

Sustainable Poultry Farming Group,
Abbotsford, B.C.

Groundwater Protection Program

2002/2003 Annual Report

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Groundwater Protection Program

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1.0 Introduction

The Groundwater Protection Program (GPP) was initiated in the fall of 1995 as a project of the 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 was hauled out of storage facilities, rather than directly out of poultry barns.

Table 1 Increase 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 (adjusted)*</i>	
			<i>Over Previous Year</i>	<i>Rolling Average over preceding years</i>
Year 1 (1995/96)	6,200 yd ³	8 months	NA	NA
Year 2 (1996/97)	18,200 yd ³	12 months	+ 96 %*	+ 96 %*
Year 3 (1997/98)	24,930 yd ³	12 months	+ 37 %	+ 67 %
Year 4 (1998/99)	23,675 yd ³	12 months	- 5 %	+ 43 %
Year 5 (1999/00)	40,640 yd ³	12 months	+ 72 %	+ 50 %
Year 6 (2000/01)	53,240 yd ³	12 months	+ 31 %	+ 46 %
Year 7 (2001/02)	40,105 yd ³	12 months	- 25 %	+ 34 %
Year 8 (2002/03)	38,760 yd ³	12 months	- 3 %	+ 16 %

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

2.0 Manure Hauling Activity

During 2002/03, a total of 139 poultry farm hauling events were coordinated (including rentals), with 129 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 last year. The average manure handling event was 297 cubic yards, while ranging in size from 35 to 970 cubic yards for 2002/03.

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
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 2002/03 (includes conveyor rentals)

Shipping Arrangements	Distant Markets	Alternate Markets	Local Markets			Total
			LFV	CFV	UFV*	
	----- Cubic yards -----					
SPFG Coordinated	38,500	-	250	-	-	38,750
Farmer Handled (with conveyor Rental)	260	960	510	100	870	2,700
Total	38,760	960	760	100	870	41,450

* Total includes Chilliwack and Rosedale

From Table 3, a total of 41,450 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 is included as a distant market.

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

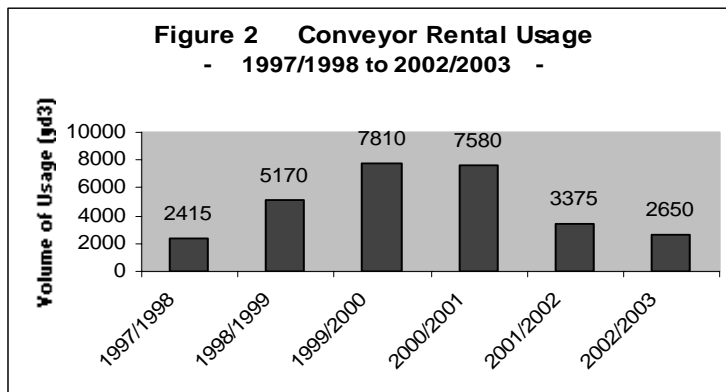


Figure 2, conveyor rentals peaked in 1999/2000, and have declined since then. This is likely due to the fact that a conveyor is now available for rent from a trucking company, as well as at least one farmer now owns a conveyor. As in the last two years, it is felt that conveyors are increasing in importance 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 1999/2000

As identified in Table 4, most of the poultry farms which ship manure from the Fraser Valley to distant markets are either directly on the Abbotsford Aquifer (66 %), or nearby within the Central Fraser Valley (18%). Together, both the Central Fraser Valley and Abbotsford Aquifer areas comprise 84 % of shipments to distant markets. While the total amount of manure shipped decreased from that in 2001/2002, the proportional amount shipped directly off the Abbotsford Aquifer increased from 62 % in 2001/02 to 66 % in 2002/03. SPFG shipments out of the Central Fraser Valley (excluding Abbotsford Aquifer) declined slightly, from 25 % to 18 %, while Lower Fraser Valley shipments were slightly elevated from 9 % to 13 %.

Table 4 2000/2001 Manure Shipments to Distant and All Markets from Fraser Valley Areas

Source Area	Distant Markets		All Markets	
In Fraser Valley	--- Cubic yards ---			
	<i>2001/2002</i>	<i>2002/2003</i>	<i>2001/2002</i>	<i>2002/2003</i>
Abbotsford Aquifer	24,630 (62%)	25,555 (66%)	26,830 (59%)	26,835 (65%)
Central Fraser Valley	10,140 (25%)	7,115 (18%)	10,810 (24%)	7,115 (17%)
Upper Fraser Valley	1,740 (4%)	1,250 (3%)	1,970 (4%)	1,700 (4%)
Lower Fraser Valley	3,595 (9%)	4,840 (13%)	5,920 (13%)	5,800 (14%)
Total	40,105 (100%)	38,760(100%)	45,530 (100%)	41,450(100%)

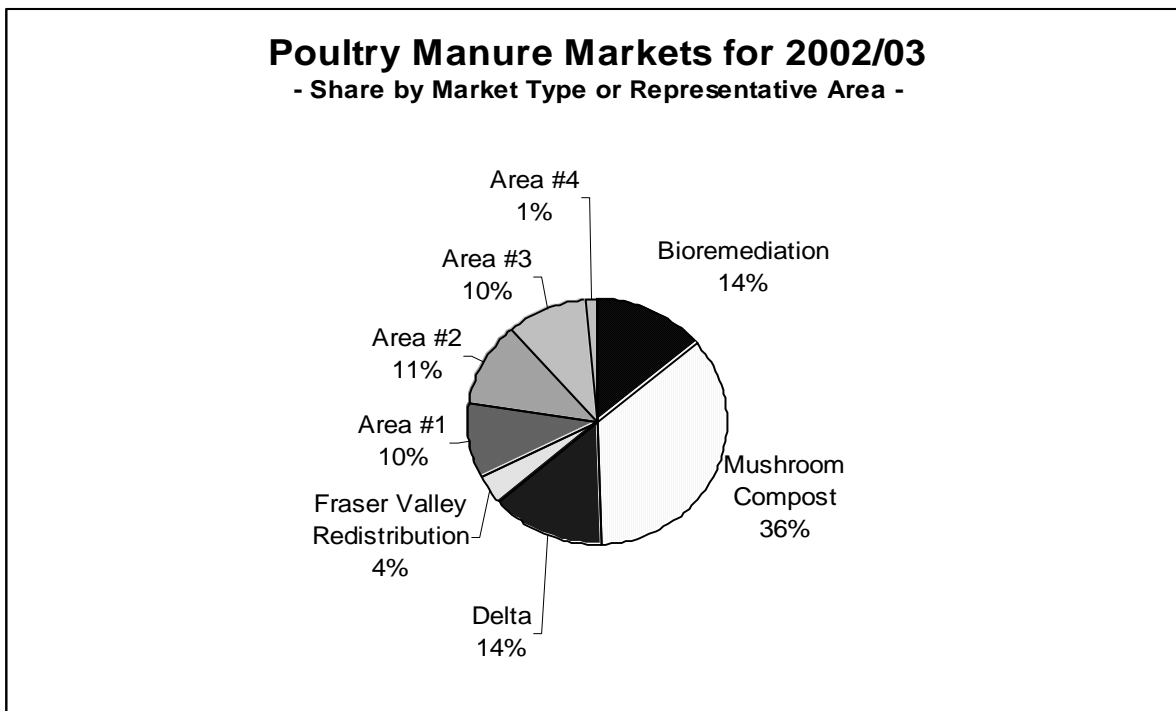
Since shipments originating in the Central Fraser Valley are also considered as reducing the total amount of poultry manure spread on the aquifer area, then one could consider that for 2002/2003, 84 % of shipments to distant markets likely reduce the amount of manure stored and spread on the Abbotsford 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 to Delta have decreased (see Fig. 3)., while shipments to the BC Interior have increased. Furthermore, new market areas in 150 Mile House and Vancouver Island are beginning to take shape. Bioremediation of hydrocarbon contaminated soil was found to be an opportunity during 2002/03 as well. Changes in manure markets are seen to be a progressive move to continued market development within new areas and industries.

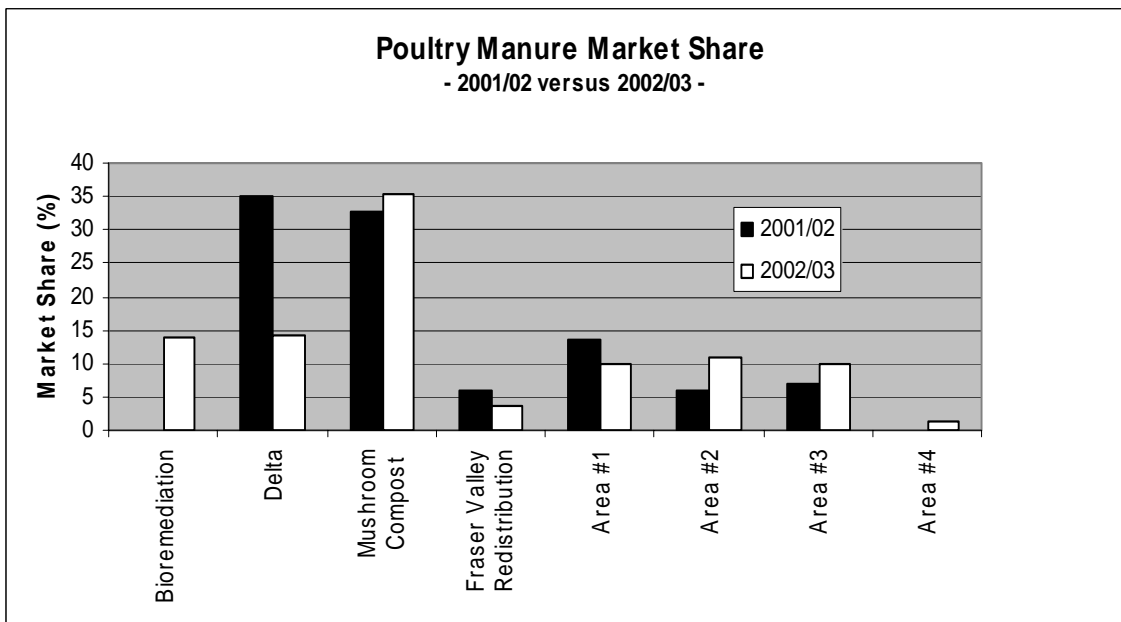
Since the development of the Delta market through the GPP, local contractors are now well-established and able to provide substantial supply. Delta will continue to be an important market for manure from the Fraser Valley poultry industry.

Figure 2



In 2002/2003, Mushroom Compost (36 %) was the largest market. As an entire market region, the BC Interior (Areas #1 to #3) held the next greatest market share at 31 % of shipments. The Bioremediation market and Delta market region were the same size at 14 % each. A lot of interest is being generated in Area #4 at this time. While shipments were just 1 % of total volume, if it can be shown that the delivered cost for manure can be financially justified, then this region could prove to be a significant market. A field project will be undertaken in the 2003 cropping season with a crop producer in Courtenay for this purpose.

Figure 3



Markey Identification Key for Areas #1 - 4:

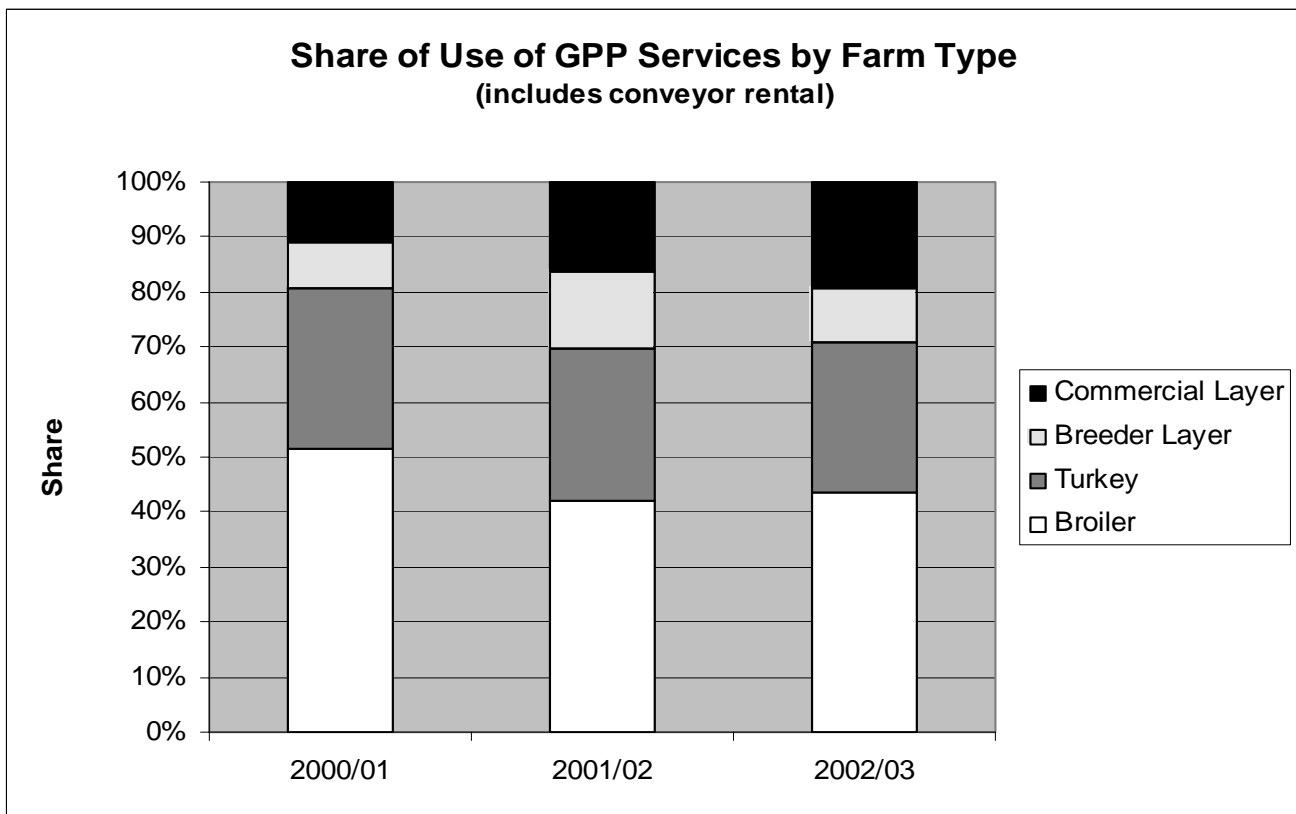
- Area #1
Merritt, Kamloops, Barriere
- Area #2
Lillooet, Cache Creek, up to 150 Mile House
- Area #3
Princeton, Cawston, OK Falls, Rock Creek, Kelowna
- Area #4
Sechelt, Vancouver Island

During the 2000/2001 year, the SPFG decided that a wise strategy would be to move manure further into previously undeveloped markets. These markets include BC Interior ranches, organic crop producers, composting, and soil bioremediation. Figure 3 compares the distant market share for each market type or region from 2001/02 to 2002/03. From Figure 3, efforts at maximizing less developed markets are showing success as the proportion of both BC Interior shipments (Areas #1 - #3) have increased while reliance on the Delta market has lessened. Future work will involve further increasing this trend.

2.5 Types of Poultry Manure Shipped

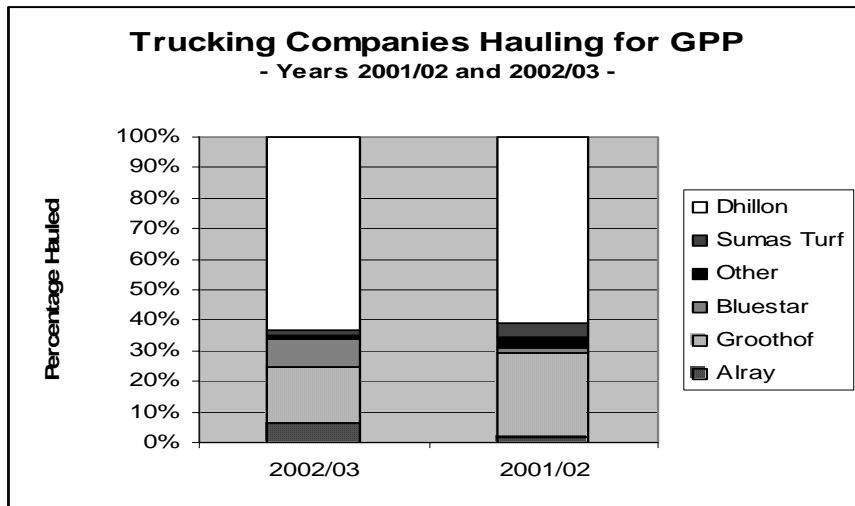
From Figure 4, while Broiler growers remain the largest users of the GPP, Commercial Layer farmers have increased their use of GPP services consistently over the past three years. Turkey producers remain the second largest GPP services user as in previous years. Breeder Layer farms continue account for the lowest usage of GPP services by industry type. However, 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 the year (similar to last year) was Dhillon Industries. Dhillon Industries hauls to markets in the Fraser Valley and Washington state. Groothof, Bluestar, and Alray generally provide trucking services to the interior. During 2002/03, while Groothof provided the greatest volume for the year, both Bluestar and Alray have been utilized to increase shipping volume to the interior.

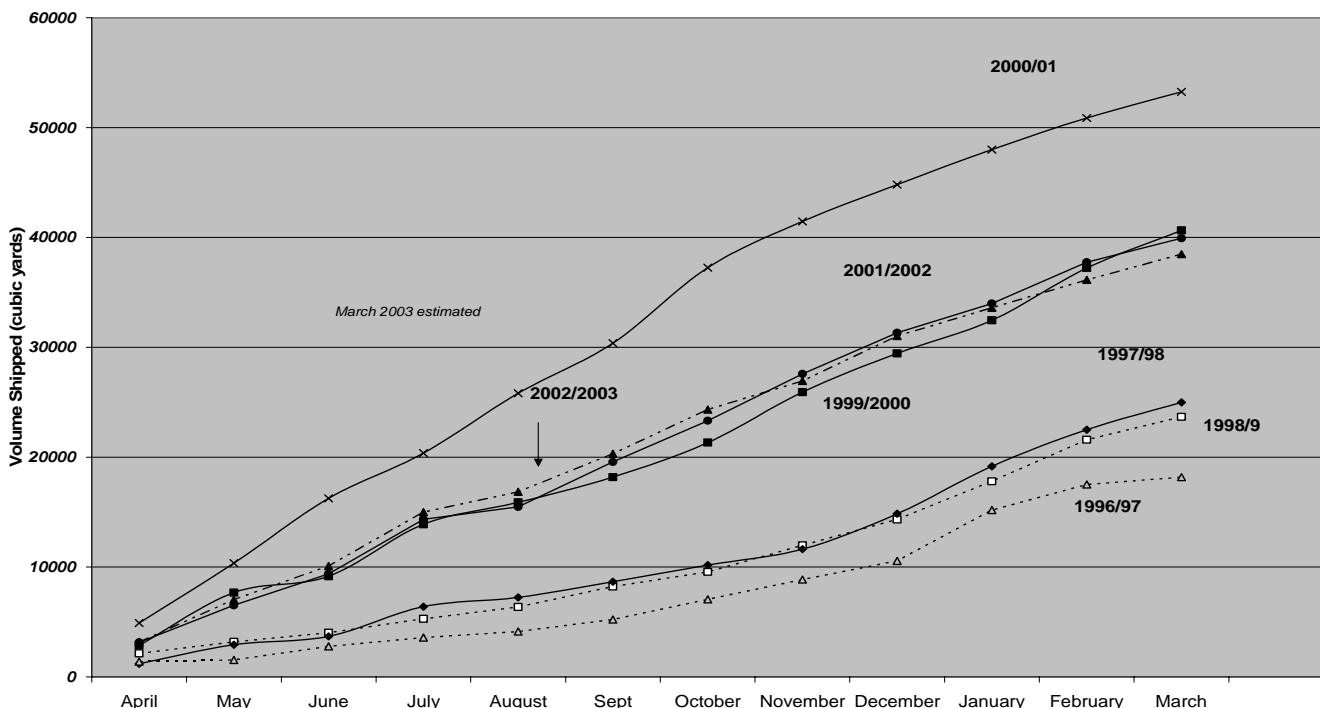
4.0 Historical Analysis

4.1 Year to Year Increase in Shipments to Distant Markets

In Figure 6, 1996/97 to 2002/2003 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 for 2002/03 were similar to 1999/00 and 2001/02.

Figure 6

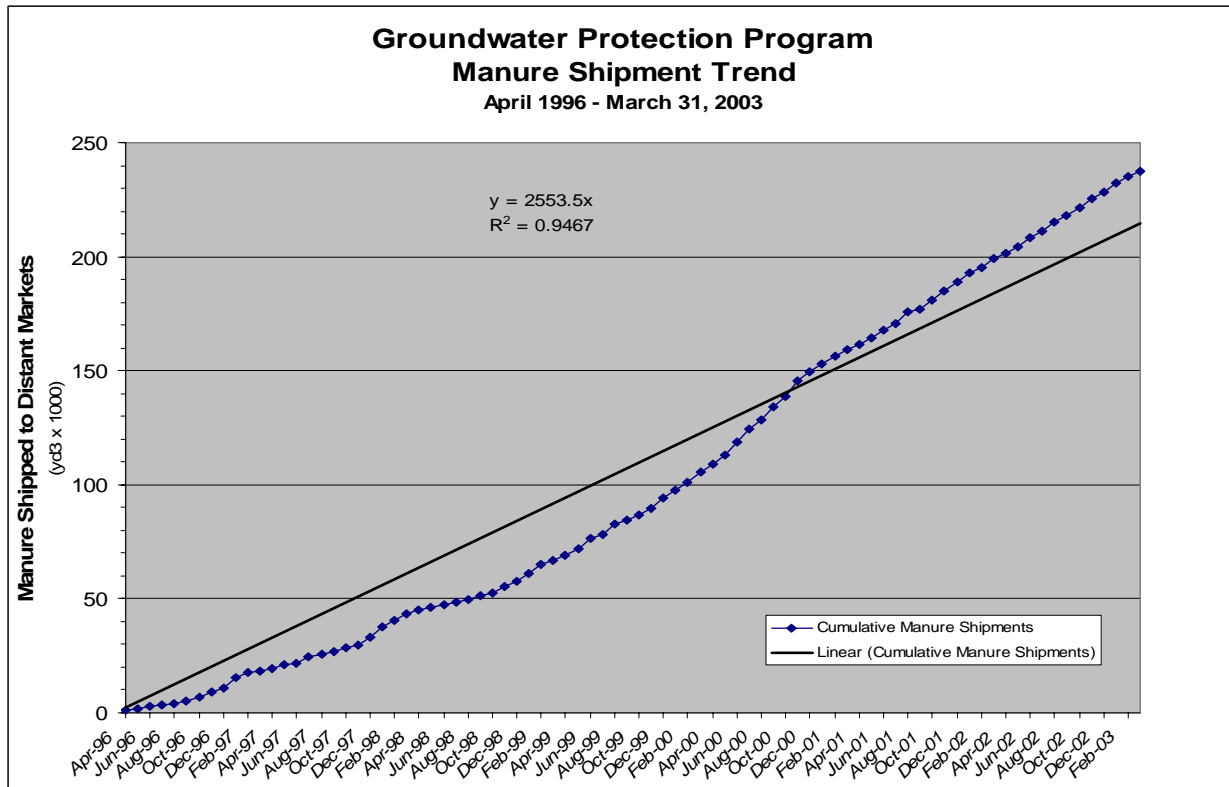
A Comparison of Monthly Poultry Manure Shipments to Distant Markets - Years 1996/97 to 2002/03 -



4.2 Overall Seven Year Increase in Manure Shipments

To identify the overall expansion of the manure shipment program to distant markets, data was assembled from the last seven years (1996/97 to 2002/2003). While shipments occurred in 1995/96, they were limited in volume and deemed not of significance for inclusion. Figure 7 shows the actual cumulative shipments for this period, as well as an imposed trendline ($y = 2553.5x$ $R^2 = 0.9467$). While total manure shipments are slightly down this year, the overall trend is for increasing shipments.

Figure 7



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

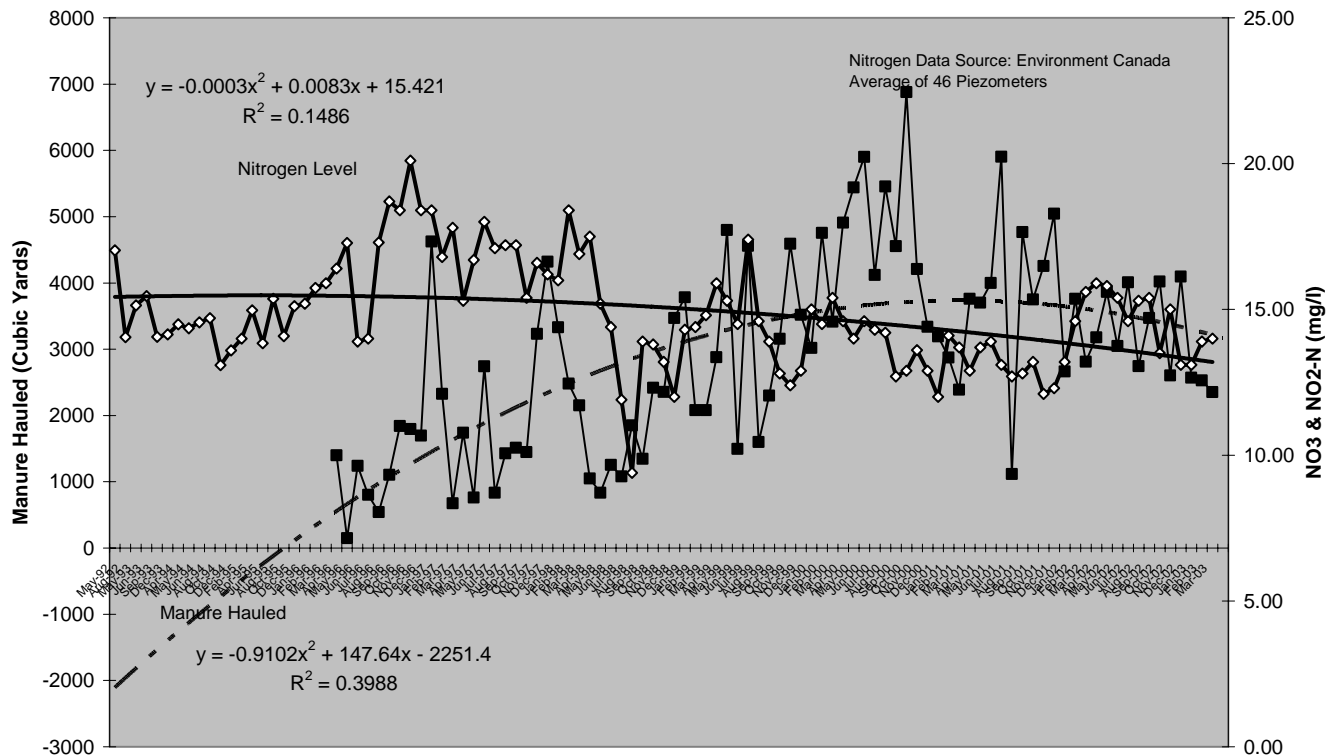
Figure 8 shows the relationship between average groundwater nitrate levels (Environment Canada sampling data for the period May 1992 to March 2003) and poultry manure shipments off the Abbotsford Aquifer for the period April 1996 to March 2003.

From Figure 8, nitrate level trends continue to decrease, albeit slightly less than for 2001/02. While manure shipments off the Abbotsford Aquifer increased slightly (about 900 cubic yards or 4%), the amount hauled from the Central Fraser Valley was down by 3,000 cubic yards or 7%). A consistent effort in growth of manure shipments off the Abbotsford Aquifer will be required to reinforce the decreasing trend in groundwater nitrate levels observed over the past period of about 5 years.

Figure 8

Abbotsford Aquifer - Nitrogen Level versus Poultry Manure Volume Hauled

Period May 1992 - March 2003



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.

The use of conveyor technology promoted by the GPP for handling manure on Fraser Valley poultry farms is increasing. An increasing amount of manure is moving to Delta and other distant markets both by individual farmers and contractors. At this time, very little manure is moving to interior markets other than through the GPP.

6.0 Summary

During the last two years, manure shipments to distant markets have been similar in size while manure hauling to distant markets peaked three years ago. The number of hauling events coordinated and the average size of each event was similar to last year with a value of 139 events and an average of 300 cubic yards per event. Similar to last year, chicken producers were the largest users of GPP services (44%), while turkey producers (27%) and both commercial (19%) and hatching egg producers (10%) used the services to a lesser extent.

The largest proportion of manure was shipped to the Washington market region as a mushroom compost ingredient (36%) while the BC interior region has increased to 31% (27% last year). In 2002/03, the soil bioremediation market rebounded from a low in 2001/02 to 14% in 2002/03. The Delta market received 14% of manure shipped to distant markets.

Groundwater nitrate levels continued to decrease during 2002/03, although at a slightly decreasing rate. Manure shipments off the Abbotford Aquifer need to continue increasing to reinforce the decreasing trend in groundwater nitrate levels.