

## Pacific Northwest Honey Bee Pollination Economics Survey 2010

by  
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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 report for 2010 represents 25 years of summarizing the general state of pollination economics in the PNW. This is the longest running examination of pollination economics for any region in the U.S.

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.

The USDA National Agriculture Statistical Service estimates that there are 92,000 production honey bee colonies in the PNW (Oregon and Washington). 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 crop that relies on and/or benefits from bee pollination (ca. 350,000 acres), the resulting pollination requirement would utilize 700,000 colony rentals. If we multiply the hypothetical rentals by the 2010 average colony rental fee (\$70<sup>85</sup>) it results in a potential pollination rental income of nearly 50 million dollars for PNW beekeepers. If we add to this the estimated 2010 California almond pollination income, available to PNW commercial beekeepers (\$25 million), we end up with a potential gross pollination rental income of 75 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 PNW honey bee colony in the year 2010?’ For 2010 that figure is approximately \$815 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 (50 million \$) to the farm-gate value of the crops pollinated in the PNW (2.75 billion \$) shows that the money spent by growers to ensure adequate pollination is

about 1.8% of the total crop value. This is an impressive illustration of what a remarkable bargain pollination rental is to the at-large commercial agricultural industry of the PNW.

The 2010 pollination survey continues to illustrate the critical reliance of PNW beekeepers on income generated from colony rentals. For 2010 the average commercial beekeeper reported receiving 73% of his or her annual operating gross from pollination rental, which is a slight increase from the 2009 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 continued into the 2009 pollination season where the average almond pollination fee was \$150<sup>25</sup>. For 2010 the average fee paid for almond pollination was \$137<sup>20</sup> which is the first decrease seen in 5 years; however almonds are still by far and away, the highest rental crop for PNW beekeepers. 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 2010 the average pollination rental fee, computed from commercial colony rentals on all crops reported (including almonds), was \$70<sup>85</sup>. This is a 21% decrease from the average pollination fee paid in 2009 (\$89<sup>90</sup>) (see Table 1). This decrease is strongly influenced by the corresponding decrease in the average fee for almond pollination in 2010. Table 2 provides the average rental fees by crop and a comparison to the average fee received in 2009. For table 2 only crops where at least 3 commercial beekeepers reported rentals are listed.

During the past ten years the average pollination rental fee has increased from \$33<sup>65</sup> (2001) to \$70<sup>85</sup> (2010), an increase of 210%. While dramatic gains in pollination fees have occurred, 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. Figure 1 depicts the average pollination fee paid since the beginning of the PNW pollination survey in 1986.

Within the PNW, tree fruits (apples, pears and sweet cherries) have been and remain the dominant crop types for pollination income. In 2010 the combination of apples, pears and sweet cherries and accounted for 40% of all reported rentals and 21% 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 27% of all rentals and 52% of all rental income in the 2010 survey (see Table 4). Almonds have consistently produced a high average pollination fee and for the past five years have displayed remarkable fee increases compared to the 2005 average fee of \$79<sup>40</sup>: for 2006, \$129<sup>20</sup>; for 2007, \$137<sup>35</sup>; for 2008, \$148<sup>15</sup>; and for 2009, \$150<sup>30</sup>.

In 2010 the combination of California almonds and PNW tree fruit accounted for 67% of all rentals and 79% 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 21% of the beekeeper's gross pollination income in 2010.

In terms of acreage, apples are the largest crop grown in the PNW (almost 200,000 acres) and this is reflected by the large number of reported rentals (23.5% of all rentals and 16% of the total reported rental income).

The average PNW commercial honey bee colony was rented 2.1 times in 2010 and this includes California almonds. This is a slight increase from 2009. This statistic had been trending downwards since 1999 when the average number of rentals per colony was 2.8. Does this actually reflect the real world situation? Are PNW commercial beekeepers concentrating on almonds and 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 2010 pollination season, an average rental fee of \$70<sup>85</sup>, combined with an average of 2.1 pollination rentals per colony, results in an annual per colony pollination income of \$148<sup>80</sup>. Table 3 displays the data concerning the trends of ever larger individual operations, and the increasing per colony income derived from pollination. With the “average” commercial operation running 3,284 colonies, a hypothetical 2010 gross pollination income for the “average” commercial beekeeping operation in the PNW was \$488,660.

The combined colony numbers from those commercial beekeepers who responded to the 2010 survey, (59,948 hives), represent about 65% of the USDA's estimate of commercial colony numbers in Oregon and Washington. Therefore, if we divide the total reported pollination income of the survey respondents (\$8,885,774) by a factor of 0.65, we have a ball park estimate of the pollination income generated by commercial beekeeping in the PNW in 2010, *i.e.*, a regional pollination income of approximately 13.5 million dollars. 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 2010 survey once again 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 “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. The reported “colony equivalent” for 2010 is 960 hives which is little changed from the 2009 “colony equivalent” of 996 colonies. Lower colony equivalent numbers suggest that hives are receiving 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 \$157 per colony for the year 2010. The range in individual responses was from a high of \$220/hive to a low of \$110/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 should reconsider adjusting your operational accounting system.

For 2010 the average colony maintenance cost is once again higher than the average per colony pollination income. From the 2010 survey data, pollination income was \$148<sup>80</sup>/colony and the colony maintenance cost was \$157; a difference of \$8<sup>20</sup> per colony. This illustrates that the net operational profit needs to be generated by sources of income outside of pollination rental, most frequently, honey production.

In interpreting the average pollination fee for an individual crop (Table 2), 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 3 beekeepers reporting, have been excluded from Table 2, but these low reported crops have been included for computing the average pollination fee for 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 25 years, has generated the most accurate assessment of commercial pollination known in the U.S. It has been an illuminating and rewarding activity to track the pollination economic conditions of the Pacific Northwest for the past quarter century. Over the years feedback received from the beekeeping industry suggests that this work has been of assistance to PNW beekeepers in their pollination management and I wish them all ever improving fortune in the coming years.

**Table 1. Average Pollination Fee 2001 - 2010**

<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>
33.65	36.40	36.45	38.65	51.30	73.85	70.65	81.15	89.90	70.85

**Table 2. 2010 Average pollination fees as reported by 18 commercial beekeeping operations.**

<u>Crop</u>	<u>No. Rentals</u>	<u>Avg. Fee</u>	<u>Fee +/-<sup>1</sup></u>
Pears	6,239	\$45 <sup>90</sup>	-10.7%
Cherries	14,546	\$46 <sup>80</sup>	-9.1%
Apples	29,433	\$49 <sup>00</sup>	-1.5%
Berries <sup>2</sup>	5,734	\$32 <sup>25</sup>	-16.0%
Blueberries	11,488	\$39 <sup>60</sup>	-6.8%
Vegetable seed	7,345	\$55 <sup>75</sup>	+3.7%
Clover seed <sup>3</sup>	4,027	\$44 <sup>20</sup>	-4.3%
Squash & Pumpkin	2,392	\$48 <sup>90</sup>	+3.4%
Meadowfoam	4,910	\$45 <sup>25</sup>	0%
Almonds	33,738	\$137 <sup>20</sup>	-8.7%
Average Pollination Fee = <b>\$70<sup>85</sup></b>			
<sup>1</sup> % change from 2009			
<sup>2</sup> Includes blackberries, raspberries, Marion berries, & Logan berries.			
<sup>3</sup> Includes red & white clover as grown for seed.			

**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 1992-2010.**

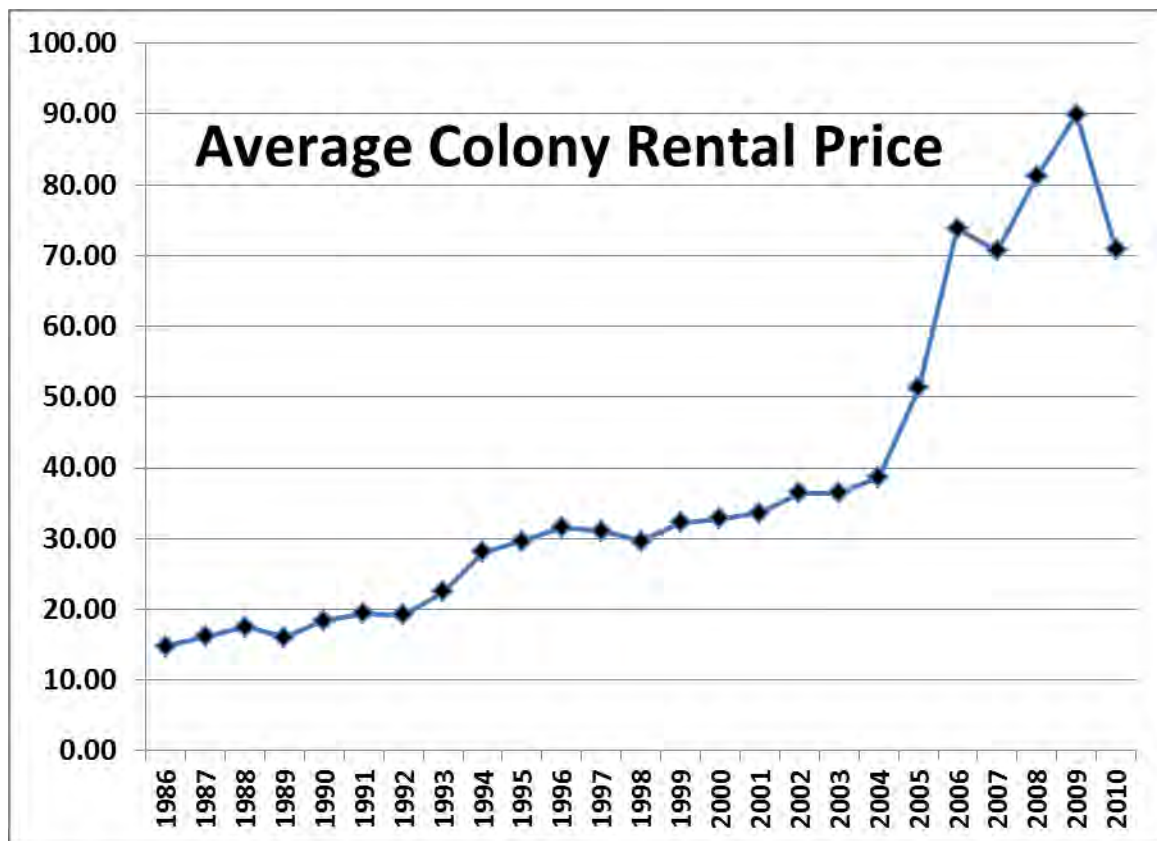
<u>Year</u>	<u>Average No. Colonies</u>	<u>Average Rental Fee</u>	<u>Average Annual Rental Income per Colony</u>
1992	765	\$19 <sup>25</sup>	\$49 <sup>70</sup>
1993	990	\$22 <sup>50</sup>	\$62 <sup>25</sup>
1994	1,225	\$28 <sup>10</sup>	\$78 <sup>70</sup>
1995	1,348	\$29 <sup>60</sup>	\$78 <sup>15</sup>
1996	1,350	\$31 <sup>55</sup>	\$97 <sup>50</sup>
1997	1,504	\$31 <sup>05</sup>	\$92 <sup>20</sup>
1998	1,153	\$29 <sup>65</sup>	\$83 <sup>00</sup>
1999	2,058	\$32 <sup>25</sup>	\$89 <sup>30</sup>
2000	2,055	\$32 <sup>85</sup>	\$77 <sup>40</sup>
2001	3,168	\$33 <sup>65</sup>	\$64 <sup>60</sup>
2002	4,255	\$36 <sup>40</sup>	\$63 <sup>75</sup>
2003	2,612	\$36 <sup>45</sup>	\$86 <sup>40</sup>
2004	3,555	\$38 <sup>65</sup>	\$74 <sup>60</sup>
2005	2,055	\$51 <sup>30</sup>	\$112 <sup>85</sup>
2006	3,855	\$73 <sup>85</sup>	\$151 <sup>10</sup>
2007	3,091	\$70 <sup>65</sup>	\$176 <sup>60</sup>
2008	4,800	\$81 <sup>15</sup>	\$154 <sup>20</sup>
2009	5,140	\$89 <sup>90</sup>	\$164 <sup>50</sup>
<b>2010</b>	<b>3,284</b>	<b>\$70<sup>85</sup></b>	<b>\$148<sup>80</sup></b>

**Table 4. Pollination rentals and income by crop type as reported by 18 PNW beekeepers in 2010.**

**commercial**

Crop	# Rentals	% of total rentals	Rental Income	% of total rental income
Tree Fruit	50,218	40.0%	\$2,408,221	27.1%
Almonds	33,738	26.9%	\$4,628,560	52.1%
All other crops	41,417	33.1%	\$1,848,992	20.8%
<b>Total</b>	<b>125,373</b>		<b>\$8,885,774</b>	

**Figure 1. PNW average pollination fee for all crops {including almonds}: 1986 – 2010.**



**Summary Information - 2010**

Number of participating commercial beekeepers = **18**

Number of colonies in the survey = **59,948**

Total colony rentals = **125,373**

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

**\$70<sup>85</sup>**

The average commercial colony was placed in **2.1** pollination sets in 2010, for an average per hive rental income of **\$148<sup>85</sup>**

The average commercial bee operation maintained 3,284 colonies and grossed **\$488,660** in pollination rental income for 2010.