

Heartworm in Canada in 2010 with comments on Western Canada

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On November 30, 2010, 2816 questionnaires were sent by postal mail to small and mixed animal practices in Canada to determine the status of heartworm (HW) infection in dogs in 2010. On January 17, 2011, the questionnaires were sent again to clinics in Ontario, Quebec, and Manitoba (the HW endemic areas in Canada), that had not responded at that time.

In early February 2011, the response to the mail outs was relatively poor, and the pharmaceutical companies supporting the survey opted for a "fax blast" to all clinics urging a response from those who had not done so. Respondents could return a completed questionnaire by postal mail or submit data at a website online. The survey was closed on March 3, 2011. About 84% of the questionnaires came via postal mail, 16% were online.

A total of 1344 questionnaires were returned, but 75 were not included in the analysis of the data. Forty of the latter were returned by the postal services with notations of address unknown. The other 35 had either missing or questionable information and the data could not be verified, or were from specialized clinics with no HW testing. The response rate for the survey was 46.4%. In each year from 1976-2002, except 1999, I had sent to practitioners across Canada questionnaires to assess the prevalence of HW in Canada. In 2002, the response rate was 46.2%.

In 2010, 564 dogs were diagnosed with HW in Canada (354 in 2002). There were 367,385 dogs tested for HW in 2010 (317,182 in 2002), and an estimate of prevalence of HW in dogs in 2010 is 0.15% (0.11% in 2002). In 2010 in Ontario, three cats (one from Sri Lanka), two coyotes, and one fox, were found with HW at necropsy.

In 2010, a significant number of HW dogs, when compared to 2002 and previously, were from outside Canada. The primary impetus for this 2010 survey was some evidence that "Katrina dogs" ("rescue" dogs imported from southern USA states into Canada after hurricane Katrina in 2005) may have caused an increase in

Table 1. 2010 Heartworm questionnaire results for Canada

1. When are most dogs routinely tested for HW(%).	Spring 67	Summer 20	Fall 3	Winter 3	No Response 7
2. No. of Dogs Tested for HW in 2010					367,385
3. No. of Dogs Diagnosed with HW in 2010					564
4. Travel History: Imported from southern USA (Katrina dogs)					49 (9%)
Imported from other USA states or Countries					70 (12%)
Traveled outside Canada six months or more prior to diagnosis					17 (3%)
Traveled six months or more prior to diagnosis to Southern Ontario, Quebec, or Manitoba if not residing in those provinces					14 (2%)
Never left your area					286 (51%)
Travel history questionable or unknown					130 (23%)
5. With <u>clinical signs</u> of HW					79 (14%)
6 Diagnosed with HW <u>prior</u> to 2010					71 (13%)
7. Diagnosed with HW <u>only</u> in 2010 and on preventative medication in 2009					77 (14%)
8. If Question 7 is > 0 , Failure of preventative medication was due to:					
	Missed treatment 17	Inadequate dosage 1	Unknown 54	Other 5	
9. No. of dogs tested in 2010 and on preventative medication in <u>2009</u>					305,709
10. No. of cats and other animals with HW in 2010: Specify Animal:					6
11. In 2005-2010 were Katrina dogs in your area and/or practice?%	Yes 28	No 35	Unknown 37		

prevalence of HW in Ontario dogs. This survey was not designed to evaluate what effect "Katrina dogs" may have had. However, in the 2010 questionnaire, there were more questions than in the previous surveys on the travel history of HW positive dogs that were, or had been, outside Canada.

In previous surveys, there was a single question on HW dogs that were outside Canada (Canadian dogs that had travelled outside of Canada, and dogs imported into Canada). In 2002, there were 17 such dogs (less than 5% of all HW dogs that year). In 2010, the request was to identify these HW dogs as either "Katrina dogs", or dogs imported from other USA states and countries, or Canadian dogs which had been outside Canada.

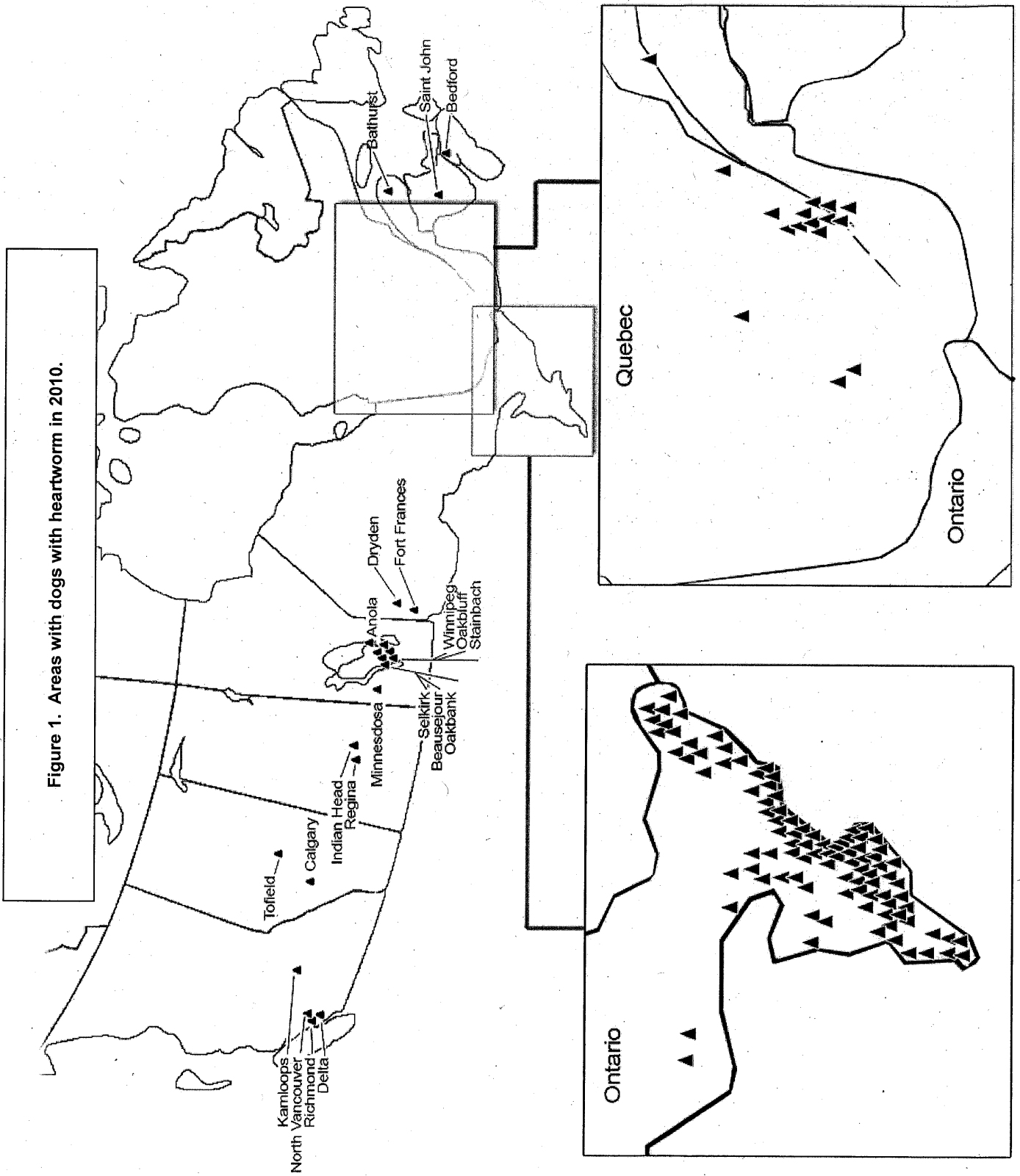
There were a total of 136 HW dogs in the three categories identified above (more than 24% of all dogs with HW in 2010). Only 49 dogs were identified as "Katrina dogs", and these were mostly in Ontario, with one each in British Columbia and

Saskatchewan. But 28% of the respondents, and from all provinces except Prince Edward Island, indicated that from 2005 through 2010 "Katrina dogs" had been in their area, and/or practice.

The major foci of infection in Canada continued to be in southern Ontario, southern Manitoba, and southern Quebec. The number of HW dogs in those provinces increased significantly over those reported for 2002. In Ontario, 431 dogs were diagnosed with HW in 2010 (268 in 2002). In Manitoba, there were 77 HW cases (53 in 2002), and in Quebec 41 (21 in 2002). In 2002 and 2010, most of these dogs had never left their provinces, and accounted for 62% and 51% of the HW positive dogs in 2002 and 2010, respectively. In 2010, HW was not found in Prince Edward Island or Newfoundland & Labrador, but 15 cases were diagnosed in the other five provinces.

The increased number of cases in Manitoba and Quebec in 2010 appeared unrelated to the number of "Katrina dogs"

Figure 1. Areas with dogs with heartworm in 2010.



and the other imports. In 2010, there were no "Katrina dogs" in Manitoba or Quebec. There were only two HW dogs in Manitoba and five in Quebec from other USA states and countries. There were 21, and 10 HW dogs in Manitoba, and Quebec, respectively, with travel history unknown. HW infected dogs in all these categories may have been in Manitoba and Quebec in 2005 through 2009. Whether their presence had any effect on the prevalence of HW in dogs in those provinces is unknown.

In previous surveys, I had indicated that in the endemic areas of Ontario, Manitoba, and Quebec, more attention needs to be focussed on dogs not on HW preventive medication. Most of these dogs are likely not ones that visit clinics routinely. In those provinces, of 482 dogs diagnosed with HW only in 2010, 408 were not on preventative medication in 2009.

Western Canada

The findings in 2010 for Western Canada are presented in four tables, and with some comments.

1. There were 1015 questionnaires sent out and 377 returned, but 19 were not used in the analysis of the data for reasons indicated above. The rate of response was 35.9% (35.3% in 2002). There were 141 completed questionnaires from British Columbia, (33.9% response), 112 from Alberta (31.6% response), 43 from Saskatchewan (36.4%), and 62 from Manitoba (56.4% response).

2. There were 89 dogs with HW in Western Canada (61 in 2002), most of them in Manitoba.

3. There were 28,096 dogs tested for HW (21,457 in 2002).

4. There were two "Katrina dogs" diagnosed with HW in Western Canada. There were eight HW positive dogs that were imports from other USA states and countries, three had traveled outside of Canada, and two had visited the endemic areas in Ontario, Quebec, or Manitoba. Most of the HW positive dogs (38) had never left their area, and for 36 the travel history was unknown.

5. About 21% of the respondents indicated that "Katrina dogs" had been in their areas and/or practices in 2005-2010.

6. The focus of infection in Western Canada continued to be in southern Manitoba.

Table 2. 2010 Heartworm questionnaire results for British Columbia, Alberta and Saskatchewan

1. When are most dogs routinely tested for HW(%).	Spring 42	Summer 22	Fall 7	Winter 5	
	No Response 24				
2. No. of Dogs Tested for HW in 2010					4,904
3. No. of Dogs Diagnosed with HW in 2010					12
4. Travel History: Imported from southern USA (Katrina dogs)					2
Imported from other USA states or Countries					6
Traveled outside Canada six months or more prior to diagnosis					2
Traveled six months or more prior to diagnosis to					
Southern Ontario, Quebec, or Manitoba if not residing in those provinces					1
Never left your area					0
Travel history questionable or unknown					1
5. With <u>clinical signs</u> of HW					4
6 Diagnosed with HW <u>prior</u> to 2010					2
7. Diagnosed with HW <u>only</u> in 2010 and on preventative medication in 2009					2
8. If Question 7 is > 0, Failure of preventative medication was due to:					
	Missed treatment 0	Inadequate dosage 0	Unknown 1	Other 1	
9. No. of dogs tested in 2010 and on preventative medication in <u>2009</u>					2,817
10. No. of cats and other animals with HW in 2010: Specify Animal:					0
11. In 2005-2010 were Katrina dogs in your area and/or practice?% Yes 24 No 37 Unknown 39					

Table 3. 2010 Heartworm questionnaire results for Manitoba

1. When are most dogs routinely tested for HW(%).	Spring 73	Summer 16	Fall 3	Winter 3	
	No Response 5				
2. No. of Dogs Tested for HW in 2010					23,192
3. No. of Dogs Diagnosed with HW in 2010					77
4. Travel History: Imported from southern USA (Katrina dogs)					0
Imported from other USA states or Countries					2
Traveled outside Canada six months or more prior to diagnosis					1
Traveled six months or more prior to diagnosis to					
Southern Ontario, Quebec, or Manitoba if not residing in those provinces					1
Never left your area					38
Travel history questionable or unknown					35
5. With <u>clinical signs</u> of HW					17
6 Diagnosed with HW <u>prior</u> to 2010					6
7. Diagnosed with HW <u>only</u> in 2010 and on preventative medication in 2009					2
8. If Question 7 is > 0, Failure of preventative medication was due to:					
	Missed treatment 1	Inadequate dosage 1	Unknown 0	Other 0	
9. No. of dogs tested in 2010 and on preventative medication in <u>2009</u>					17,342
10. No. of cats and other animals with HW in 2010: Specify Animal:					0
11. In 2005-2010 were Katrina dogs in your area and/or practice?% Yes 10 No 38 Unknown 52					

British Columbia

1. There were 8 dogs with HW (4 in 2002), and 1,943 dogs were tested for HW (4,573 in 2002).

2. One of the HW dogs was identified as a "Katrina dog", five were imported from other USA states or countries, and two had travelled outside of Canada.

3. Two HW dogs were on preventive medications in 2009, and the reasons for failure of the medications were unknown.

4. About 21% of the respondents indicated "Katrina dogs" were in their areas and/or practices in 2005-2010.

Alberta

1. There were two dogs with HW (4 in 2002), and 2,218 dogs were tested for HW (4,349 in 2002).

2. One HW dog was identified as imported from other USA states or countries, and one had travelled to an endemic area in Canada.

3. About 31% of the respondents indicated "Katrina dogs" were in their areas and/or practices in 2005-2010.

Saskatchewan

1. There were 2 dogs with HW (0 in 2002), and 743 dogs were tested for HW (197 in 2002).

2. One dogs was identified as a "Katrina dog", the other was a stray dog, heavily microfilaremic, and with travel history unknown.

3. About 14% of the respondents indicated "Katrina dogs" were in their areas and/or practices in 2005-2010.

Manitoba

1. There were 77 dogs with HW (53 in 2002), with six of the dogs diagnosed with HW for the first time in 2010.

2. There were 23,192 dogs tested (12,338 in 2002), and an estimate of prevalence of HW in 2010 is 0.33% (0.43% in 2002).

3. There were no reports of HW infected "Katrina dogs". There were five HW positive

dogs that were imports from other USA states and countries, one had traveled outside of Canada, and one had visited an endemic area in southern Ontario, Quebec or Manitoba. Thirty-eight of the HW positive dogs (49.4%) had never left their area, and for another 35 the travel history was unknown (45.5%).

4. About 17% of the HW dogs were reported with clinical signs of HW disease.

5. There were two dogs diagnosed with HW in 2010 that were on preventive medication in 2009. One had missed one or more treatments, and the other had inadequate dosage.

6. I sought from practitioners the number of dogs they tested for HW in 2010 and on preventive medication in 2009. The information could be used to provide an estimate of the prevalence of HW in unprotected dogs (dogs not on HW preventive medication). That static would be a better estimate of the level of risk to dogs of HW infection in an area than that shown in Item 3 above. But many practitioners did not provide the information. I solicited some practitioners, via email and telephone, for an approximation of the number of dogs in their practices tested for HW in 2010 and on preventive medication in 2009. From that data a factor was derived to estimate the numbers for practices that did not provide the information.

The results reported here, therefore, should be considered with caution. The results are not dissimilar to those reported in the previous surveys, and are as follows; (a) most of the dogs tested were given preventive medication, (b) most of the dogs diagnosed in 2010 for the first time were not on the medication in 2009, (c) and the prevalence of HW in dogs tested and not on preventive medication in 2009, 1.28% (1.34% in 2002), was considerably greater than those on medication, 0.01% (0.03% in

2002). In HW endemic areas in the province, the prevalence in unprotected dogs would be considerably higher. The number of dogs tested, the number with HW, and the number not on preventive medication, for each town, or city, can be found in Tables 4 and 5.

7. About 10% of the respondents indicated that "Katrina dogs" had been in their areas and/or practices in 2005-2010.

8. There were 23 clinics (10 in 2002), and 8 towns (6 in 2002) reporting a diagnosis of HW.

Acknowledgments

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Table 4: Number of dogs tested for heartworm in Western Canada in 2010 (number in brackets represents number of clinics).

Town	Total	No Medication in 2009	Town	Total	No Medication in 2009	Town	Total	No Medication in 2009
British Columbia								
100 Mile House (1)	10	7	Kelowna (9)	431	64	Salmon Arm (1)	7	7
Abbotsford (4)	22	3	Kitimat (1)	0	0	Saltspring Isl (1)	0	0
Bowen Island (1)	0	0	Ladysmith (1)	0	0	Sechelt (2)	1	1
Brentwood Bay (1)	0	0	Langley (3)	190	62	Sidney (2)	3	2
Burnaby (2)	24	20	Lumby (1)	1	1	Smithers (1)	0	0
Cache Creek (1)	3	3	Maple Ridge (2)	13	8	Sooke (2)	2	2
Campbell River (1)	0	0	Merritt (1)	5	0	Squamish (2)	41	1
Castlegar (2)	40	15	Mission (1)	0	0	Summerland (2)	167	46
Chase (1)	1	0	Nakusp (1)	0	0	Surrey (4)	58	38
Chemainus (1)	0	0	Nanaimo (7)	24	15	Terrace (2)	0	0
Chilliwack (4)	13	1	Nelson (1)	10	9	Tiell (2)	0	0
Coquitlam (2)	49	26	North Vancouver (4)	41	27	Trail (1)	16	8
Courtenay (4)	17	1	Oliver (1)	153	53	Vancouver (9)	117	64
Cranbrook (1)	4	2	Parksville (1)	4	4	Vanderhoof (1)	0	0
Creston (1)	10	8	Pemberton (1)	4	0	Vernon (3)	75	17
Dawson Creek (2)	4	2	Penticton (1)	110	110	Victoria (9)	44	15
Delta (4)	12	9	Port Alberni (2)	1	1	West Kelowna (1)	31	31
Duncan (1)	4	4	Port Coquitlam (2)	5	3	West Vancouver (1)	6	6
Fort St. John (1)	1	0	Port Moody (1)	0	0	Whistler (1)	3	3
Gabriola Island (1)	0	0	Prince George (1)	0	0	Williams Lake (2)	0	0
Goldon (1)	0	0	Qualicum Beach (1)	2	2	Winfield (1)	58	0
Hope (1)	0	0	Richmond (3)	17	16			
Kamloops (4)	72	6	Saanichton (3)	17	15	TOTAL (141)	1943	831
Alberta								
Airdrie (1)	20	15	Fort McMurray (1)	2	2	Red Deer (3)	169	50
Ardrossa (1)	0	0	Fort Vermilion (1)	0	0	Rimbey (1)	3	0
Beaumont (1)	0	0	Grande Prairie (4)	8	4	Sherwood Park (5)	22	19
Bellis (1)	2	0	Grimshaw (1)	0	0	Slave Lake (1)	0	0
Black Diamond (1)	10	10	High Prairie (1)	0	0	Spruce Grove (1)	34	34
Brooks (1)	3	1	High River (2)	5	0	St. Paul (1)	1	1
Calgary (33)	1501	639	Innisfail (1)	0	0	Stettler (1)	4	2
Camrose (1)	3	3	Leduc (2)	3	2	Stony Plain (1)	0	0
Canmore (1)	13	5	Lethbridge (5)	150	15	Strathmore (2)	21	5
Claresholm (1)	5	1	Medicine Hat (1)	4	3	Taber (1)	0	0
Cochrane (1)	5	0	Morinville (1)	6	0	Thorhild (1)	0	0
Coronation (1)	0	0	Nanton (1)	6	0	Toffield (1)	18	0
Dewinton (1)	6	0	Okotoks (1)	74	0	Trochu (1)	0	0
Edmonton (14)	96	47	Onoway (1)	0	0	Valleyview (1)	0	0
Edson (1)	16	16	Pincher Creek (1)	2	0	Wainwright (1)	1	0
Forestburg (1)	0	0	Provost (1)	0	0	Wetaskiwin (3)	5	0
						Total (112)	2218	886
Saskatchewan								
Assiniboia (1)	0	0	Meacham (1)	0	0	Swift Current (1)	4	1
Delisle (1)	10	10	Melford (1)	3	0	Turtleford (1)	0	0
Esterhazy (2)	8	3	Moose Jaw (3)	116	106	Watrous (1)	2	0
Estevan (1)	13	0	North Battleford (2)	4	2	Weyburn (1)	8	1
Humboldt (1)	5	2	Prince Albert (2)	10	0	White City (1)	0	0
Indian Head (1)	1	1	Regina (5)	216	118	Yorkton (2)	7	2
Kamsack (1)	0	0	Saskatoon (11)	324	198	Zehner (1)	6	6
Maple Creek (1)	1	1	Stoughton (1)	5	5	TOTAL (43)	743	505
Manitoba								
Anola (1)	226	16	Minnedosa (1)	147	0	Selkirk (2)	1154	382
Ashern (1)	53	49	Morden (1)	200	38	St. Albert (1)	0	0
Balmoral (1)	262	52	Notre Dame (1)	104	39	St. Francois Xavier (1)	443	65
Beausejour (2)	1138	200	Oak Bluff (1)	667	167	Steinbach (3)	514	304
Boissavain (1)	8	3	Oakbank (1)	144	29	Thompson (1)	0	0
Brandon (4)	1141	198	Pilot Mount (1)	66	17	Virden (2)	97	16
Dauphin (1)	135	65	Portage la Prairie (1)	169	61	Winkler (1)	375	100
East St. Paul (1)	303	100	Roblin (1)	0	0	Winnipeg (29)	15752	3883
Gladstone (1)	71	15	Russell (1)	23	0	TOTAL (62)	23192	6150

Table 5. Number of dogs diagnosed with heartworm in Western Canada in 2010 and their travel history (number in brackets represents number of clinics).

Area	Imported		Canadian			Travel History Unknown	Total	No Medication in 2009
	"Katrina"	Other Imports	Visited Outside Canada	Visited Endemic Areas in Canada	Never left the Province			
British Columbia								
Kamloops (2)	0	2	2	0	0	0	4	0
Delta (1)	0	1	0	0	0	0	1	3
North Vancouver (2)	0	2	0	0	0	0	2	18
Richmond (1)	1	0	0	0	0	0	1	0
Total (6)	1	5	2	0	0	0	8	21
Alberta								
Calgary (1)	0	0	0	1	0	0	1	0
Tofield (1)	0	1	0	0	0	0	1	0
Total (2)	0	1	0	1	0	0	2	0
Saskatchewan								
Indian Head (1)	0	0	0	0	0	1	1	1
Regina (1)	1	0	0	0	0	0	1	36
Total (2)	1	0	0	0	0	1	1	37
Manitoba								
Winnipeg (12)	0	1	0	0	3	21	25	2435
Anola (1)	0	0	0	0	2	0	2	16
Beausejour (2)	0	0	0	0	20	6	26	200
Minnedosa (1)	0	0	0	0	1	0	1	0
Oak Bluff (1)	0	0	0	0	0	2	2	167
Oakbank (1)	0	0	0	1	0	4	5	29
Selkirk (2)	0	1	1	0	3	0	5	382
Steinbach (3)	0	0	0	0	9	2	11	304
Total (23)	0	2	1	1	38	35	75	3533