PACIFIC NORTHWEST HONEY BEE POLLINATION SURVEY FOR 2006

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Since 1986 the Honey Bee Laboratory at Oregon State University has conducted an annual survey of pollination economics in the Pacific Northwest (PNW). The information from each year of the survey has been made available both regionally and nationally. The information has proved to be most useful to individual beekeepers who generate income from pollination rental, which is the primary source of income for the majority of commercial beekeepers in the PNW.

The use of managed honey bee colonies for commercial crop pollination remains the most important function of the PNW beekeeping industry. The vast and diverse agriculture of the region relies on a healthy and strong beekeeping industry to maintain optimum production. An enhanced knowledge of pollination economics is crucial to every beekeeper that enters into the world of commercial crop pollination. It is also important for those growers who contract honey bee colonies for managed pollination to understand the current economic conditions of the beekeeping industry.

The pollination requirement for commercial agriculture in the PNW is enormous. Between Washington, Oregon and Idaho there are *ca.* 355,000 acres of crops grown that require or benefit from managed honey bee pollination. The "farm-gate" value of those combined crops is approximately $1,750,000,000! Nearly half of those acres and 60% of the dollar value is in one crop – apples.

The USDA National Agriculture Statistical Service estimates that there are 200,000 production honey bee colonies in the PNW. And with these numbers there are some interesting hypothetical calculations that can be made. If all growers were to rent 2 colonies for each acre of blooming crop (355,000 acres), the resulting pollination requirement would utilize 710,000 colony rentals. If we multiple this by the 2006 average colony rental fee ($73^{85}) it results in a potential pollination rental income of more than 52,433,500 million dollars. If we add to that the 2006 estimated California almond pollination income available to all PNW commercial beekeepers ($22.8 million) we end up with a potential gross pollination income of 75 million dollars. Another way to look at this is, 'how much pollination income, under optimized conditions, should have been produced from one commercial honey bee colony in the year 2006?' For the PNW that figure is approximately $375.

Comparing the hypothetical PNW rental income ($52.5 million) to the farm-gate value of the crops pollinated in the PNW ($1.75 billion) shows that the money spent by growers to optimize pollination is 3% of the total crop value. This is another impressive illustration of what a remarkable bargain pollination rental is to the commercial agricultural industry of the PNW.

This year's survey continues to show a number of trends, one of which is the dependence of PNW commercial beekeepers on the income generated from colony rentals. For 2006 the average commercial beekeeper reported receiving 66.6% of his or her annual operating gross from pollination rentals. This percentage is slightly lower than the previous year 2005 (70%), but continues to show that the dominance of pollination rental income to the commercial beekeepers of the PNW.

Recent increases in the average pollination rental fee have been strongly influenced by a dramatic rise in the pollination rental fees paid by California almond growers. In 2005 almond growers responded to a perceived shortage of colonies by dramatically increasing the price they paid for pollination; this has obviously continued for the 2006 pollination season. The average almond pollination fee for 2006 was $129^{20}! This is a 63% increase from the 2005 average ($79^{40}).

For 2006 the average pollination rental fee, computed from commercial colony rentals on all crops reported (including almonds), was $73^{85}. This is a 44% increase from the average pollination fee of 2005 ($51^{30}) (see Tables 1 and 2). This escalation is due to the continued increase in the average almond pollination rental fee but many crops pollinated within the PNW also experienced rental fee increases. Table 2 illustrates the average fees paid by crop and a comparison to the average fee received in 2005.

During the past ten years the average rental fee has increased from $31^{05} (1997) to $73^{85} (2006), an increase of 138%. It needs to be stressed that honey bee colony rental has for many decades been an underpaid service to the agricultural industry. It is really only within the past decade that rental fees have begun to more accurately reflect the enormous value-added service of managed pollination. This is shown by the 400% increase in the average pollination fee during the last seventeen years; 1990 = $18^{40} to 2006 = $73^{85}.

Within the PNW, tree fruits are the dominant crop type for pollination income. In 2006 the combination of pears, sweet cherries and apples accounted for 37% of all reported rentals and 20% of all reported pollination income. Paradoxically, the single most important crop for PNW beekeepers is grown in California, *i.e.*, almonds. Almonds were responsible for 39% of all rentals and 69% of all rental income in the 2006 survey (see Table 4). Almonds consistently have produced a high average pollination fee; and for the past two years have displayed remarkable fee increases (for 2005 the average was $79^{40} and for 2006 $129^{20}!)

In 2006, the combination of California almonds and PNW tree fruit accounted for 76% of all rentals and 89% of all

pollination income, which illustrates the dominance and importance of these crops for a commercial PNW beekeeper (see Table 4). All other PNW cropping systems that utilize honey bee pollination contributed 11% of a beekeeper's gross pollination income in 2006.

In 2006, for crops pollinated in the PNW, cucumbers provided the highest average fee at 67^{50} per colony rental, but this average is derived from only 398 reported rentals. In terms of acreage, apples are the largest crop grown in the PNW and this is reflected by the large number of reported rentals (22% of all rentals and 12% of the total reported rental income.)

Berry crops (blackberries, Marion berries, loganberries, raspberries), are late spring to early summer bloomers and copious nectar producers. The 2006 average pollination fee for combined berry crops was 24^{45}, a lower price than the average fee because beekeepers have an expectation that a honey crop will also be produced. The rental of colonies for blueberry pollination has been increasing in recent years due to more acreage in production. The average fee for blueberries in 2006 was 32^{40}, higher than other berry crops due to the fact that there is little to no expectation of a surplus honey crop.

The average PNW commercial honey bee colony was rented 2.1 times in 2006 & this includes California almonds. This is a slight decrease from 2005. This statistic has been dropping since 1999 when the average number of rentals per colony was 2.8. Does this actually reflect the real world situation? Are commercial beekeepers concentrating on almonds and PNW tree fruit (which historically provide the major sources of pollination income) & reducing the number of colonies involved in minor crop pollination? At this time our data are not able to provide a reasonable answer to this question.

For the 2006 pollination season an average rental fee of 73^{85}, combined with an average of 2.1 pollination rentals per colony, results in an annual per colony pollination income of 155^{10}, which is up significantly from the past few years. With the "average" commercial operation running 3,855 colonies, a hypothetical 2006 gross pollination income for the "average" commercial beekeeper was $597,910.

The combined colony numbers from those commercial beekeepers who responded to the 2006 survey, (73,250 hives), represent about 37% of the USDA's estimate of colony numbers in Oregon and Washington. Therefore, if we multiply the total reported pollination income ($11,084,385) by a factor of 3, we have a ball park estimate of the pollination income generated by commercial beekeeping in the PNW, *i.e.*, a regional pollination income of approximately $33,253,155. This is far more than the normal "estimates" assigned to the bee industry by agricultural economists, who, for reasons unexplained, usually do not even include pollination rental income in their estimates of the beekeeping industry economic status. Pollination income in the PNW far exceeds the value of honey and wax sales for our regional beekeeping industry. Pollination rental income is frequently three to four times greater than honey and wax sales in any given year and this disparity between pollination income and honey/wax income has increased dramatically, especially in the past two years.

The 2006 survey asked commercial beekeepers to report the total number of full-time or full-time equivalent employees working for their operations. The figure for the "average" commercial beekeeping operation in 2004 was 2.9 full-time employees; for 2005 it was 3.4 employees and for 2006 it is 4.8 Another interesting way to look at this is to ask the question "what is the 'colony equivalent'", meaning what is the number of colonies necessary to hire one full-time employee? That figure was very close to 1,500 colonies/employee in both the years 2004 and 2005. In 2006 the "colony equivalent" is 1,115 hives per full-time employee.

While colony income from pollination rental is a critical statistic, so therefore is the annual cost to maintain a healthy hive of honey bees. Responses to this question on the survey have varied widely, often from a misunderstanding of what was being asked. However, numerous commercial beekeepers, who have over the years maintained good cost accounting records, have responded with numbers that are very reasonable relative to today's economy. The average annual hive maintenance cost was 138^{45} per colony for the year 2006. The range in responses was a high of $200/hive to a low of $80/hive. This wide range suggests that beekeepers should try to be more precise in calculating their operational costs. If you can't answer the question of your operating cost on a ***per colony basis*** you need to re-adjust your operational accounting.

For 2006 the average colony maintenance cost is lower than the average per colony pollination income. From the 2006 survey data pollination income was 151^{10}/colony and the colony maintenance cost was 138^{45}; a difference of 12^{65} per colony. This a change from recent years when the average operational cost was somewhat higher than the average pollination income on a per colony basis. This still illustrates that the majority of net operational profit is generated by sources of income outside of pollination rental, most importantly, honey production.

Remember that the data presented here represent the pollination rental situation of a hypothetical "average" commercial beekeeper in the Pacific Northwest. For individual beekeepers the survey results are most useful as benchmarks against which they should compare their individual operations. Please let me stress again that all of these "projections" are only as accurate as the data provided by responding beekeepers. The projections also assume that the participating beekeepers collectively represent the mainstream of commercial beekeeping in the Pacific Northwest. The 2006 survey is produced from a significantly greater number of commercial beekeepers and hence number of colonies and reported rentals than in 2005.

I wish to again thank all those beekeepers in Oregon and Washington who took the time to participate in the survey, which over the past 20 years, has generated the most accurate assessment of commercial pollination known in the U.S. I also offer sincere thanks to the Washington State Beekeepers Association for the funding support to continue this annual survey of PNW regional beekeeping economics.

Table 1. Average Pollination Fee 1995-2006

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
29.60	31.55	31.05	29.65	32.25	32.85	33.65	36.40	36.45	38.65	51.30	$73.85

Table 2. 2006 Average pollination fees by crop as reported by 19 PNW commercial beekeeping operations.

Crop	No. Rentals	Average Fee	Fee +/-[1]
Pears	7,975	$37.80	-1.5%
Cherries	14,842	$39.50	+4.7%
Apples	33,408	$40.00	+8.4%
Berries[2]	5,206	$24.45	-19.0%
Blueberries	8,568	$32.40	-13.3%
Cranberries	1,564	$44.40	+48.0%
Vegetable seed	5,856	$43.80	-2.4%
Clover seed[3]	5,330	$29.85	-20.8%
Crimson clover seed	50	$35.00	+41.2%
Radish seed	1,589	$46.80	+88.7%
Cucumbers	398	$67.50	+76.2%
Sq. & Pump. seed	788	$44.00	-6.6%
Watermelon	1,100	$35.00	-16.6%
Meadowfoam	3,092	$42.45	+16.1%
Misc.[4]	1,162	$21.65	-2.2%
Almonds	59,130	$129.20	+62.7%

SUMMARY = 50,058 rentals generating $11,084,385---Average Pollination Fee = $73.85

[1] % change from 2005
[2] Includes blackberries, raspberries, Marionberries & loganberries.
[3] Includes red & white clover as grown for seed. [4]canola, apricots & kiwi

Table 3. Average colony numbers, average rental fee per hive & average annual rental income per hive for a commercial beekeeping operation in the Pacific Northwest 1992-2006.

Year	Average No. Colonies	Average Rental Fee	Average Annual Rental Income per Colony
1992	765	19^{25}	49^{70}
1993	990	22^{50}	62^{25}
1994	1,225	28^{10}	78^{70}
1995	1,348	29^{60}	78^{15}
1996	1,350	31^{55}	97^{50}
1997	1,504	31^{05}	92^{20}
1998	1,153	29^{65}	83^{00}
1999	2,058	32^{25}	89^{30}
2000	2,055	32^{85}	77^{40}
2001	3,168	33^{65}	64^{60}
2002	4,255	36^{40}	63^{75}
2003	2,612	36^{45}	86^{40}
2004	3,555	38^{65}	74^{60}
2005	2,055	51^{30}	112^{85}
2006	**3,855**	**73^{85}**	**151^{10}**

Table 4. Pollination rentals & income by crop type from 19 PNW commercial beekeepers.

Crop	# Rentals	% of total Rentals	Rental Income	% of total rental income
Tree Fruit	56,225	37%	$2,224,397	20%
Almonds	59,130	39%	$7,638,135	69%
All other crops	34,703	24%	$1,221,853	11%
Total	**150,058**	**100%**	**$11,084,385**	**100%**

SUMMARY INFORMATION - 2006

Total number of participating commercial beekeepers = **19**

Total number of colonies in the survey = **73,250**

Total colony rentals = **150,058**

The average per colony pollination rental fee (for all beekeepers, for all crops including California almonds) was: **$73.85**

The average commercial colony was placed in **2.1** pollination sets in 2006, for an average per hive rental income of **$151.10**

The average commercial bee operation maintained 3,855 colonies and grossed **$597,910** in pollination rental income for 2006.