personally perform the sales and delivery services.

Specialty restaurants and steak and seafood restaurants tend to purchase more wine than general/family restaurants. A (dated) survey of Washington restaurants found that only 25% (of survey respondents) purchased more than 25 cases of non-house wine per month (Ochsner, et al, 1984). However, wine consumption has grown considerably since this survey was conducted, and the range of quality and pricing on restaurant wine lists has expanded.

### *Grocery Stores*

Grocery stores move the greatest volume of wine in the U.S.A. This is not surprising, considering that approximately 80 percent of all wine is consumed in the home. Access to this market on a large scale for very small wineries is limited, and will largely depend on a winery's ability to influence a wholesale distributor to represent their product. However, Lake Chelan vintners have an opportunity to work through regionally-based distributors, or personally, to market their products to grocers and specialty shops within the Chelan area, and in fact, throughout much of North Central Washington. The appeal of locally produced wines to visitors and local residents provides a competitive edge for grocery sales within the region.

### *Distributors*

Alcoholic beverage wholesale distributors are major players in wine-to-market commerce nationally and internationally. As suppliers to grocery stores, restaurants, and liquor stores they move high volumes of wine. However, they represent another cost in the distribution system to vintners, reducing profit margins.

A new class of distributors is emerging on the Internet with implications for wineries. By 2005 these business-to-consumer merchants are expected to move \$1.4 to \$2.9 billion of wine, approximately five to ten percent of the retail wine market. Only one or two distributors are likely to lead the online market. (Swatzberg, 2000).

## **Customer Analysis**

Winery customers include wine consumers, retailers, and wholesale distributors. Information about each of these customer groups and associated sub-groups should be periodically reviewed and considered in designing market strategies. Sources of current information about most of these market segments are available through membership in wine industry organizations, through industry newsletters, and from many websites maintained by universities, government agencies, and industry associations.

- o The wine consumer, of course, is the most important determinant of a marketing strategy. Table 7 lists some of the wine consumer demographics useful to preparing advertising strategies.

**Table 7. wineinstitute.com and Newsweek**

Wine Consumer Demographics	
55% female	65% with incomes above \$40,000
52% professionals,	90.1% white
61.5% college educated	48% with incomes over \$60,000
87.5% reside in metro areas,	80 % of wine is consumed at home
71% employed	80% of wine consumers are over 40 years old.
55% living in the south or west	13% of wine is consumed in restaurants
63.5% married	

More detailed information is accessible on websites such as:

- o [www.winemarketcouncil.com/research\\_summary.asp#market](http://www.winemarketcouncil.com/research_summary.asp#market)
- o <http://winebiz.com> See Wine Business Monthly, December 1994 issue
- o [www.wineinstitute.org/communications/statistics](http://www.wineinstitute.org/communications/statistics)

In addition to understanding wine consumers, overall, Lake Chelan area vintners will want to tailor their consumer marketing programs to match the traits and preferences of visitors and local residents; the population that likely constitutes the greatest potential market for Chelan area wineries. It appears that the demographic profile of many Lake Chelan area visitors match the profile of serious wine consumers (likely to initiate visits to winery destinations wherein they purchase quality wines). Research to verify or refute this assumption, and to determine specific visitor preferences would help to forecast sales and design promotions for this market segment. An estimate of the number of visitors to Lake Chelan that may frequent Chelan area wineries is provided later in this section, under the heading “Tasting Room Sales Potential”.

## **Products**

A thorough knowledge of consumer preferences, and trends should guide a winery’s selection of which varieties of wine to produce. A mix of wine beverage offerings is recommended. In the financial analysis for this study, it is assumed that the product mix of each winery is 60% white and 40% red wine (however, this should not be inferred as a recommended ratio for a mix). Small wineries may include in their product line a lesser known, unique variety for which they can establish a specialty market.

In terms of consumer product preference, four varietals wines account for 52% of all wine sold in the United State: Chardonnay, presently leading with 19% market share; White Zinfandel (13%); Merlot (11%); and Cabernet Sauvignon (9%).

While consumers continue to prefer white wines, the red varieties are increasing in consumer appeal and demand for blush wines have decreased. Since 1991, sales of blush wines have decreased by about 38%, white wine sales have decreased by about 16% and red wines have increased approximately 124%. (Wine Institute, 2001) Consumer tastes will continue to change as people seek new and unique experiences.

Regardless of variety, all wines considered for the Lake Chelan area should be of premium quality. The growth segment of the wine market, internationally, is for premium table wines (Folwell, 2002). Analysis of California wine sales during 1999 indicated that premium wines held 23% of the market share but resulted in 52% of the total revenue. Super premium wines held a 16% market share with 27% of the revenue and Deluxe wines just a 7% market share with 25% of the revenue. Wines in the Sub-premium and economy classes held 77% of the market share but only 48% of the total revenue. (Wine institute, 1999) A recent analysis indicates that consumer preferences may be shifting as sales of sub-premium and economy wines, priced below \$8 are down by 3 percent while wines premium priced wines \$8 to \$15 have increased by almost 13 percent (Moran, 2002).

### *Product And Services Mix*

Aside from wine beverages, a broad selection of other goods and an array of services may be included in a winery's product line. In a cursory review of wine industry newsletters and articles, it was discovered that (anecdotally) many small wineries report 15% to 30% of their tasting room/winery revenues are derived from goods and services other than wine beverages.

*Non-wine product examples include:* service tools (e.g., bottle stoppers, corkscrews); accessories (e.g., glasses, wine racks); wine luggage (e.g., cooler bags); record keeping (e.g., cellar books for wine connoisseurs); education/fun (e.g., scent and tasting kits); gift sets ( – e.g., cheese knife; bar tools); specialty foods; clothes (e.g., hats, shirts, with wine themes, logos); art (e.g., tapestries; pottery; furniture (e.g., designer chairs, tables)

*Types of services offered by small wineries include:* food service; tastings and tours (for which admission is charged); hosting special events (e.g., weddings, anniversaries, reunions); concerts and dramatic events; seminars (courses in wine aromas, secrets of food and wine pairing).

## **Pricing**

Markets for wine products are segmented by price. Pricing appears to be largely determined by the quality reputation of a wine, earned by winning tasting awards, favorable reviews, and the image as projected by a packaging and the winery's marketing program. Price generally provides an indicator of quality, whereas image differentiates one winery's products from their competitor's. Starting at the low product price range, wines are classified as "economy," "sub-premium," "premium," "super-premium" or "deluxe" and finally "ultra-premium". Wine grapes

grown for the highest quality wines are most often in high demand and receive prices well above average.

The lower-priced wine market is dominated by a handful of large wineries, because they can use economies of scale to keep prices down. The higher price ranges are where smaller wineries can successfully compete, because margins are higher and the market is narrow and less expensive to target for advertising. A small, exclusive label has a cachet that a huge-volume wine can never achieve.

Wine pricing varies based on quality level, and whether sold through the tasting room or sold wholesale. In the financial analysis for this study, it was assumed that:

- o all the wineries would produce premium quality wines
- o the price of wine sold via a winery's cellar door would average \$15 per bottle
- o the price of wine sold to wholesale markets would average \$10 per bottle

## **Promotions**

Promotional opportunities for small wineries are numerous and varied. In the case of boutique wineries, the premium quality of the product and association of the wine with an indelible image of the state, region, and the winery are key goals. Small "boutique" wineries typically engage in independent marketing of their product and their wineries (tasting rooms), but also pursue marketing initiatives in partnership with other regional wineries and community organizations. The promotional mix for a small winery-marketing plan may include:

Regional marketing initiatives in partnership with other local wineries (and/or industry associations, and Chambers of Commerce, Port Districts, etc.) such as:

- o Special events (e.g., harvest festivals, spring releases tastings, etc.)
- o Wine Trails (Wine trails are groups of wineries that are related geographically and work cooperatively to market their area as a destination for wine tours. They may take responsibility for signage, sponsor special event programs that feature wine and food pairings throughout the year, print maps, etc.)
- o Maps that pinpoint the location of wineries in a region
- o Regional websites – typically designed to allow a potential customers to click on a list of wineries, view a map to locate them, follow links to individual wineries and to other attractions in the area.
- o Image and branding of the region. (This may include securing an appellation designation for their region from the Bureau of Tobacco, Firearms, and Alcohol (BATF).
- o Restaurant and grocery store campaigns – working with local retailers and restaurateurs to feature local wines (or participate in such events organized on a large,

statewide scale, by the Washington Wine Commission. Their programs include Winemaker dinners, wine and food pairing demonstrations, and opportunities to taste and learn more about the diversity and quality of the state's wine industry.)

Independent promotions, such as:

- Branding of wines with an attractive and compelling label and logo
- Internet website
- Printing of the logo and website address on everything from labels and corks to brochures, stationery, newsletters and business cards
- Issuing news releases about quality awards, new products, events, etc.
- Direct mailings / emails
- Tasting room specific promotions

## **Tasting Room Marketing Strategies**

The primary venue for marketing and selling wines directly to the consumer is the winery tasting room. Strategies for effective tasting room marketing are becoming increasingly creative and niche oriented. Several key components to consider in a comprehensive strategy are presented below:

- |  |  |
|--|--|
| <input type="checkbox"/> Wine beverage offerings     | <input type="checkbox"/> Customer service/staff training |
| <input type="checkbox"/> Product and services mix    | <input type="checkbox"/> Ambience                        |
| <input type="checkbox"/> Displays, signs, literature | <input type="checkbox"/> Marketing programs              |

### **Wine Beverage Offerings**

A selection of varieties and a range of differently priced wines will broaden the potential for wine purchases within a tasting room. Although all wines produced by a winery should be for sale, it is recommended that the wines available for tasting be somewhat limited, and periodically changed/rotated (e.g., monthly) to pique the interest of regular/returning customers. Special vineyard or varietally-labeled wines underscore the uniqueness of an individual winery and the region, and add to the quality of the purchasing experience for tasting room wine buyers. Some wineries feature "Buy of the Month" specials, or offer discounts for case purchases.

### **Product And Services Mix**

Aside from wine itself, a broad selection of other goods and an array of services are offered by small wineries. Although current, accurate figures are not available, it appears that most small wineries report that 15% to 30% of their tasting room/winery revenues are derived from non-wine goods and services.

### *Non-wine product examples*

- Service tools – wine thermometers; wine funnel; tastevins; mixing and pouring accessories; bottle stoppers; bottle spouts; Corkscrews; decanters
- Other Accessories – glasses; wine glass coasters; champagne bucket; wine charts & posters; Wine Racks; cleaning – glass drying racks; specialty brushes; stain removers
- Wine luggage – cooler bags; wine totes; wine hampers (like picnic baskets)
- Record keeping – journals; registers; cellar books for wine connoisseurs
- Education/fun – scent and tasting kits; living grapevines sold in tube; wine cellar plans; multi-media educational videos and CDs for the wine consumer; books; cork bulleting board frames; cork trivet frames; wine bottle to lamp/candle conversion kits
- Gift sets – cheese knife; bar tools; wine server tools; cutlery
- Specialty foods – gourmet quality oils; chocolates; picnic supplies of cheese, pate, and salami . Branded gourmet foods often sell well in tasting rooms and, when they carry a winery’s name and logo, customers will think of the winery whenever they partake of the foods.
- Clothes – hats, shirts, jackets (wine themes, logos)
- Art – tapestries; posters; pottery; magnets. Small wineries frequently sell works by local artisans to their visitors who are looking for unique, regionally produced crafts of fine quality.
- Furniture – designer chairs, tables

### *Types of Services offered by small wineries*

- Food service – food encourages people to sit and enjoy themselves, and people get hungry on winery trips
- Tastings and Tours – Barrel samples, year-round reserve tastings
- Hosting special events – like weddings, anniversaries, reunions, etc.
- Special events – specialized “release” tastings, concerts
- Seminars –Wine related educational workshops are growing in popularity. Some wineries offer daily seminars on a regular basis. Workshops generally range from one to four hours and are often limited to groups of twelve or less. Prices for workshops vary from \$10 - \$150 per person. Subject matter varies, targeting wine-savvy consumers and new wine enthusiasts with different offerings, as illustrated by the sample list of subjects and class titles below:
  - Courses in wine aromas
  - Blending – how to blend your own wines
  - Secrets of food and wine pairing
  - Appellation-based tasting,
  - "Picnic in the vineyard," tours that takes a small group through all the elements of grape growing and winemaking and closes with a food-and-wine picnic under a trellis in a vineyard.

## **Displays, Signs, Literature**

Displays – As in any retail business, effective merchandising includes decisions about how to best place and display items to sell. A standard practice is to place the most popular items in areas which require customers to walk through the rest of your wine and non-wine displays. Physical placement, display shelves and cases, and spot lighting are typically used to attract the customer's attention to special items. Items may be grouped to give patrons ideas on how they could use the products at home, and can result in selling two or three items instead of just one. Wines should be attractively displayed and easy to find. Special vineyard or varietally-labeled wines can be set off in separate display sections. If offering wines on special discount, periodically rotate the types of wines offered so repeat visitors find something "new".

Signage/Printed Material - Signs and literature should be up-to-date, attractive and easily readable. The visitor should be able to see all prices without having to ask for assistance. Food pairings can be suggested with tasteful signs, artwork, or photographs. Include winery logo and website address on literature and signs.

## **Customer Service/Staff Training**

Customer service is especially critical for selling wines out of the tasting room. Winery staff should be prepared to:

- Greet each visitor upon entry
- Assess each visitor's level of wine knowledge and respond appropriately
- Help visitors decide on purchases – make suggestions
- Speak knowledgeably about all wines offered, new releases
- Speak knowledgeably about food and wine pairings
- Offer tourism advice about the region
- Offer locations (stores and restaurants) where the wines can be purchased near their own homes
- Invite patrons to join a wine club (if one exists)
- Ask patrons if they would like to be on an e-mail list
- Conduct formal and/or informal customer research

Staff training takes many forms:

- General wine training: Workshops and classes offered by community college, CDs and videos
- Winemaker speaking to staff
- Conducting blind tastings of winery varietals versus other wines from the state
- Demonstrations of food and wine pairings
- Field trips to other tasting rooms

- Mentor training

### **Ambience**

The atmosphere of a winery tasting room is an important factor in attracting new visitors, and in generating an experience that entices previous visitors to return and encourages others “word of mouth” to patronize a particular winery. Small, boutique wineries are especially well positioned to use their diminutive size to great advantage – to generate an intimate, living room feel that will offer the patron a personalized experience.

In addition to quality and personalized customer service, ambience is also a product of physical appearance, outside and inside.

- Visual appeal of the winery exterior helps to attract visitors, and suggests the ambience the visitor will enjoy during their experience. Architectural design, landscaping, signs, and parking are key elements to the exterior appeal and accessibility.
- Similarly, room layout, displays, furniture and décor are key to the ambience of the interior space. A pleasant acoustical “feel” is also important, and is sometimes enhanced with background music or sounds. Some wineries may set aside special purpose rooms – away from the activity of the main tasting/lobby area for workshops, specialized wine tastings, wine club events, trade groups, etc. These rooms are generally quieter, more intimate, and comfortable than the main tasting area.

### **Marketing programs**

Every visitor in a tasting room is a potential customer, and returning customer, at the winery, and in local restaurants, and in their home communities. Visitors, if pleased, will also generate additional customers through “word of mouth” advertising. Some ideas for on-site marketing to tasting room patrons include:

- Printing the winery’s web page address on every receipt, and personally inviting them to visit the site after they return home
- Inviting them to join a wine club
- Featuring a Special Buy of the Month with a special discount
- Suggesting that they return, and bring their friends
- Market Research (e.g., Ask tasting room patrons how they found out about your winery and what made them decide to visit; ask if they've visited other local wineries and what they liked about them; ask if there's anything that they'd hoped to find in your sales room, but could not.)

## Financial Analysis

The premium wineries forecasted to emerge in the Lake Chelan area have great potential for financial profitability and long-term sustainability. In addition to a growing international demand for premium wines, and an apparently strong market for tasting room sales in the Lake Chelan area, these small wineries perform very well when subjected to the rigors of financial analysis.

A timely, comprehensive evaluation of the economies of six wineries (2,000; 5,000; 10,000; 50,000; 200,000; and 500,000 annual case production) was recently presented by Professor Ray Folwell, et al, of Washington State University. The information that follows is based upon his findings, published by WSU Cooperative Extension in the Costs of Investment and Operation in Various Sizes of Premium Table Wine Wineries in Washington State in April 2001 and updated in January, 2002.<sup>9</sup>

**Small (premium) wineries perform well** – Although this report is only concerned with the analyses of the 2,000 – 5,000 - 10,000 case wineries, it is noteworthy that these wineries were found by Folwell to be preferable; that is, the most profitable and least risky ventures of the six wineries studied. Specifically, “the high per unit investment costs of the smallest wineries were outweighed by even higher per unit profit margins. The result was stronger returns to investor capital than was measured for the largest wineries (50,000 – 500,000 case). . . The risk measures also pointed to the smaller wineries as being the best performers... (exhibiting) satisfactory debt recovery and equity payback periods under base and sensitivity scenarios” as shown below.

### Positive Cash Flows

By year two for 2,000 & 5,000 case wineries  
By year three for 10,000 case wineries

### Equity payback

5,000 case – within 3.8 years (least risk)  
2,000 case – within 4.7 years  
10,000 case – within 6.3 years

### Profitability Ranking (based on Net Present Value & Internal Rate of Return criteria only)

#1 - 5,000 case; #2 – 2,000 case; #3 – 10,000 case

**Prospective investors must be financially prepared for the commitment of initial capital to establish a winery and to weather the early negative cash flows.** The cost of establishing a winery ranges from approximately \$480,000 for a 2,000 case winery to \$1,260,000 for a 10,000

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<sup>9</sup> The original analysis, WSU Cooperative Extension publication EB1909, was updated with a paper supporting a presentation at the Oregon Horticultural Society Meeting, Portland, Oregon, on January 29, 2002. The paper was co-authored by Timothy Bales, and Trent Ball. The objective of the research was to “identify current practices in the wine industry in terms of product mix and winery size and utilize this information. . . to provide updated information for use by potential investors and lenders in evaluating the expected costs and returns of investing in a winery.” Models for this research were designed, on paper, by specifying building size, equipment specs, and several assumptions.

case winery (Table 8). The total cost of operations (per year) ranges from \$215,000 for a 2,000 case winery to \$700,000 for a 10,000 case winery (Table 9). Negative cash flows in the first year of operations for the two smallest wineries, and through the second year for the 10,000 case winery, will require adequate up-front operating capital for the venture. Based on these estimates, the total capital requirements to establish and operate a (small) winery until it becomes self-sustaining, ranges from approximately \$700,000 to \$2,700,000.

**Table 8. “Investment and Operating Costs of a Winery” (Folwell, etal, 2002)**

<b>Investment Costs to Establish a Winery</b>			
	2,000 case	5,000 case	10,000 case
Total Investment	\$480,000	\$760,000	\$1,260,000
Per Unit - \$/Case	\$240	\$153	\$125
Per Unit - \$/750 ml	\$20	\$13	\$10

Economies of scale affect the costs of investment and operation – as winery size increases, the per unit (i.e., case or bottle) costs decreases (Table9). To achieve profitability small wineries depend heavily on offsetting high per unit investment and operation costs with:

- higher prices (than large wineries) and differentiated products. (High quality premium wines, and appropriate packaging and marketing techniques are requisites for obtaining higher prices per bottle.)
- selling a relatively high percentage of their wine at retail (vs. wholesale) prices through their tasting rooms/cellar doors. In fact, key to the positive economic performance of the small wineries in Folwell’s analysis are the following assumptions about tasting room sales, as a percentage of total sales by winery size: 2,000 case – 55%; 5,000 case – 25%; 10,000 case – 15%.

**Table 9. Folwell, 2002**

<b>Winery Operating Costs Summary</b>			
	2000 cases	5000 cases	10,000 cases
Subtotal Variable Costs	\$116,768	\$241,893	\$429,846
Subtotal Fixed Costs	\$98,581	\$164,396	\$269,778
Total Operating Costs	\$215,349	\$406,289	\$699,624
Per Unit Costs \$/case	\$ 108	\$ 81	\$ 70

## IV. ECONOMIC IMPACTS

A recent report on the economic impact of the wine industry in Washington State shows that the industry generates \$ 2.4 billion per year, and more than 11,000 jobs (Washington Wine Commission).

For this study, a cursory evaluation of potential local economic benefits of the emergent wine industry in Lake Chelan was conducted.. Over ten direct and indirect impacts were identified that will ripple through various sectors of the local economy. Over half of these are quantifiable (Table 10), based on the financial performance projections of wineries identified elsewhere in this report. The economic benefits to the local area include:

- o Direct Jobs
- o Annual Payroll
- o Annual sales revenues
- o Sales tax revenues
- o Property Taxes
- o New Visitor spending
- o Capital Investment
- o Indirect jobs
- o Shoulder-season attraction for visitors
- o Market for ag operations – vineyards
- o Sale of local products in wineries

Projected quantifiable economic impacts are presented below. The projections are given for 2006 and 2011, representing the 5<sup>th</sup> and 10<sup>th</sup> years of the industry’s future activity in the Lake Chelan area. The figures are based on a variety of assumptions.<sup>10</sup>

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<sup>10</sup> Assumptions include: five wineries in full operation by 2006, including one 2,000 case winery; three 5,000 case wineries; and one 10,000 case winery; and ten wineries by 2011, including two 2,000 case wineries; six 5,000 case wineries; and two 10,000 case wineries. Winery financial data was drawn from two studies conducted by WSU’s economist, Ray Follwell, cited throughout this report. Methodologies, formulas, and related assumptions used to develop these projected impacts are provided in the Appendix to this report (unabridged version).

**Table 10**

Measurable Local Economic Impacts of Lake Chelan Wineries		
	<b>Year 2006</b>	<b>Year 2011<sup>11</sup></b>
Direct Jobs	23 full-time (equivalents)	46 full-time (equivalents)
Annual Payroll	\$530,000	\$1,000,000
Annual sales revenues	\$3,560,000	\$8,240,000
Sales tax collections/yr.	\$68,000	\$158,000
Property Taxes/yr.	\$18,400	\$36,800
New Visitor spending/yr.	\$1,100,000 (3,000 visitors)	\$2,100,000 (5,000 visitors)
Bed nights (lodgings)	4,500 additional bed nights	7,500 additional bed nights
Capital Investment	\$4,028,000	\$8,055,000

The quantifiable economic impacts listed above are briefly explained below. Note: Numbers are only provided for the Year 2006 projection.

**Direct Jobs** (*23 full-time equivalents*) - Full and part-time job positions vary considerably in wineries, depending upon the winery size and the labor participation of the owner(s). The range of positions, however, include the following:

Full Time

- o General Manager
- o Winemaker
- o Cellarman
- o Office Manager

Part Time

- o Press Operators
- o Bottling
- o Clerical
- o Customer Service
- o Warehouse

**Annual Payroll** (*\$530,000*) - Based on labor cost per winery as per financial projections.

**Annual sales revenues** (*\$3,560,000*) – These estimates are based on wholesale and retail sales of wine, assuming the wineries produce at full capacity and sell all of their production. This figure does not include the sale of non-wine-beverage items such as arts and crafts, gifts, specialty foods, and wine related paraphernalia (Note: revenue from these items may contribute from 5% to 30% of all winery tasting room sales).

<sup>11</sup> Note: The projections for 2006 are grounded in relatively reliable data about the number of wineries anticipated. Year 2011 projections, however, are less reliable as they represent an extrapolation based on the presumed success of the local wine industry, and the stability of the state’s economy and consumer preferences - far too many variables that may change dramatically in the 10-year planning horizon.

**Sales tax collections** (\$68,000) – Sales taxes are collected only on the sale of wines sold directly to consumers (retail) via a winery’s “cellar door” or tasting room. Sales taxes are a major contributor to the tax base of the local jurisdiction (i.e., city or county) in which the winery is located. (The amount shown here represents the tax collected on tasting room sales only, at eight percent.)

**Property Taxes** (\$18,400) – Property taxes were based on Yakima County rate of approximately \$15 per \$1,000 of assessed value. Assessed value was assumed to equal the total of investment and building costs for each size winery (Folwell 2002).

**New Visitor spending/yr.** (\$1,100,000 from 3,000 new visitors) – These estimates are based on the assumption that the local wine industry will have achieved a critical mass, and matured in its cooperative marketing efforts, positioning the Lake Chelan area as a wine tourism destination. Special wine related events, wine club and group marketing have the potential to attract new visitors who will travel to the Lake Chelan area primarily to visit the wineries. The visitor numbers are very approximate as they are based primarily on anecdotal information about wine events and visitor patterns from other wine regions. The dollar figures are based on spending analyses as reported by the Washington Tourism Office. NOTE: To inject a more conservative value into market assumptions, the number of new visitors used in the projection for determining Tasting Room Market Assumptions, Appendix F was just 1,800.

**Bed nights (lodgings)** (4,500 additional bed nights) – These estimates are driven by the number of new visitors, as defined above. Actual bed nights generated by wineries will likely be greater than the number simply generated by new visitors, however, as other (regular, returning) visitors may be expected to extend their stays to enjoy this additional activity in the Lake Chelan area. The number of bed nights is based on an assumption that most travel parties in this subset are couples, sharing one room for 3 nights of an average 4.3 day stay.

**Capital Investment** (\$4,028,000) - Based on total cumulative investment in plant and office of all projected wineries, as per financial projections.

Other economic impacts:

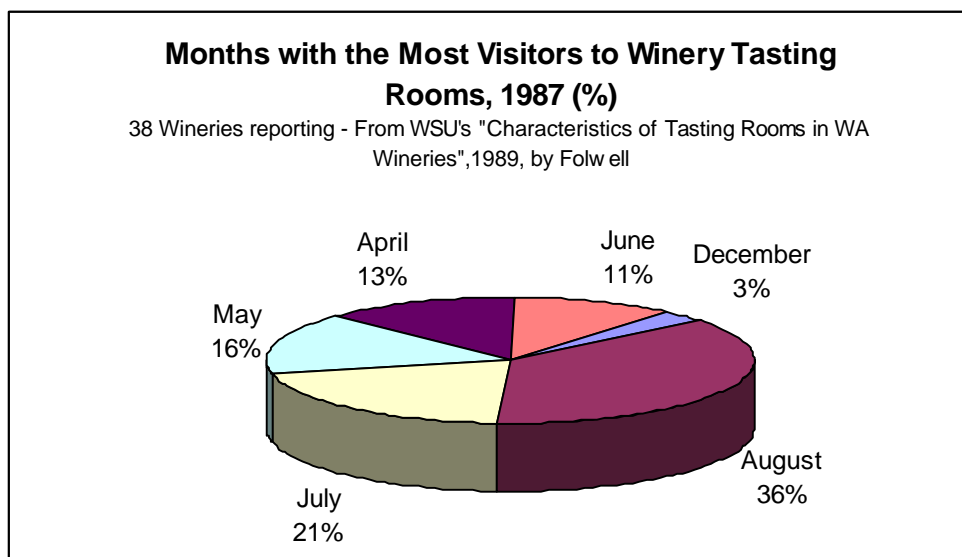
**Indirect jobs** – In addition to jobs generated within the wineries, by 2006 the winery industry will have likely contributed indirectly to the creation/retention of jobs in a variety of business sectors. The types of positions most likely to enjoy the greatest impact include those in the following types of businesses: hospitality (lodgings); restaurants; and maintenance. Additionally, construction and building supply related jobs will be supported during the capital facility development phases of the wineries.

**Shoulder-season attraction for visitors** – Communities seeking to expand their tourism visitation seasons increasingly value wineries. Although the summer travel season appears to be the heaviest for winery visits, wineries in many areas have proven their ability to attract new visitors to their locations during the “shoulder seasons”. At these times, tourism-dependent businesses suffer from cash-flow challenges and begin to layoff employees.

Wineries in the Lake Chelan area have an excellent opportunity to organize events and assemble wine-tour packages that will attract new visitors to the area during these “slow” months. Examples from other regions include: Autumn harvest festivals that attract visitors in September and October; Spring Releases drawing visitors in March and April; and pre-Christmas Holiday Packages – promoting special wine deals for gift-buyers, packaged with discounted lodging, in November and early December.

Figure 7, generated from a 1987 study of Washington wineries, illustrates that the months with the greatest number of visitors, in order of importance were August, July, May, April June, and December. However, while these figures are illustrative of seasonal traffic volume, they are based on visitor counts from the very early stage of the Washington Wine Industry, before significant wine events or a solid reputation had been established.

**Figure 7. Folwell, 1989**



**Market demand for wine grape production** – Although demand for local wine grapes will be dependent on the quality of wine grapes produced, it appears that there will be a demand from five wineries forecasted to be operating by 2006, will producing a total of 27,000 cases of wine at full capacity. Based on the assumptions and calculations from the projections (Folwell, 2002), this level of wine production, if satisfied totally by the local grape growers, would generate approximately \$314,000 in sales.

**Sale of local products** – Approximately 85% of wineries sell non-beverage items in their tasting rooms (Folwell, 1989). Many of these items may be locally produced arts, crafts, or gourmet foods.

## V. NURTURING THE LAKE CHELAN WINE/GRAPE INDUSTRY

A variety of industry organizations, educational institutions, and business groups can support the emergence and sustainability of the wine grape industry in the Lake Chelan area, which is led by the Lake Chelan Grape Growers Association and its members. Below are several suggestions for activities to support the industry for consideration by the Port District of Chelan County and/or other organizations. Also included in this section is a synopsis of the two most active educational institutions.

### **Potential Activities to Nurture Growth of Lake Chelan Wine Industry**

*For consideration by the Port District of Chelan County and/or other organizations*

The primary purpose of port districts throughout the state is to strengthen communities by fortifying local economies to stimulate job creation. Ports are public agencies with substantial powers established by the state legislature to develop opportunities that present themselves in the marketplace. With regard to facilitating development of the emergent wine industry in the Lake Chelan area, two authorized activities of ports appear to have special relevance:

- o Buying and improving properties for lease - or sometimes to sell - to private industry for industrial and commercial uses
- o Promoting tourism as an economic stimulus within the port district jurisdiction

Based on the above, and other actions in which a port may engage, the following activities are recommended for consideration by the Port of Chelan County:

- o Develop an incubator that would serve (some) needs of the emergent wine industry, reducing capital intensive demands on small and start-up wineries
- o Assist with wine-tourism consumer research and planning
- o Assist with collection and retention of data in support of an application for a (BATF) American Viticultural Area designation (appellation) for the Lake Chelan region
- o Assist with collection of weather data
- o Assist with industry planning efforts and training and education for winemakers and growers

Although each of the potential activities above is described in the following pages, additional information and analysis by the Port will be necessary before any decisions to proceed on any of these activities can be expected. In evaluating its potential involvement in these activities the Port will likely consider, at a minimum:

- o Its legal authority / limitations to engage in the activity
- o The cost of investment

- o The economic development return on the investment (Will the investment result in a sufficient number of direct or indirect jobs or other community economic benefits to warrant the expenditure?)
- o Private sector interest in pursuing and investing in the activity/opportunity (Ports invest in projects for which there is generally insufficient financial return to induce private sector investments. Their intent is to stimulate private sector investments, not compete for ownership of a project.)
- o The likelihood of partnerships to share in cost and/or execution of activities
- o Whether or not the Port, or other organization, should assume the lead role for the activity

**1. Develop an incubator that would serve (some) needs of the emergent wine industry, reducing capital intensive demands on small and start-up wineries**

Typically, business incubators provide fledgling companies with facilities and services that may range from little more than affordable, unimproved space - to elaborate structures with a comprehensive range of business support services. Generally, space is leased to the incubator tenants; services, if available, are provided as part of the (lease) package and/or on a fee-for-services basis.

In many established wine regions such “incubators” are typically owned and operated by private firms (generally, wineries with excess capacity) and are known as “custom crush” operations. They provide services and access to equipment that very small (boutique) or start-up winemakers do not have at their own winemaking facility, significantly easing their capacity constraints and capital demands.<sup>12</sup> For example, the Napa Wine Company in northern California “provides a place for winemakers to crush, ferment, rack, top, age and bottle wines. Each of the (60) brands has a winemaker or consulting winemaker that determines the processes the wines will incur. (Napa Wine Company) staff oversees the implementation of those winemaking techniques. Customers of the custom crush range in size from 250 cases to 100,000 cases.”<sup>13</sup>

In areas where the wine industry is still in a neophyte stage, “custom crush” operations are less likely to be financially viable or sufficiently profitable to attract private investment. In these regions, it is not unusual for public agencies (e.g., cities, port districts) to play a role that replicates (at least, some) of the activities of custom crush operations. Rather than profit making, the objective of these public agencies is to “incubate” the embryonic wine industry in their communities with the goal of eventually expanding the economic base via agricultural diversification (wine grape production), value-added processing (wine-making), and tourism.

The list below identifies categories of incubator facilities, equipment, and services that could reduce the capital and operating demands of small and emergent wineries in the Lake Chelan

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<sup>12</sup> Note: The equipment for crushing and fermenting premium wines is capital intensive. Its short-term seasonal usage makes the equipment onerous for small operators to own; leasing/sharing such equipment is financially preferable.

<sup>13</sup> From <http://www.napawineco.com/winery.html>

area, thereby increasing their chances for sustainability and growth.<sup>14</sup> On the following page, the categorical list is expanded to include specific types of items to be considered in each category.

#### **Facilities and Equipment**

- o Processing
- o Winemaking/Tank Storage
- o Barrel Storage
- o Laboratory
- o Packaging
- o Business related

#### **Services**

- o Crushing/ Fermenting
- o Winemaking/Tank Storage
- o Barrel Storage
- o Analysis
- o Packaging
- o Business & Information services

The items in these lists represent a fairly comprehensive inventory of typical custom crush / wine incubator offerings; all or a few of which may be available in any given operation. Given the relatively few number of wineries expected to emerge in the Lake Chelan area, any plans for a regional incubator would have to be scaled appropriately. At a minimum, a feasibility analysis for such a project would be necessary to determine precisely:

- o What facilities, equipment and services the local emergent wineries would find most valuable and commit to using, if available<sup>15</sup>
- o The capital and operational investment costs of providing these items via an incubator
- o Pricing levels for the various offerings that are acceptable to identified/potential incubator customers
- o Financial sustainability of the incubator at various levels of service and pricing

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<sup>14</sup> Note: Incubator customers could include wine makers from outside of the immediate Lake Chelan area to supplement the incubator's revenue stream.

<sup>15</sup> Initial indications from emergent wine makers in the area suggest that crushing, fermentation, and lab analysis facilities/services (in that order) would provide the greatest immediate value to their operations.

## Preliminary Facilities/Equipment Options – Wine Industry Incubator

### Processing

Truck Scale  
Crush Stations / triage tables  
Fermenting & aging rooms (temp. controlled)  
Must Chiller  
Tank Presses  
Tanks (temp. controlled)

### Winemaking / Tank Storage

Filters (various types)  
Potable Water  
Tank Temperature Control System

### Barrel Storage

Barrel Aging Facility  
Barrel Racking  
Forklift

### Laboratory

Acid Stills  
Automatic Titrator  
Chemstat Analyzer  
Equipped Customer Blending Room  
Nephelometer  
SO<sub>2</sub> Apparatus  
UV/Visible Spectrophotometer

### Packaging

Bottling Line  
Label Applications

### Other

Conference Room  
Fax/copy machine  
Sales & Tasting Room

## Preliminary Services Options – Wine Industry Incubator

### Crushing / Fermenting

Barrel Fermentation  
Certified Weighmasters  
Crush For Juicing / Must Chill  
Irrigator or Hand Pump-Over  
Standard Crush  
Whole Cluster Pressing

### Winemaking / Tank Storage

Blending  
Filtration  
Fining  
Racking  
Temperature-Controlled Stainless Storage

### Barrel Storage

Barrel Aging  
Barrel Fermentation  
General Barrel Services  
New Barrel Preparation

### Analysis

Alcohol  
Bottling QA/QC  
Brix  
Enzymatic R.S. And Malate  
Heat & Cold Stability  
PH / CO<sub>2</sub> / NH<sub>3</sub> / O<sub>2</sub> / S<sub>02</sub>  
Routine Wine / Lot Maintenance  
Specific Gravity  
Total Acid (Automated Titration)  
Volatile Acidity

### Packaging

Custom Packaging

### Business

General Secretarial/Bulk mailing  
Library, information clearinghouse

## **2. Assist with wine-tourism consumer research and planning**

Once a critical mass of wineries has been established in the Lake Chelan area, the opportunities for wine tourism to contribute to the local economy will be significant. The Chelan area already enjoys a reputation as a vacation and meeting destination; when it also becomes known as a wine tourism destination the area will attract more visitors, and the seasons of visitor activity will be extended.

The boutique wineries expected to blossom in the area will likely focus much of their sales efforts in attracting consumers to the retail space within their wineries. These outlets, with their tasting rooms and attractive surroundings, become the destinations of wine-tourists and the profit-centers for small wineries.

A proactive approach to laying the groundwork and determining strategies for marketing the Lake Chelan area as a wine tourism destination is recommended. If begun in the present, early phase of the industry's emergence, the industry and community will be positioned for a timely and well-executed launch into the market when the industry has evolved to "destination readiness".

To guide the process of outlining a proactive approach to a wine tourism destination strategy, several observations, tasks and issues are offered for consideration in the paragraph below.

- o It appears that the demographic profile of many Lake Chelan area visitors match the profile of serious wine consumers (likely to initiate visits to winery destinations wherein they purchase quality wines). Research to verify or refute this assumption, and to determine consumer preferences would help to forecast sales, target market segments, and design promotions.
- o Educational workshops focusing on regional wine tourism strategies would prepare those in the wine industry and local tourism marketing organizations to create and engage in effective, synergistic marketing programs.
- o The recognized synergy between future wine tourism promotions and Lake Chelan Chamber of Commerce tourism marketing efforts presents exceptional opportunities for cooperative / coordinated marketing programs and special events.
- o Work with the Lake Chelan Grape Growers Association and others to design, print and distribute a map of area wineries.
- o Potential project-specific partnerships to facilitate wine tourism planning and/or marketing could be generated. Parties involved may include:
  - Individual wineries
  - Lake Chelan Grape Growers Association
  - Lake Chelan Area Chamber of Commerce

- Lake Chelan Marketing Association
- Port of Chelan County Tourism Action Group
- WVC's Institute for Rural Innovation & Stewardship
- Chelan County (lodging tax funds)
- Washington Wine Commission
- Washington Association of Wine Grape Growers
- Tourism Division, WA Office of Trade & Economic Development

The legislature and other ports have lauded the Port of Chelan County for its groundbreaking involvement in tourism marketing. Just last year, the Port was awarded for its ability to forge meaningful partnerships. Its record in tourism and partnership suggests that, at this juncture, the Port could make a significant contribution by initiating a meeting of potential partners to explore a proactive, strategic approach to the marketing of wine tourism in the Lake Chelan area.

### **3. Assist with collection and retention of data in support of an application for a (BATF) American Viticultural Area designation (appellation) for the Lake Chelan region**

Most regions that have successfully achieved recognition for their area's grapes and wines have sought and secured a designation as an American Viticultural Area (AVA) from the Bureau of Alcohol, Tobacco, and Firearms (BATF). This designation permits the use of viticultural area names as *appellations of origin* in wine labeling and advertising. It helps consumers better identify the wines they may purchase, and helps winemakers distinguish their products from wines made in other areas. (See Table 1 for a list of types of BATF appellations and their respective requirements.)

Members of the Lake Chelan Grape Growers Association have expressed a desire to pursue an AVA designation for the area. However, at this early stage in their evolution, the association's organizational capacity and priorities are focused on more immediate challenges. Meanwhile, the ability to use an AVA *appellation of origin* to accelerate the emergent industry's market presence slips further into the future – a future that is further extended by a regulatory process that may take several years.

If the Port of Chelan County is willing and able to assist in the AVA petition process, it is likely that an AVA designation could be achieved a year or years ahead of current estimates. This would provide the emergent industry with a valuable, proven tool to market its products and enhance the area's reputation as a wine tourism destination. Following is a brief description of the tasks involved in securing an American Viticultural Area designation and name from the BATF.

Official recognition of an area by the BATF begins with the filing of a petition. AVA Petitions for an AVA designation require persuasive, comprehensive information providing:

- Evidence that the name of the viticultural area is locally and/or nationally known as referring to the area specified in the application;
- Historical or current evidence that the boundaries of the viticultural area are as specified in the application
- Evidence relating to the geographical features (climate, soil, elevation, physical features, etc.) that distinguish the viticultural features of the proposed area from surrounding areas
- Marked, specific boundaries of the viticultural area, based on features which can be found on U.S. Geological Survey (U.S.G.S.) maps of the largest applicable scale

In spite of the apparent simplicity of the above information requirements, the petitions are relatively elaborate and academic. They may include extensive (and costly) evidence from historians, researchers, soil scientists, meteorologists, and researchers to satisfy stringent evidentiary requirements.

The petition, moreover, is only one step in the AVA process. Before a petition is filed, it is necessary to forge alliances and conduct meetings with growers that might be affected by the establishment of an AVA. The selection of an AVA name (subject to BATF regulations and approval) and boundaries are derived in this pre-petition phase. The post-petition phase includes a notice-and-comment period where written comments are solicited through a notice published in the Federal Register. Once the public comments are obtained, BATF conducts its own review and has the option, based on the evidence and comments received, of issuing a final regulation to formally establish the viticultural area.

#### **4. Assist with collection of weather data**

Accurate macro and microclimate data is critically important to wine grape growers in general, and especially meaningful to new growers and potential growers in the Lake Chelan area. Specifically, such data helps determine heat accumulation, length of growing season, and severe winter temperatures. Combined with soil, solar, wind, and other information – precise climatological data is used to determine whether or not a specific area can support quality wine grape cultivation, and if so, which grape varieties are best suited to the site. Clearly, climate data is essential to the long-term development of the wine grape growing industry in the Lake Chelan area.

The Port of Chelan County, recognizing the importance of weather data to all agriculturalists in the area, currently contracts with Wilbur-Ellis to collect and archive weather data from several stations in the Lake Chelan area. This data complements National Weather Service data of record between 1948 and 2000, and is referenced in Appendix A and B.

#### **5. Assist with industry planning efforts and training and education for winemakers and growers**

The Port may assist with industry planning by providing resources for planning meetings (e.g., meeting facilitators, organizational consultants, wine specialists). Additionally, the Port may

assist with implementation of certain activities. For example, the Port could potentially identify and secure grant funds<sup>16</sup> for an industry project.

The Port has already been involved in supporting training and education for the Lake Chelan wine industry through its participation in the Wine Growing Short Course, presented in February 2002. That cooperative effort exemplifies the partnering role the Port may play in future training programs for the industry.

## **Education & Research Institutions**

### ***Wenatchee Valley College - Institute for Rural Innovation and Stewardship***

Wenatchee Valley College's Institute for Rural Innovation and Stewardship (IRIS) has launched an initiative to use modern electronic media and distance learning, in addition to traditional classroom environments, to promote the "diversification of crops, products, and rural businesses such as wineries, (and) agri-tourism . . ."<sup>17</sup>. In a proactive response to the needs of the emergent wine industry throughout North Central Washington, IRIS developed a Wine Growing Short Course for interested growers and potential winemakers. The first presentation of the workshop in February 2002 was planned and executed through a cooperative effort with the Port of Chelan County, Lake Chelan Grape Growers Association, and Okanagan University College in British Columbia, Canada.

It appears likely that IRIS will play an important, proactive role in providing training opportunities for the emergent wine industry. The Wine Growing Short Course attracted approximately 200 people, and responses to a survey circulated at the workshop suggests a significant interest in a web-based curriculum and a 2-year degree program in viticulture and enology.

The Institute's emphasis on cooperative efforts, exemplified by its approach to creating the short course, suggests its potential as a key player in the mix of partnerships working to develop the wine industry in the Lake Chelan area.

### ***Washington State University***

Washington State University is the leading wine grape research and training institution in the state. Although the emphasis of its wine and grape research is based on industry needs in the south central portion of the Columbia Valley, wherein lies 90% of the state's wine production, much of WSU's research and its many resources are relevant to the emergent Lake Chelan area

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<sup>16</sup> Examples of funding sources include: USDA's Rural Business Opportunity Grants, USDA Cooperative Development Grants, grants from the Washington State Office of Trade and Economic Development

<sup>17</sup> IRIS brochure, published by the Wenatchee Valley College Foundation

wine industry. Especially relevant is the fact that WSU programs are “designed to sustain the economic production of high quality grapes for the production of high quality premium wines”<sup>18</sup>

In addition to its many research projects, WSU offers a Bachelor of Science degree with an emphasis in viticulture and enology, produces enology and viticulture mini-courses, and maintains a website and archive with valuable data and reports. Many of these, and other courses, are available through the WSU Learning Center located on the Wenatchee Valley College campus.<sup>19</sup> Additionally, WSU’s extension agents in the Columbia Valley have counseled local Chelan area wine grape growers upon request. WSU also has developed a program, the Washington State Enology and Viticulture Education Consortium in association with several community colleges.

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<sup>18</sup> <http://winegrapes.wsu.edu/scripts/general/overview.htm>

<sup>19</sup> Dr. Kent Mullinix is an academic advisor for the WSU Learning Center and is located on the WVC campus.

## REFERENCES

- A C Nielson/Adams. [www.wineinstitute.org/communications/statistics](http://www.wineinstitute.org/communications/statistics)
- Anderson, Chris (2001) grower interview.
- Appel, Ted (2002) Recession, imports rein in wine sales. The Press Democrat. January 31, 2002
- Ashton, Linda (2001) Wine industry is making money for state economy, Columbian, Vancouver, WA April 26, 2001
- Ashton, Linda. 2001. Columbia Publishing Company. News Article April 26.
- Bond, Jeff. (2001) Branding. Washington CEO, October, 2001. 12 (11) p 54
- Bordelon, Bruce. Economics of Midwestern Grape Production, Purdue University, [www.indianawines.org](http://www.indianawines.org)
- California Association of Wine Grape Growers (2001) Website [www.cawg.org](http://www.cawg.org)
- Candiagua (2001) Web site [www.candiagua.com](http://www.candiagua.com)
- Chelan Public Utility District (2000) Final Study Report, 1998/1999 Recreational Use Assessment, Lake Chelan Hydroelectric Project,
- Demsky, Andy. (2001) The new tasting rooms get personal, Wine Business Monthly, April 25.
- Dietrich, William (2000) The Wine Department is the supermarket temple of mystery. Pacific Northwest Magazine, The Seattle Times. October 29, 2000
- Economist, (1999) Glug, glug, glut. The Economist, 353 (8150) p103
- Ferguson, Scott (2002) Direct sales programs in today's wine industry. Wine Business Monthly, January 2002.
- Franson, Paul (2001) Many in wine business trying to ignore reality. Napa News December 26, 2001
- Gebers, B. Crawford, S. Folwell, R. Wample, R. and Thorsen, T. 1997. Establishment and Annual Production Costs for Washington Wine Grapes. Washington State University Cooperative Extension Bulletin EB1588,
- Hansen, Melissa (1999) Growers urged to be active in wine making. Good Fruit Grower,
- Hansen, Melissa, (2000) Destination vineyard is a dream come true, Good Fruit Grower,
- Jones, Shirley (2000) Wineries, websites, and cyberspace - are they worth it?, Wwinebusiness.com, June 01.
- Klock, Glen. 2002. A perspective of the Lake Chelan Wine industry potential. 12 p.
- Larson, Cassandra (2001) The value of brand: Building investment in a highly competitive marketplace. Wine Business Monthly,
- Lillstrom, James (2000) Chelan County Visitor Profile, Summer 1998-2000. Port of Chelan County, Tourism Action Group

- Moran, Tim (2002) Attacks sour wine industry. Modbee.com posted January 26, 2002
- Pellechia, T. (1997) Days of Wine. Brandweek, 38 (37) p30
- Phillips, Curtis (2001) What a Small Winery Needs for Harvest Analysis. Wine Business Monthly 8 (9); September 04.
- Runyon, Dean (1997). Chelan County Visitor Profile. Port of Chelan County
- Runyon, Dean (2000) WA State 1991-1999p Travel Impacts and Visitor Volume. WA State Community, Trade, and Economic Development
- Shapiro, L. (1998). A glass half empty. Newsweek, October 5, pp. 74-76.
- Shara, Lisa (2001) Can technology predict terroir? Wine Business Monthly, 8 (8) August 28.
- Shore, Terri (1996). Wheels of fortune demystify wine business cycles. Vintner and Grower January.
- Stevens, Robert G. 1999. Growing Grapes in Eastern Washington. Proceedings from the 1998 Washington State University short course for establishing a vineyard and producing grapes. Jack Watson (ed) Good Fruit Grower, Yakima, WA Pp. 75-81
- Swartzberg, Mark (2000) Impact of E-commerce. Wine Retailing News, June 1.
- Thach, Liz & Curtis Eaton (2001) E-commerce adoption in the wine industry. Wine Business Monthly, 8 (5) May 23.
- Washington State Agricultural Statistics.
- Washington Wine Commission, Website. [www.washingtonwine.org](http://www.washingtonwine.org)
- Watson, Jack. 1998. Washington Viticulture – The Basics. Proceedings from the 1998 Washington State University short course for establishing a vineyard and producing grapes. Good Fruit Grower, Yakima, WA Pp. 13-20
- Wine Institute (2001) Website [wineinstitute.org/industry/statistics](http://wineinstitute.org/industry/statistics)
- Winemarketcouncil.com -- Industry overview 1999.  
[winemarketcouncil.com/research\\_summary.asp#market](http://winemarketcouncil.com/research_summary.asp#market)
- Winter, Mick (2001) Is your tasting room ready for the Crowds? Wine Business Monthly April 25

## **Appendix A**

### **Viticultural Potential Of the Lake Chelan Area**

#### **Historical Aspects of the Washington Wine Grape Industry**

The first *Vitis vinifera* (wine grapes) in Washington were probably planted by the Hudson's Bay Company at Fort Vancouver in 1825. At about the same time, it has been presumed that French trappers planted *vinifera* vines in the Walla Walla region of the state. Washington, however, did not see its first bonded winery until 1933, immediately following the repeal of Prohibition. By 1938, Washington had 42 wineries. Most of the wines produced at that time were fortified, sweet desert wines.

One of the most influential personalities in the growth of the Washington wine industry was Walt Clore, who came to Washington State College in 1934 and became an assistant horticulturist at WSU's Prosser Research Center in 1937. Over the next 20 years at Prosser, he tested the growth potential of 250 American, European and hybrid grape varieties. From this early beginning to even today, Clore has been able to assure farmers that *vinifera* can be grown successfully in Washington (Steury 2001).

The Washington wine producing industry was first stimulated by Chas Nagel at WSU in 1960 with his work on the effects of acidity on the quality of wine as well as developing methods for adjusting acidity.

Even with this interest in the wine industry at WSU, by the late 1960's still fewer than 500 acres in Washington were planted to *vinifera* with only six varieties with most acreage in Rieslings. From that early beginning, however, *vinifera* now covers about 29,000 acres in Washington

#### **Current Aspect of the Washington Wine Grape Industry**

##### ***Washington***

These 29,000 acres of wine vineyards in Washington produced an estimated record production of 107,000 tons of wine grapes in 2001. Washington's wine industry is relatively small when compared with California's 568,000 acres of wine grapes with an estimated production of 3.4 million gallons or 90 percent of the wine in the United States. Here in Washington, however, in a growing industry wine grapes produced will be processed by more than 170 wineries to make about 4.9 million cases of wine with an estimated value of \$576 million (Ashton 2001).

A continued increase in the production of wine grapes is expected in Washington. However, lower production years will occur in the future as a result of the periodic freeze damage that can be expected in Washington vineyards.

### ***Lake Chelan Area***

Growing wine grapes and winery development in the Lake Chelan Grape Growing Area is definitely part of the Washington “frontier” wine industry. It is estimated that by the end of 2002 there will be about 60 acres of wine grapes, many of which are in the immature stage of production. It is further estimated these acres will mature by 2006 and yield 240 to 270 tons of wine grapes if not affected by severe winter conditions. The dominant varieties planted are Riesling and Merlot.

At present, a local winery market for the Lake Chelan grape production is limited. A survey of members of the Lake Chelan Grape Growers Association in 2001 indicates that at least five entities are in various stages of developing small wineries with a production range of 2,000 to 10,000 cases annually. Until wine grapes and wine is commercially produced in the Lake Chelan Area, there can be no assessment of the “terroir” of the area. At present there is no local commercial wine available for quality testing. However, some Lake Chelan vineyards should have fruit suitable for wine production and quality testing with the 2002 crop.

An assessment of the conditions for producing quality wine grapes as described below for the Lake Chelan Area shows no major site limitations to growing *vinifera* other than expected periodic winter damage. It should be noted, however, a more formable limitation to future production may be the \$15,000 per acre estimated cost to establish a vineyard during the four to five year start-up period when there will be immature production and the ability to make a profit as a business enterprise.

### **Viticulture Potential in the Lake Chelan Area**

Eastern Washington has proven itself as one of the premier grape growing areas in the world. Can the lands of the Lake Chelan Area of north central Washington be a part of this success where experience has shown that the limiting factor for producing a consistent high quality grape crop in Washington is cold injury?

Many cultural and/or agronomic practices take this cold injury limitation into consideration. The following discussion is focused on the basic commercial viticulture practices employed in eastern Washington, with special attention applied to avoiding cold injury for an emerging grape growing industry in the Lake Chelan Area. Other cultural and/or agronomic practices that are key to grape production in the Lake Chelan Area are also discussed.

## *Climate*

Generally, grapes grow best between the 35<sup>th</sup> and 50<sup>th</sup> latitudes in the northern hemisphere noting that the Lake Chelan Area is about 48<sup>o</sup> north latitude. Within these latitudes the common factor for quality wine grape growing sites is limited, but even, water availability, at least during the maturation period of the grapes. For the Lake Chelan Area, water control through irrigation is very important to meet this requirement. Outside these latitudes it is either too warm or in the case of the northern latitudes the colder climate prevents grapes from assimilating sufficient sugar for full ripeness, and leading to tart, over-acid wines.

The site-specific latitude, however, may be modified by the slope of the land that leads to an “effective latitude” providing the opportunity to grow a range of varieties with different climatic requirements all within the same region. For example, lands on a gentle south slope may have an “effective latitude” several degrees lower and warmer than a level surface and grape plants with higher heat requirements will respond accordingly.

From a wine grape growing perspective, the best wines are produced from grapes that just achieve maturity in a given site. An explanation is that a long, slow even ripening of the grapes imparts the maximum flavor, balance and concentration to the resultant wine.

In eastern Washington, there are three primary criteria applied to determine the suitability of climate for grape production (Watson 1999). The first criterion is the length of growing season. Within the 45<sup>o</sup> to 48<sup>o</sup> latitude region of Washington, midseason ripening grapes require 130 to 170 days to mature. The average growing season in the Lake Chelan basin below 1,500 feet elevation is about 200 days. Additional time is required after harvest for vines to achieve dormancy. If a killing frost should occur in the spring, fruit buds could be lost and the crop production may be significantly reduced. Frost occurring in the fall before vines go dormant curtails photosynthesis and the natural dormancy process, making vines more susceptible to winter injury.

The second criterion is the accumulation of heat throughout the growing season. This heat summation, expressed as degree- days, is measured by taking the average of the maximum and minimum daily temperature in degrees Fahrenheit and subtracting 50 degrees. Daily heat units are added throughout the growing season to obtain a total for the year. Total heat units should be in excess of 1,700 to allow grapes to ripen (Winkler 1974). If accumulated heat units exceed 3,500 grapes tend to be low in acid and quality can suffer.

National Weather Service data of record between 1948 and 2000 shows for the Lake Chelan Area a mean heat units of 2,677 with an annual range between 1,918 and 3,343. The annual heat units 45 percent of the time range between 2,529 and 2,825. This data indicates that the annual heat units for the Lake Chelan Area near the lake level is about 300 units above that of Prosser, Washington where extensive grape production now exist. Several private local weather stations exist within the growing area. There seems to be a large variability among heat units reported by these stations, which may reflect local microclimates. However, there may be some instrumentation or calculation error included as part of this reported heat unit variability.

Although an average heat accumulation requirement is discussed here, there is a relative difference in heat unit requirements among varieties as shown in Table 1.

Table 1. Relative Heat Unit Requirements of Grapes Grown in Eastern Washington (Wolfe 1999).

HEAT UNIT REQUIREMENTS		
Low	Moderate	High
Riesling	Chardonnay	Cabernet Sauvignon
Gewurztraminer	Lemberger	Cabernet Franc
Pinot Noir	Syrah	Sauvignon Blanc
Pinot Gris	Merlot	Sangiovese
Pinot Blanc		Chenin Blanc

The third criterion is severely cold winter temperatures. Well-hardened grape vines can usually withstand temperatures around 0° F without injury. At temperatures below -10° F, bud and wood loss can be expected. Should warm temperatures occur just before a severe cold period, vines are dehardened by the warmer weather and become more vulnerable to cold injury. One of the more severe wood losses, particularly on the southwest side of trunks, occurs when direct or snow-reflected sunlight warms grape trunks during cold spells. When the sun sets, temperatures drop rapidly, and trunk tissue becomes very susceptible to cold damage.

Although Lake Chelan provides moderation, it is not unusual for winter cold snaps to drop below 0° F for a few days each winter and occasionally below -10°F. The coldest weather occurs with outbreaks of cold arctic air. Thus, grape wood loss can be expected in the Lake Chelan Area some years.

Although the minimum temperatures may vary in the Lake Chelan region it should also be kept in mind that there is a relative cold hardiness among varieties as shown in Table 2.

Table 2. Relative Cold Hardiness of Grapes Grown in Eastern Washington (Wolfe 1999).

RELATIVE COLD HARDINESS		
Low	Moderate	High
	Sauvignon Blanc	Riesling
Merlot	Lemberger	Chardonnay
Sangiovese	Cabernet Sauvignon	Gewurztraminer
Sermillon	Cabernet Franc	Pinot Noir
Syrah		Pinot Gris
Viognier		Pinot Blanc

Although the Lake Chelan Area's climate can cause cold injury to vines, it provides favorable conditions to potentially grow high quality grapes. Warm sunny days and cool nights characterize the growing season and provide an excellent balance to grape sugar and acid. The local arid conditions reduce disease problems associated with high rainfall and high humidity.

And finally, because of the more northern latitude of the Lake Chelan Area, summer days are long and compensate for shorter growing season and low heat units elsewhere.

### ***Varieties***

There are two species of grapes that potentially could be grown in the Lake Chelan Area. *Vitis labrusca*, grown primarily for juice and jellies is planted on approximately 24,000 acres elsewhere in Washington. The varieties of importance are Concord and Niagara. These grapes are native to the eastern coast of the United States and are somewhat more cold hardy than *Vitis vinifera* varieties discussed later. *Vitis labrusca* vines can be characterized by their trailing habit of growth; leaves that are felty or covered with fine hairs on the lower surface; and by grapes whose skin slips or does not adhere firmly to the pulp. *Labrusca* grapes also differ from other species by their flavor, described as foxy or having atypically Concord-like taste. Concord and Niagara grapes have experienced a period of expansion during the late 1990s, and now production seem to be in equilibrium with market demand.

*Vitis vinifera*, the other important species of grapes grown in Washington, is produced primarily for wine production. There are an estimated 29,000 acres of wine grapes planted in Washington and 170 wineries (up from 19 in 1981) producing 4.9 million cases of wine a year worth about \$576 million (Ashton 2001). Between 1990 and 1999, the size of the annual wine grape crop increased 64 percent and red wine grapes edged out white wine grapes as the Washington standard (Ashton 2001). The harvest in 2000 was about 88,500 tons, almost 25 percent more than a previous 71,000-ton record set in 1998 (Leff 2000). Varieties of *Vitis vinifera* planted in Washington are listed in Table 3. Data shows an increase in acreage from 1997 (Folwell 1998) to 2000 of Chardonnay, Cabernet Franc, Cabernet Sauvignon, Syrah and Merlot with the other varieties remaining about the same level (USDA 2000). Small acreages of Nebbiolo, Sangiovese, Viognier and Pinot Gris are also planted. French hybrid wine grapes as well as *Vitis vinifera* table grapes have been grown successfully in eastern Washington, but marketing of these varieties has been difficult.

Table 3. Major Washington *Vitis vinifera* Varieties and average acreage in 1997 (Washington State Agricultural Statistics, 1999).

Red Varieties	Acreage	White Varieties	Acreage
Merlot	5,600	Chardonnay	6,100
Cabernet Sauvignon	5,000	White Riesling	1,900
Pinot Noir	200	Chenin Blanc	400
Lemberger	150	Sauvignon Blanc	700
Cabernet France	700	Semillon	600
Syrah	1,500	Gewurztraminer	400
Other Red	350	Other White	400

### ***Site Suitability***

The suitability of a site for planting grapes is influenced by several factors of climate, soil and resource availability (Watson 1999). The climate, as discussed earlier, should be studied both for its regional influence on heat accumulation, length of growing season, and severe winter

temperatures, as well as it is affected by site characteristics such as slope or aspect of the land, wind currents, soil texture, and altitude (Ahmedullah 1985). Because there is such a strong emphasis on wine grape quality as affected by growing conditions and because of the grape's relative low cold tolerance, site selection for raising *Vitis vinifera* in the Lake Chelan region would be very critical. Site selection is more flexible for the more-cold tolerant *Vitis vinifera* (Table 2), but is still an important consideration. Characteristics that are associated with good grape-growing locations include a southern slope with good cold air drainage, less than 1,500-foot elevation, and light or coarsely textured soil.

Other considerations that may enhance site suitability would be closeness to either Lake Chelan or the Columbia River, which can absorb heat and help temper climate in the immediate vicinity. Exposed westerly ridge tops or other windy locations tend to have less frost, but strong persistent winds can reduce vine growth and yield.

It should be kept in mind that the controlled use of irrigation water in the Lake Chelan Area can be an asset in regulating grape vine vigor and assisting with cold hardiness. Vines that receive limited irrigation water early in the growing season produce higher quality fruit and a more manageable canopy. Water stress late in the growing season can hasten dormancy. A final irrigation after harvest and before the ground freezes, helps insulated roots from severe winter cold. The judicious use of nitrogen fertilizer can similarly help manage vigor and hasten dormancy. Although not measured, it is highly likely that the irrigation water requirements for grape production in the Lake Chelan Area would be less than 14 inches annually.

In addition to cultural practices, there are protection devices that can be effective. Wind machines can be used to circulate warm air that collects in the inversion layer above the vineyard. These machines can be used both in mid-winter to increase vineyard temperatures and in the spring and fall to reduce frost injury. Orchard heaters and water can also be used for cold protection.

Considerations for selecting a site should also be given to the availability of trellis and other supplies, labor, processing capability and market access.

### ***Importance of Soil and Nutrient Management***

There is probably no single soil constituent or type that is indispensable for vigorous grape plant growth, or that is indisputably the contributing factor in all top quality wines (Berry 1990). Although often speculated, there are no undisputable geologic factors or base rock type that affects vine growth and wine quality. The most common soil physical properties are that of root penetration and drainage followed by resistance to erosion. Water input and retention by the soil are undoubtedly the most vital aspect of any soil for plant growth. The physical structure of the soil will also affect heat retention and reflection, and thereby have an effect on the ripening time of the fruit.

The chemical properties or composition of the soil are very important. The pH of the soil plays a very important role in soil's acidity or alkalinity and consequently the availability of key macro and micronutrients to the grape plant for healthy growth. Thus, nutrients vary

considerably from soil to soil and not only will they affect plant growth, but will affect the exact chemical composition of the wine produce from the grape plant. It is important to consider the trace elements or micronutrients that may be fixed or transitory and may vary according to the nature and the history of the site. Micronutrient availability affects a site's suitability for fine wine production, and will influence the pH of the soil, its richness or deficiency in the essential elements of iron, boron, magnesium, potassium, nitrogen and calcium, all of which will affect the wine grape's growth.

The color in wine may be influenced by trace elements in the soil. Minute amounts of iron can give a violet tint, and the acidity and/or pH of the wine in particular, which is influenced by the soil chemical properties, can affect tannins and other co-pigments such as alkaloids, affecting the resultant color. The flavor of wine can also be influenced by the absence or abundance of soil trace elements.

Soil nutrient levels, particularly potassium, can affect the "organoleptic" condition and the keeping qualities of wine, primarily because of its effect on the wine pH. Too much soil potassium can elevate the grape juice pH, especially on certain soil types. Excessive watering and luxury nitrogen uptake will also influence the acidity and pH of grape juice.

Maintenance of a good soil organic content is highly desirable in vineyards thereby supporting improved soil structure, cation exchange and water retention. A level of soil organic matter of about 2 percent is considered desirable for vine growth. Desirable soil organic matter levels can be maintained with a good effective vineyard fertilization program.

There is no conclusive evidence to show that fruit composition of a wine grape is due to the rootstock itself. However, on a given identical site, scion, and age of vine, there is often a marked difference in grape composition and quality between differing rootstocks. This influence could equally be due to a combination of factors in the difference in leaf area, fruit:weight ratio or to the total root growth caused by a specific combination of rootstock and scion. The depth and colonization of the soil will affect the uptake of both nutrients and water, and will depend as much upon the choice of rootstock as upon the soil's physical and chemical properties. Since most soil properties are virtually impossible to significantly alter, the choice of rootstocks adaptable to the site conditions is critical.

In summary, the most well recognized effect of soil in the production of quality wine is the soil's physical properties, providing a desirable rate of infiltration and internal water movement. This soil condition maximizes the opportunity for potential water uptake by the plant thereby affecting the vine's ability to assimilate the nutrients present in the soil. The physical nature of the soil also dictates its heat capacity and conductivity, and thus the ripening cycle of the vine. The chemical properties of the soil will alter the trace elements in the wine, more particularly in cases of limited yield, and in case of marginal or cooler vineyards where the growing and ripening cycle of the vines has been prolonged.

In the temperate zones, grape fruit ripening completely, but slowly, will give the best and most consistent quality. The soil in a quality vineyard will tend to minimize fluctuations created by climate, thereby leading to consistent quality wine production.

Given the above effects of soil properties on wine *vinifera* growth and resultant wines produced, it is obviously essential to conduct a thorough soil testing program before developing any new vineyard site.

### ***Lake Chelan Grape Growing Area Soil Suitability***

Grapes can be grown successfully under many soil conditions as demonstrated by the variety of sites producing grapes in the Pacific Northwest (Stevens 1999). Soil conditions, however, may play an important role in determining the cost of establishing and maintaining a successful vineyard. The “ideal” soil for a vineyard has been described as being a deep, well-drained soil of medium or medium to light texture with no layers that restrict the movements of water or root growth. Grapes, especially wine grapes, however, with proper management can be grown in soils that significantly deviate from this “ideal” soil.

As more emphasis is placed on the quality of grapes produced, the uniformity of the vineyard becomes even more important than when just the volume of production is the basis for measuring success. The soil properties and topography will play an important role in how uniform the production and quality is across a vineyard. Factors such as soil texture and depth will play key roles in determining soil moisture levels, thus affecting how the crop matures and its cold hardiness in different areas. Viticulturists recognize that the variation in soil properties must be known and understood to maximize the quality and quantity of grapes grown on a given landscape. This is particularly true in the Lake Chelan Area

The most prevalent and capable soils for growing grapes in the Lake Chelan Area is the Chelan series, namely the Chelan gravelly sand loams on slopes 0 to 45 percent. The Chelan series consists of well-drained, moderately coarse textured soils that formed in pumice, volcanic ash, and loess over non-sorted, gravelly, cobbly, or bouldery deposits of ablation glacial till (Soil Survey of Chelan Area, Washington, u.d.). These soils range in elevation from 1,200 to 1,800 feet with the upper elevations unlikely available for grape growing because of cold winter conditions. The average annual precipitation is 10 to 15 inches, average annual air temperature is about 50° F, and the frost-free season is 180-200 days. Chelan soils are currently used for orchards, pasture, range, wildlife habitat and small grain.

Other soils series besides the Chelan series could support grape production in the Chelan area. Total gross acreage for these soils in the Lake Chelan grape growing area is about 3,500 acres. Urban and other land uses appears to have or soon will take about 1,500 acres out of production, thereby leaving about 2,000 acres of production land over the next ten years. Based on information from a recent survey of land use by farmers in the Lake Chelan Area, it is unlikely that more than 10 percent or 200 acres might go into grape production in the next ten years. Most *vinifera* production would be expected along the southern slopes of the north shore of Lake Chelan. This estimate is based on year 2001 agricultural economic conditions, particularly in the tree fruit industry, and may vary considerably in the future.

For the soil types and climate in the Lake Chelan Area, *vinifera* production should average about 3-4 tons annually on mature plants. It could thus be inferred that if all 200 acres were planted and reached maturity at the same time, maximum total production of wine grapes in the Lake Chelan grape growing area would remain less than 800 tons annually through the year 2010.

### LITERATURE CITED

Ashton, Linda. 2001. Columbian Publishing Company. News Article April 26.

Berry, Elizabeth. 1990. The Importance of Soil in Fine Wine Production. *Journal of Wine Research* Vol. 1(2) pp 179-195.

Echikson, William. 2001. Wine War. *Business Week*. September 3. pp. 54-60.

Evan, Robert G. 1998. Irrigation Choices for *Vitis Vinifera* Grapes in Washington. IN: *Growing Grapes in Eastern Washington*. Proceedings from the 1998 Washington State University shortcourse for establishing a vineyard and producing grapes. Jack Watson (ed) Good Fruit Grower, Yakima, WA. Pp. 57-74.

Folwell, Raymond J. 1998. The Economic Realities of Growing Grapes in Eastern Washington. IN: *Growing Grapes in Eastern Washington*. Proceedings from the 1998 Washington State University shortcourse for establishing a vineyard and producing grapes. Jack Watson (ed) Good Fruit Grower, Yakima, WA. Pp. 1-12.

Leff, Marni. 2000. *Seattle Post Intelligencer* September 6.

Steury, Tim. 2001. Cataclysm, Light, & Passion. (How Washington came to produce some of the world's greatest wines) *Washington State Magazine*, November, pp. 18-28.

Stevens, Robert G. 1998. Soil and Nutrient Management for the Vineyard. IN: *Growing Grapes in Eastern Washington*. Proceedings from the 1998 Washington State University shortcourse for establishing a vineyard and producing grapes. Jack Watson (ed) Good Fruit Grower, Yakima, WA. Pp. 52-56.

USDA 2000. Washington Wine Production Data (Internet spreadsheet files)

Wamole, Robert L. 1998. Water Relations and Irrigation Management of Wine Grapes. IN: *Growing Grapes in Eastern Washington*. Proceedings from the 1998 Washington State University shortcourse for establishing a vineyard and producing grapes. Jack Watson (ed) Good Fruit Grower, Yakima, WA. Pp. 75-81.

Washington Department of Agriculture. 1999. *Washington State Agricultural Statistics, 1999*

Watson, Jack (ed). 1998. Washington Viticulture – The Basics IN: *Growing Grapes in Eastern Washington*. Proceedings from the 1998 Washington State University shortcourse for establishing a vineyard and producing grapes. Jack Watson (ed) Good Fruit Grower, Yakima, WA. Pp. 13-20.

## **Appendix B**

### **Lake Chelan Temperature History**

Obtaining adequate heat to mature wine grapes to a desired level is one of the significant criteria in determining the potential success and profitability of site for producing wine grapes. Aspects of temperature are also important in making viticulture decisions, selecting varieties that will produce mature fruit within the length of growing season, and allowing vines to become dormant to be protected from winter freeze damage.

In order to predict the limitations of temperature the Port of Chelan contracted with Wilbur-Ellis Company to provide data from several weather stations located in agricultural sites in and around the Chelan valley. Historical records were also obtained from the National Weather Service National Climate Data Center (NWS) for a weather station located in the City of Chelan near the lake front. As the NWS data provides 43 years of records, 1958 to 2001 and became the base line to which other weather stations were compared. As the NWS weather station was moved in 1958 the records for 1948 to 1958 were not used.

#### **Heat Units (Degree Days) at Chelan**

Annual accumulated 'heat units' (Degree Days) calculated are calculated for this report using the University of California, Davis model of averaging the daily high and low temperature then subtracting 50. Calculations start on April 1 and end on October 31 each year. At present research conducted by Washington State University is and much historical data is recorded using the daily average temperature method.

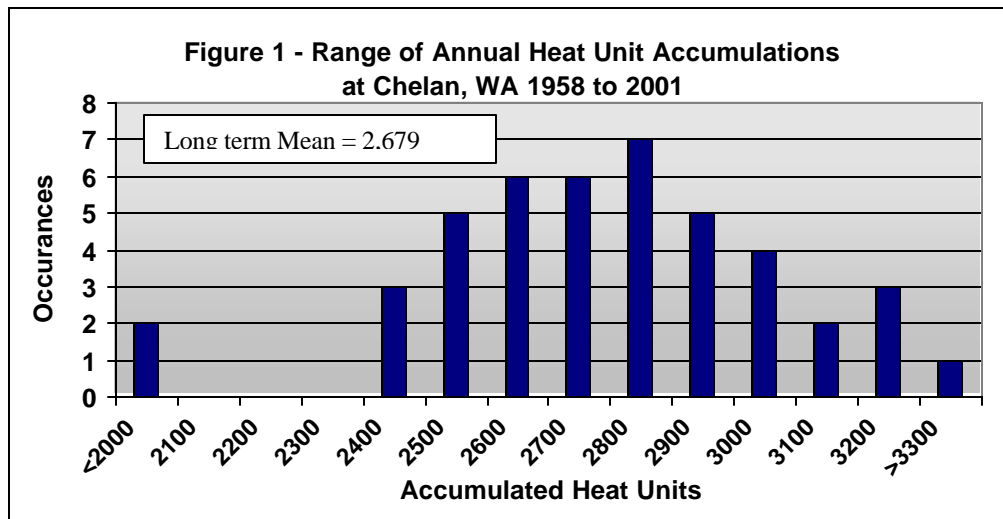
As technology becomes more available to make continuous temperature recordings the Adcon model for calculating growing conditions can be used. Adcon calculations are made every 15 minutes starting on March 1 and ending on October 1. As shown in Table 1 the accumulated heat units for 2001 using the Adcon model were consistently higher than the results using a daily average temperature. There is enough of a difference between these two methods to warn against making any direct comparisons without identifying the method of calculation.

Source Wilbur-Ellis, Adcon and NWS all data is for year 2001.

Table 1 Comparison of Heat Units (Degree Days) calculation Methods				
Weather Station	Elevation <i>Above sea level</i>	Adcon Method	Daily Average Temperature Method	Variance
2885 - Col. River	685 ft.	3,058	2,720	338
2971 - Chelan View	1,342 ft.	2,622	2,279	343
2978 - Howard Flat	1,234 ft.	2,916	2,554	362
3248 - Manson	1,178 ft.	3,040	2,738	302
4328 - Bear Mt.	1,367 ft.	2,956	2,748	211
9947 - Apple Eye	1,599 ft.	2,676	2,403	273
3340 - U. Boyd	2,028 ft.	Incomplete	Incomplete	
Chelan NWS	1,120 ft.	ND	2,908	

From records provided by the NWS the annual accumulated heat units at Chelan, WA were calculated (daily average temperature method), Figures 1. Approximately 75 percent of the years recorded at this weather station accumulated sufficient heat units to be classified as a Region II (California grape classification system, 2,500 to 3,000 heat units). During only two years were accumulations less than 2,300 heat units and there were six years that accumulated more than 3,000 heat units.

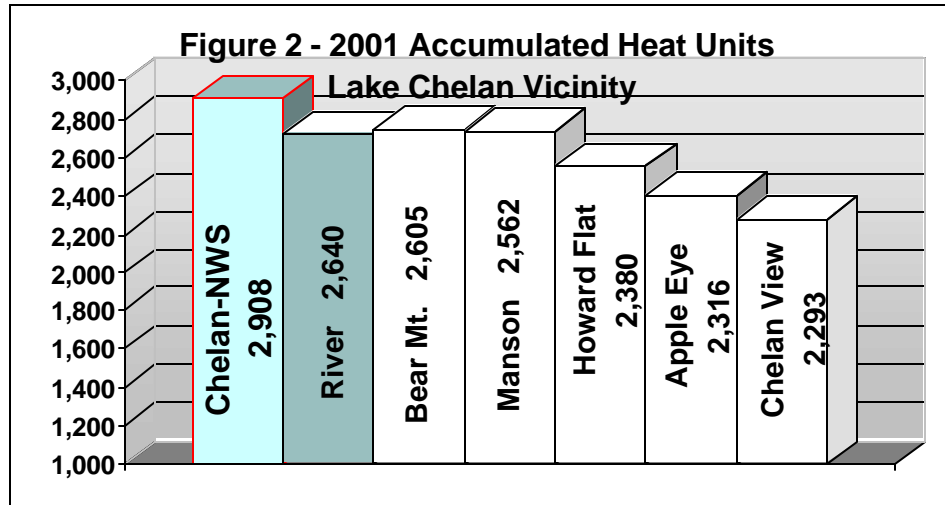
Source NWS Records 1958 – 2001, calculated using average daily temperature method



### Site Comparison

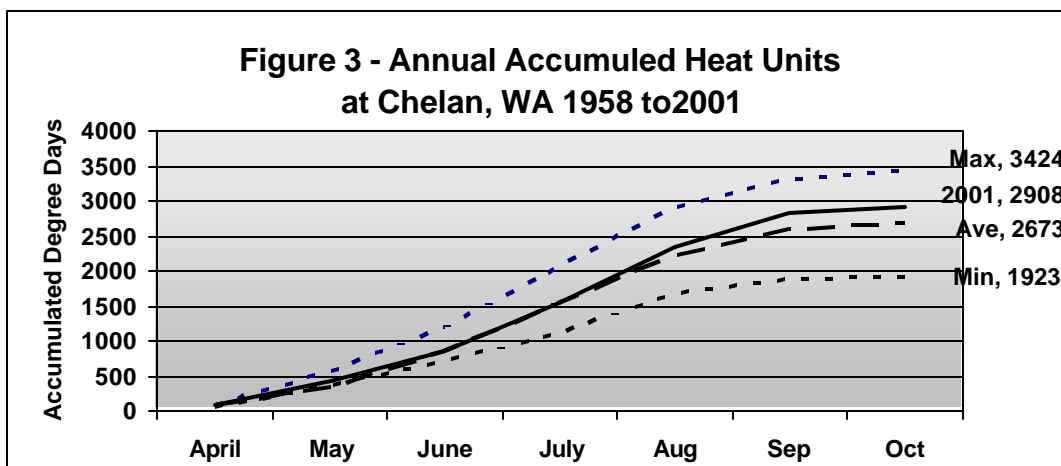
Data collected from these eight sites indicate that in 2001 all of these locations accumulated sufficient heat units to produce wine grapes. Yet the difference of almost 600 heat units between highest and lowest sites points to the need for site specific temperature data for any proposed vineyard. While this is only a one year comparison it can serve as an indicator if the site data is correlated to the long term data obtained for the NWS station. Figure 2 compares the total accumulated heat units within the Chelan Valley vicinity.

Source: Wilbur-Ellis Co. and NWS. Calculated using average daily temperature method



Examining the amount of accumulated heat units obtained each day, Figure 3, for reveals that prior to April 15<sup>th</sup> weather is cool enough that there was no accumulation of Heat Units. Likewise at the end of the growing season temperatures in mid to late October are low enough that very few heat units are accumulated past the first week of October. These cool weather periods could influence the vines ability to become fully dormant after harvest and before the occurrence of freezing weather.

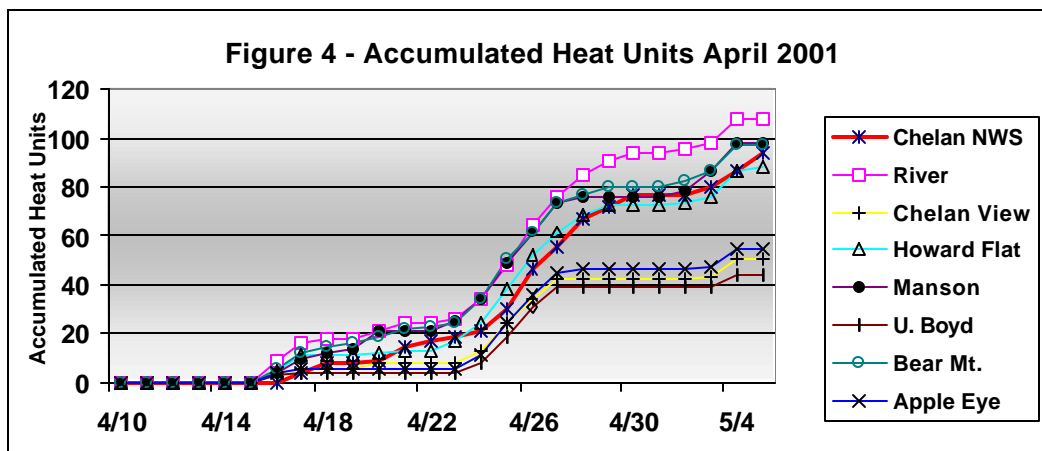
Source: NWS Records 1958 – 2001, calculated using average daily temperature method.



An examination was made of the data collected for all of the weather stations during April, 2001. Prior to April 15<sup>th</sup> there was no appreciable accumulation of heat units then in the third week of April all of the sites received average daily temperatures high enough to start accumulating heat units. Those sites that warmed the quickest were Bear Mt., Manson and the Columbia River. Sites at Chelan View, Apple Eye and Upper Boyd accumulated the least amount of heat units.

A closer look at the daily range of temperatures revealed that while daily high temperatures were similar for all sites (in the low 60's) the daily low temperatures at Chelan View, Apple Eye and Boyd were dropping into the 30's while Bear Mt. or Manson remained above 40. This pattern was repeated during the first week of May when daily lows at Chelan View were into the 30's including two days of frost while Bear Mt. did not drop below 40. Starting in the second week of May the sites accumulate daily heat units at similar amounts.

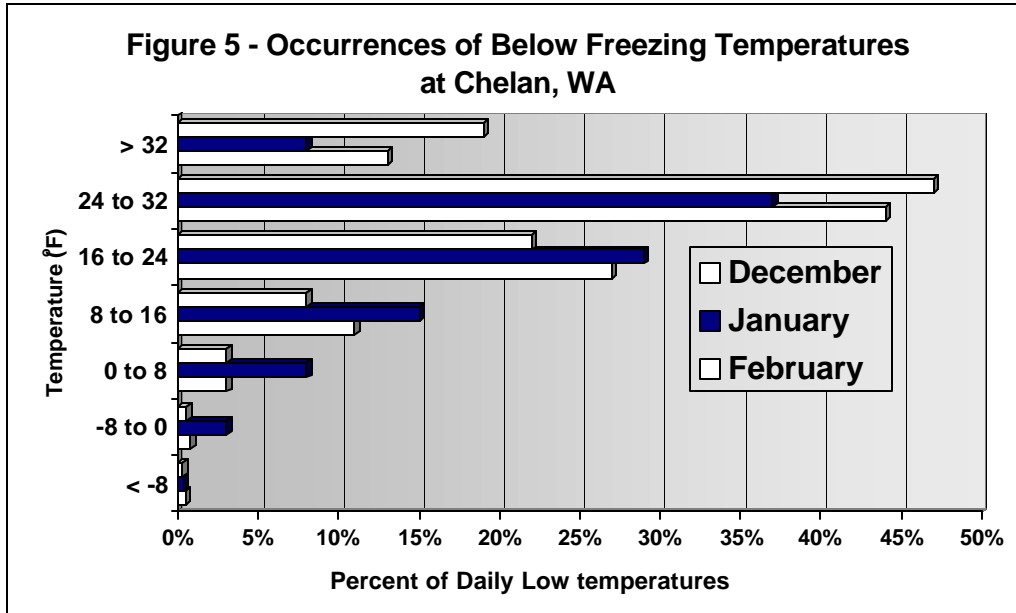
Sources: Wilbur-Ellis and NWS, 2001, calculated using average daily temperature method



### Risk of Freezing

Records for the Chelan NWS station indicate that the risk of damage from severe freezing weather is relatively low at that site. The temperatures at which damage can occur to buds or stem tissues vary according to season and plant hardiness. Figure 5 uses NWS data to show the percent of times that certain temperatures occurred in each winter month. The seven Wilbur-Ellis sites did not have adequate data to make a complete correlation to the NWS station.

Critical temperatures at which grape vines can be damaged vary with the level of dormancy that the plant has reached prior to the freeze. Washington State University's website for the wine grape research <http://winegrapes.wsu.edu> posts updates for cold hardiness on various varieties of vines.

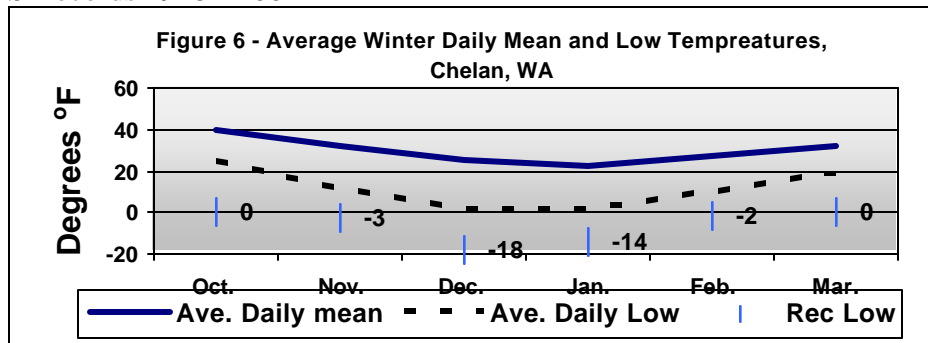


Over a 54 year period recorded by the NWS serious freezing weather had occurred in only two storm events with a total of seven days with low temperatures below  $-10^{\circ}\text{F}$ . One storm lasted for three days from December 29 to 31<sup>st</sup>, 1986. Daily low temperatures were recorded at  $-14$ ,  $-18$  and  $-17^{\circ}\text{F}$  on each of these days. Records show daily high temperatures on those three days were  $-1$ ,  $-7$  and  $-4^{\circ}\text{F}$ . A more severe storm with severe freezing conditions lasting for 24 days was recorded in January 1950. Of the 24 day period 18 days were below  $0^{\circ}\text{F}$  and six of those days were below  $-10^{\circ}\text{F}$ . A record low was recorded at  $-14^{\circ}\text{F}$  on January 25, 1950. Figure 6 plots NWS data for the average of daily mean temperatures, average of daily low temperatures and record lows for each winter month.

**Frost Free Growing Season**

On average there are 187 days during a growing season that are frost free. The first frost of the winter usually occurs around October 22 and the average last frost occurs about April 14<sup>th</sup>. Risk of frost before October 1<sup>st</sup> is a low 3.8% the earliest recorded was on September 18, 1982. Almost 60 percent of the first frosts are during the last half of October. Last Frost in the spring has occurred as early as late as May 5<sup>th</sup>. However, frosts after April 31 have occurred only 4 times in 53 years (7.5%). Proposed vineyards at cooler locations are likely to have an increased amount of risk from freeze damage.

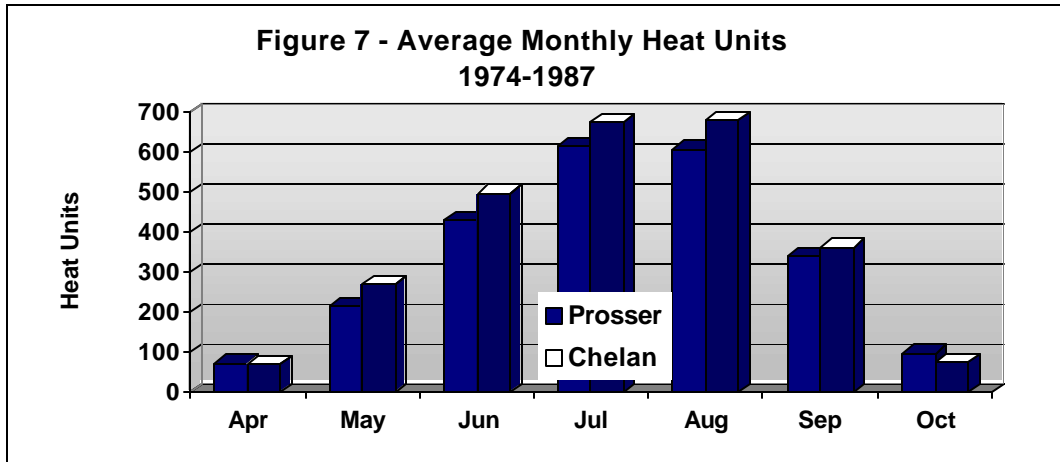
Source NWS Records 1948 - 2001



### Comparison to Other Regions

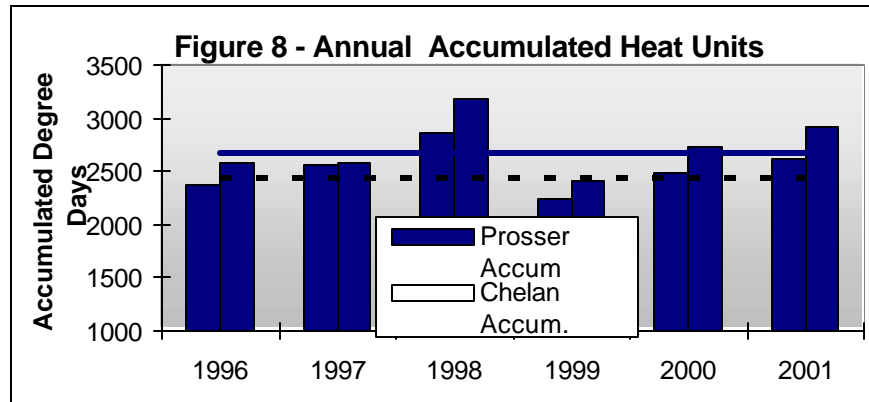
Bench marking Chelan’s weather data to other grape growing regions will enable growers to adapt the knowledge regarding viticulture practices at other locations to meet the local growing challenges. Figure 7 compares Chelan’s data to the Washington State University – Irrigate Agricultural Research Extension Center (IAREC) at Prosser. It appears that in April Aires’s advantage is in a slightly warmer April and October while Chelan accumulates more degree days during May through September. Over a 14 year period the average degree days accumulated for IAREC were 2,378 with 2,633 for Chelan. (EB1591 and NWS data)

Sources NWS Records 1974 -1987 and Nagel, C. 1987

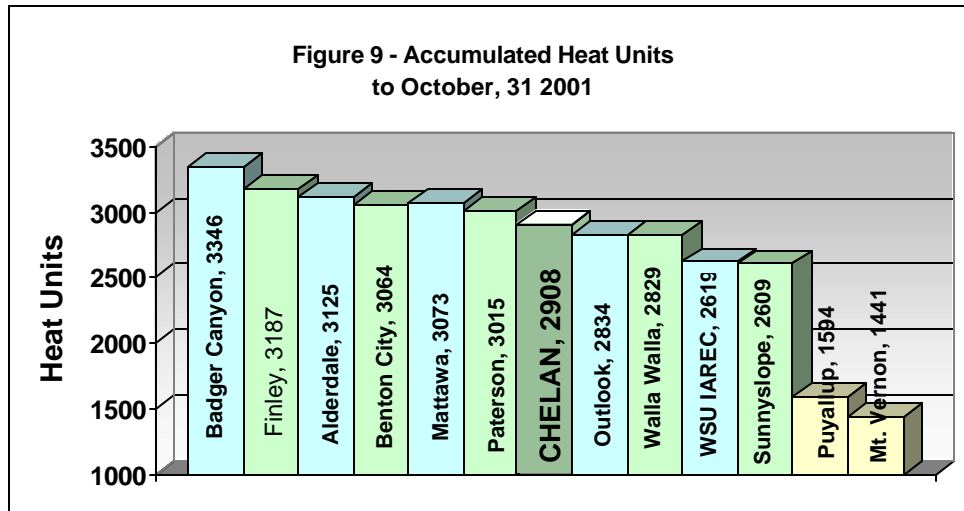


Using the same sources of data, Figure 8 compares the average accumulated heat units as of October 31 each year. Prosser’s six year average was 2,430 or 273 less than Chelan’s average of 2, 676 degree days for the same period.

Sources NWS Records 1974 -1987 and Nagel, C. 1987



Also posted on the WSU wine grape website was information on the degree days accumulated at other major grape growing areas. Figure 9 demonstrates that based on 2001 degree days Chelan has sufficient degree days to be competitive with other growing regions for quality and yield. Chelan data from NOAA weather station at Chelan. As of October 31, 2001



## Access to Weather Data

- **NOAA–NWS weather station network**

Select a desired weather station from a map of the Pacific NW states at [www.wrh.noaa.gov/missoula/nwsonso.sfcrgl.html](http://www.wrh.noaa.gov/missoula/nwsonso.sfcrgl.html)

- Chelan, COOP weather station daily observations. Provides 24hour max, min and mean temperature, 24 hour precipitation. Station elevation 1120 feet above sea level.
- Manson – AGRIMET weather observations every 15 minutes. Provides temperature, dew point, wind, precipitation, accumulated precipitation. station elevation 1972 feet above sea level
- Camp 4 -- RAWS weather observations every hour. Provides temperature, dew point, wind, precipitation, accumulated precipitation. Station elevation 3600 feet above sea level.

- **Wilbur-Ellis**

Maintains a number of weather stations in the Chelan region.

- **National Climate Data Center**

Historical data from various weather stations. Access web sit and search for weather stations by city name. There is a cost to download historical records.

[www.lwf.ncdc.noaa.gov/oa/climate/stationloactor.html](http://www.lwf.ncdc.noaa.gov/oa/climate/stationloactor.html)

- **IAREC – Prosser**

Website updates posted for growing degree days at IAREC-Prosser and other location around the state. Also posts cold hardiness data during the winter.

## References

Folwell, R., Gebers, B., Wample, R., Aegerter, A., and Bales, T. (1997) Production and marketing risks associated with wine grapes in Washington, Extension Bulletin XB 1035. Washington State University

Nagel, C., Spayd, S., Yield and Enological Characteristics of Grape Cultivars in Central Washington 1974 – 1987, Washington State University, Extension Bulletin 1591.

[Winegrapes.wsu.edu](http://Winegrapes.wsu.edu)

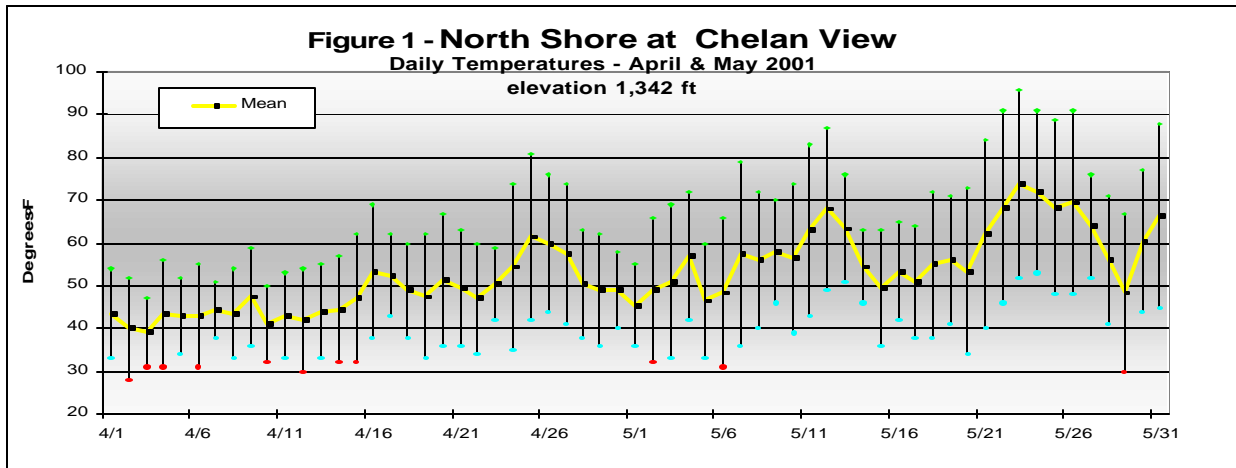
NOAA NWS weather station records for Chelan 1948 to 2001.

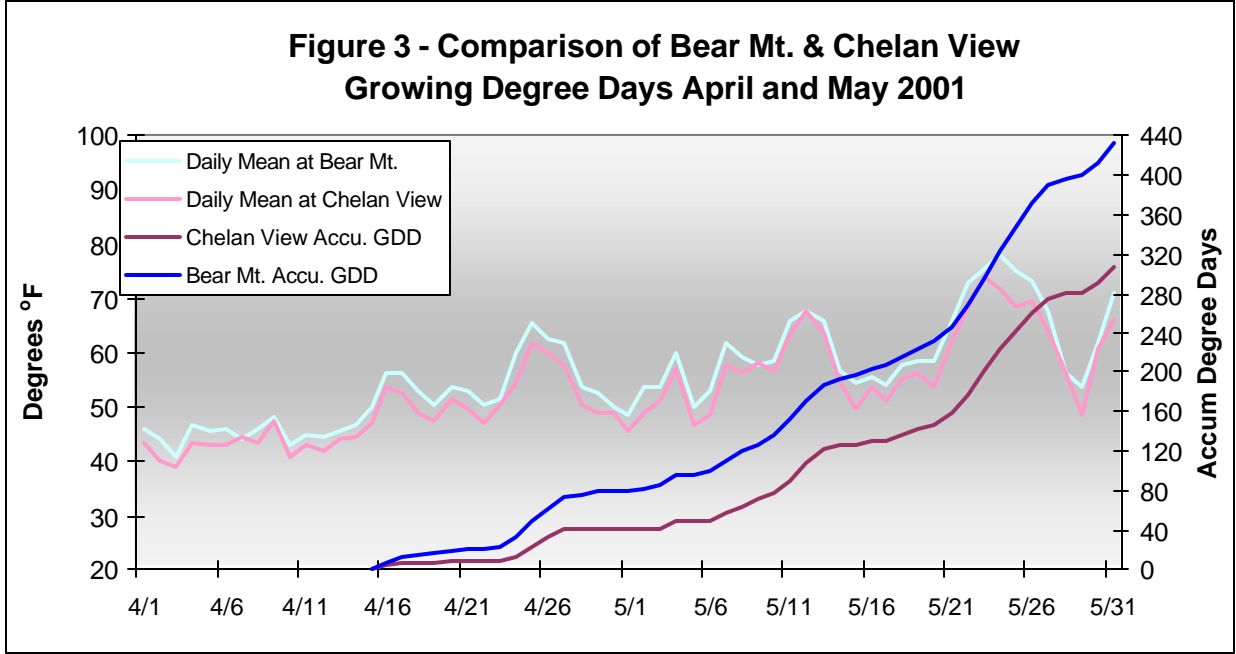
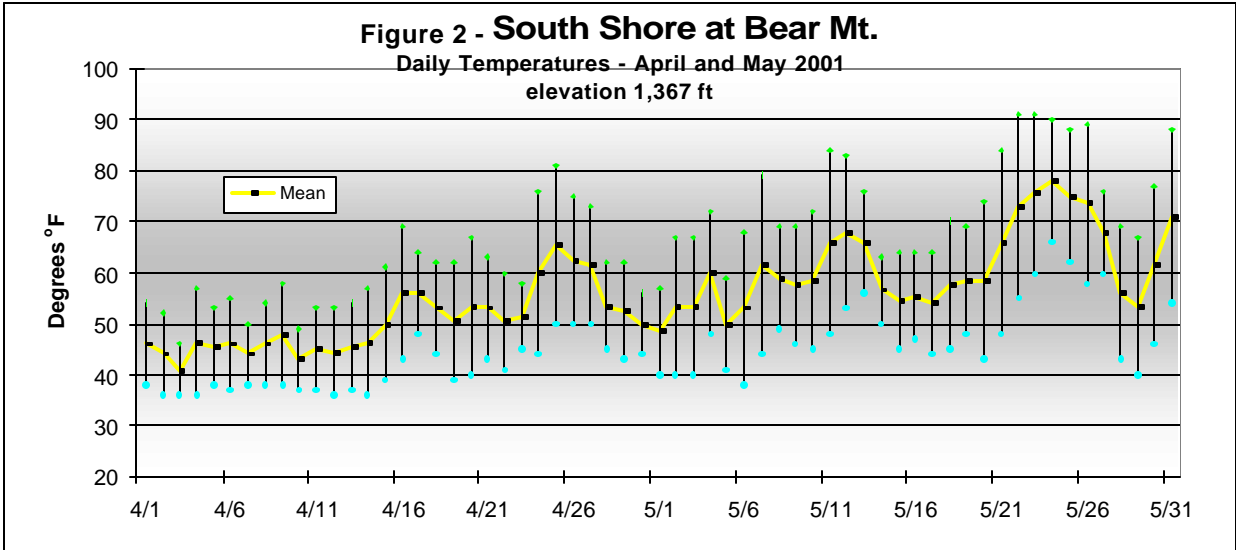
## Additional Graphs and Data

**Sources:** The following charts were calculated from data provided by Wilbur-Ellis and the NWS weather stations in the Lake Chelan vicinity.

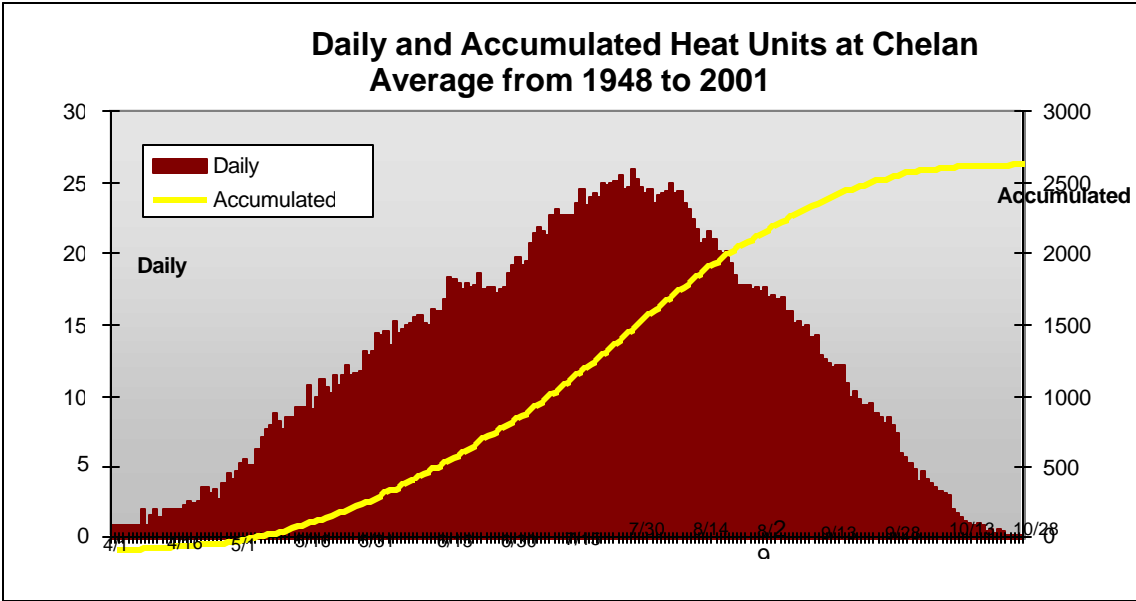
Plots of daily high, low and average temperatures can reveal how wide the daily temperature charges. This type of graph can also be useful in comparing various sites for indication as to how a weather system can have different effects on sites. For example the daily temperature ranges were plotted for Chelan View and Bear Mt. at similar elevations and across the lake from each other. By the end of May Bear Mt. had accumulated 125 more growing degree days (41 percent) than did Chelan View.

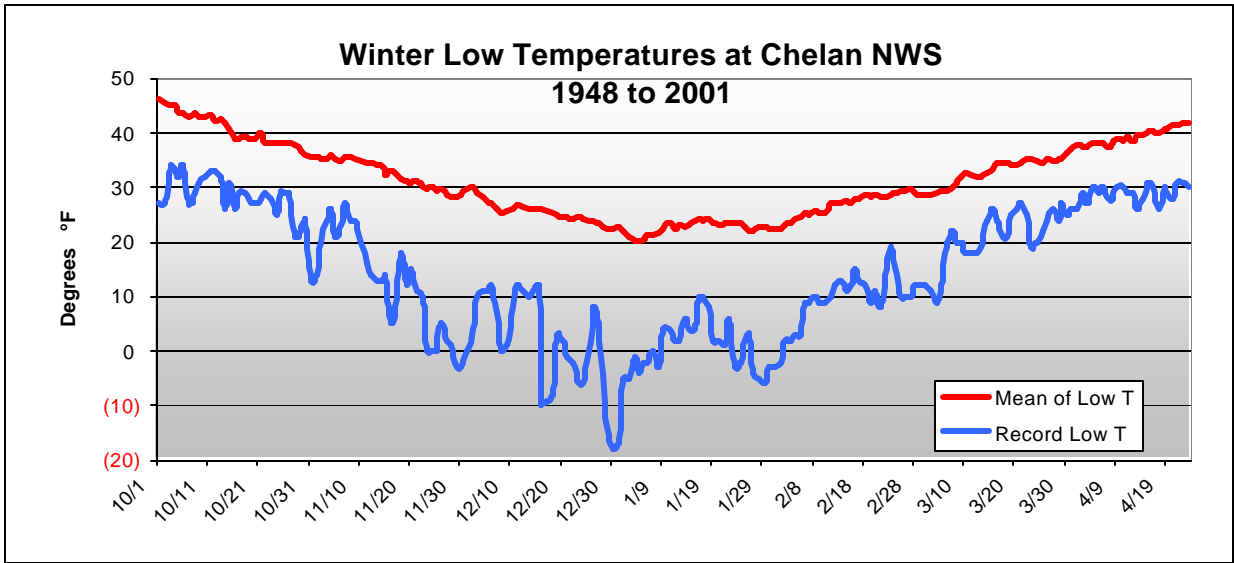
Careful comparison the graphs (Figures 1, 2, and 3) helps understand why the difference. While both sites are almost equal in daily high temperatures the Chelan View daily low temperatures averaging six degrees cooler, along with eleven occurrences of frost (red dots on figure 1), resulting in fewer accumulated degree days at this site. An investigation can now focus on probable causes for the cooler daily low temperatures before sitting a vineyard in the Chelan View area e.g. cold winds moving into the area, or shading that result in a later sunrise/direct sunlight on the site. This type of comparison can be made for the entire growing season to assist in evaluating the potential for growth and maturity of wine grape vines.





Monthly Accumulated Heat Units - Lake Chelan, 2001									
ave. daily temperature method									
	Chelan NWS	Col. River	Chelan View	Howard Flats	Manson	U. Boyd	Bear Mt.	Apple Eye	Regional Ave.
April 30	77	<b>94</b>	42	73	76	39	80	46	61
May 31	417	431	308	385	<b>452</b>	295	432	305	370
June 30	<b>849</b>	835	614	774	<b>849</b>	624	825	627	731
July 31	1,549	1,514	1,225	1,463	<b>1,578</b>	1,259	1,518	1,253	1,404
Aug. 31	<b>2,329</b>	2,206	1,866	2,136	2,298	Incomplete	2,252	1,939	2,102
Sept. 30	<b>2,841</b>	2,680	2,256	2,532	2,722	ND	2,723	2,369	2,511
Oct. 31	<b>2,908</b>	2,720	2,279	2,554	2,738	ND	2,748	2,403	2,576





## Appendix C

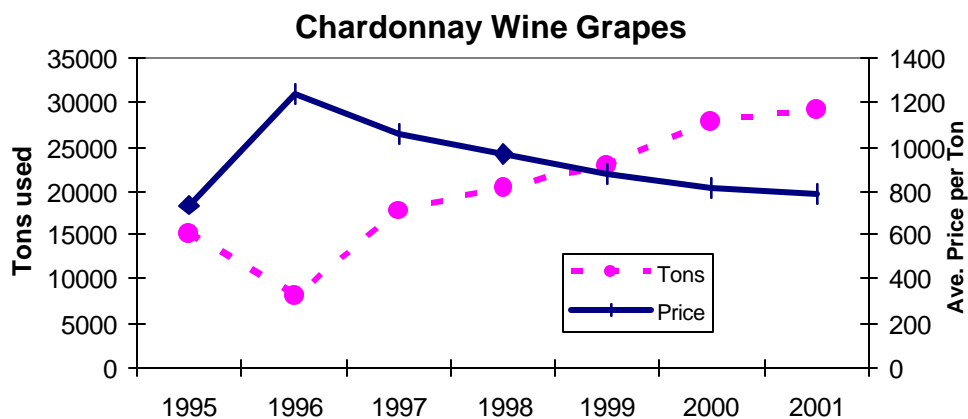
### Washington State Wine Grape Market Trends

Tracking information regarding the wine grape industry will provide indicators as to market place trends that are likely to influence prices. While this information is mostly historical the data can provide a basis from which future projections can be made. Historical data is most useful when connected to other events that can also be monitored. For the wine grape grower information regarding past prices and tons used to producer wine can be considered in context with the number of acres planted, bearing age and to trends in wine sales.

For example: Between 1993 and 1999 the acreage planted to Chardonnay increased by 235 percent to a total of 6,100 acres. As of 1999 about 18 percent of those acres had not yet reached bearing age. Thus the increased production during 2000 and 2001 was at least partially a result of those 1,000 acres maturing and bearing grapes. The increasing amount of Chardonnay grapes on the market influenced prices along with other factors such as decreasing sales of Chardonnay wine. This trend will continue until sales of chardonnay pick up and or acreage planted in Chardonnay is reduced.

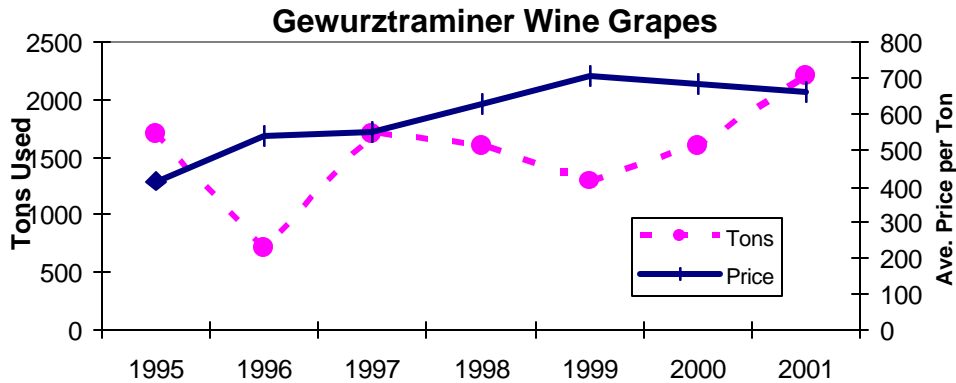
The following charts are based on information from the Washington State Agricultural Statistics Service. Prices are the published statewide average. Published information does not include any range of prices nor does the data reflect the influences of quality on price. These charts are intended to indicate the relative change in price as quantity increases or decreases. This is most notably demonstrated by those varieties that were damaged during the 1996 freeze. A significant loss in total production resulted in a large jump in prices as wineries demand exceeded supply. When prices are fairly consistent from year to year there appears to be some balance between supply and demand.

Table 1. Washington Grape Reports – Washington Agriculture Statistics Service



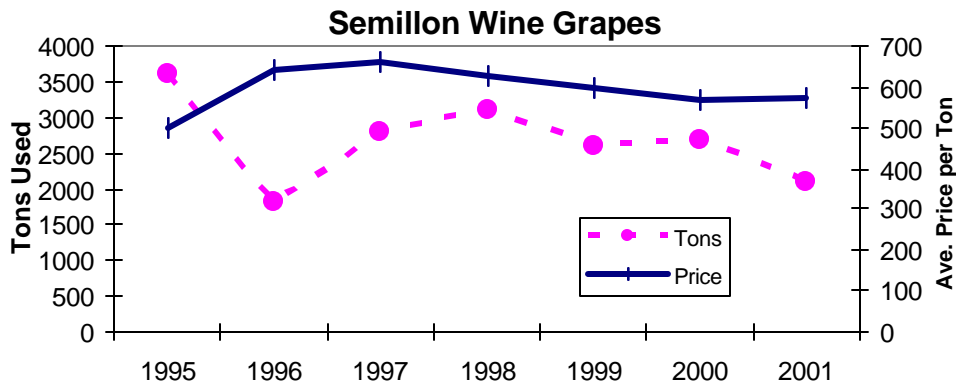
Tons of Chardonnay grapes used increased 28 percent from 1999 to 2001 with a drop of 11 percent in the average price per ton. In 1999 there were almost 1,000 acres of Chardonnay vines that had not of bearing age these acres contributed to the increased production in 2000 and 2001.

**Table 2. Washington Grape Reports – Washington Agriculture Statistics Service**



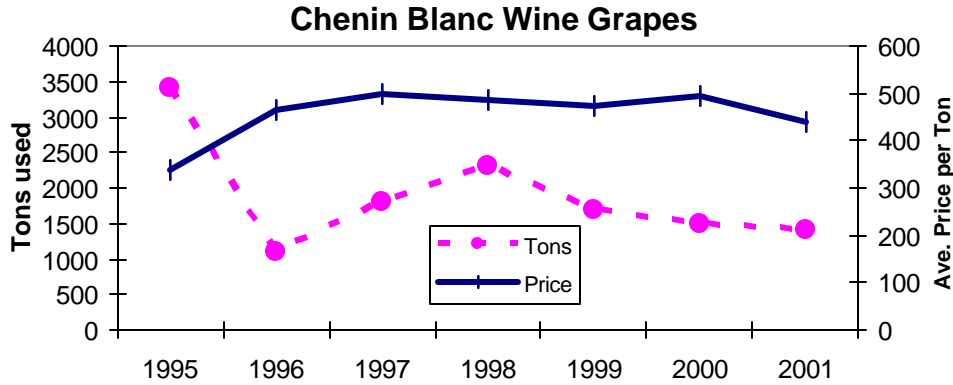
Use of Gewurztraminer grapes increased by 69 percent from 1999 to 2001 with a 6percent drop in average price per ton. In 1999 25 percent of the Gewurztraminer vineyards were not of bearing age.

**Table 3. Washington Grape Reports – Washington Agriculture Statistics Service**



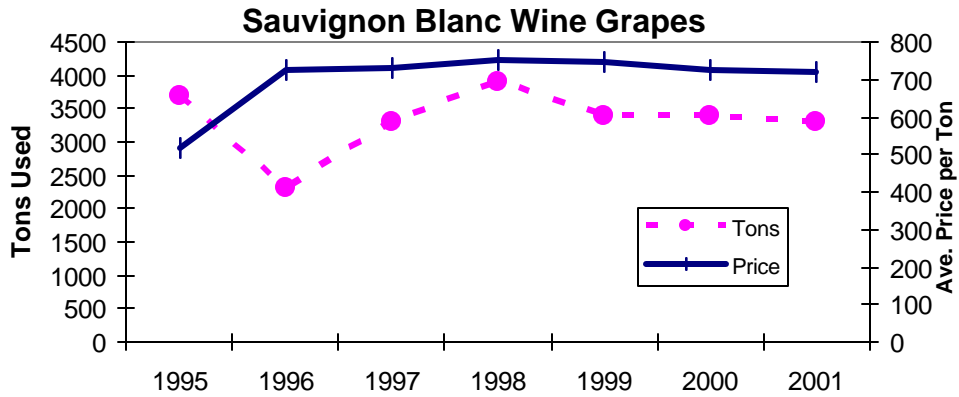
Utilization of Semillon grapes are about 19 percent below the 1999 volume. Average price per ton responded to the drop by increasing 0.9 percent from 2000 but remains four (4%) percent below the 1999 a price. In 1999 almost all (98%) of the acres planted in Semillon were bearing grapes.

**Table 4. Washington Grape Reports – Washington Agriculture Statistics Service**



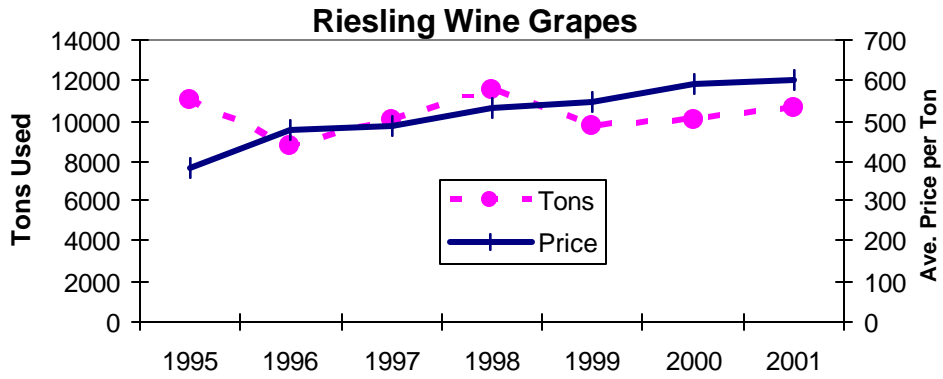
From 1999 to 2001 the tons of Chenin Blanc grapes used decreased by 18 percent along with a 7 percent decrease in the average price per ton. Reports indicate during 1999 all (100%) acres growing Chenin Blanc were productive.

**Table 5. Washington Grape Reports – Washington Agriculture Statistics Service**



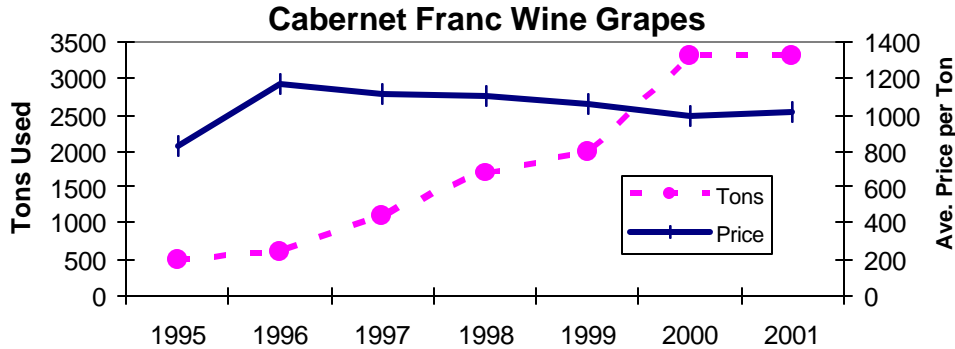
Production year 2001 use of Sauvignon Blanc grapes declined only 3 percent since 1999 and prices have declined 4 percent. As of 1999 only 75 percent of the Sauvignon Blanc acreage was of bearing age.

**Table 6. Washington Grape Reports – Washington Agriculture Statistics Service**



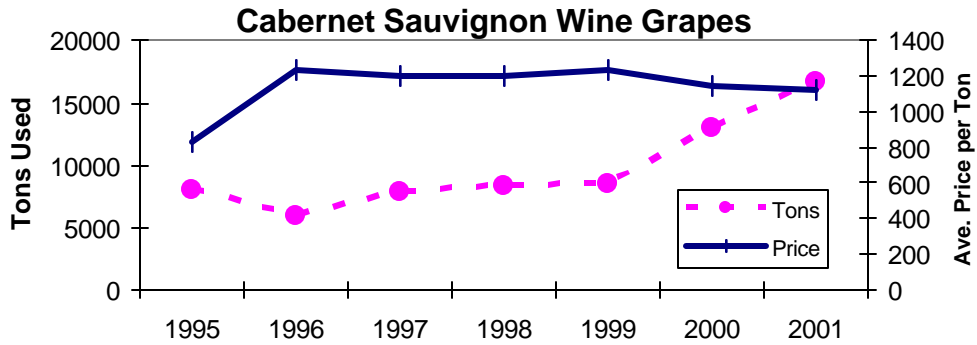
White Riesling is the only white wine variety to show any consistent long term price growth. From 1999 to 2001 quantity utilized has increased eight (8%) percent and prices have increased ten (10%) percent. In 1999 93 percent of White Riesling vines were of bearing age.

**Table 7. Washington Grape Reports – Washington Agriculture Statistics Service**



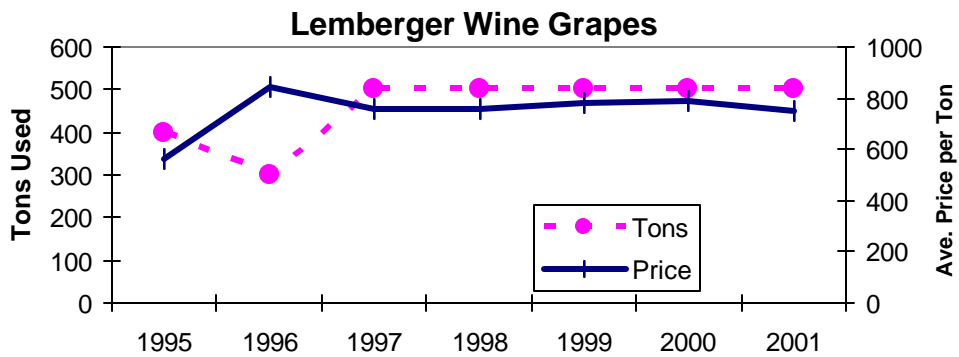
Cabernet Franc completed six consecutive years of increase production. Quantity used in 2000 increased by 65 percent over the 1999. The 2001 quantity increased by only 2.2 percent. Prices over this period remained high but held a down ward trend until 2001 when the edged back up by 1.8 percent over 2000. By 1999 just under 30 percent of the Cabernet Franc acres were immature and not bearing grapes.

**Table 8. Washington Grape Reports – Washington Agriculture Statistics Service**



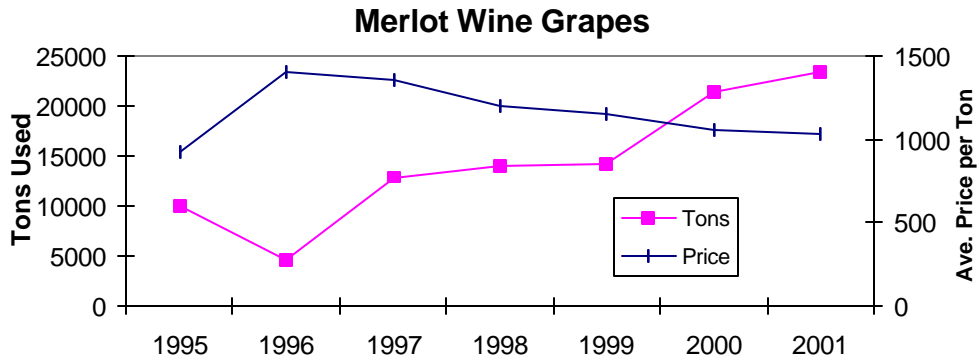
Use of Cabernet Sauvignon made a significant increase over the past two years the 2001 use 99 percent increase over the 1999 use. Considering the large increase in volume used the price drop was only nine (9%) percent over that same time. In 1999 almost half of the Cabernet Sauvignon vines were not yet bearing.

**Table 9. Washington Grape Reports – Washington Agriculture Statistics Service**



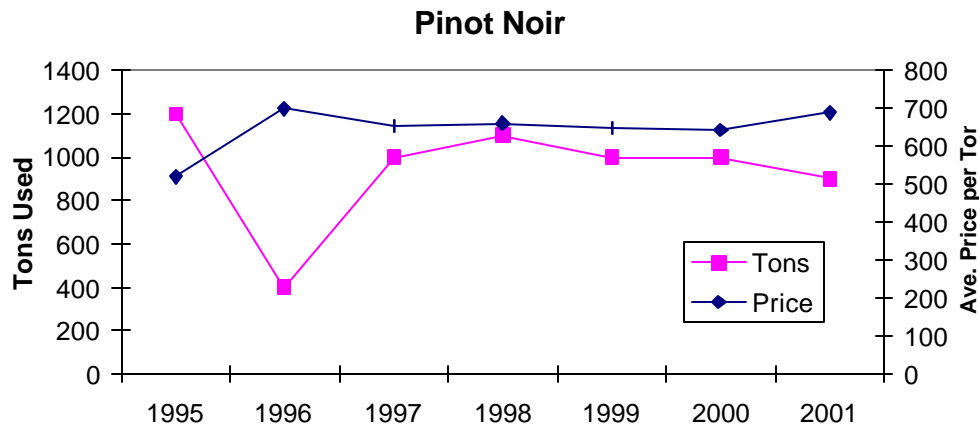
Utilization of Lemberger varieties has remained constant over the past four years and has shown zero percent increase in tons used since 1999. Prices have also remained steady. In 1999 only 150 acres were planted to Lemberger and 25 percent of those were not yet of bearing age.

**Table 10. Washington Grape Reports – Washington Agriculture Statistics Service**



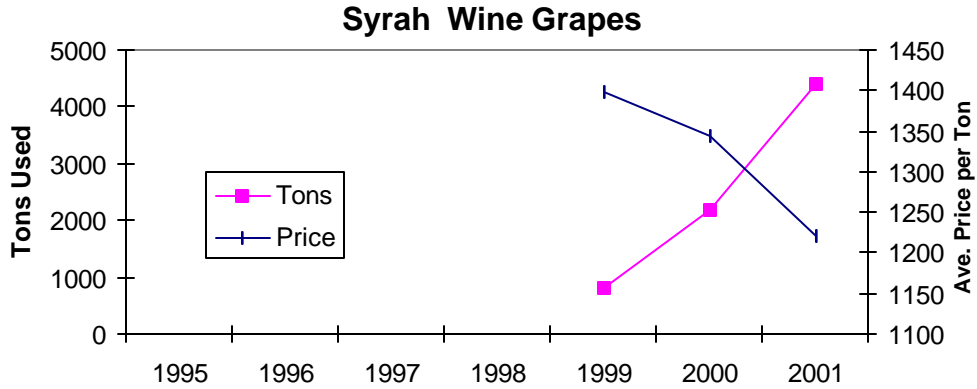
From 1999 to 2001 use of Merlot wine grapes has increased by 64 percent while prices declined by ten (10%) percent. Extensive planting of Merlot increased the total to about 5,600 acres by 1999 with 28 percent not yet of bearing age.

**Table 11. Washington Grape Reports – Washington Agriculture Statistics Service**



Pinot Noir is the only red wine variety to show decreasing production as utilization in 2001 is down ten (10%) percent from 1999. This decreased production was matched by a six (6%) percent increase in average price. In 1999 it was estimated that 100 percent of all Pinot Noir acreage was of bearing age.

**Table 12. Washington Grape Reports – Washington Agriculture Statistics Service**



Syrah varieties have been available for some time but sales were small and thus were classified as “other.” Since 1999 the use of Syrah has increase 450 percent and prices have remained high but show signs of weakening with a 13 percent decline since 1999. The large increase in Syrah in 2000 and 2001 would have occurred from maturing plants as only 20 percent of the acreage planted with Syrah was productive in 1999.

Demand for varieties is also shown by the increase in the number of acres planted from 1993 to 1999 Tables 13 and 14. In addition to the increasing acreage planted for each of the leading varieties the number of acres at bearing age in 1999 would be maturing from 2000 to 2002 supporting additional increases in harvest volumes available to wineries. A new crop survey was conducted by the Washington Agricultural Statistics Service starting in November 2001 however the results of that survey have not been published by the time of this report.

**Table 13. 1999 Washington Wine Grape Acreage Survey – WA Agricultural Statistics Service**

<b>Increase in Acres of White Wine Varieties Planted 1993 to 1999</b>										
	Chardonnay	Chenin Blanc	Gewürztra miner miner	Sauvignon Blanc	Riesling	Muscat Canelli	Pinot Gris	Viognier	Other	
Total Acres	6100	400	400	700	1900	110	150	60	80	
Increased Acreage since 1993	235%	67%	133%	88%	86%	95%	n/a	n/a	n/a	
Acres of Bearing Age in 1999	5030	400	112	600	1780	110	80	20	80	
% Bearing in 1999	82%	100%	28%	86%	98%	94%	53%	33%	100%	

**Table 14. Washington Grape Reports – WA Agriculture Statistics Service**

<b>Increase in Acres of Red Wine Varieties Planted 1993 to 1999</b>									
	Cabernet Franc	Cabernet Sauvignon	Lemberger	Merlot	Pinot Noir	Sangiovese	Syrah	Zinfandel	Other Reds
Total Acres	700	5000	150	5600	240	100	1500	50	150
Increased Acreage since 1993	467%	357%	100%	311%	80%	n/a	n/a	n/a	n/a
Acres of Bearing Age in 1999	510	2690	110	4000	240	40	290	10	100
% Bearing in 1999	73%	54%	73%	71%	100%	20%	19%	20%	67%

At the time of the 1999 crop survey there were four American Viticulture Areas (AVA's) designated. Then Columbia Valley AVA had sub regions for Wahluke Slope, Royal Slope, Tri-Cities, Alderdale Ridge and other. Total acreage planted with a variety is an indication of the past demand by wineries for that variety Tables 15 and 16. However, demand does change as it did for Syrah grapes of which there were few acres prior to 1995.

**Table 15. 1999 Washington Wine Grape Acreage Survey – WA Agricultural Statistics Service**

<b>1999 Acres of White Wine Varieties by AVA</b>						
	Yakima	Columbia	Walla Walla	Puget Sound	Other Areas	Total
Chardonnay	2,910	3,090	80	0	20	<b>6100</b>
Chenin Blanc	180	220	0	0	0	<b>400</b>
Gewurztraminer	290	90	10	0	10	<b>400</b>
Sauvignon Blanc	250	450	0	0	0	<b>700</b>
Semillon	190	410	0	0	0	<b>600</b>
Riesling	760	1,130	0	0	10	<b>1900</b>
Muscat Canelli	30	80	0	0	0	<b>110</b>
Pinot Gris	120	10	0	0	20	<b>150</b>
Voignier	30	30	0	0	0	<b>60</b>
Other Whites	10	20	0	40	10	<b>80</b>
<b>Total</b>	<b>4,770</b>	<b>5,530</b>	<b>90</b>	<b>40</b>	<b>70</b>	<b>10,500</b>
<b>Percent Bearing</b>	<b>81%</b>	<b>89%</b>	<b>89%</b>	<b>100%</b>	<b>100%</b>	

**Table 16. 1999 Washington Wine Grape Acreage Survey – WA Agricultural Statistics Service**

<b>1999 Acres of Red Wine Varieties by AVA</b>						
	<b>Yakima</b>	<b>Columbia</b>	<b>Walla Walla</b>	<b>Puget Sound</b>	<b>Other Areas</b>	<b>Total</b>
Cabernet Franc	230	450	20	0	0	<b>700</b>
Cabernet Sauvignon	1,450	3,390	150	0	10	<b>5,000</b>
Lemberger	120	30	0	0	0	<b>150</b>
Merlot	1850	3,630	110	0	10	<b>5,600</b>
Pinot Noir	110	40	0	10	40	<b>240</b>
Malbec	10	30	10	0	0	<b>50</b>
Sangiovese	30	60	10	0	0	<b>100</b>
Syrah	510	940	50	0	0	<b>1,500</b>
Zinfandel	0	50	0	0	0	<b>50</b>
Other Red	20	100	10	10	10	<b>150</b>
<b>Total Acres</b>	<b>4,330</b>	<b>8,720</b>	<b>360</b>	<b>20</b>	<b>70</b>	<b>13,500</b>
<b>Percent of Acres Bearing</b>	<b>64%</b>	<b>70%</b>	<b>44%</b>	<b>100%</b>	<b>100%</b>	

References:

Bordelon, B. Economics of Midwestern Grape Production. Purdue University Horticulture Extension Service. [www.indianawines.org](http://www.indianawines.org).

Gebers, B., Crawford, S., Folwell, R., Wample, R., and Thorsen, T. Establishment and Annual Production Cost for Washington Wine Grapes. Extension Bulletin 1588 Washington State University Cooperative Extension Service.

Kirpes, D., Folwell, R. and Ahmedullah, M. (1983) Cost Analysis of Selected Wine Grap Vineyard Production Practices in Washington. Extension Bulletin 1200. Washington State University Cooperative Extension Service.

Washington State Agricultural Statistics Service

- Washington Grape Report January 28, 2002
- 1999 Washington Wine Grape Acreage Survey

## Appendix D

### Vineyard Budget

#### WINE GRAPE VINEYARD ACTIVITY BASED BUDGETING

##### Instructions

Activity based budgeting identifies those activities of production that drive costs. Expenses are assigned to Activity based budgeting identifies those activities of production that drive costs. Expenses are assigned to The following worksheets are set up to estimate the full cost per acre for growing grape vines. By knowing your Cells In yellow have equations to complete the necessary calculations. Cells in grey are open for adding or

Worksheet 1 Overhead and Fixed Costs		
<b>Total acres in parcel of land</b>	20	Total number of acres in the parcel of land that contains the vineyard
<b>Cost basis of land (loan payment)</b>	\$ -	Annual loan payment including interest.
<b>Cost per acre</b>	\$ -	Annual loan payment per acre.
<b>Acres in wine grapes</b>	<u>Variety</u>	
	Merlot	2
	Chardonnay	2
<b>Total acres in grape vines</b>	4	
<b>Irrigation assessment on land parcel</b>	\$ 500.00	Current year irrigation district assessment for the parcel in line 1.
<b>Irrigation assessment per acre</b>	\$ 25.00	
<b>Property Taxes</b>	\$ 1,000.00	Current year taxes payable on the parcel in line one
<b>Property taxes pre acre</b>	\$ 50.00	
<b>Management Fees</b>	\$ 2,000.00	Amount paid to manage the vineyard, includes yourself
<b>Management fees per acre</b>	\$ 500.00	
<b>Farm Building</b>	\$ 4,000.00	Annual loan payment including interest for buildings used to support the farm. Zero if buildings have no debt.
<b>Cost per acre of buildings</b>	\$ 200.00	
<b>Insurance on land crops and buildings</b>	\$ 1,000.00	Total annual insurance premiums paid for agricultural lands, buildings, crops, worker injury, (do not include vehicle insurance it is included as a vehicle cost)
<b>Cost per acre of insurance</b>	\$ 50.00	

## Appendix D Vineyard Budget

Irrigation system development per acre years	\$ 3,000.00	Per acre cost to install an irrigation system for the vineyard.
	20	
Annual cost of irrigation system	\$ 150.00	cost of irrigation system divided by its life.
Required Return on Investment (IRR)	8%	Rate needed to cover financing costs.
Net Investment to establish vineyard	\$ 14,600	per acre investment to establish crop
Loan Payment (after establishment)	\$ 1,487	Term years 20
		APR 8.0%
<b>TOTAL FIXED COST</b> (after establishment)	<b>\$ 2,462</b>	

<b>Vineyard Establishment Budget</b>				
	1st Yr	2nd Yr	3rd Yr	4th Yr
	Cost / acre	Cost / acre	Cost / acre	Cost / acre
<b>Operations</b>				
<b>Site Preparation</b>				
Clear & Grade	\$ 247.80			
Soil amendment (lime if needed)				
Vineyard layout and marking	\$ 145.83			
<b>Planting</b>				
Vines 5 X 10 spacing 968 /acre	\$ 1,930.55			
<b>Trellising (install in 1st or 2nd yr)</b>				
		\$ 1,849.10		
<b>Weed Control</b>				
Weed spraying	\$ 174.98	\$ 175.00	\$ 175.00	\$ 175.00
Mowing	\$ 73.72	\$ 74.00	\$ 74.00	\$ 74.00
Hand hoeing & weeding	\$ 357.00	\$ -		
<b>Fertilization</b>				
fertilizing program	\$ 74.60	\$ 75.00	\$ 75.00	\$ 75.00
soil-plant testing	\$ 50.00	\$ 5.00	\$ 50.00	\$ 50.00
<b>Disease &amp; Insect Control</b>				
Sprays - as needed	\$ 148.97	\$ 150.00	\$ 150.00	\$ 150.00
<b>Canopy Management</b>				
Shoot & Cluster Thinning		\$ 225.00	\$ 200.00	\$ 200.00
Ties		\$ 10.00	\$ 5.00	\$ 5.00
Flower Removal		\$ 60.00	\$ -	\$ -
<b>Dormant Pruning</b>				
Pruning Cordon training/tying	\$ 240.46	\$ 120.00	\$ 120.00	\$ 120.00
<b>Replanting</b>				
Replacing damaged/dead vines (labor and plants)		\$ 50.00	\$ 50.00	\$ 50.00
<b>Harvest Costs</b>				
Tons Harvest Cost			1.5	2.5
			\$ 440.70	\$ 734.50
<b>Total Annual Operating Costs to Establish Crop</b>				
	\$ 3,444	\$ 2,793	\$ 1,341	\$ 1,636
Interest @ 8% on establishment cost				
		\$ 276	\$ 499	\$ 606
<b>Fixed Costs (during establishment)</b>				
	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000
<b>Total Costs</b>				
	\$ 4,444	\$ 4,069	\$ 2,840	\$ 3,242
<b>Accumulated Cost To Establish</b>				
	\$ 4,444	\$ 8,513	\$ 11,353	\$ 14,595

<b>Full Production Operating Costs and Amoritization of Debt</b>						
		Year 5	Year 6	Year 7	Year 8	Year 9
<b>Weed Control</b>						
	Weed spraying	\$ 175.00	\$ 175.00	\$ 175.00	\$ 175.00	\$ 175.00
	Mowing	\$ 74.00	\$ 74.00	\$ 74.00	\$ 74.00	\$ 74.00
<b>Fertilization</b>						
	fertilizing program	\$ 75.00	\$ 75.00	\$ 75.00	\$ 75.00	\$ 75.00
	soil-plant testing	\$ 50.00	\$ 50.00	\$ 50.00	\$ 50.00	\$ 50.00
<b>Disease &amp; Insect Control</b>						
	Sprays - as needed	\$ 15.00	\$ 15.00	\$ 15.00	\$ 15.00	\$ 15.00
<b>Canopy Management</b>						
	Shoot & Cluster Thinning	\$ 200.00	\$ 200.00	\$ 200.00	\$ 200.00	\$ 200.00
	Ties	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00	\$ 5.00
<b>Dormant Pruning</b>						
	Pruning Cordon training/tying	\$ 120.00	\$ 120.00	\$ 120.00	\$ 120.00	\$ 120.00
<b>Replanting</b>						
	Replacing damaged/dead vines (labor and plants)	\$ 50.00	\$ 50.00	\$ 50.00	\$ 50.00	\$ 50.00
<b>Harvest Costs</b>						
	Tons	4.5	4.5	4.5	4.5	4.5
	Harvest Cost 125lbs/hr @ \$7.50/hr	\$ 540	\$ 540	\$ 540	\$ 540	\$ 540
<b>Total Annual Operating Costs to Establish Crop</b>		<b>\$ 1,304.00</b>	<b>\$ 1,304.00</b>	<b>\$ 1,304.00</b>	<b>\$ 1,304.00</b>	<b>\$ 1,304.00</b>
<b>Plus Fixed Costs</b>		<b>\$ 2,462.04</b>	<b>\$ 2,462.04</b>	<b>\$ 2,462.04</b>	<b>\$ 2,462.04</b>	<b>\$ 2,462.04</b>
<b>Total Production Costs</b>		<b>\$ 3,766</b>	<b>\$ 3,766</b>	<b>\$ 3,766</b>	<b>\$ 3,766</b>	<b>\$ 3,766</b>

## Worksheet 2 - Equipment Costs

Equipment Renatal Rate	Purchase Price	Deprec. Years	Annual Maint. Cost	Annual Insurance, taxes etc.	Cost Per year	Units in (hours or miles)	Est. Annual use	Equipment cost rate per unit	Estimated fuel cost per unit	Cost per unit to use equipment
<b>Tractor A (used)</b>	15,000.00	10	1000	200	\$ 2,700.00	hours	1000	\$ 2.70	\$ 5.00	\$ 7.70
<b>Tractor B (old)</b>	-	1	2000	0	\$ 2,000.00	hours	1500	\$ 1.33	\$ 5.00	\$ 6.33
<b>Sprayer (used)</b>	7,500.00	15	250	75	\$ 825.00	hours	65	\$ 12.69	\$ 5.00	\$ 17.69
<b>Truck (new)</b>	20,000.00	5	750	600	\$ 5,350.00	miles	15000	\$ 0.36	\$ 0.09	\$ 0.45

**Worksheet 3 - Activity Costing -- per acre of operations**

**OPERATING EXPENSES**

Activity		From Worksheet 2 Cost to use and operate equipment			Total Equipment Cost	Total Equip. Operator		Total Labor		Total Labor	Materials	Other	Total
		Estimated total Equipment Hours/miles	Units	Hours		Equip. Oper rate	Hours	Labor Rate					
Clear & grade	tractor A	\$ 7.70	3	hours	\$ 23.10	3	\$ 12.10	5	\$ 9.90	\$ 85.80			\$ 108.90
	tractor B	\$ 6.33	5	hours	\$ 31.65	5	\$ 12.10			\$ 60.50			\$ 92.15
	plant coner - tractor B	\$ 6.33	0.75	hours	\$ 4.75	1	\$ 12.10	1	\$ 9.90	\$ 22.00	\$ 20.00		\$ 46.75
					\$ -					\$ -			\$ -
<b>Total Clear &amp; Grade</b>					\$ 59.50					\$ 168.30			\$ 247.80
Survey & Marking	Tractor B	\$ 6.33	1	hours	\$ 6.33			5	\$ 9.90	\$ 49.50	\$ 15.00		\$ 70.83
					\$ -			5	\$ 15.00	\$ 75.00			\$ 75.00
					\$ -					\$ -			\$ -
					\$ -					\$ -			\$ -
<b>Total Survey &amp; Marking</b>					\$ 6.33					\$ 124.50			\$ 145.83
Plant Vines	Tractor A	\$ 7.70	10	hours	\$ 77.00	2	\$ 12.10	73	\$ 9.90	\$ 746.90	\$ 985.00		\$ 1,808.90
	Truck (get plants)	\$ 0.45	200	miles	\$ 90.00					\$ -			\$ 90.00
	Tractor B	\$ 6.33	5	hours	\$ 31.65					\$ -			\$ 31.65
	Auger	\$ -			\$ -					\$ -			\$ -
<b>Total Planting</b>					\$ 198.65					\$ 746.90			\$ 1,930.55
Weed control	Tactor	\$ 7.70	2	hours	\$ 15.40	2	\$ 12.10		\$ 9.90	\$ 24.20	\$ 100.00		\$ 139.60
	Sprayer	\$ 17.69	2	hours	\$ 35.38					\$ -			\$ 35.38
					\$ -					\$ -			\$ -
					\$ -					\$ -			\$ -
<b>Total Weed Control</b>					\$ 50.78					\$ 24.20			\$ 174.98
Mowing	Tractor B	\$ 6.33	4	hours	\$ 25.32	4	\$ 12.10			\$ 48.40			\$ 73.72
	Mower	\$ -			\$ -					\$ -			\$ -
					\$ -					\$ -			\$ -
					\$ -					\$ -			\$ -
<b>Total Mowing</b>					\$ 25.32					\$ -			\$ 73.72
Fertilize	Tractor A	\$ 7.70	2	hours	\$ 15.40	2	\$ 12.10		\$ 9.90	\$ 24.20	\$ 35.00		\$ 74.60
	Fertilizer Spreader	\$ -			\$ -					\$ -			\$ -
					\$ -					\$ -			\$ -
					\$ -					\$ -			\$ -
<b>Total Fertilizing</b>					\$ 15.40					\$ 24.20			\$ 74.60
Pest/Disease Control	Tractor A	\$ 3.20	3	hours	\$ 9.60	3	\$ 12.10		\$ 9.90	\$ 36.30	\$ 50.00		\$ 95.90
	Sprayer	\$ 17.69	3	hours	\$ 53.07					\$ -			\$ 53.07
					\$ -					\$ -			\$ -
					\$ -					\$ -			\$ -
<b>Total Pest/Disease Control</b>					\$ 62.67					\$ 36.30			\$ 148.97
Hand Hoeing					\$ -			30	\$ 9.90	\$ 297.00		\$ 60.00	\$ 357.00
					\$ -					\$ -			\$ -

Total Hand Hoeing				\$ -					\$ -			\$ -
				\$ -					\$ 297.00			\$ 357.00
Trellis Construction	Tractor A	\$ 7.70	10	hours	\$ 77.00	10	\$ 12.10	40	\$ 9.90	\$ 517.00	\$ 834.00	\$ 1,428.00
	Auger	\$ -		hours	\$ -					\$ -		\$ -
	Tractor B	\$ 6.33	20	hours	\$ 126.60	20	\$ 12.10			\$ 242.00		\$ 368.60
	parts trailer	\$ -		hours	\$ -					\$ -		\$ -
	Truck (materials)	\$ 0.45	50	miles	\$ 22.50	2	\$ 15.00			\$ 30.00		\$ 52.50
Total Trellis Construction				\$ -					\$ -			\$ -
				\$ 226.10					\$ 789.00			\$ 1,849.10
Pruning	Tractor B	\$ 6.33	2	hours	\$ 12.66		\$ 12.10	22	\$ 9.90	\$ 217.80	\$ 10.00	\$ 240.46
	small trailer (brush removal)	\$ -			\$ -					\$ -		\$ -
	Total Pruning				\$ -					\$ -		\$ -
				\$ 12.66					\$ 217.80			\$ 240.46
Harvesting	Tractor A	\$ 7.70	10	hours	\$ 77.00			4	\$ 200.00	\$ 800.00		\$ 877.00
	Tractor B	\$ 6.33	40	hours	\$ 253.20					\$ -		\$ 253.20
	Trailer	\$ -	40	hours	\$ -					\$ -		\$ -
	Truck	\$ 0.45	100	miles	\$ 45.00					\$ -		\$ 45.00
	Total Harvesting				\$ -					\$ -		
				\$ 375.20					\$ 800.00			\$ 1,175.20

## **Appendix E**

### **Winery Financial Profiles**

A timely, comprehensive evaluation of the economies of six wineries (2,000; 5,000; 10,000; 50,000; 200,000; and 500,000 annual case production) was recently presented by Professor Ray Folwell, et al, of Washington State University. The information that follows is based upon his findings, published by WSU Cooperative Extension in the Costs of Investment and Operation in Various Sizes of Premium Table Wine Wineries in Washington State in April 2001 and updated in January, 2002.<sup>1</sup>

#### **Investment Cost to Establish a Winery**

Establishing a winery requires a significant commitment of capital. Folwell's research estimates the cost ranges from approximately \$480,000 for a 2,000 case winery to \$1.3 million for a 10,000 case winery as shown in Table 1 and Figure 1.

As illustrated in Figure 3, construction of the winery building (plant, office, tasting room) represents the largest single cost of a winery's establishment, as a percentage of total investment costs (ranging from 33% to 44%).

Total investment costs on a per unit (case) basis declines as the winery size increases (with the exception of cooperage<sup>2</sup>) as illustrated in Figure 2. The greatest change in investment per unit is between the 2,000 and 5,000 case wineries. (The \$86.63 difference reflects a \$239.56 per unit cost for the 2,000 case winery versus \$152,93 for the 5,000 case winery).

Investment (and/or financing) costs, initially or even long-term, may be substantially reduced by:

- o Purchasing used equipment. Although this equipment may or may not be suitable for a premium winery, it could reduce investment costs. Used equipment for cellar, bottling and

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<sup>1</sup> The original analysis, WSU Cooperative Extension publication EB1909, was updated with a paper supporting a presentation at the Oregon Horticultural Society Meeting, Portland, Oregon, on January 29, 2002. The paper was co-authored by Timothy Bales, and Trent Ball. The objective of the research was to "identify current practices in the wine industry in terms of product mix and winery size and utilize this information. . . to provide updated information for use by potential investors and lenders in evaluating the expected costs and returns of investing in a winery." Models for this research were designed, on paper, by specifying building size, equipment specs, and several assumptions. Most of these assumptions, and some of the methods employed, are provided in the final pages of this section.

<sup>2</sup> Although most material needs increase at a decreasing rate as winery size increases, the cooperage does not; as the size of the winery increases, cooperage capacity increases at an equivalent rate. Oak cooperage investment costs range from 12% of total investment costs for the 2,000 case winery to 22% for the 10,000 case winery.

crush equipment is advertised through specialty publications<sup>3</sup>; a few equipment brokers; and Internet exchanges<sup>4</sup>

- o The use of “custom crush” services. For example, renting the services of mobile truck-based bottlers can save the initial cost of purchasing bottling equipment. Similarly, sharing crush equipment with other vintners can eliminate or delay the need to purchase that hardware. In many areas, some wineries have elected to supplement their income by offering a variety of services to other small wineries (e.g., use of bottling equipment, crushers, laboratory, etc.). In regions where there is not a critical mass of wineries to generate enough business to interest a for-profit “custom crush” service, non-profit groups (e.g., regional wine association, municipality, or economic development organization) may offer a variety of services to nurture the industry.

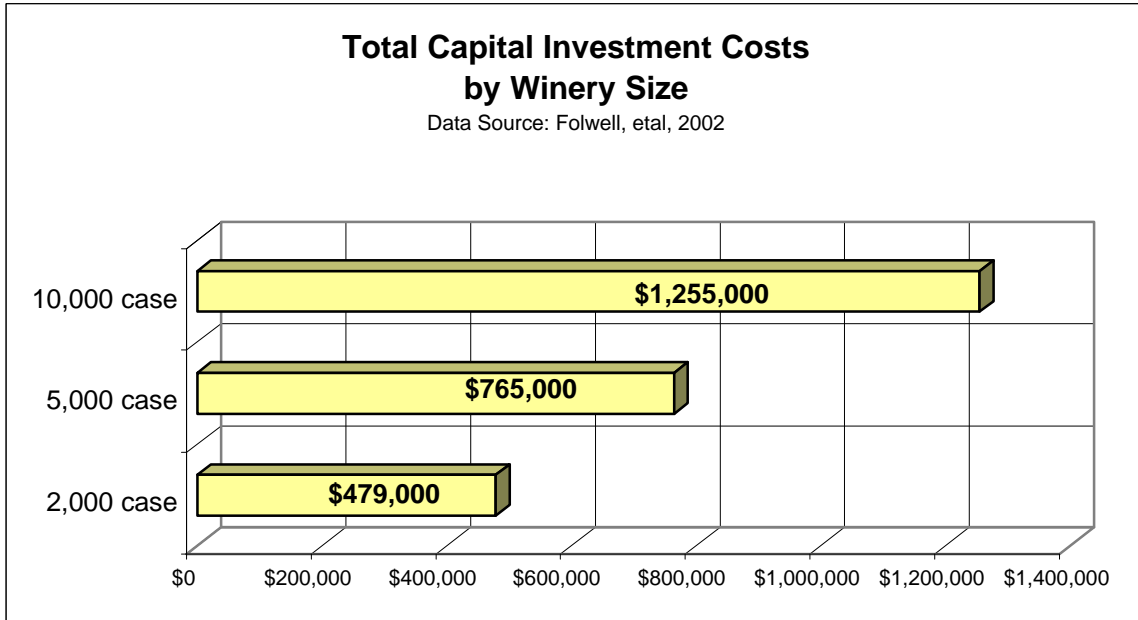
**Table 1. Investment Costs to Establish a Winery** (Folwell, etal, 2002)

<b>Investment Costs to Establish a Winery</b>			
<b>Cost Category</b>	<b>2,000 case</b>	<b>5,000 case</b>	<b>10,000 case</b>
Receiving Equipment	\$30,939	\$32,449	\$66,147
Cellar Equipment	\$34,277	\$40,573	\$61,887
Refrigeration	\$20,408	\$38,265	\$61,224
Bottling	\$25,510	\$122,448	\$122,448
Fermentation & Storage	\$57,137	\$91,433	\$189,667
Oak Cooperage	\$57,533	\$142,205	\$271,016
Materials Handling	\$42,540	\$44,566	\$69,056
Plant and Office	\$210,773	\$252,717	\$413,196
<b>Total Investment</b>	<b>\$479,117</b>	<b>\$764,656</b>	<b>\$1,254,641</b>
<b>Per Unit - \$/Case</b>	\$240	\$153	\$125
<b>Per Unit - \$/750 ml</b>	\$20	\$13	\$10

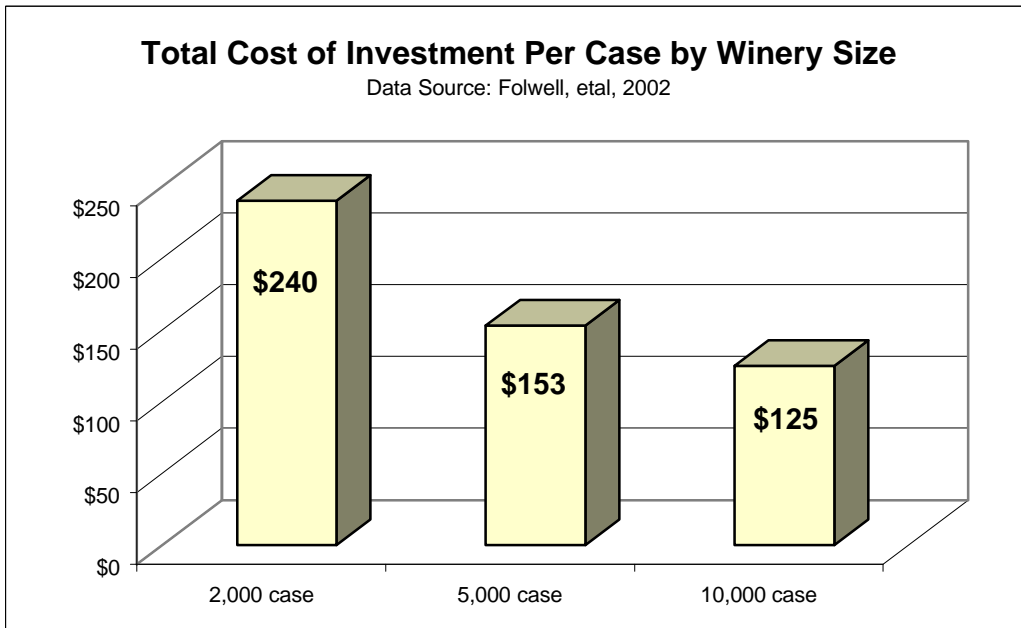
<sup>3</sup> Example: Wine Country Classifieds, a weekly publication from St. Helena, California

<sup>4</sup> Example: WineryExchange.com; WinerySite.com; eVine.net; winebusiness.com

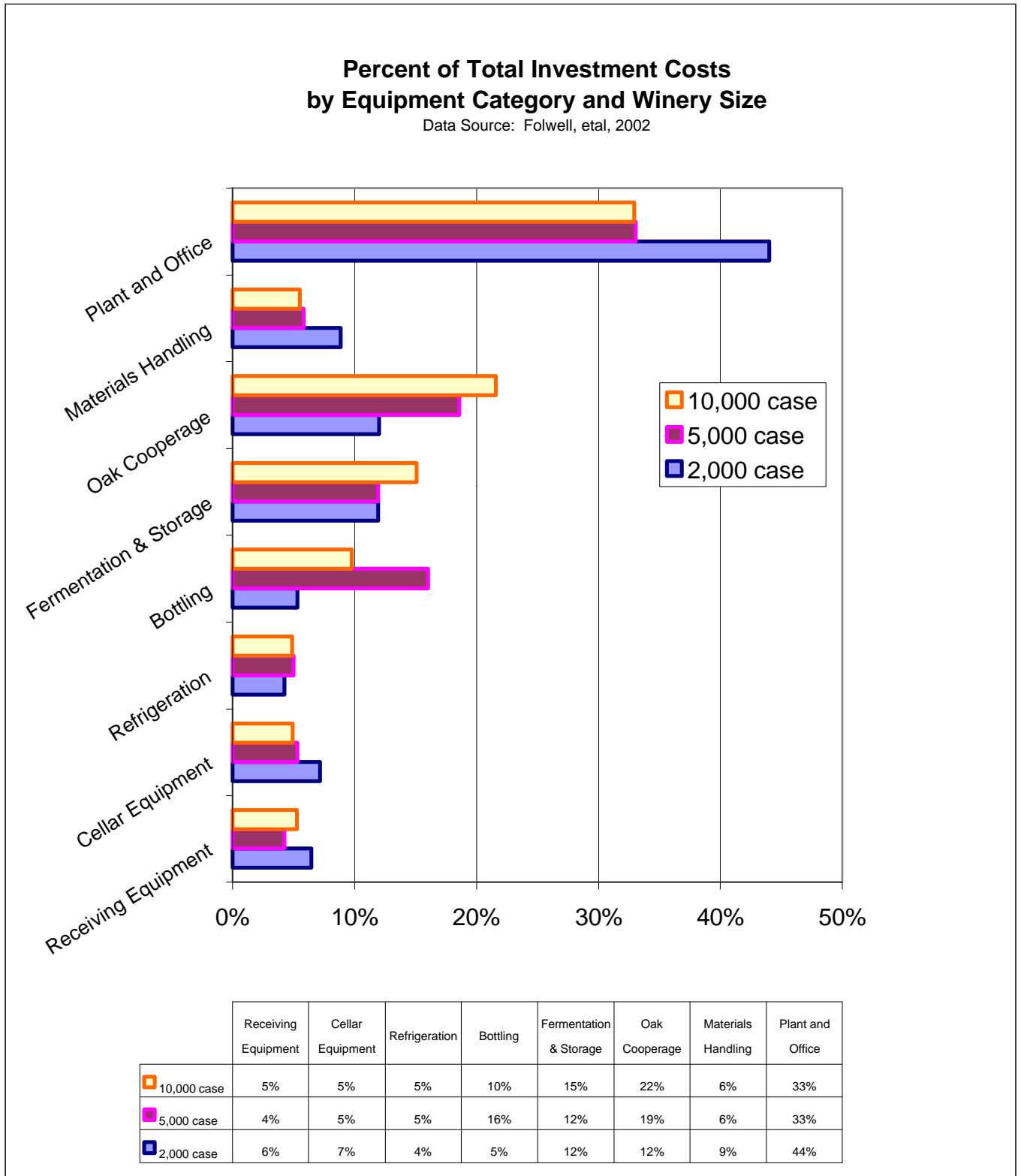
**Figure 1. Total Capital Investment Costs**



**Figure 2. Total Cost of Investment Per Case**



**Figure 3. Percent of Total Investment Costs**



## **Cost to Operate a Winery**

Total cost of winery operations vary from approximately \$100,000 for a 2,000 case winery to \$270,000 for a 10,000 case winery, as shown in Table 2. Variable costs exceed fixed costs for all three wineries, as shown in Table 2 and illustrated in Figure 4.

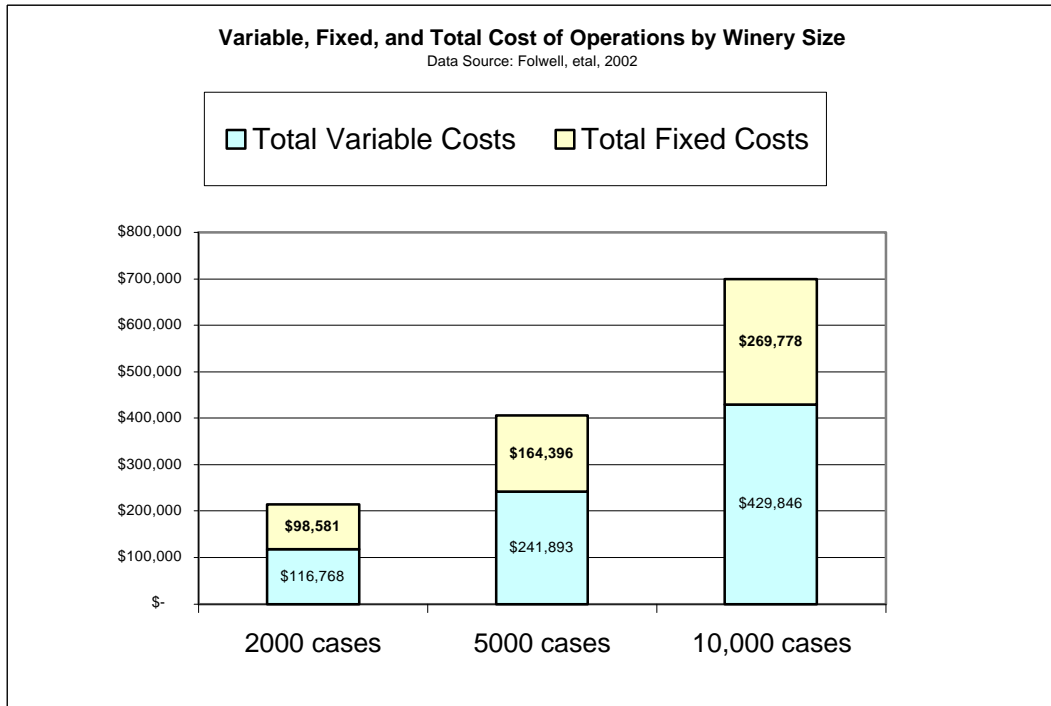
The major operating costs were: the costs of financing (loan); full-time and part-time labor; and grape costs as represented in Table 2.

Economies of size exist, as illustrated in Figures 5-8. For example, per case operating costs decline from \$107.67 for the 2,000 case winery to \$69.96 for the 10,000 case winery, a difference of \$37.71

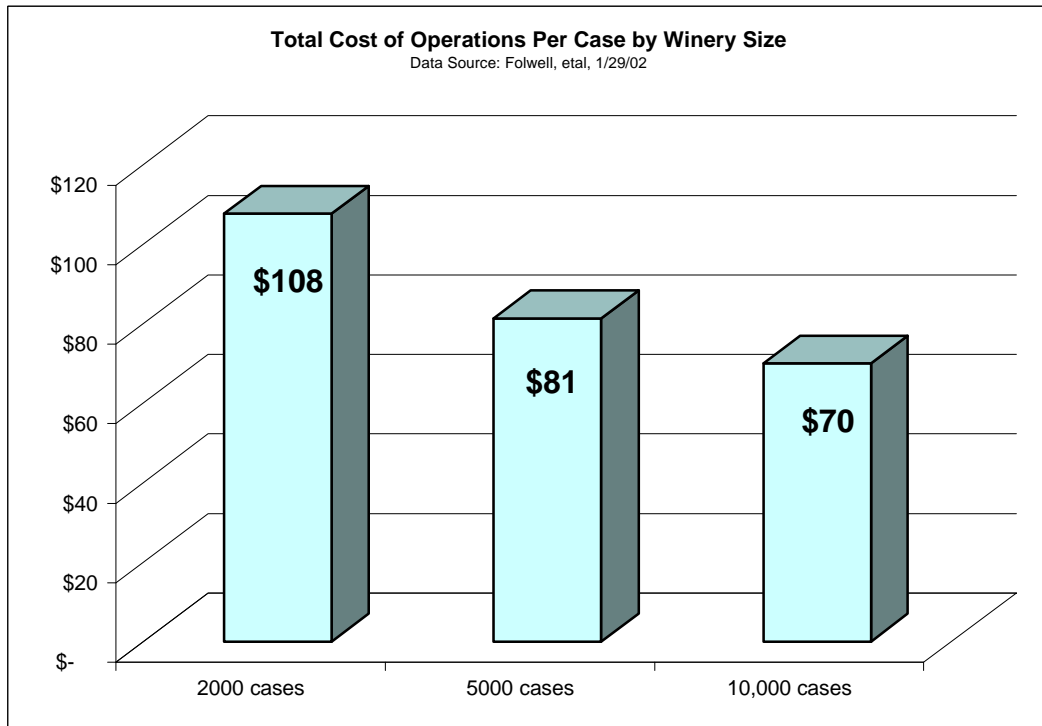
**Table 2. Operating Costs**

Variable Operating Costs	<b>2000 cases</b>	<b>5000 cases</b>	<b>10,000 cases</b>
Grapes	\$23,413	\$58,182	\$115,707
Packaging	\$17,681	\$44,203	\$88,844
Taxes & Dues	\$5,108	\$8,990	\$12,802
Full Time Labor	\$50,688	\$81,102	\$132,211
Part Time Labor	\$11,025	\$22,598	\$25,809
Marketing	\$3,889	\$16,205	\$36,732
Utilities	\$2,429	\$5,016	\$7,920
Office Supplies	\$676	\$1,584	\$2,957
Other	\$1,859	\$4,013	\$6,864
<i>Subtotal Variable Costs</i>	<b>\$116,768</b>	<b>\$241,893</b>	<b>\$429,846</b>
Fixed Operating Costs			
Insurance	\$2,112	\$4,488	\$7,392
Interest	\$36,932	\$55,930	\$91,789
Depreciation	\$36,118	\$62,104	\$101,572
Cost of Equity	\$19,578	\$36,143	\$59,270
Property Tax	\$2,785	\$3,355	\$5,531
Maintenance	\$1,056	\$2,376	\$4,224
<i>Subtotal Fixed Costs</i>	<b>\$98,581</b>	<b>\$164,396</b>	<b>\$269,778</b>
<b>Total Operating Costs</b>	<b>\$215,349</b>	<b>\$406,289</b>	<b>\$699,624</b>
<b>Per Unit Costs \$/case</b>	<b>\$ 107.67</b>	<b>\$ 81.26</b>	<b>\$ 69.96</b>

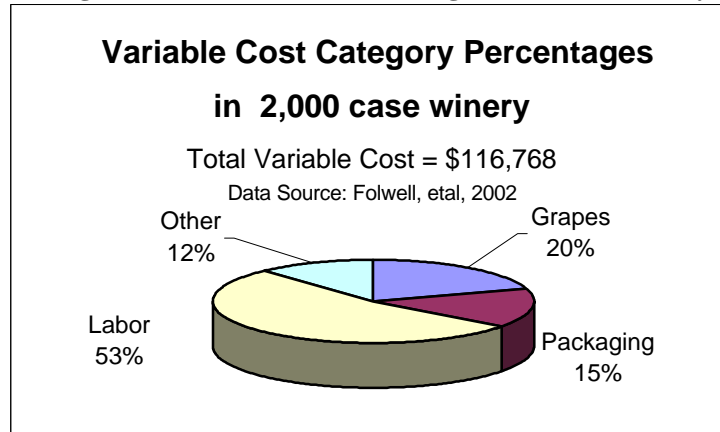
**Figure 4. Total Cost of Operations**



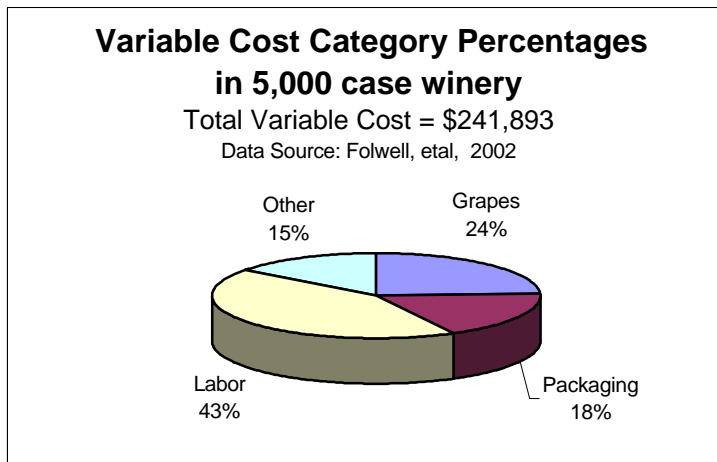
**Figure 5. Total Cost of Operations Per Case**



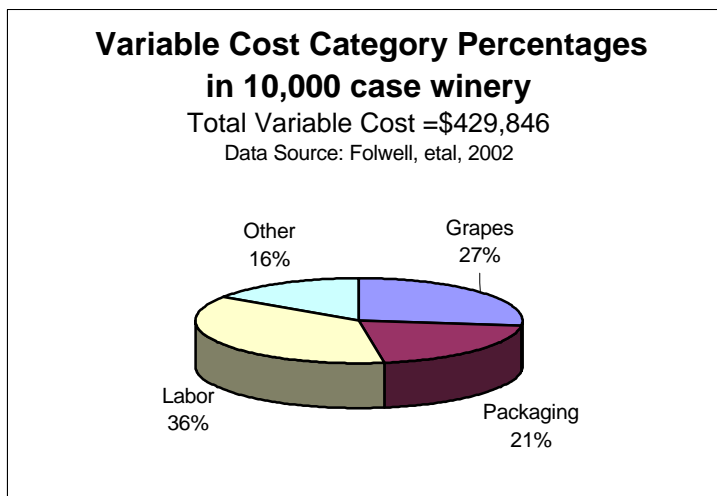
**Figure 6. Variable Cost Percentages in 2,000 cs. Winery**



**Figure 7. Variable Cost Percentages in 5,000 cs. Winery**



**Figure 8. Variable Cost Percentages in 10,000 cs. Winery**



## **Economic Performance of Wineries – by size**

As shown in Figure 9, all three wineries are likely to produce positive cash flows by their third year, enabling them to meet all operating cost obligations including debt repayment.

Negative cash flows only occurred in the first year for the 2,000, and 5,000 case wineries; the 10,000 case winery experienced negative cash flows in the first and second years of operation. Negative cash flows result from the fact that the wineries produce at 100% capacity beginning in year one, but do not sell at 100 percent capacity until year four. The wineries have to hold a portion of the product line for proper aging to produce the premium table wines assumed in the product mix. Consequently, production costs are realized fully in the first four years, but revenues are only partially realized.

Of the six wineries analyzed (Folwell, 2001) the most profitable winery was the 5,000 case winery. It had the second largest Net Present Value (\$1,042,628) and the highest Internal Rate of Return (32.69%), as given in Table 3 and illustrated in Figures 11 and 12.

The 5,000 case winery is the least risky project with an equity payback period of about 4 years. The 2,000 case winery follows as the second least risky project with a payback period of 4.7 years, as illustrated in Figure 10.

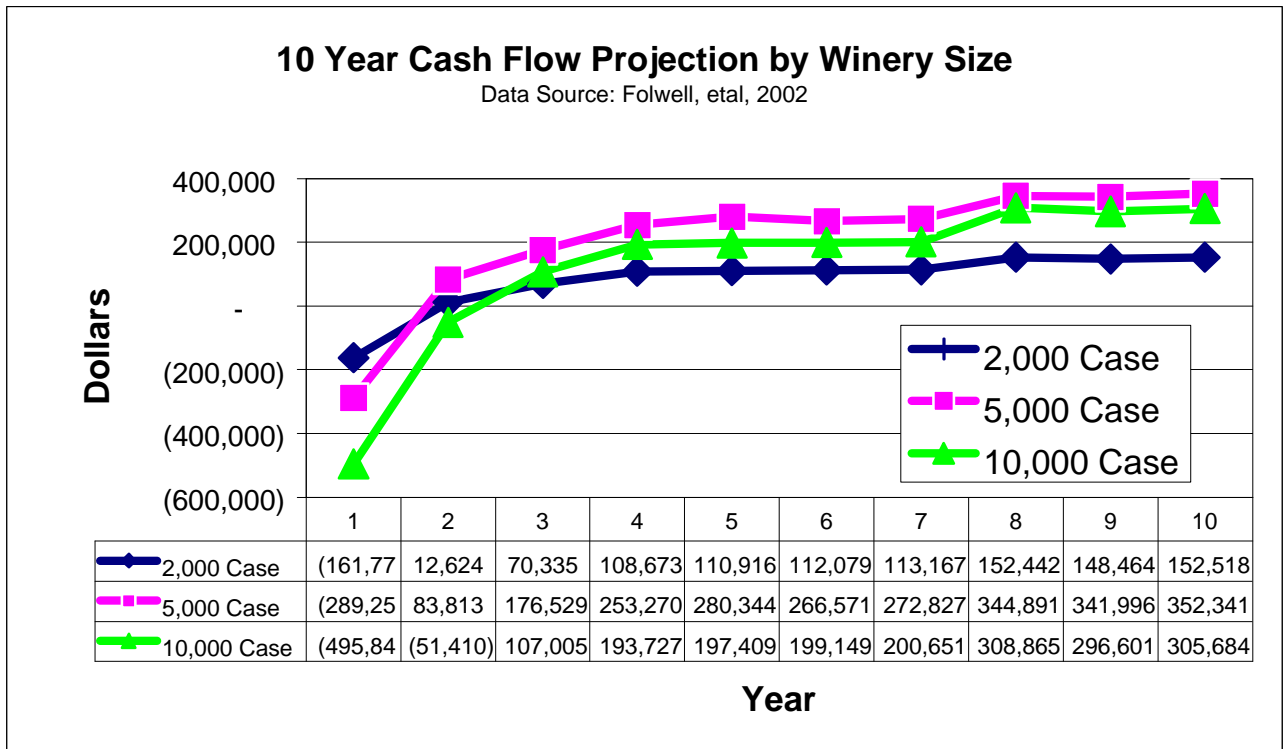
### Sensitivities

- o 2,000 and 5,000 case winery financial returns were most sensitive to a decrease in the price of all wine, as compared to other variations in prices of wine and grapes considered. A 20% reduction of the price of tasting room premium wine or cellar door price had the greatest impact on profitability. Wine price changes had a much greater impact on profitability when compared to the impact of grape price changes for the 2,000 case winery.
- o The 10,000 case winery financial returns were impacted the most when wine and grape prices were varied. The 10,000 case winery was most sensitive to a decrease in the price of all wine.

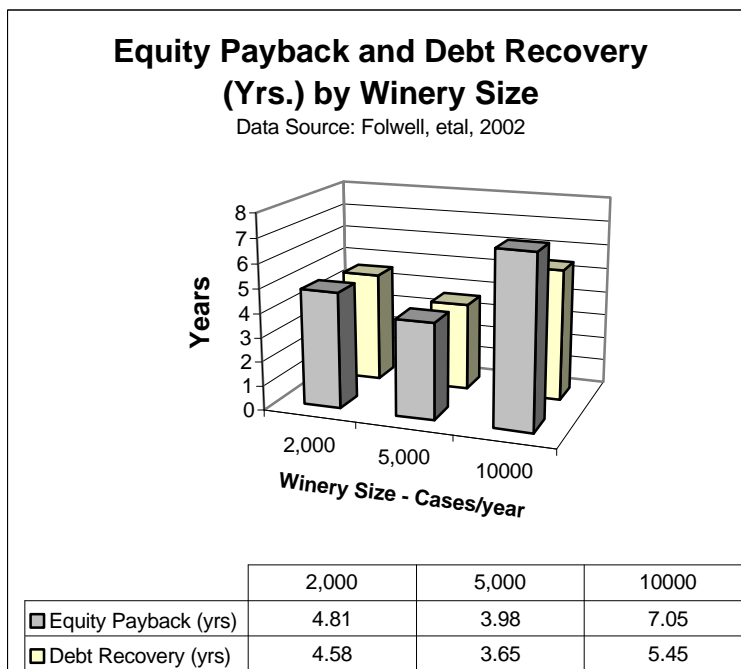
**Table 3. Indicators of Profitability and Risk** (Folwell, etal, 2002)

<b>Indicators of Profitability and Risk</b>			
	<b>2,000 case</b>	<b>5,000 case</b>	<b>10,000 case</b>
Net Present Value	\$ 381,571	\$ 1,042,628	\$ 278,637
Internal Rate of Return (%)	24.14	32.69	11.74
Equity Payback (yrs)	4.81	3.98	7.05
Debt Recovery (yrs)	4.58	3.65	5.45

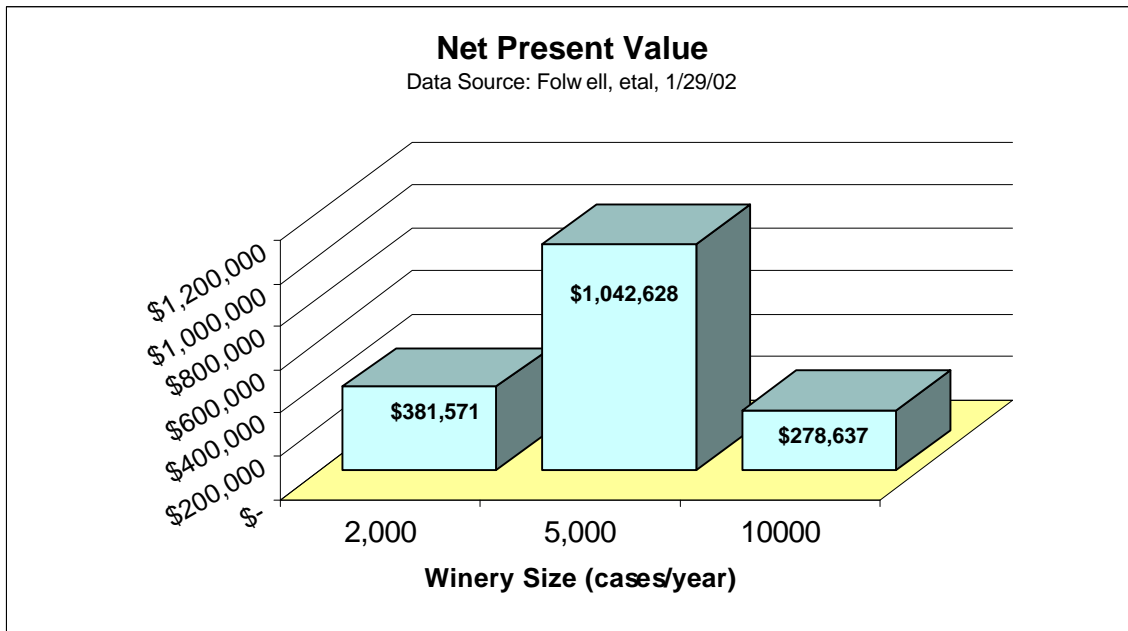
**Figure 9. Ten Year Cash Flow Projection**



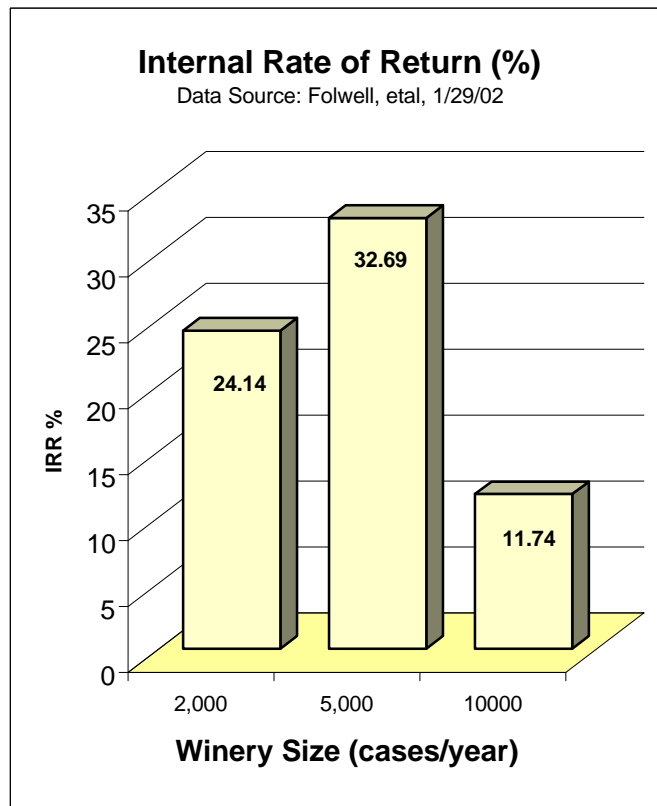
**Figure 10. Equity Payback and Debt Recovery**



**Figure 11. Net Present Value**



**Figure 12. Internal Rate of Return**



## **KEY ASSUMPTIONS**

The following general assumptions were applied:

- o Wineries were separate from any vineyard operation
- o Wineries were classified as premium wineries (one that produces quality wines capable of being sold for about \$7 per 750 ml bottle at the retail level after appropriate markups)

Investment Cost Assumptions:

- o Investment costs are for new equipment and include all applicable delivery and installation charges.
- o The simulated winery building was designed to be very functional with a tasting room being the only embellishment.
- o Product mix was 60% white and 40% red table wines
- o Each tone of grapes would yield 70 cases of wine (630 litres)
- o The 2,000 case winery had a semi-automatic bottling line while the larger wineries had automatic systems equipped for 750 ml bottles only

Operating Cost Assumptions:

- o Each winery produced and sold at its maximum capacity. (Example: costs associated with the 2,000 case winery were based on the winery producing and selling 2,000 cases of wine per year.)
- o Cost of the loan consisted of interest expense and the cost of equity. Interest was calculated as a sum of two different loans for each project, The first loan was for equipment and was amortized over 7 years at a rate of 11 percent. The second loan was for the land and building and was amortized over 20 years at a rate of 8.5%. Loan payments were considered as annual disbursements containing all interest and principal due.
- o The cost of equity is defined as the foregone returns that would have resulted from utilizing the equity funds in the next best alternative investment of equivalent risk. The cost of equity was assumed to be a rate of 10.5%, the average historical rate of return on common stock.
- o Labor costs were estimated using the labor requirements similar to those found in Castaldi (1984). Salaries and wages were adjusted by the Consumer Price Index and were then checked against current salary and wage levels being paid to verify their level.
- o The grape price used was \$776 per ton.

Economic Performance Assumptions

The financial analysis was based upon cash flows and the following baseline assumptions concerning:

- o product prices for tasting room and wholesale sales
- o percent of wine sold through the tasting rooms
- o inflation rate
- o discount rate used with the cash flows
- o period of analysis (number of years)
- o structure of the debt

Assumptions methods underlying projection of cash flows were:

- o the project planning horizon was 10 years
- o all three wineries were regular corporations subject to 1997 IRS regulations outlined in publication 542
- o a rate of 3% was used to estimate the effect of inflation on future cash flows
- o tasting room sales accounted for 55% of premium cases sold for the 2,000 case winery, 25% for the 5,000 case winery, and 15% for the 10,000 case winery
- o no wine was sold in the first year, but in the second year all varieties of white and red (except Cabernet Sauvignon) were sold
- o in the third year all varieties of white and red (except Cabernet Sauvignon) were sold
- o in the fourth year all varieties of wine were sold
- o any and all additional injections of capital beyond the initial outlays were 100% equity financed
- o wine prices varied based on the winery size and whether the case was sold through the tasting room or sold wholesale

**Table 4. Wine Prices Used in Projecting Cash Flows**

Category	Prices Used in Projecting Cash Flows		
	2,000 cs. winery	5,000 cs. winery	10,000 cs. winery
Tasting room	\$180/case	\$180/case	\$144/case
Wholesale	\$120/case	\$120/case	\$72/case

- o Assumed rate of inflation used to calculate future cash flows was 3%. The per case price was inflated annually by the assumed 3 percent rate and sales were assumed to equal production in periods (years) four through ten.
- o Taxable income was calculated by subtracting the total operating expenses, including interest, from the total revenue for each period. Gross cash flow was attained by subtracting the calculated income tax from taxable income.
- o Depreciation was added back to gross cash flow because it was a non-cash expense and the principal portion of the loan payment for that period was subtracted to obtain the net cash flow.

# Appendix F

## Tasting Room Market Assumptions

	A	B	C	D
1	<b>Assumes five wineries by 2006</b>			
2	<b>Wine Production Assumptions</b>	<b>Year 2006</b>		
3	No. of wineries in Chelan Area	5		
4	One winery producing 2,000 cases per year for a total of:	2000		
5	Three wineries producing 5,000 cases per year for a total of:	15000		
6	One winery producing 10,000 cases per year for a total of:	10000		
7	Total # of cases of wine to be produced by all five wineries (above)	27000		
8				
9	Avg. # cases bottled per winery	5400		
10	Avg. # bottles per winery	64800		
11				
12	Total # of cases of wine bottled by all five wineries (forecasted) in Lk. Chelan area	27,000		
13	Total # of bottles produced by all five wineries in Lk. Chelan area	324,000		
14	<b>Tasting Room Wine Sales</b>			
15	<b>Projections based on existing visitor traffic to Lake Chelan</b>			
16	Est. Annual Visitor trips to Lake Chelan Area	460,000		
17	Est. Annual ADULT Visitor trips to Lake Chelan Area	395,600		
18				
19	<b>Serious Wine Consumers (SWCs)</b>			
20	Est. % of Chelan area visitors that are serious wine consumers (SWCs)	18		
21	# of serious wine consumer (SWC) trips to Lake Chelan area/yr.	71,208		
22	Est. % of SWCs visiting Lk. Chelan that will visit winery tasting rooms	75		
23	# of SWCs visiting Lk. Chelan that will visit winery tasting rooms	53,406		
24	Percentage of existing SWC visitors to wineries that will actually purchase wine	78		
25	# of regular SWC visitors to Lk. Chelan wineries that will actually purchase wine	41,657		
26	# of new (SWC) visitors that (will) travel to Lk. Chelan primarily to visit wineries / tasting rooms	1,800		
27	Total # of SWCs (existing and new-winery-driven) that will actually purchase wine	43,457		
28	Avg. # of bottles of wine purchased by buyers of wine in tasting rooms	2		
29	Projected # of bottles to be purchased by all SWCs visiting in Chelan wineries	86,913		
30	Projected # of cases to be purchased by all SWCs in Chelan wineries	7,243		
31				

# Appendix F

## Tasting Room Market Assumptions

	A	B	C	D
32	<b>Marginal Wine Consumers (MWCs)</b>			
33	Est. % of Chelan area adult visitors that are Marginal Wine Consumers	20%		
34	# of MWC trips to Lake Chelan area/yr.	79,120		
35	Est. % of MWCs visiting Lk. Chelan that will visit winery tasting rooms	25%		
36	# of MWCs visiting Lk. Chelan that will visit winery tasting rooms	19,780		
37	Percentage of MWC visitors to wineries that will actually purchase wine	78%		
38	# of existing MWC visitors to Lk. Chelan wineries that will actually purchase wine	15,428		
39	Avg. # of bottles of wine purchased by MWCs in tasting rooms	2		
40	Projected # of bottles to be purchased by all MWCs visiting in Chelan wineries	30,857		
41	Projected # of cases to be purchased by all MWCs in Chelan wineries	2,571		
42				
43	TOTAL TRIPS THAT WILL INCLUDE VISITS TO AREA WINERIES	74,986		
44	TOTAL EST. # OF TASTING ROOM VISITORS THAT WILL PURCHASE WINE	58,885		
45	TOTAL EST.# BOTTLES TO BE PURCHASED BY ALL MWCs and SWCs in Chelan wineries	117,770		
46	TOTAL EST.# CASES TO BE PURCHASED BY ALL MWCs and SWCs in Chelan wineries	9,814		
47	% OF TOTAL CHELAN VOLUME TO BE PURCHASED IN WINERIES BY MWCs and SWCs	36%		
48	Total # of cases that must be sold out of tasting rooms to satisfy financial assumptions for (5) wineries	6,350		
49	Total % of cases that must be sold out of tasting rooms to satisfy Folwell assumptions	24%		
50	<b>Note: Total sales will be most impacted by the avg. # of bottles purchased by ea. Purchaser</b>			
51				
52	<b>Tasting Room Sales Percentage Requirements by Winery Size - per financial assumptions</b>	<b>2000 cs.</b>	<b>5000 cs.</b>	<b>10000 cs.</b>
53	Percent of Tasting Room Wine Sales by Winery Size (per Folwell assumptions used for financial analysis in this study)	55%	25%	15%
54	No of Wineries of this size estimated to be operating within 5 years	1	3	1
55	Total # of cases to be produced at maximum output	2,000	15,000	10,000
56	Total # of cases that must be sold from winery tasting room to satisfy the percentage of tasting room sale percentage	1,100	1,250	1,500
57	Total # of cases that will be sold by all wineries by winery size - based on Folwell assumption	1,100	3,750	1,500
58	Total # of cases that must be sold out of (5) tasting rooms to satisfy Folwell assumptions	6,350		

# Appendix F

## Tasting Room Market Assumptions

**Cell:** A16

**Comment:** Based on assumption that approximately 40% of all visitors to Chelan county visit the Lake Chelan area, and 1999 data from "Travel Impacts and Visitor Volume" by Dean Runyon Associates.

**Cell:** B16

**Comment:** Assumes modest increase in visitor volume of 2% per year from the year 2000. This is approximately equal to the rate of the state's overall 2000 estimates:  $2(\%) \times 6 \text{ yrs.} = 12\%$ .

**Cell:** A17

**Comment:** profile, March 1997.

**Cell:** A20

**Comment:** Based on Wine Marketing Council report indicating core wine consumers in US represent 10% of US population. Core wine consumers

Wine Consumers. Therefore, we are assuming higher percentages for projections.

Sales forecasting is very sensitive to this percentage - which is approximated for this study. Market Research to accurately determine this percentage would be valuable.

**Cell:** A22

**Comment:** This % will be very sensitive to winery marketing efforts

**Cell:** A24

**Comment:** From WSU 1989 Research Bulletin XB1013, p. 6, 78% was the mean percentage.

**Cell:** A26

**Comment:** These visitors will plan visits the Lake Chelan area especially to tour the local wineries. The wineries represent a new attraction for the area. This will be dependent on efforts to market the area as a wine tour destination.

**Cell:** A27

# Appendix F

## Tasting Room Market Assumptions

**Comment:** Assumes that all new winery-driven visitors will purchase wine in tasting rooms.

**Cell:** A28

**Comment:** From WSU 1989 Research Bulletin XB1013, p. 6

**Cell:** A32

**Comment:** Wine Marketing Council reports that 15% of the US adult population consumes 14% of table wine volume. These consumers are called Marginal Wine Consumers (MWCs).

**Cell:** B33

**Comment:** Assumes the percentage of Marginal Wine Consumers among all visitors to Chelan is 5% higher than the national average, based on comparative demographics.