

BC Sustainable Poultry Farming Group,
Abbotsford, B.C.

Groundwater Protection Program

2003/2004 Annual Report

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Groundwater Protection Program

2003/04 Annual Report

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1.0 Introduction

The Groundwater Protection Program (GPP) was initiated in the fall of 1995 as a project of the BC Sustainable Poultry Farming Group. The GPP began with the construction of an on-farm conveyor system, built to reduce the high costs associated with transporting manure long distances. A total complement of four conveyors now exists to match the needs of the program.

Manure shipments to distant markets have both increase and decreased from one year to the next. (see Table 1). However, there has been an overall average increase in manure shipments to distant markets since program inception in 1995/96. As for last year, similar amounts of manure were hauled out of storage facilities, rather than directly out of poultry barns.

Table 1 Change in Distant Market Manure Shipments from Year 1 (1995/96) to Year 7 (2001/02)

<i>Year of Operation</i>	<i>Shipment Volume</i>	<i>Shipment Period</i>	<i>Increase Over Previous Year</i>
Year 1 (1995/96)	6,200 yd ³	8 months	NA
Year 2 (1996/97)	18,200 yd ³	12 months	+ 96 %*
Year 3 (1997/98)	24,930 yd ³	12 months	+ 37 %
Year 4 (1998/99)	23,675 yd ³	12 months	- 5 %
Year 5 (1999/00)	40,640 yd ³	12 months	+ 72 %
Year 6 (2000/01)	53,240 yd ³	12 months	+ 31 %
Year 7 (2001/02)	40,105 yd ³	12 months	- 25 %
Year 8 (2002/03)	38,760 yd ³	12 months	- 3 %
Year 9 (2003/04)	28,970 yd ³	12 months	- 25 %

* Increase adjusted to reflect the increased Shipment Period from Year 1 to Year 2

2.0 Manure Hauling Activity

During 2003/04, a total of 114 poultry farm hauling events were coordinated (including rentals), with 104 of these events involving shipments of manure to distant or alternate markets (see Table 2). This year, manure hauling statistics are similar in nature to those of previous years. The average manure handling event was 290 cubic yards, while ranging in size from 70 to 700 cubic yards.

Table 2 – Selected Hauling Event Statistics (cubic yards)

Year	Total # Events Coordinated	# Events to Distant Markets	Average Volume per Event	Minimum Volume per Event	Maximum Volume per Event
2003/04	114	104	290	70	700
2002/03	139	129	300	45	1100
2001/02	150	139	297	35	970
2000/01	138	126	365	80	3640

2.1 Manure Handling Connections

Arrangements for manure hauling connections occur in many ways. While the manure is always sourced from individual poultry farms, the method of shipping and the delivery location can vary substantially. Table 3 provides a summary of the marketing arrangements for SPFG coordinated and farmer handled manure hauling events.

Table 3 - Connections for Poultry Manure Shipments for 2003/04 (includes conveyor rentals)

Shipping Arrangements	Distant Markets	Alternate Markets	Local Markets			Total
			LFV	CFV	UFV*	
	----- Cubic yards -----					
SPFG Coordinated	29,120		360	-	1,630	31,110
Farmer Handled (with conveyor Rental)	400		745	850	880	2,875
Total	29,520		1,105	850	2,510	33,985

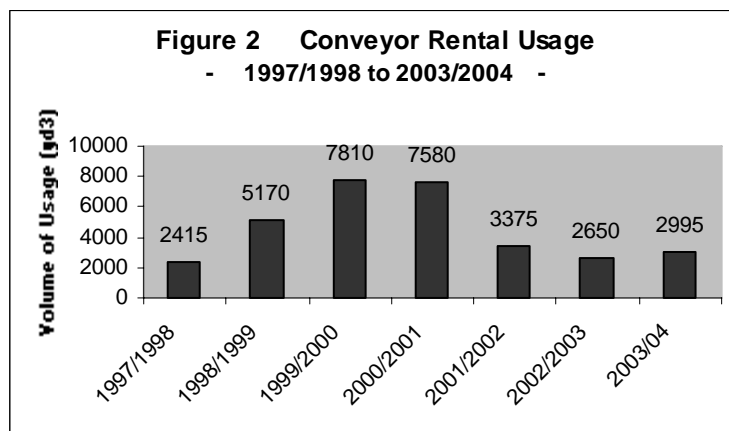
* Total includes Chilliwack and Rosedale

From Table 3, a total of 33,985 cubic yards of poultry manure shipments were handled through use of the Groundwater Protection Program.

GPP services include connecting poultry producers with local manure markets, particularly in cases where the manure is too heavy (wet) to transport cost-effectively to distant markets. In many cases, poultry manure was shipped off the Abbotsford Aquifer to the Sumas Prairie or Matsqui Prairie, or to alternate markets. This year, the soil bioremediation industry was not a large user of poultry manure. However, there is some indication that municipal landfills are increasingly becoming interested in using poultry manure as a source of nutrients in their composting process for green/yard waste.

2.2 Conveyor Rental Usage

GPP conveyors are available for rent by poultry producers. Poultry producers typically rent a conveyor to ship manure in more cost-effective ways i.e. to a local dairy or crop farm or alternate market. Figure 2 below identifies the usage of GPP conveyors for this purpose. From Figure 2, conveyor rentals peaked in 1999/2000, and have generally declined since then (except for a slight increase this year). The decrease is likely due to the fact that a conveyor is now available for rent from a trucking company, as well as at least one farmer now owns a conveyor. As in the last two years, it is felt that conveyors are increasing in importance for manure handling on Fraser Valley poultry farms. However, while in the beginning, the SPFG was the only source of conveyor machinery, this situation has changed somewhat.



2.3 Sources of Manure Shipped During 2003/2004

As identified in Table 4, most of the poultry farms which ship manure from the Fraser Valley to distant markets are either located directly on the Abbotsford Aquifer (69 %), or nearby within the Central Fraser Valley (13%). Together, both the Central Fraser Valley and Abbotsford Aquifer areas comprise 82 % of shipments to distant markets. While the total amount of manure shipped decreased from that in 2002/2003, the proportional amount shipped directly off the Abbotsford Aquifer increased from 62 % in 2001/02 to 66 % in 2002/03, and increased again to 69 % in 2003/04. SPFG shipments out of the Central Fraser Valley (excluding Abbotsford Aquifer) declined slightly, from 18 % to 13 %, while Lower Fraser Valley shipments were slightly elevated from 13 % to 14 %.

Table 4 Manure Shipments to Distant and All Markets from Fraser Valley Areas – Year 2003/04 compared to 2002/03

Source Area	Distant Markets		All Markets	
	2003/2004	2002/2003	2003/2004	2002/2003
In Fraser Valley	--- Cubic yards ---			
Abbotsford Aquifer	20,015 (69%)	25,555 (66%)	22,615 (67%)	26,835 (65%)
Central Fraser Valley	3,775 (13%)	7,115 (18%)	4,880 (14%)	7,115 (17%)
Upper Fraser Valley	1,040 (4%)	1,250 (3%)	1,870 (5%)	1,700 (4%)
Lower Fraser Valley	4140 (14%)	4,840 (13%)	4620 (14%)	5,800 (14%)
Total	28,970 (100%)	38,760(100%)	33,985 (100%)	41,450(100%)

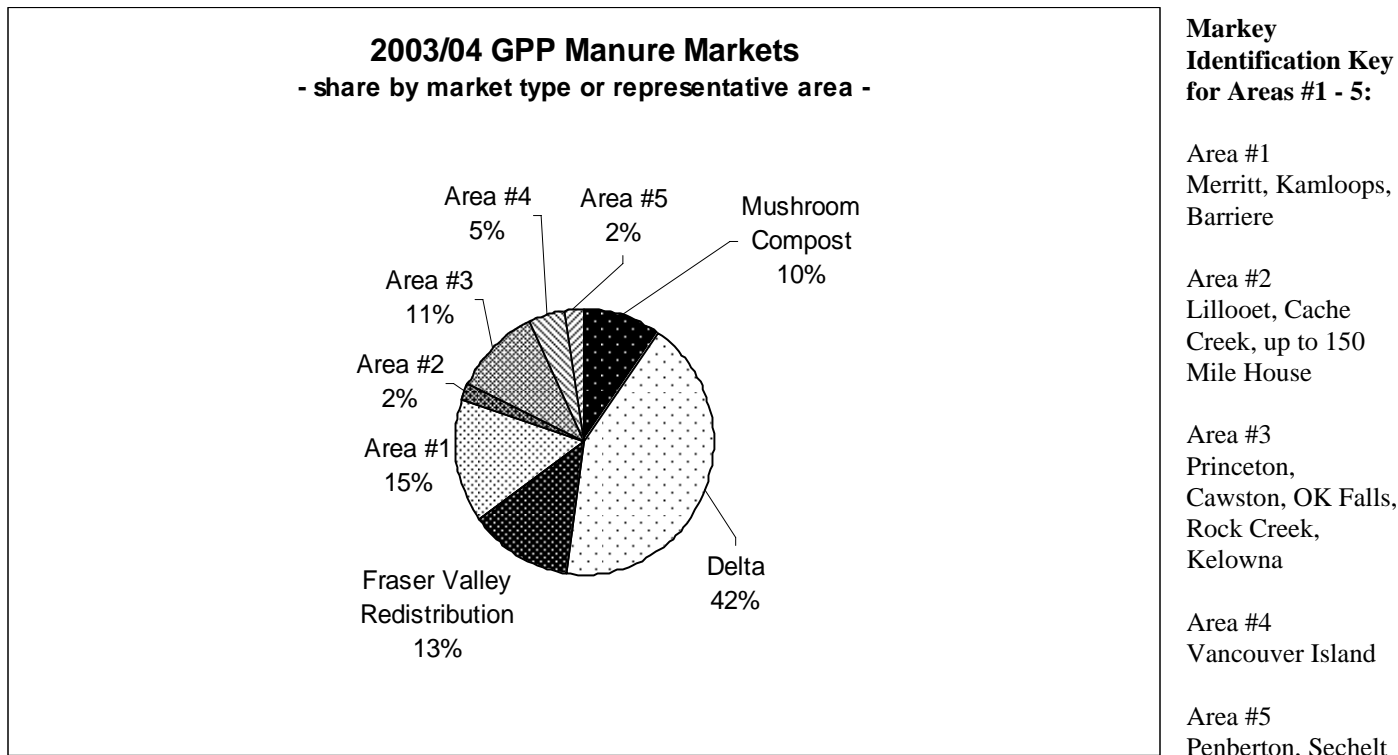
Since shipments originating in the Central Fraser Valley are also considered as reducing the total amount of poultry manure spread on the aquifer area, then one could consider that for 2003/2004, 82 % of shipments to distant markets likely reduced the amount of manure stored and spread on the Abbotsford Aquifer.

2.4 Destination of Manure Shipments

As in previous years, distant or alternate markets have been dynamic in size and scope (Fig. 2). Initially, the challenge was to lead the development of markets in, and ensure delivery of product to Delta crop producers. GPP peak shipments to Delta occurred in 1999/2000. Since then, shipments decreased. However, with the addition of the some new crop producers in Richmond to the Delta market category, shipments to this general area of the Fraser Valley have increased this year to 42 %. New market areas in 150 Mile House,

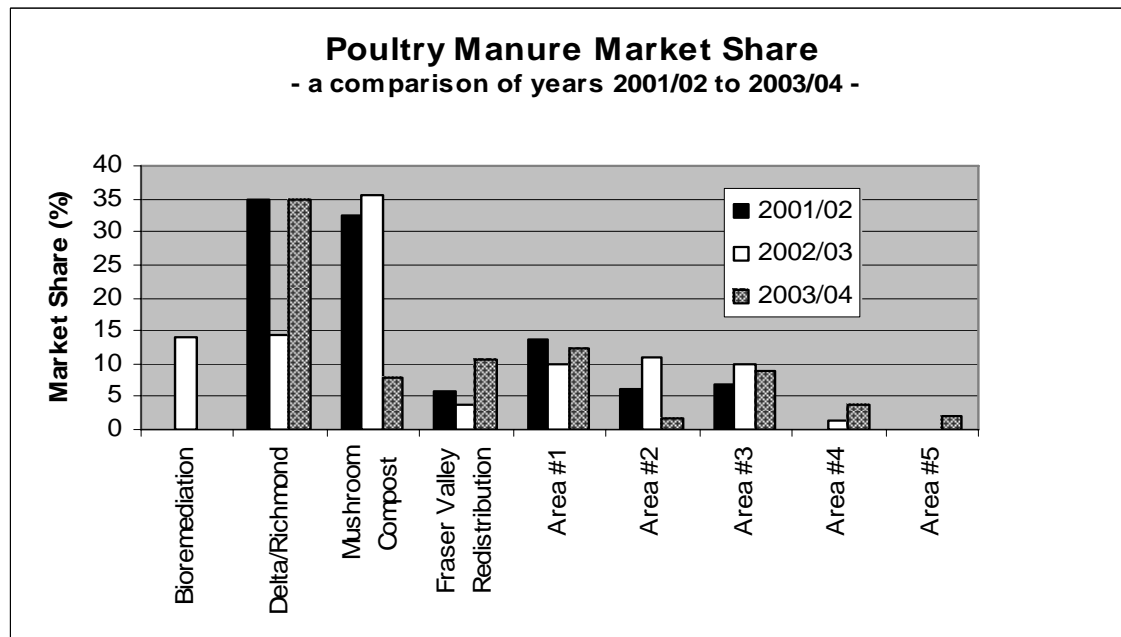
Vancouver Island, and Pemberton are beginning to take shape. Changes in manure markets are seen to be a progressive move to continued market development within new areas and industries.

Figure 2



In 2002/2003, Mushroom Compost (36 %) was the largest market, while this year it is only 10 % as shown in Figure 3. As an entire market region, the BC Interior and Vancouver Island (Areas #1 to #5) held a market share of 35 % of shipments. About 42 % of manure was shipped to the Richmond and Delta market region (similar to 2002/03). Area #5 (2 %) is a new market region in process of development this year. It is believed that there is potential for this market in both farming and non-farming sectors. Area #4 has grown from 1 % (2002/03) to 5 % this year. A field trial undertaken in the 2003 cropping season with a crop producer in Courtenay was credited with some marketing success leading to this increase.

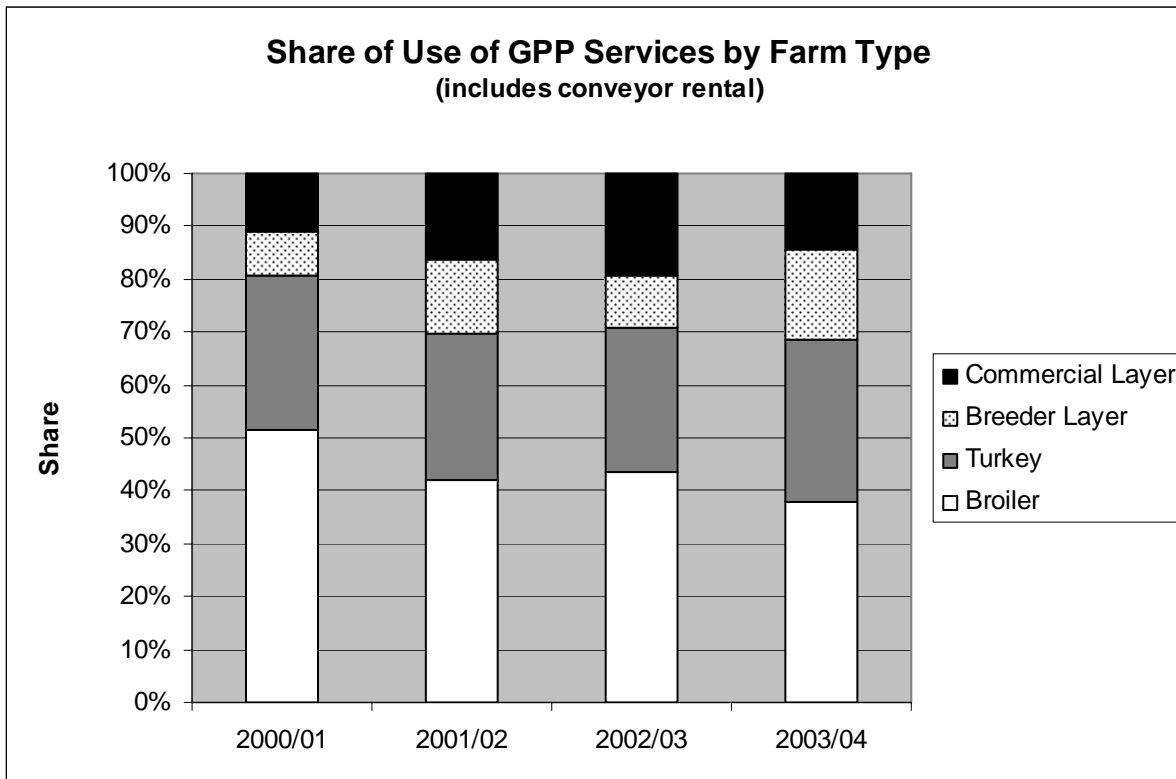
Figure 3



2.5 Types of Poultry Manure Shipped

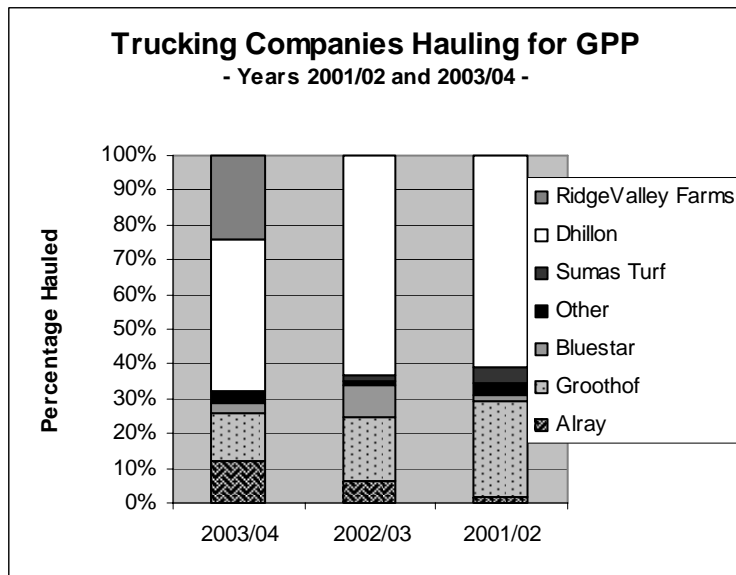
From Figure 4, while Broiler growers remain the largest users (38%) of the GPP, Breeder Layer farmers (at 14%) have increased their use of GPP services this year. Turkey producers remain the second largest GPP services user (31%) as in previous years. Commercial Layer farms now account for the lowest usage (17%) of GPP services by industry type. However, similar to last year, if volume of manure production by each industry was factored into the analysis, chicken producers may actually utilize GPP services the least as a proportion of manure production while Breeder Layer farms utilize the GPP to the greatest extent.

Figure 4



3.0 Manure Hauling Contractors

Figure 5



During 2001/2002, the GPP utilized the services of about nine trucking contractors. As shown in Figure 5, the highest utilized for this year (similar to last year) was Dhillon Industries. Dhillon Industries hauls to markets in the Fraser Valley and to some extent, interior markets. Groothof, Bluestar, and Alray generally provide trucking services to the interior. RidgeValley Farms is a new trucking company to the GPP this year. To date, RidgeValley has hauled to local, Delta, and Interior markets. Certainly, for 2003/04, Dhillon and Groothof Trucking Companies hauled the greatest volume for the year. It is expected that RidgeValley will play a more prominent role in trucking next year.

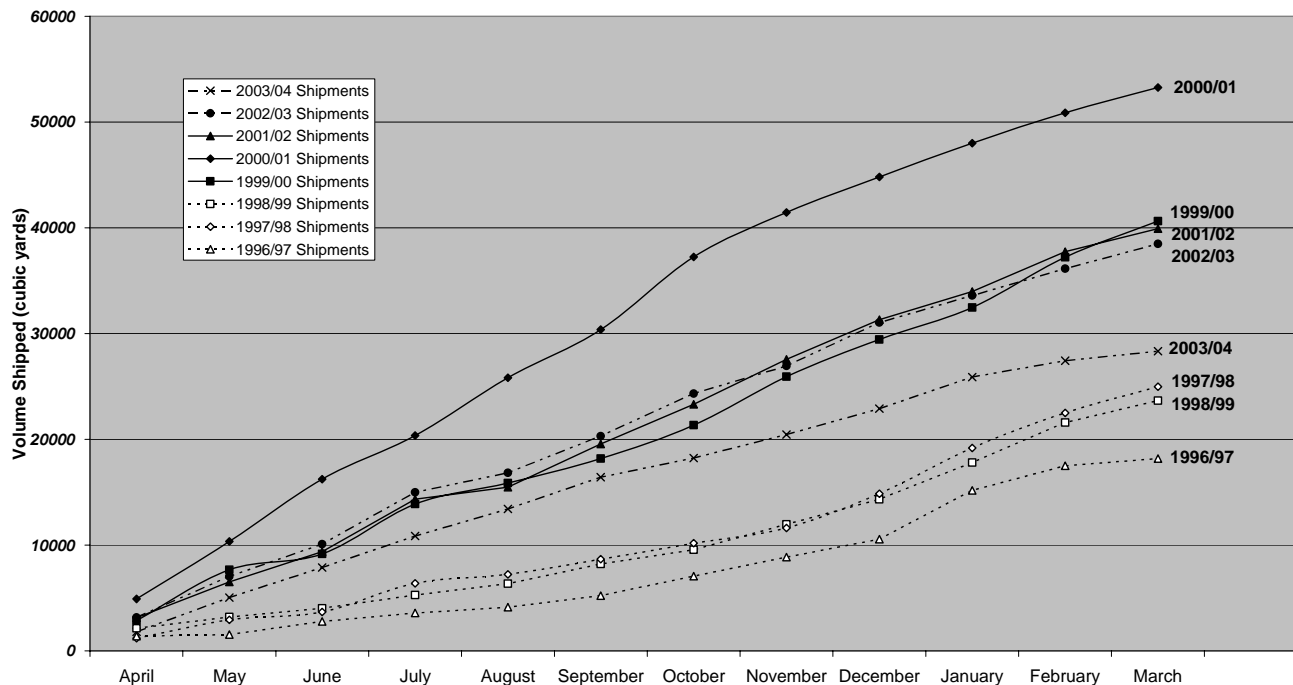
4.0 Historical Analysis

4.1 Year to Year Increase in Shipments to Distant Markets

In Figure 6, 1996/97 to 2003/2004 GPP shipments are identified and compared cumulatively. In 2000/01, overall shipment volumes to distant markets peaked, likely due to a constraint in local markets at that time making it difficult for poultry farmers to market manure. Shipments levels since then have seen an overall drop. This scenario has been repeated again this year.

Figure 6

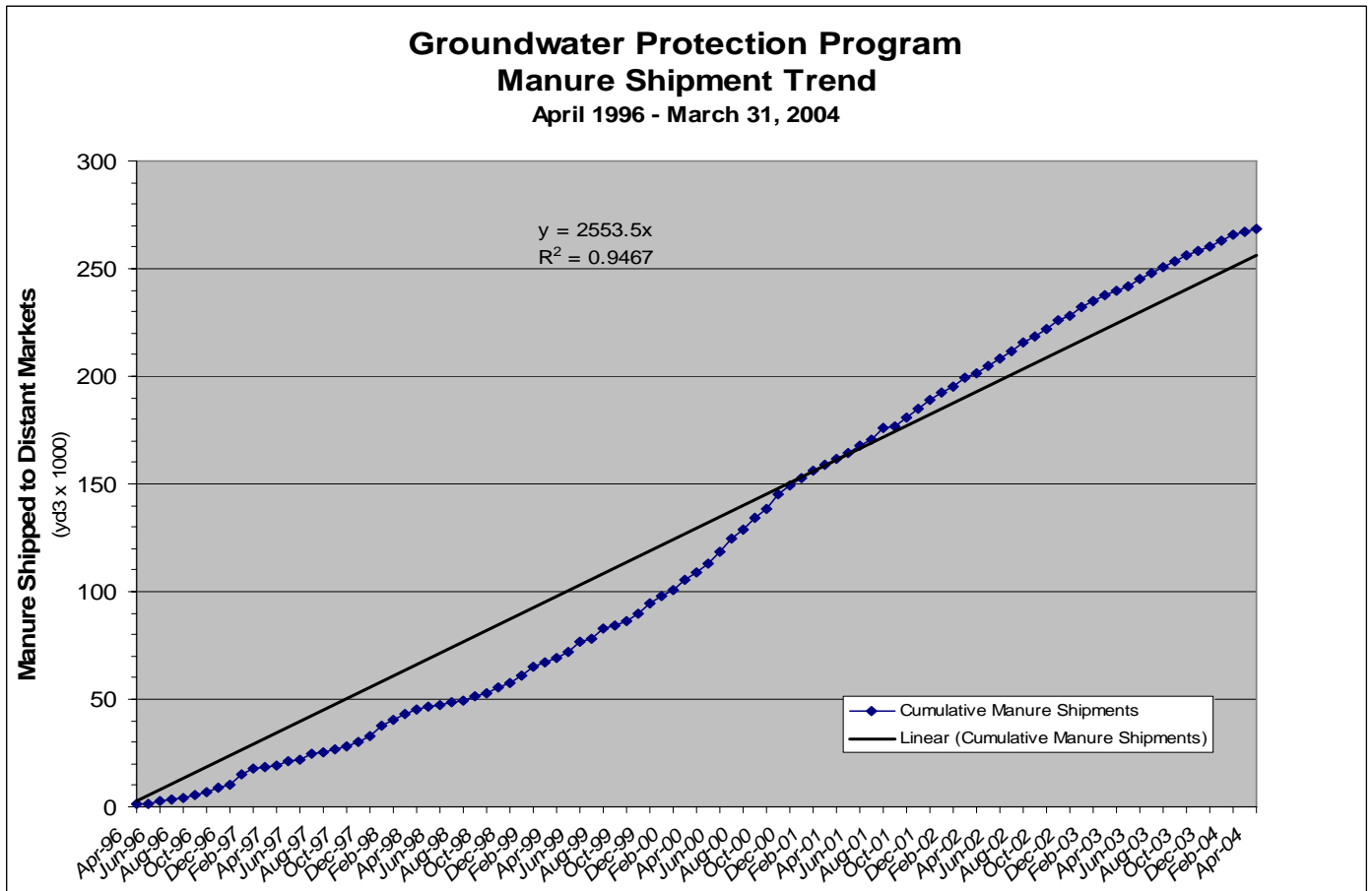
A Comparison of Monthly Poultry Manure Shipments to Distant Markets - Years 1996/97 to 2003/04 -



4.2 Overall Eight Year Pattern for Manure Shipments

To identify the overall year to year change in the manure shipment program to distant markets, data was assembled from the last eight years (1996/97 to 2003/2004). Figure 7 shows the actual cumulative shipments for this period, as well as an imposed trend line ($y = 2553.5x$ $R^2 = 0.9467$).

Figure 7



4.3 Abbotsford Aquifer Nitrate Level Trends and Fraser Valley Poultry Manure Hauled under the Groundwater Protection Program

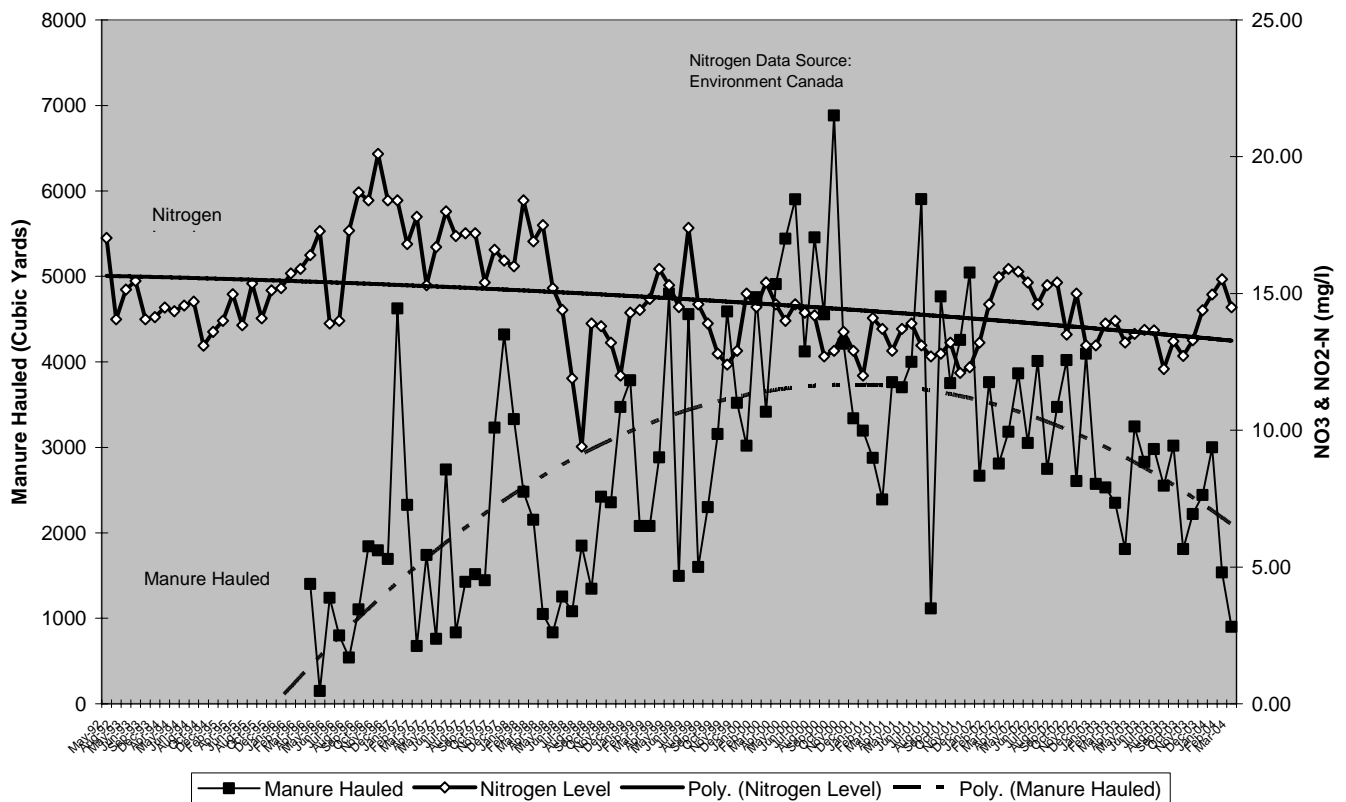
Figure 8 shows the relationship between average groundwater nitrate levels (Environment Canada sampling data for the period May 1992 to March 2004) and poultry manure shipments off the Abbotsford Aquifer for the period April 1996 to March 2004.

From Figure 8, the decreasing nitrate level trend seen in previous years appears to be slowing. Groundwater nitrate levels for the last two years suggest a leveling off of the drop in levels seen in years preceding the last two. The greatest reduction in nitrate/nitrite levels in any one period, seems to coincide with the period of highest level of manure hauling activity (March 2000 – March 2002). While the proportion of manure shipments off the Abbotsford Aquifer increased slightly (3% of total hauled), there was an actual decline in total amount hauled this year in comparison to last. As well, the amount hauled from the Central Fraser Valley was down by 3,300 cubic yards. A consistent effort in growth of manure shipments off the Abbotsford Aquifer will be required to maintain the decreasing trend in groundwater nitrate levels observed over the past period of about 5 years.

Figure 8

Abbotsford Aquifer - Nitrate and Nitrite-N Level versus Poultry Manure Volume Hauled

Period May 1992 - March 2004



5.0 Observations on GPP Operations

Manure markets are being developed in many new areas. However, to supply these new and expanding markets, a greater supply of manure is needed. Markets prefer broiler litter over other types of poultry manure due to its high nutrient content both on a weight and volume basis, as well as the consistent physical and chemical makeup of the product. Ideally, the GPP needs a larger supply of broiler litter preferably, but also dry turkey litter. Often turkey litter has a higher moisture content making it more costly to transport to distant markets for a given level of delivered nutrient.

While the use of conveyor technology promoted by the GPP for handling manure on Fraser Valley poultry farms is increasing, a cursory view of nitrate levels within the Abbotsford Aquifer suggest that significant hauling of manure from this area is not occurring other than through the GPP. The increasing amount of manure moving to Delta and other distant markets both by individual farmers and contractors reported on last year may not be through manure hauling off the Abbotsford Aquifer. As for last year, it is believed that very little manure is moving to interior markets other than through the GPP.

6.0 *Summary*

This year, manure shipments out of the Abbotsford Aquifer and Central Fraser Valley to distant markets decreased by about 5,500 and 3,000 cubic yards, respectively over the previous year. This decrease repeats a pattern for the fourth year in a row; manure hauling to distant markets peaked four years ago. The number of hauling events coordinated was lower this year at 114 (139 last year) while the average size of each event was similar to last year with an average of 290 cubic yards per event.

Similar to last year, chicken producers were the largest users of GPP services, while turkey producers and both commercial and hatching egg producers used the services to a lesser extent. The largest increase in use of GPP services was noted for the hatching egg sector.

The largest proportion of manure was shipped to the BC Interior market region as a fertilizer and mushroom compost ingredient (41%) while the Delta region is second largest at 38%. New marketing areas opened up this year are Richmond as a crop fertilizer (6%), Pemberton (2%), and Vancouver Island (5%).

Some evidence suggests that previous year decreases in groundwater nitrate levels may be difficult to maintain possibly due to a drop in the amount of manure hauled out of the Abbotsford Aquifer and Central Fraser Valley areas. The volume of manure shipments hauled off the Abbotsford Aquifer through the GPP likely needs to continue increasing to reinforce the decreasing trend in groundwater nitrate levels previously noted.