Appendix K2

Agricultural Impacts

NCW 2002 Wheat, Oats, Barley and Hay Sales
Source: 2002 Census of Agriculture

Compiled by R. Faini, WSU Extension, Chelan County

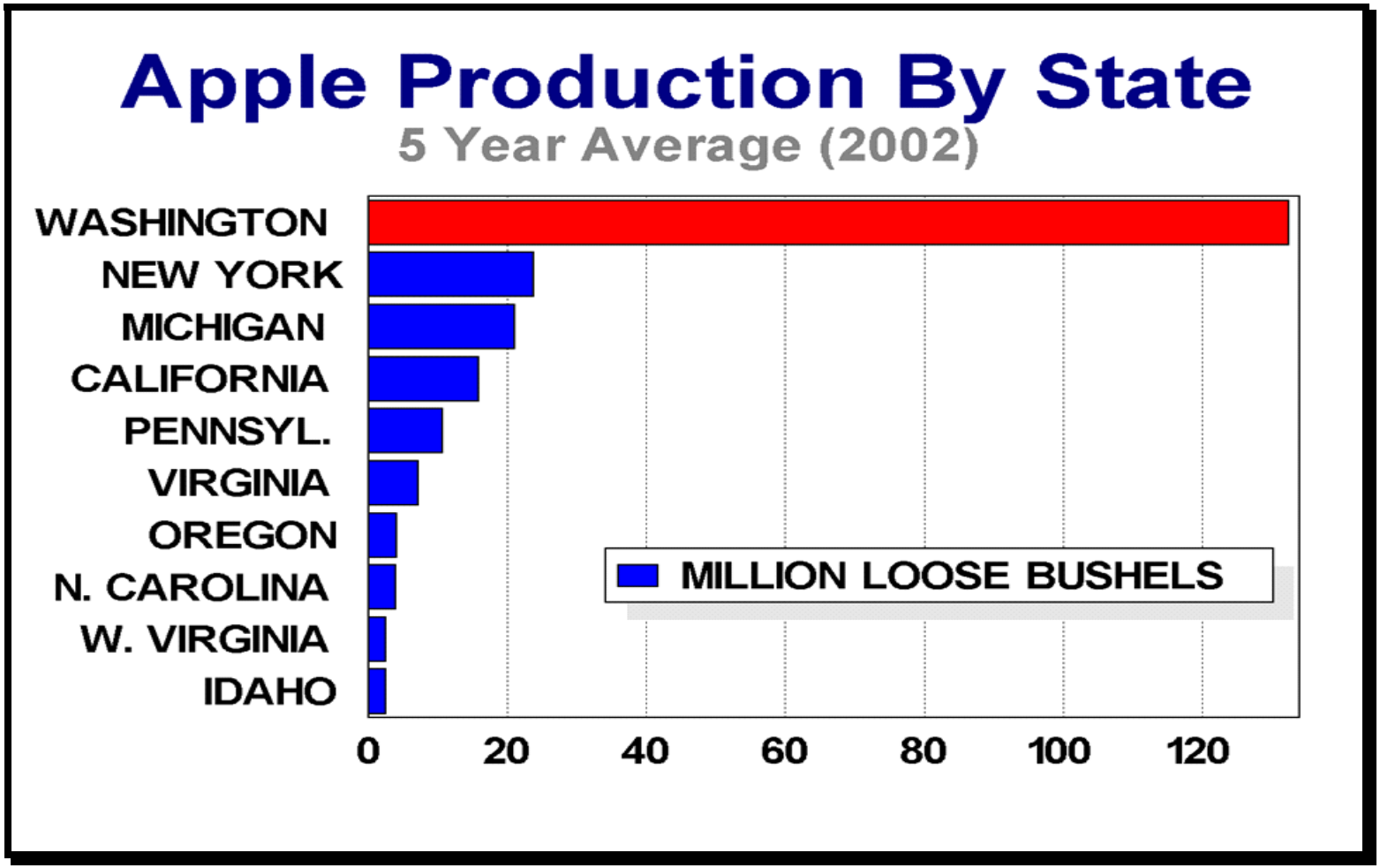
All Wheat	Acres	Yield (bu)	value
Douglas	184829	7122466	@3.25 = $23,148,014
Okanogan	9763	452682	= $1,471,266
			TOTAL VALUE: $24,619,230

All Oats	Acres	Yield (bu)	
Douglas	1632	65535	@2.00 = $131070.
Okanogan	2011	13933	= $27866
			TOTAL VALUE: $158,936

All Barley	Acres	Yield (bu)	
Douglas	3993	147327	@2.00 = $294654
Okanogan	318	11700	= $23400
			TOTAL VALUE: $318,054

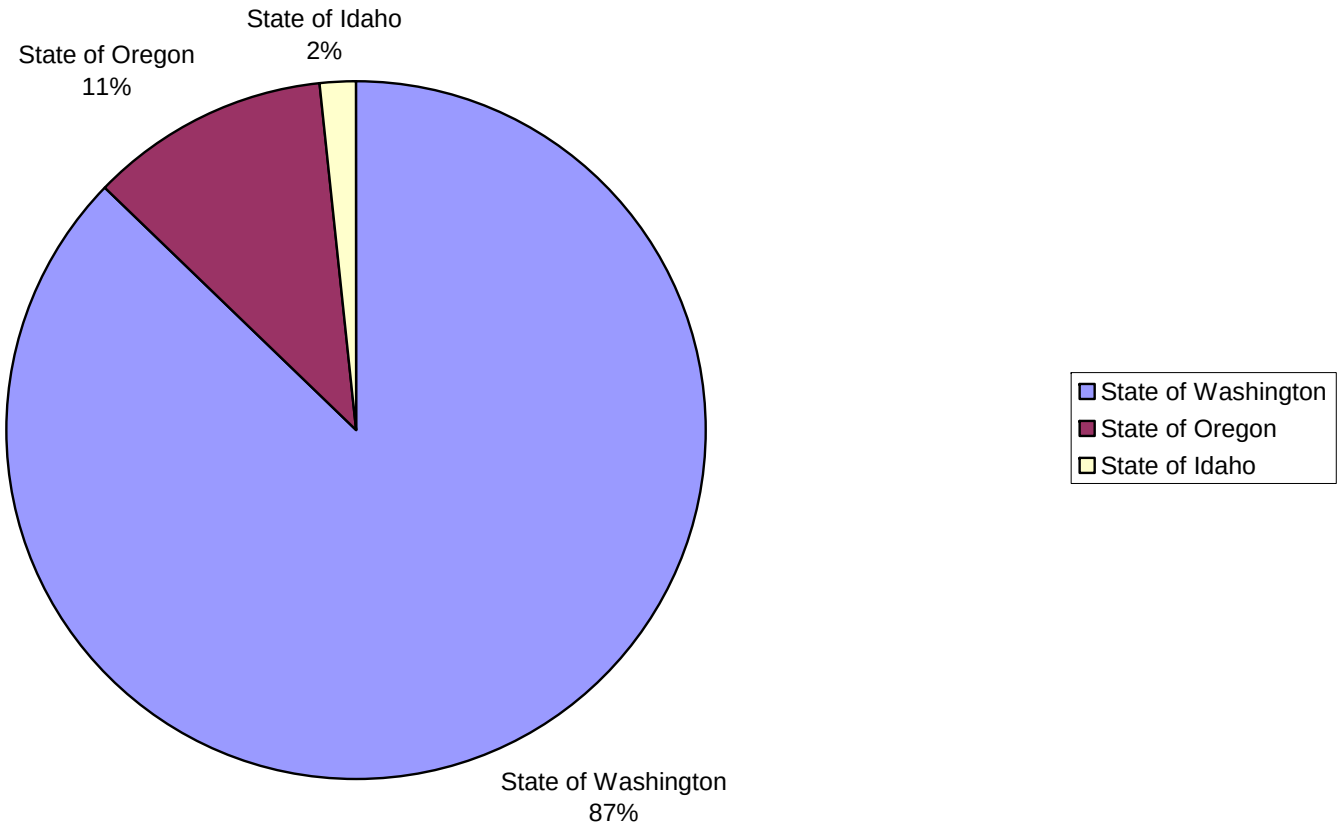
All Hay	Acres	tons	Value
Chelan	1823	3218	@120 = $386,160
Douglas	3654	16500	= $1,980,000
Okanogan	34138	85089	= $10,210,680
			TOTAL VALUE: $12,576,840

Totals Acres = 242,161
Value = $37,673,060



Source: Tim J. Smith

Chart 1 - Total Farmgate Values - Northwest States



Source: William S. Jensen, 2004

Tree Fruit Industry Impact on the North Central Region of Washington State

INCOME IMPACT RESULTS:

Direct and Indirect Purchases by Business Sectors	**$154,473,468**
Total Household Income of Owners and Employees	**444,297,553**
Local Business Sectors Impacted by Household Expenditures	**199,728,201**
Total Economic Income Impact to Region	**$798,499,222**

Local Sectors Impacted by Household Expenditures:

IMPLAN SECTOR	IMPLAN #	% of Local Consumer Expend.	Local $ Impact
Housing	mix	8.02	$28,102,108
Retail Trade	mix	3.63	$12,719,533
Health Care	mix	14.69	$51,473,812
Eating & Drinking Places	481	4.40	$15,417,616
Food Processing	mix	2.17	$7,603,688
Wholesale Trade	mix	3.47	$12,158,892
Utilities	mix	2.02	$7,078,087
Insurance	428	0.55	$1,927,202
Personal Services	mix	1.64	$5,746,566
Communications	mix	0.72	$2,522,883
Transportation Services	mix	1.34	$4,695,365
Motor Vehicle Operation	mix	4.80	$16,819,217
Banking/Credit Services	mix	2.53	$8,865,129
State/Local Services	mix	1.06	$3,714,244
Petroleum Products	mix	0.00	$0
Education	mix	0.83	$2,908,323
Recreational Activities	mix	1.26	$4,415,044
Hotels & Lodging	479	0.61	$2,137,442
Investments	426	0.35	$1,226,401
Civic/Religious Assoc.	mix	0.35	$1,226,401
Fabrics/Apparel	mix	0.01	$35,040
Publications/Paper	mix	0.04	$140,160
Business/Labor Assoc.	mix	0.35	$1,226,401
Household Furnishings	mix	0.61	$2,137,442
Household Industry	494	0.22	$770,881
U.S. Postal Service	398	0.08	$280,320
Other	mix	1.26	$4,415,044
Non-Local Purchases	mix	43.00	$150,672,152
Total Purchases		**100.00**	**$350,400,353**

ESTIMATED AVERAGE ANNUAL EMPLOYMENT **39,925**
(Assumes annual average income of $20,000)

Source: William S. Jensen, 2004

Tree Fruit Water Usage Calculations
Calculating the amount of water used by 1 acre of fruit trees <u>per season</u>
for cool, average and warm weather conditions in NCW.

	Water Use Per Day Acre Inches Used				Water Use Per Season Acre Inches Used		
	Cool	Average	Warm	days	**Cool**	**Average**	**Warm**
Early April	0.04	0.05	0.05	15	0.6	0.75	0.75
Late April	0.08	0.09	0.1	15	1.2	1.35	1.5
Early May	0.1	0.14	0.2	15	1.5	2.1	3
Late May	0.17	0.18	0.25	15	2.55	2.7	3.75
Early June	0.2	0.23	0.26	15	3	3.45	3.9
Late June	0.25	0.29	0.33	15	3.75	4.35	4.95
July	0.28	0.33	0.38	30	4.2	4.95	5.7
Early Aug	0.27	0.31	0.35	15	4.05	4.65	5.25
Late Aug	0.22	0.24	0.3	15	3.3	3.6	4.5
Early Sept	0.15	0.19	0.25	15	2.25	2.85	3.75
Late Sept	0.08	0.1	0.15	15	1.2	1.5	2.25
October	0.05	0.08	0.1	30	0.75	1.2	1.5
(Table calculations from Tim Smith, WSU Extension)							
	Total Season Use: Acre Inches				**28.35**	**33.45**	**40.8**

<u>Converting ANNUAL water usage from "Acre inches" to "cfs"</u>

A) 1 acre of land covered by 1 inch of water = 3630 cubic feet of water

B) Since there are 3630 cubic ft in 1 acre inch And 31,536,000 seconds in a year

C) Per acre we divide 3630 cubic ft by 31,536,000 seconds.= 0.0001151 cubic ft/sec/A for each acre inch applied.

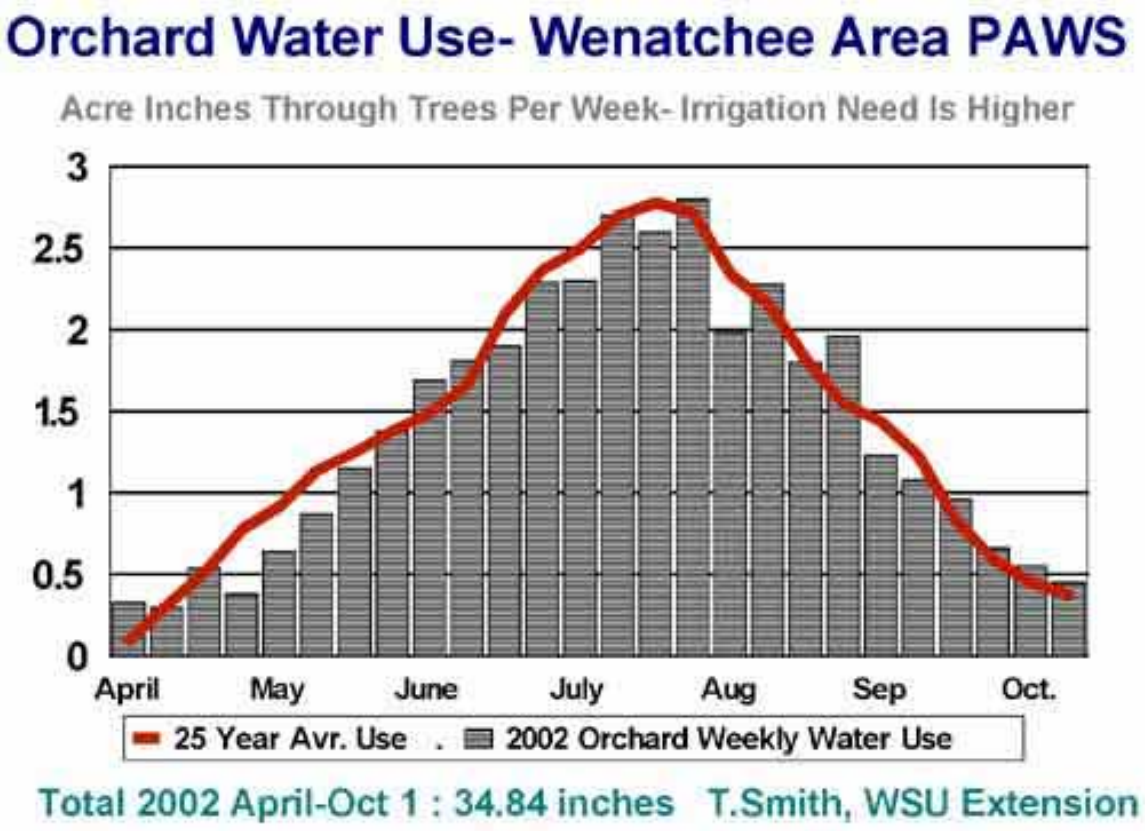
D) To factor in irrigation inefficiencies, which range from 15% - 40%, additional water needed is calculated here:

* 15% = 1.15 x 0.0001151 ft3/sec = 0.0001323 ft3/sec per acre each year
* 40% = 1.40 x 0.0001151 ft3/sec = 0.0001611 ft3/sec per acre each year[1]

E) For the average use noted above (33.45 Acre inches), **all nut & tree fruit acreage** in NCW (77,459) would use only 342.8 to 417.4 cfs per season from ALL RIVERS COMBINED in Chelan, Douglas and Okanogan Counties

[1] Calculations: A - D, Robert Simmons, WSU Water Quality Specialist
R. Faini, Director, WSU Extension Chelan County

Sources: T.J. Smith, R. Simmons, and R. Faini, 2006, 1968-1998


Orchard Water Use- Wenatchee Area PAWS
Acre Inches Through Trees Per Week- Irrigation Need Is Higher
3
2.5
2
1.5
1
0.5
0
April
May
June
July
Aug
Sep
Oct.
25 Year Avr. Use
2002 Orchard Weekly Water Use
Total 2002 April-Oct 1 : 34.84 inches T.Smith, WSU Extension

Tree Fruit Water Usage Calculations

Calculating the amount of water needed to irrigate 10,000 Acres
Showing Acre Feet, CFS and Average Streamflow
(Reference Table on p.5 for foundation of numbers used here.)

	Water Use Per day[1]	**CFS Needed***	**Average streamflow**
	Acre ft on 10,000 A, adding an inefficiency of 30% to the **Average** use	to Supply 10,000 Acres During Season	Wenatchee River at Monitor, WA[2] 1962-2004, in ft3/sec
Early April	54.2	27.31	
Late April	97.5	49.16	April: **4002 cfs**
Early May	151.7	76.47	
Late May	195.0	98.31	May**: 8004 cfs**
Early June	249.2	125.62	
Late June	314.2	158.39	June**: 8969 cfs**
July	357.5	180.24	July: **4440 cfs**
Early Aug	335.8	169.32	
Late Aug	260.0	131.08	August: **1495 cfs**
Early Sept	205.8	103.77	
Late Sept	108.3	54.62	September: **820 cfs**
October	86.7	43.69	October: **1091 cfs**

Table Calculations by Robert Simmons, WSU Water Quality Specialist

* A) 1 acre of land covered by 1 inch of water = 3630 cubic feet of water

*B) Since there are 3630 cubic ft in 1 acre inch and 86,400 seconds per day

*C) Per 10,000 acres we mulitply # Acre In used by 3630 cubic ft and divide by 86,400 seconds to get CFS Needed

[1] Multiply the Acre feet in this column by 12 to get Acre Inches

[2] Number shown is **after all prior depletions** (including domestic use and irrigation)
Source: USBR

R. Faini, Director
WSU Extension Chelan County

References

Faini, R.J. 2006. 2002 NCW Wheat, oats, barley and hay sales. 2002 Census of Agriculture. Chelan County, WA.

Faini, R.J., Simmons, R. and Smith, T.J. 2006, 1968-1998. Tree fruit water usage calculations: Calculating the amount of water needed to irrigate 10,000 acres. WSU Extenstion.

Jensen, William S. 2004. Total farmgate values – Northwest states.

Jensen, William S. 2004. Tree fruit industry impact on the north central region of Washington state.

Smith, T. J. 2005. Apple production by state, 5 year average (2002). Wenatchee, WA.

Smith, T.J. 2002. Orchard water use – Wenatchee area PAWS. WSU Extension.

Smith, T.J, Simmons R. and Faini, R.J., 2006,1968-1998. Tree fruit water usage calculations: Calculating the amount of water used by 1 acre of fruit trees per season. National Weather Service. Wenatchee, WA.