Pacific Northwest Honey Bee Pollination Economics Survey 2008

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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 USDA National Agriculture Statistical Service estimates that there are 200,000 production honey bee colonies in the PNW. With these numbers there are some interesting hypothetical calculations that can be made. For instance, if all growers of crops that require or benefit from managed honey bee pollination in the PNW, 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 multiply the hypothetical rentals by the 2008 average colony rental fee ($81.75) it results in a potential pollination rental income of more than 58 million dollars for PNW beekeepers. If we add to this the estimated 2008 California almond pollination income, available to PNW commercial beekeepers ($29.5 million), we end up with a potential gross pollination rental income of 87 and a half million dollars. Another way to look at this is by asking the question, 'how much pollination income, under optimized conditions, should have been produced from one commercial honey bee colony in the year 2008?' For the PNW that figure is approximately $437.50 per hive. Which is obviously unattainable, if for no other reason than the impossibility of one colony being sequentially utilized in all of the necessary cropping systems required to produce such a hypothetical per colony income.

Comparing the hypothetical PNW rental income ($58 million) to the farm-gate value of the crops pollinated in the PNW ($1.75 billion) shows that the money spent by growers to ensure adequate pollination is about 3% of the total crop value. This is an impressive illustration of what a remarkable bargain pollination rental is to the commercial agricultural industry of the PNW.

This year's survey continues to illustrate the critical reliance of PNW beekeepers on income generated from colony rentals. For 2008 the average commercial beekeeper reported receiving 68% of his or her annual operating gross from pollination rental, which is identical to that reported for the 2007 crop year. This percentage shows the dominance of pollination rental income to a PNW beekeeper's financial "health".
Recent increases in the average pollination rental fee have been strongly influenced by the 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 were willing to pay for pollination; this has continued for the 2008 pollination season. The average almond pollination fee for 2008 was $148.15. This is a 86.5% increase from the 2005 average ($79.40) and a 7.8% increase from the average almond pollination fee paid in 2007 ($137.35). Almond pollination is a target crop for nearly all commercial beekeepers in the Pacific Northwest and represents the beginning of the annual pollination season.

For 2008 the average pollination rental fee, computed from commercial colony rentals on all crops reported (including almonds), was $81.15. This is a 14.8% increase from the average pollination fee paid in 2007 ($70.65) (see Table 1). Table 2 provides the average rental fees by crop and a comparison to the average fee received in 2007.

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During the past ten years the average pollination rental fee has gone from $32.25 (1999) to $81.15 (2008), an increase of 250%. It needs to be stressed that honey bee colony rental was for many decades, an underpaid service to the agricultural industry at-large. 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 440% increase in the average pollination fee during the last nineteen years; 1990 = $18.40 to 2008 = $81.15.

Within the PNW, tree fruits (apples, pears and sweet cherries) have been and remain the dominant crop types for pollination income. In 2008 the combination of apples, pears and sweet cherries and accounted for 34% of all reported rentals and 18.5% 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 36.6% of all rentals and 67% of all rental income in the 2008 survey (see Table 4). Almonds consistently have produced a high average pollination fee and for the past three years have displayed remarkable fee increases compared to the 2005 average fee of $79.40: for 2006, $129.20; for 2007, $137.35; for 2008, $148.15.

In 2008 the combination of California almonds and PNW tree fruit accounted for 71% of all rentals and 85.5% 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 utilizing honey bee pollination contributed 14.5% of a beekeeper's gross pollination income in 2008.

In terms of acreage, apples are the largest crop grown in the PNW and this is reflected by the large number of reported rentals (19% of all rentals and 11% of the total reported rental income).
Berry crops (blackberries, Marion berries, Logan berries, raspberries), are late spring to early summer bloomers and most often copious nectar producers. The 2008 average pollination fee for these combined berry crops was $30.25, 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 rental fee for blueberries in 2008 was $36.90, somewhat 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 1.9 times in 2008 and this includes California almonds. This is a decrease from 2007 (2.5). This statistic has trended downwards 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) and reducing the number of colonies involved in minor crop pollination? Following almond pollination, are colonies being shifted away from pollination to concentrate on honey production? At this time our data are not able to provide reasonable answers to these questions.

For the 2008 pollination season, an average rental fee of $81.15, combined with an average of 1.9 pollination rentals per colony, results in an annual per colony pollination income of $154.20. With the "average" commercial operation running 4,800 colonies, a hypothetical 2008 gross pollination income for the "average" commercial beekeeping operation in the PNW was $740,000.

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The combined colony numbers from those commercial beekeepers who responded to the 2008 survey, (57,616 hives), represent about 29% of the USDA's estimate of colony numbers in Oregon and Washington. Therefore, if we multiply the total reported pollination income ($8,945,086) by a factor of 3.5, we have a ball park estimate of the pollination income generated by commercial beekeeping in the PNW in 2008, i.e., a regional pollination income of approximately $31,000,000. This is far more than the "estimates" assigned to the bee industry by agricultural economists, who, for reasons unexplained, usually do not even include pollination rental income in their evaluation of beekeeping economics. Pollination income in the PNW far exceeds the value of honey and wax sales for our regional beekeeping industry. Pollination rental income is frequently four to five times greater than honey and wax sales in any given year. This disparity between pollination income and combined honey/wax sales has increased dramatically, especially in the past few years, concurrent with the impressive rise in pollination rental fees.

The 2008 survey asked commercial beekeepers to report the total number of full-time or full-time equivalent employees working for their operations. An interesting way to look at this question concerning the average number of full-time employees, is to ask the question "what is the colony equivalent", meaning, how many colonies are necessary in order to hire one full-time employee? That figure was very close to 1,500 colonies/employee in 2004 and 2005. In 2007 the "colony equivalent" was 1,125 hives per full-time employee, and for 2008 the reported "colony equivalent" is 870. This lower number would suggest that colonies are received more intensive management, which ultimately means healthier hives.

While colony income from pollination rental is a critical statistic, so therefore is the annual cost to maintain a healthy hive of honey bees. Numerous commercial beekeepers, who have over the years maintained accurate cost accounting records, have reported colony maintenance costs that are very reasonable relative to today's economy. The average annual hive maintenance cost was $178 per colony for the year 2008. The range in individual responses was from a high of $225/hive to a low of $132/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 2008 the average colony maintenance cost is once again higher than the average per colony pollination income. From the 2008 survey data, pollination income was $154.20/colony and the colony maintenance cost was $178; a difference of $23.80 per colony. This illustrates that the net operational profit needs to be generated by sources of income outside of pollination rental, most importantly, honey production.

In interpreting the average pollination fee for an individual crop, it is important to recognize that the reliability of the "average" is strongly influenced by the number of reported rentals. The "average" for almonds should be considered very realistic because of the large number of beekeepers and rentals reported for this crop, and such is also the case for tree fruit in the PNW. For this year's survey report, pollination rental averages for crops with fewer than 1,000 reported rentals, have been excluded from Table 2, but they have been included for computing the average pollination fee from all reported rentals.

It is important to 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. Let it be stressed 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.

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 23 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 1999-2008

1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
$32.25	$32.85	$33.65	$36.40	$36.45	$38.65	$51.30	$73.85	$70.65	$81.15

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Table 2. 2008 Average pollination fees as reported by 11 commercial beekeeping operations.

Crop	No. Rentals	Avg. Fee	Fee +/-[1]
Pears	7,246	$42.35	+3.9%
Cherries	9,334	$42.35	0%
Apples	21,112	$45.40	+5.8%
Berries [2]	2,844	$30.25	-11.9%
Blueberries	8,588	$36.90	+3.4%
Cranberries	1,578	$50.00	+12.6%
Vegetable seed	8,932	$47.30	-16.9%
Clover seed [3]	4,165	$31.15	-41.7%
Radish seed	1,002	$35.75	0%
Watermelon	1,435	$49.25	+33.8%
Meadowfoam	1,500	$45.35	+3.6%
Almonds	40,385	$148.15	+7.8%

Average Pollination Fee = $81.15

[1] % change from 2007
[2] Includes blackberries, raspberries, Marion berries, & Logan berries.
[3] Includes red & white clover as grown for seed.

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Table 3. Average colony numbers, average rental fee per hive, and average annual rental income per hive for a hypothetical commercial beekeeping operation in the Pacific Northwest 1992-2008.

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
2007	3,091	$70.65	$176.60
2008	**4,800**	**$81.15**	**$154.20**

Table 4. Pollination rentals and income by crop type as reported by 11 PNW commercial beekeepers in 2008.

Crop	# Rentals	% of total rentals	Rental Income	% of total rental income
Tree Fruit	37692	**34.20%**	$1,660,418	**18.50%**
Almonds	40358	**36.60%**	$5,982,920	**67%**
All other crops	32175	**29.20%**	$1,302,045	**14.50%**
Total	**110252**		**$8,945,383**	

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Summary Information - 2008

Number of participating commercial beekeepers = **11**

Number of colonies in the survey = **57,616**

Total colony rentals = **110,252**

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

$81.15

The average commercial colony was placed in **1.9** pollination sets in 2008, for an average per hive rental income of **$154.20**

The average commercial bee operation maintained 4,800 colonies and grossed **$740,160** in pollination rental income for 2008.