

## PWDCA Health Survey – 2014

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## **Date Collection and Management.**

The survey was designed in and the data were collected in a SurveyMonkey account that was independent of the PWDCA account. SurveyMonkey is a web survey development cloud based company. Chairs of each PWDCA health committee were asked for their input on the survey questions. Owners of PWDs were invited to participate regardless of their membership status or geographical location. Thanks are extended to everyone who took the time to complete the survey and to the many who wrote comments. I have read each and every comment, though not every one of them has been incorporated into this report.

A number of people tested the waters to see the questions or they didn't have all the needed information to complete the survey the first time around. The result was duplicate entries for some dogs (addressed below).

After the survey closed the data were downloaded as Excel spreadsheets (3 for the single survey; 11 for the multiple survey). Data were reviewed for:

- Inconsistencies (e.g., a year of birth or death that hasn't happened yet or was so long ago it was obviously a typing error). The HLD was searched, then the owner was contacted if necessary.
- Placement of exact date of death or birth into the wrong field. This was fixed so that as many dates as possible were available for calculation of age of living dogs or deceased dogs.
- Missing information (e.g., date of death for a dog marked deceased – the HLD was searched first, then the owner contacted)
- Duplicate entries of dogs or owners or both. Duplicate dog information was deleted so that each dog was in the file just one time with the most complete record. Duplicate owner information was removed so as to not inflate the number of responses on owner based questions about the HLD, PWD health, experience, research suggestions and the like.
- The occasional odd finding; e.g., 20 hypoparathyroid dogs – this is a rare disease in dogs, so each owner was contacted to ask if that or hypothyroidism was the correct diagnosis. Most were hypothyroidism.

Data were added or corrected if owners contacted me with information after they completed the survey. Thus, the data analyzed are as close to the certainty as is humanly possible.

Once the review was finished the data were imported into MS Access 2013 for analysis.

The report was created in Word 2013; it was converted to a PDF so as to retain color in graphs and to provide a universally used format. Once the reports are posted on the PWDCA web site, announcements can be made on internet lists and facebook pages to alert non-members.

## **Owner Information (# = 750)**

Geographic Location.

657 owners were from the USA and of those 38% are PWDCA members. The other 93 were non-USA.

PWDCA Member

Yes	247 (247/1996 = 12% of the membership)
No	248

## Breeder

Yes	156
No	582

## Health Litter Database (HLD) Participation

The survey question was when you enter a dog into the PWDCA Health Litter Database do you include health problems?

Yes	334
No	90 (21% of those answering the question)
Unknown	280

Reasons for not entering health information are given below.

HLD Comments. These included some already known facts as well as unexpected misconceptions. The numbers in the list are how many people made the comment.

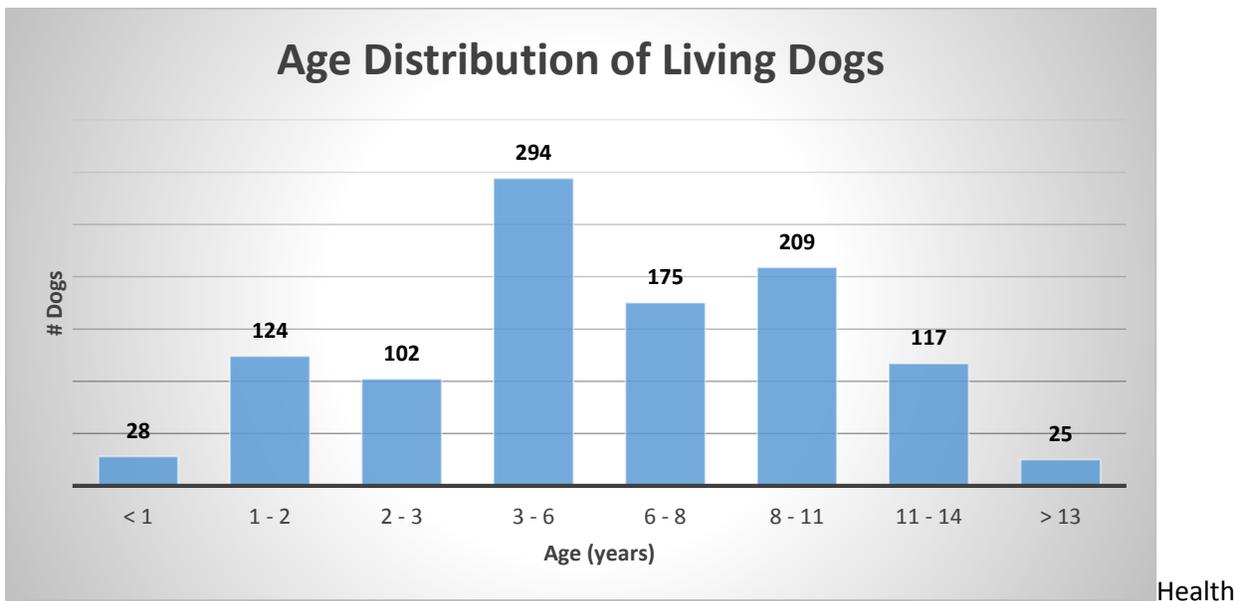
- Awareness
  - Don't know what HLD is – 11 (usually non-members). This may have been a fault in survey design as the abbreviation HLD was used, rather than spelling it out
  - Don't know how to enter info or to check if dog is in – 2
  - I am not a breeder and didn't know about this database
- Misconceptions
  - Dog has/had no health problems (i.e., healthy dog information is not of interest) – 20
  - Have to be a breeder to enter information – 18
  - My breeder does this (breeders are not teaching puppy buyers how to use the HLD) – 8
  - Dog doesn't show and isn't used for breeding – 1
  - Have to be a member to enter information – 1
  - Problem has to be genetic to be reported (I have not entered the behavioral issues in HLD because I don't have enough information on whether this is a genetic/breed problem or a result of environment.)
  - Medical conditions are cumulative and data entry only happens once – 1
  - Haven't bred a litter in a long time
- Usability
  - Can't search on health conditions, cause of death, or for other information that is individually dog based.
  - Dog's data disappeared twice; understood it was because he was not used for breeding
  - System defaults my entries; administrator has to update for me
- Other
  - Don't enter litters
  - Use my own dogs for breeding and don't sell intact dogs or bitches – so don't enter in HLD
  - Several commented that they believe breeders should report problems in their breeding stock, that future of breed depends on knowledge in the HLD, and the like
  - Don't participate in HLD because info is used to disparage breeders (multiple comments on this)
  - Health information that cannot be found in CHIC or OFA is mostly used in a negative way
  - Don't remember being asked to

- I feel like I'm in the minority. By entering all the health issues, as I think one has an ethical obligation to do, I look like I have the sickest dogs.
- I have no dog in the HLD, but I would not hesitate to indicate health problems. The health of the breed and each dog should stand in front of personal animosity of breeders or owners.
- I truly haven't used that much, as when I belonged to the PWDCA there was so much politics involved in what got attention, what got concern that it burned me out on it.
- Why is HLD participation required to participate in various programs or to be a volunteer?

**Dogs (n=1388)**

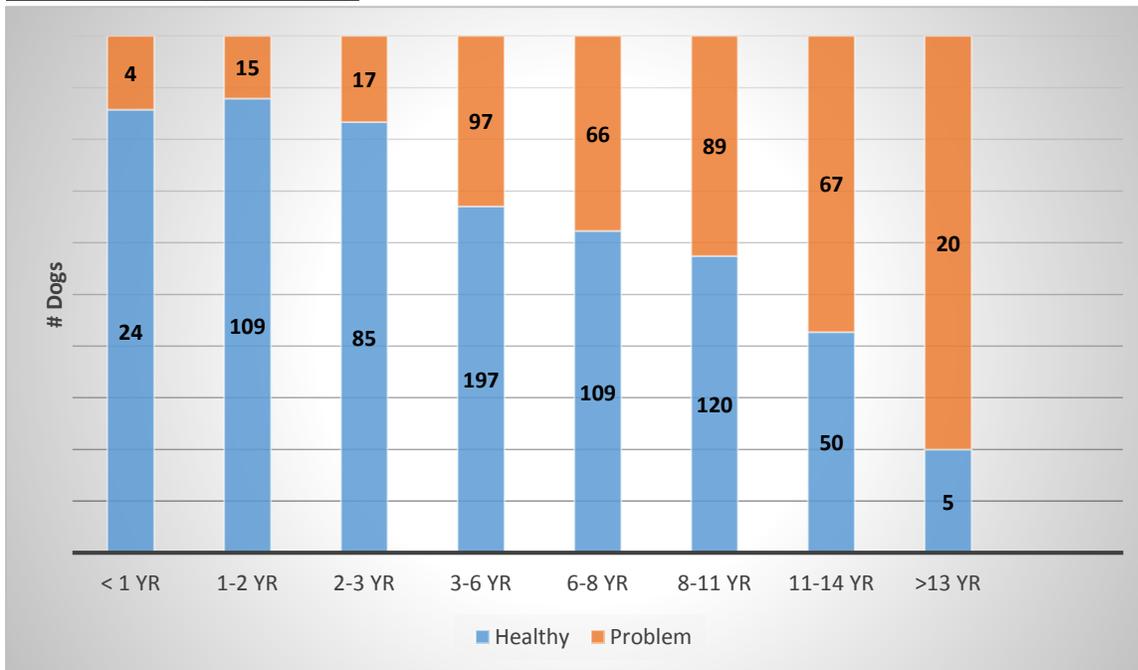
Age of Living Dogs.

This was calculated from date of birth to August 11, 2014. The average of living dogs was 6.3 (n=1073; minimum 0.25 yr; max 16.7 yr)



As would be expected with aging, there was an increase in health problems with increasing age.

## Health Status by Age Group



## Reproductive Status

Female, spayed	564
Female, not spayed	253
Male, neutered	370
Male, not neutered	201
Spayed or neutered	925 (66.6%)

## Preventive Measures

### Vaccination

Titer use after puppy vaccinations

Yes	413
No	821
Unknown	154

Vaccine	Yearly	Every 2-3 year	Every 3 years	Never
Kennel cough	465	59	34	251
Rabies	124	192	743	28*
Distemper, parvo	313	157	312	83
Corona	141	57	89	386
Lyme	201	36	9	470
Leptospirosis	313	63	35	355
Hepatitis	102	56	129	365

\*12 dogs who never had rabies vaccination were from the USA; the remainder from outside the country.

#### Other Comments about vaccination

- 25 per vet recommendations
- 6 older dogs not getting vaccinations; occasional dog with medical condition not receiving vaccines
- When required for grooming (usually kennel cough; several rabies), day care, therapy work (5), travel, boarding, showing (or other high exposure areas), prior to semen collection (lepto, Norway)
- 17 canine flu yearly
- Some commented about yearly rabies vaccination requirement in some states
- 1 rattlesnake (yearly)
- Several give when titers indicate necessity
- Several noted UK vaccinations are annual with rabies every 3 years

#### Heartworm and Flea Preventative Use

##### *Heartworm Prevention*

Use regularly as prescribed by vet	961
Use if traveling to endemic area	111
Heart worm test only	104
Don't use heartworm preventive	106

Comments about heartworm preventive use.

Not used in UK

Used seasonally

Used year round

Alaska, Sweden don't have heartworm

West coast vets don't recommend heartworm preventive

A variety of frequency comments: monthly, about every 6 wks, every 6-8 weeks

Data are available for incidence of heartworm in the USA (data for 2010):

<http://www.heartwormsociety.org/download/Incidence-Map-2010.pdf>. Cases have been reported in central and northern California, and SW Oregon on the border with CA. You may want to discuss these data with your veterinarian if you live in these or other areas of drought that have evolved recently.

##### *Flea Prevention*

Flea collar	35
Monthly pill	162
Monthly skin application	675
No flea preventative	292

Comments about flea preventive use:

- During rainy season, during summer, during warm months, specific months (in essence – flea season however that is defined for one's area)
- Not done on breeding bitch
- If traveling to endemic area, shows
- Herbals, homeopathic, essential oils, natural

- Non-toxic spray
- Longer interval than monthly
- Bathing, vacuuming house

## Training and Exercise

Where dog received training in general manners

<b>Puppy socialization</b>	
Obedience school	942
PetSmart or similar program	69
Companion dog obedience class	627
<b>In home</b>	
With trainer	188
Self	872
None	7

Other: multiple classes, multiple disciplines (e.g., CGC, obedience, agility, conformation), while boarding, therapy training, day school, AKC good manners training, go to work with owner (pet store), wilderness search and rescue. Several commented – training a lot, training all the time, training in multiple places for multiple events for multiple classes

How much time is/was spent in general manners training in a week

- Daily - 697
- Almost daily - 419
- 2-3 times - 173
- Once - 54

### Exercise Activity

How much exercise daily (# of dogs – 1259)

Av: 2 hours. Range: 0-45 hours (seven dogs had 15 or more hours weekly)

<b>Activity</b>	<b># Dogs</b>
Swimming	716
Performance training	496
Dog park	289
Off leash	1076
On leash	986
None of the above	59
<b>Combinations</b>	
Swimming and performance	459
Swimming and off leash	613
Swimming and on leash	548
Swimming and dog park	171
Performance and off leash	575
Performance and on leash	521
Performance and dog park	141

## Health Problems

### Data Presentation

Each table lists problems within category, percent frequency of the problem for dogs in the category and for all dogs. Most categories also have a table giving age of diagnosis. Information about how diagnoses were made is in Appendix I. Some owners did not provide the age of onset or how a problem was diagnosed so those numbers may be fewer than the number of dogs.

There were 865 dogs (62%) with no health problem or tick disease; there were 531 dogs with one of those issues. Addison's disease is included in both the endocrine and autoimmune categories.

### Orthopedic (141 problems in 122 dogs)

Diagnosis	#	% dogs with orthopedic problems	% all dogs
Hip dysplasia*	61	50	4.4
Arthritis	43	35.3	3.1
ACL	16	13.1	1.2
Transitional vertebrae	9	7.4	
Elbow dysplasia*	5	4.1	
Panosteitis	5	4.1	
Osteochondritis dessicans (OCD)	2		

\*OFA data are available for the dysplasias:

Elbow dysplasia. Rank 90/111. # evaluations 2875 – 98.5% normal, 1.5% dysplastic

Hip dysplasia. Rank 80/172.

Total evaluations, 8187 with 14.3% Excellent and 12.5% Dysplastic

Evaluations 2001-2010 with 20.5% Excellent and 8.9% Dysplastic

### Age of Diagnosis

Diagnosis	Age (yr)					
	< 1	1-2	2-3	3-6	6-8	8 and above
Hip dysplasia	10	22	25	3	-	1
Arthritis	-	1	1	5	11	25
ACL	-	2	-	6	1	7
Transitional vertebrae	-	5	3	-	-	-
Elbow dysplasia	1	2	1	-	-	1
Panosteitis	4	-	-	-	-	-
OCD	2	-	-	-	-	-

Cardiac (39 problems in 37 dogs)

Diagnosis*	#	% dogs with cardiac problems	% all dogs
Heart murmur	27	72.9	2

\*2 each with mitral valve insufficiency and ventricular septal defect; 1 each with JDCM, pulmonic stenosis, heart failure, atrial hemangiosarcoma, cardiomyopathy at 7 ½ yr, irregular ventricular premature heart rate (asymptomatic), pulmonary hypertension, infant murmur that was outgrown. Since a heart murmur is non-diagnostic, the extent of defined cardiac problems in this population of PWDs is unknown.

Gastrointestinal and Liver (120 problems in 98 dogs)

Diagnosis	#	% dogs with GI problems	% all dogs
Food intolerance/allergy*	54	55	3.9
IBD	26	26.5	1.9
Pancreatic disease	15	15.3	1.1
Colitis	7	7.1	
Hemorrhagic gastroenteritis	6	6	
Protein losing enteropathy	6	6	
Other**			

\*Thirty three of these are also listed with a dietary allergy

\*\*2 each with cirrhosis and liver failure, and 1 each with megaesophagus and hepatocutaneous syndrome. There were no cases of hepatic shunt.

Age of Diagnosis

Diagnosis	Age (yr)					
	< 1	1-2	2-3	3-6	6-8	8 and above
Food intolerance/allergy	16	20	5	11	1	2
IBD	6	3	4	3	6	4
Pancreatic disease	2	1	1	4	2	5
Colitis	2	1	1		1	2
HGE*	1				1	4
Protein losing enteropathy			1		4	1
Cirrhosis						2

\*HE is hemorrhagic gastroenteritis.

Cancer (92 problems in 86 dogs)

Diagnosis*	#	% dogs with cancer	% all dogs
Hemangiosarcoma	51	59.3	3.7
Lymphosarcoma	18	20.9	1.3
Mammary	12	14	
Liver	6	7	

\*1 each with brain cancer, lung cancer, nasal cancer, osteosarcoma, and melanoma. There were no cases of leukemia.

### Age of Diagnosis

Diagnosis	Age (yr)					
	< 1	1-2	2-3	3-6	6-8	8 and above
Hemangiosarcoma					1	50
Lymphosarcoma		1		2	8	7
Mammary				2	3	7
Liver				1	2	3

Thus, cancer in the PWD is a problem for the middle age and older dogs, rather than youngsters.

### Endocrine (94 problems in 91 dogs)

Diagnosis	#	% dogs with endocrine problem	% all dogs
Hypothyroid*	57	62	4.5
Addison's disease	23	25	1.7
Cushing's disease	5	5.4	
Hypoparathyroid	2		

\*This includes 5 cases of autoimmune thyroiditis from the autoimmune category.

Other problems were 1 each: hyperparathyroid, atypical Addison's disease, tumor on parathyroid, diabetes mellitus.

### Age of diagnosis

Diagnosis	Age (yr)					
	< 1	1-2	2-3	3-6	6-8	8 and above
Hypothyroid	1	4	13	24	15	6
Addison's		4	4	8	6	
Cushing's					2	3
Hypoparathyroid						2

OFA Data on hypothyroidism: Rank 39/103. # evaluations - 422 with 85.8% normal, 4.5% autoimmune, 0.2% idiopathic, and 9.5% equivocal.

Given the facts that hypothyroidism is the 5<sup>th</sup> most common problem (including cases of autoimmune thyroiditis) in the survey, 4.5% of cases in the OFA database are autoimmune, that autoimmune thyroiditis is considered hereditary, and the relative low frequency of thyroid testing among prebreeding assessments (26% dogs and 29% bitches), the topic would be a wise one for breeders to discuss.

### Dental (70 problems in 59 dogs)

Diagnosis	#	% dogs with dental problem	% all dogs
Undershot jaw	19	32.2	1.4
Missing teeth	14	23.7	1.0
Toothbuds/supernumerary teeth	8	13.6	
Gum disease	6	10.2	
Base narrow canines	5	8.5	
Overshot jaw	5	8.5	

Other issues listed: 2 each small teeth, crooked jaw and baby teeth that didn't come out spontaneously, 1 each malocclusion (not described), upper jaw tooth crowding, wolf bite, lower jaw bone loss with multiple teeth not correctly anchored, retained canine, thin enamel, benign gum tumor

The vast majority of dental problems were diagnosed before 1 years of age; the exception was more gum disease in dogs 8 years and over.

Undershot jaw was the most frequent dental problem; it was also the most common problem reported in progeny of sires and dams (see the reproductive sections).

Kidney problems (72 problems in 69 dogs)

<b>Diagnosis*</b>	<b>#</b>	<b>% dogs with kidney problem</b>	<b>% all dogs</b>
Recurrent UTI	25	36.2	1.8
Bladder stones	16	23.2	1.1
Incontinent post spay	12	17.4	

\*6 had chronic kidney failure, 4 incontinent pre spay, 3 each diabetes insipidus, juvenile renal dysplasia, and acute kidney failure. There were no cases of nephritis.

Age of diagnosis

<b>Diagnosis</b>	<b>Age (yr)</b>					
	<b>&lt; 1</b>	<b>1-2</b>	<b>2-3</b>	<b>3-6</b>	<b>6-8</b>	<b>8 and above</b>
Recurrent UTI	10	2	3	3	4	3
Bladder stones	1			4	4	7
Incontinent post spay		1	1	3	5	2

Neurological (66 problems in 57 dogs)

<b>Diagnosis</b>	<b>#</b>	<b>% dogs with neurological problem</b>	<b>% all dogs</b>
Vestibular syndrome	15	26.3	1.1
Idiopathic epilepsy*	15	26.3	1.1
Alzheimer's	12	21.1	
Stroke	7	12.3	
Seizures, unspecified type	7	12.3	
Other**			

\*8 with idiopathic epilepsy were diagnosed by clinical findings only (see Appendix I) so that may or may not have been a correct diagnosis. Other causes must be first eliminated before the diagnosis can be considered idiopathic epilepsy; examples of other causes include metabolic (low blood sugar, low blood calcium, high ammonia levels from liver disease), toxins, encephalitis. At a minimum the workup should include a complete blood count, blood chemistries, and urinalysis; spinal fluid might be obtained in some cases. Idiopathic epilepsy is hereditary in some breeds and for that reason it deserves attention in the PWD.

\*\*4 degenerative neurological disease in older dog; 3 fibrocartilagenous embolism (2 of these also had stroke), and 1 each pinched nerve lower back, laryngeal paralysis, abnormal uterine nerve development which caused sphincter failure.

#### Age of diagnosis

Diagnosis	Age (yr)					
	< 1	1-2	2-3	3-6	6-8	8 and above
Vestibular syndrome						15
Idiopathic epilepsy	3	4	4	5	1	2
Alzheimer's					1	9
Stroke	1			1		5

Most problems occurred in older dogs.

#### Autoimmune Problems (69 problems in 62 dogs)

Diagnosis	#	% dogs with autoimmune problem	% all dogs
Addison's disease*	23	39.0	1.7
Dry eye	12	20.3	
Vaccination reaction	9	15.3	
Autoimmune thyroiditis**	5	8.5	

\*Also reported in endocrine category.

\*\*Two were closely related.

Other problems were: 3 autoimmune thrombocytopenia, 2 each discoid lupus and symmetrical lupoid onychodystrophy, 1 each, autoimmune hemolytic anemia, rheumatoid arthritis, myositis, pemphigus, skin IGA deficiency, eye problem.

#### Age of diagnosis

Diagnosis	Age (yr)					
	< 1	1-2	2-3	3-6	6-8	8 and above
Addison's disease		4	4	8	6	
Dry eye	1			4	3	3
Vaccination reaction	3		1	2	1	2
Autoimmune thyroiditis		1	2	1	1	

APS2. Sixty dogs with the health problems reported by Maclaren in the index case (Addison's, cirrhosis, liver cancer, interstitial nephritis, and IBD) along with autoimmune thyroiditis and diabetes mellitus were reviewed. None had a diagnosis of nephritis or diabetes mellitus. Twenty-six dogs had IBD but none of the other diseases. Two dogs had cirrhosis but none of the other diseases. There were five with liver cancer and one of those had Addison's disease but no other problem. There were five with autoimmune thyroiditis but no other problem. Twenty-three dogs had Addison's disease; one of those has discoid lupus erythematosus and one was hypothyroid (unknown if this was autoimmune thyroiditis).

In this survey population of PWDs there is no evidence for APS2 as defined by clinically symptomatic and diagnosed diseases that were described in the original report on Zach. APS2 by this definition is either quite uncommon in the PWD population, a dog may have had subclinical conditions, or owners with dogs who have experienced the combination of disorders did not enter their dogs in the survey.

Beyond the survey, Dr. Lark of the Georgie Project responded to a direct question about APS2 from the endocrine committee chair with this answer: "To answer your main question, the idea of heritable APS in the breed cannot be supported by our large number of autopsies #300 at this time. Addisonians

seem to have more concurrent Hemangiosarcomas than the rest of the population and possibly more atherosclerosis and osteoporosis. They seem to have less lymphosarcomas. Certainly there is no evidence for APS as an associated syndrome. Changes in the thyroid, pancreas and salivary glands as well as the liver and spleen are about the same frequency as in the population as a whole.” (Courier July/Aug 2013 and email communication where number of necropsies was updated to 388). (Note: The higher number with hemangiosarcoma and fewer with lymphoma among the necropsies in Addisonian dogs may be a reflection of these cancer rates in the PWD rather than unique to the Addisonian dog – see the cancer category).

Problem as a Newborn or Young Puppy (25 dogs)

- 7 – umbilical hernia
- 6 each – cryptorchid and heart murmur
- 2 each – monorchid and protracted Giardia
- 1 each – cleft palate, fading puppy, runt, parvo like infection (was 1 or 4 surviving pups)
- No cases of lymphedema or puppy eye syndrome

These problems differ in occurrence from progeny problems for sires and dams (see the reproductive sections).

Eye Problems (76 problems in 56 dogs)

Diagnosis	#	% dogs with eye problem	% all dogs
Cataract, punctate	28	50	2
Distichiasis	11	19.6	
Cataract, hereditary	10	17.9	
Persistent pupillary membrane	6	10.7	
PRA	5	8.9	

There were 4 cases of older age onset cataracts, 3 cases of an autoimmune eye problem (2 were also reported in the autoimmune problem section), and 1 each of cataracts secondary to PRA, corneal dystrophy and iris atrophy, night blindness, unilateral microphthalmia, entropion caused by chronic follicular conjunctivitis, lens subluxation, cataract due to accidental electrical shock when young, compromised vision (no reason given), and eye ulcer.

Age of diagnosis

Diagnosis	Age (yr)					
	< 1	1-2	2-3	3-6	6-8	8 and above
Cataract, punctate		2	3	5	6	12
Distichiasis	3	5	1	1	1	
Persistent pupillary membrane	2	4				
Cataract, hereditary		3				2
PRA		3				2

Skin and Coat Problems (147 problems in 114 dogs)

Diagnosis	#	% dogs of skin/coat problems	% all dogs
Sebaceous cyst	60	52.6	4.3
Lipoma	31	27.2	2.2
Hair loss	13	11.4	
Itching*	9	7.9	

Viral papilloma	9	7.9	
Follicular dysplasia	7	6.1	
Sebaceous adenitis	5	4.4	
Incorrect coat	3		
Other**	12		

\* Of the nine with itching (some listed atopy specifically) only 1 checked atopy as a diagnosis in allergy section.

\*\*Other problem were: fatty tumors in 3, sensitive skin in 2, and 1 each interdigital cysts, cutaneous lymphoma, exfoliative dermatitis, dry skin, and hepatocutaneous syndrome. There were no cases of poor pigmentation.

#### Age of diagnosis

Diagnosis	Age (yr)					
	< 1	1-2	2-3	3-6	6-8	8 and above
Sebaceous cyst	1	7	10	16	3	13
Lipoma		1	5	7	9	9
Hair loss	3	3		1		6
Follicular dysplasia	2			1		4
Sebaceous adenitis		1				3
Incorrect coat	2		1			

Hair loss was associated with the following problems: hypothyroidism (4), steroid use (3), Cushing's (1), digestive disorder (1), IBD (1), follicular dysplasia 1, hepatocutaneous syndrome 1, rabies vaccination (1). One dog with Cushing's disease had a normal amount of hair.

#### Allergies (135 problems in 109 dogs)

Diagnosis	#	%dogs with allergy problems	% all dogs
Dietary	53	48.6	3.8
Contact dermatitis	32	29.4	2.3
Atopy	29	26.6	2.1
Flea	8	7.3	

\*Other diagnoses: 2 each seasonal and chronic foot licking, and 1 each numerous grasses & trees (on monthly injections), dust/mite/fungi, allergies but to what not specified, stiches when spayed, itchy dry skin, allergies generally, on hypoallergenic food but still required Atopica to prevent hot spots, multiple, some seasonal/some not.

#### Age at diagnosis

Diagnosis	Age (yr)					
	< 1	1-2	2-3	3-6	6-8	8 and above
Dietary	14	17	9	10	1	2
Contact dermatitis	4	11	4	8	3	
Atopy	3	8	6	7	1	2
Flea	2	2	3			1

Ear Problems (72 problems in 65 dogs)

Diagnosis	#	% dogs with ear problems	% all dogs
Chronic ear infection	32	49.2	2.3
Deafness	21	32.3	1.5
Hematoma	8	12.3	

There were 3 cases of several infections (not chronic), 2 related to swimming, 2 very thick wax, and 1 each, constant yeast problem, vestibular disease, right ear infected more than left, associated with allergy to chicken and grain.

Chronic ear infections happened in mostly young dogs (25 below the age of 3, 78%) and the deaf cases were all in older dogs.

Temperament/Behavior Problems (620 problems in 242 dogs)

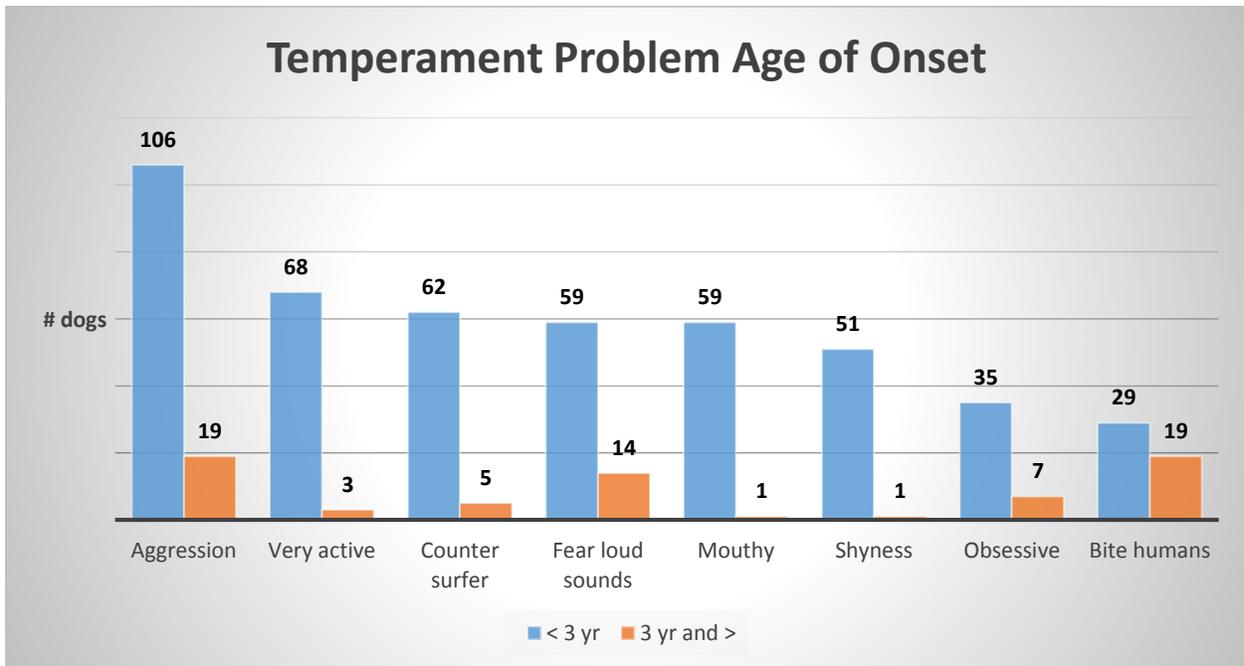
Diagnosis	#	% dogs with temperament problems	% all dogs
Aggression	124	51.2	8.9
Fear of loud sounds	76	31.4	5.5
Very active	71	29.3	5.1
Habitual counter surfer	67	27.7	4.8
Mouthy	60	25	4.3
Shyness	51	21.1	3.7
Bite humans	48	19.8	3.5
Obsessive behavior	42	17.4	3
Other phobias	32	13.2	2.3
Moderate activity	21	8.7	1.5
Touch sensitivity	11	4.6	0.8

Comments about aggressive dogs gave the following information; 103 were dog-dog aggression, 14 were toward people (often a stranger), or not specified. There were 18 with leash aggression, 11 fear, 8 protecting their person, 6 territorial, 4 when another dog was perceived to be in space of aggressive dog, 4 protecting a non-human possession, 4 after prior attack by a different dog, 5 associated with illness (2 hypothyroid, 1 each chronic pancreatitis, Addison's disease, and hydrocephalus (also follicular dysplasia) diagnosed by the Georgie project in a dog whose aggressive attacks were unprovoked.)

Age of onset

Problem	Age of onset			
	< 1 yr	1-2 yr	2-3 yr	3 yr and >
Aggression	28	48	30	19
Fear of loud sounds	39	16	7	14
Habitual counter surfer	37	13	12	5
Very active	52	10	6	3
Mouthy	48	8	3	1
Bite humans	3	12	14	19
Shyness	41	9	1	1
Obsessive behavior	17	12	6	7
Other phobias	17	5	3	7
Moderate activity	15	5	-	1
Touch sensitivity	4	3	3	1

The majority of temperament problems started before three years of age except for biting a human; this is shown graphically on the next page. It should be noted that some biting events happened when an owner was trying to separate dogs in a fight.



*Association with Other Temperament Problems*

<b>Problem</b>	<b>Isolated Problem</b>	<b>Associated with Other Problems</b>
Aggression	15	109 (88%)
Fear of loud sounds	12	64 (83%)
Habitual counter surfing	3	64 (96%)
Very active	5	66 (93%)
Mouthy	4	56 (93%)
Bite humans	4	44 (92%)
Shyness	10	42 (81%)
Obsessive behavior	7	35 (83%)
Other phobias	5	27 (84%)
Touch sensitivity	0	14 (100%)

<b>Problem</b>	<b>Single problem</b>	<b>Associated with another problem</b>					
		<b>Biting a human</b>	<b>Very active</b>	<b>Fear loud sound</b>	<b>Mouthy</b>	<b>Aggression</b>	<b>Shy</b>
Aggression	15	35	35	35	33		16
Fear of loud sounds	12	13	19		16	35	31
Very active	3	17		19	28	35	11
Mouthy	4	14	28	16		33	8
Bite humans	4		17	13	14	34	6
Shyness	10	6	11	31	8	16	
Obsessive behavior	7	10	16	8	12	21	9

*Sex Distribution of More Frequent Temperament/Behavioral Problems*

<b>Problem</b>	<b>Female</b>	<b>Male</b>
Aggression	62	44
Noise phobias	51	36
Very active	33	38
Bites human	19	30
Shyness	31	21

The greater number of female dogs with noise phobias and shyness and the greater number of male dogs who bit a human are similar to the findings of the 2005 Health Survey. Aggression is not comparable between the two surveys because it was a single category in 2014 and three separate groups in 2005.

Whether the more frequently reported temperament and behavior problems are innate characteristics of a PWD or have evolved within the context of their home life/environment is not known. It is also a likelihood that some behaviors may be viewed as problematic by one household but not in another.

### *Other Associations*

Various events (spay/neuter, vaccinations, hypothyroidism, stress) have been associated with canine behavioral changes. Of 11 dogs who were spayed or neutered within a short time of behavior change, 6 had improvement in aggression (either less aggression or more stability/calmness), 1 worsened (it was noted the neuter was not until 2 years of age), 1 had recurrence of aggression after being neutered and having training intervention. One dog became shy and fearful after the initial rabies vaccination. Two had significant dog-dog aggression after the second rabies vaccination; in both cases other vaccinations were given simultaneously with the rabies so it is impossible to sort out which one might have been associated with the behavioral change, if at all. Rabies vaccine is a killed vaccine so the likelihood of the infectious agent component contributing to behavioral change is minimal as compared with modified live vaccines. There were behavioral changes in 15 dogs after a family crisis event (mostly for the humans; only 1 instance of a dog health crisis) but there was no one behavioral change that predominated.

Thyroid status of dogs with the more frequent behaviors is presented in the next table. Not all dogs had thyroid panel results so the percentages of normal and of hypothyroid does not always total 100.

<b>Problem (total # dogs with problem)</b>	<b># tested (% thyroid evaluated)</b>	<b>% normal of those tested</b>	<b>% hypothyroid of those tested</b>
Aggression (129)	39 (30%)	82%	18%
Fear loud sound (77)	14 (18%)	79%	21%
Bite human (51)	21 (41%)	62%	24%
Very active (72)	13 (18%)	62%	Unknown
Shyness (51)	14 (28%)	64%	7%
Fear other sounds (32)	3 (9%)	33%	67%
Touch sensitivity (16)	5 (31%)	60%	40%

The frequency of thyroid testing in dogs with a temperament problem is quite low. Still, for those found to be hypothyroid and whose behavior was improved after thyroid replacement, what a help it must have been for dog and family. It is not known if the thyroid test done was a full panel (although the survey specified that) or just a total T4. The full panel is strongly recommended because a variety of conditions can affect the total T4.

### *Behavioral Intervention*

The following professional groups were used for Intervention with behavior or temperament problems. A total of 140 dogs (55.6%) received intervention and many of these dogs had more than one type of intervention.

- Certified Veterinary animal Behaviorist - 44
- Certified Pet Dog Trainer - 87
- Regular Vet - 68
- Others – 18 (some owners are Certified Trainers, email, breeders, phone consultation, seminars, other dog owners, non-certified trainers)

Of the 140 dogs who received intervention, information was available about response to intervention in 79; 36 (46%) showed no improvement while the remainder did have improvement although owners often commented that vigilance was still needed to avoid trigger situations that set off a behavior. Since the majority of dogs experienced more than one temperament problem, analysis of professional intervention for individual problems was not applicable.

### Tick Diseases (130 problems in 102 dogs)

Tick Disease	# Dogs	% of Tick Diseases
Lyme Disease	76	58.5
Ehrlichia	25	19.2
Anaplasmosis	21	16.2
Rocky Mtn Spotted Fever	7	5.4

There was 1 case of Bartonella and no cases of Babesiosis.

Titers were used to help diagnose disease in 96 dogs. After an initial bout of tick disease and when the dog was healthy, the veterinarian recommended a course of antibiotics based on a titer at the time in 23 dogs. After that treatment based on a titer in a healthy dog, 12 had titers done.

It is important to remember that titers (serology tests – immunofluorescent antibody tests (IFA) for some diseases or ELISA (enzyme-linked immunoabsorbent assay tests for other diseases), if positive, indicate prior exposure to the infectious agent. The IFA test results provide actual titer numbers (e.g., 1:64); the ELISA test results provide positive or negative, depending on the titer.

Diagnosis of Lyme Disease is aided by the Lyme C6 test which detects antibodies to the C6 outer surface protein on the bacteria and can distinguish between exposure/infection and vaccination, unlike previous tests used to diagnose Lyme. This is because the Lyme C6 test has little or no cross-reactivity with Lyme vaccines.

Ask your veterinarian for an explanation of whatever testing is used if your dog is suspected of having a Tick Borne Disease. The clinical picture, lab tests, and serology or specific PCR (polymerase chain reaction) tests are all incorporated in making a diagnosis. Serology tests on acute (when dog presents with symptoms) and chronic (3-4 week later) will be done for many of the suspected diseases because a later rise in titer indicates that infection likely occurred.

## Summary of Health and Temperament/Behavior Problems

### Most Frequent Individual Problems

Problem	# Dogs with Problem	% of all dogs (n=1388)
Aggression	129	8.9
Fear of loud sounds	77	5.5
Very active	72	5.1
Hypothyroid (includes 5 thyroiditis)	62	5.4
Hip dysplasia	61	4.4
Sebaceous cysts	60	4.3
Food intolerance/allergy	54	3.9
Dietary allergy	53	3.8
Hemangiosarcoma	51	3.7
Shyness	51	3.7
Bite humans	51	3.5
Obsessive behavior	46	3.0
Chronic ear infection	32	2.3
Other noise phobias	32	2.3

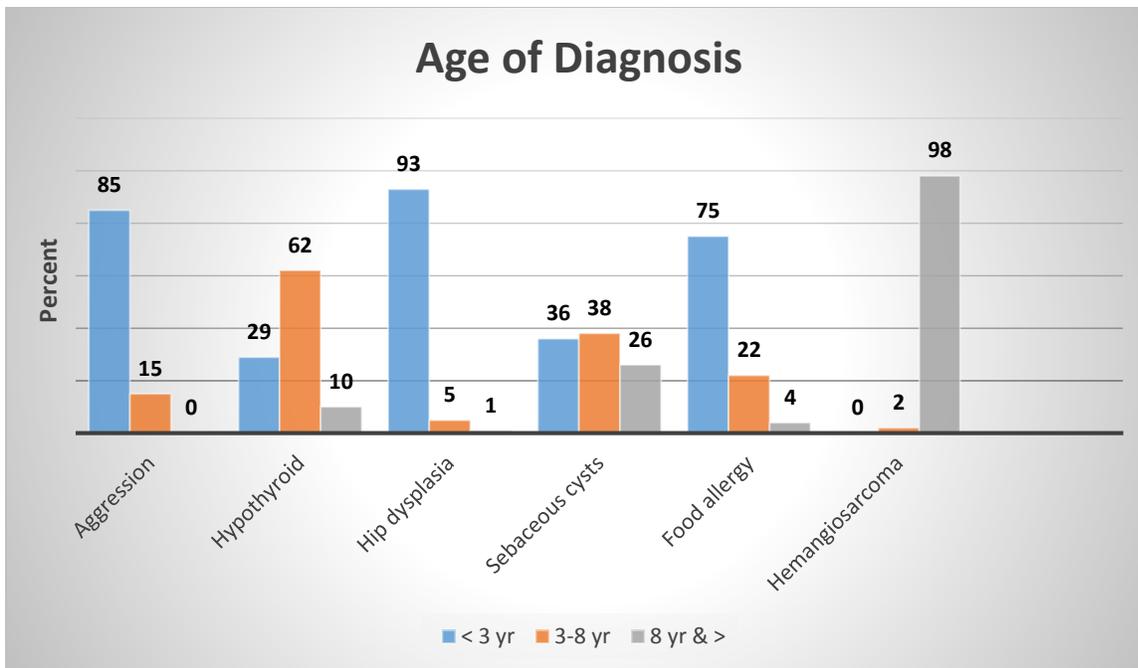
<b>Problem</b>	<b># Dogs with Problem</b>	<b>% of all dogs (n=1388)</b>
Lipoma	31	2.2
Punctate cataracts	28	2
Heart murmur	27	2
IBD	26	1.9
Recurrent UTI	25	1.8
Addison's disease	24	1.7

#### Most Frequent Categories of Problems

<b>Problem Category</b>	<b># dogs with problems</b>	<b>% of all dogs (n=1388)</b>
Temperament and behavior	242	17.4
Orthopedic	122	8.8
Skin and coat	114	8.2
Allergy	109	7.9
Tick-borne diseases	102	7.3
Gastrointestinal & liver	98	7.1
Cancer	86	6.2
Ear	72	5.2
Renal	69	5
Autoimmune	62	4.6
Dental	59	4.3
Endocrine	57	4.1
Neurological	57	4.1
Eye	56	4
Cardiac	37	2.7
Newborn or young puppy	27	1.8

#### Age of Diagnosis for More Common Problems

When deciding whether a problem should be the subject of research, one factor to consider is age of onset. Is there early onset which means a life-long management task if the problem is not lethal? Among the more common early diagnosed problems are behavior (aggression is the example in the chart below), hip dysplasia and food allergy. Other variables to consider in contemplating research support are lethality and heritability; the latter affecting the breed long term because of the clinically invisible carrier rate.



## Female Reproduction (n=297)

### Frequency of Heat Cycles

- 4 mo – 17
- 5 mo – 20
- 6 mo – 158
- 7 mo – 25
- 8 mo – 13
- 9 mo - 4
- 18 mo – 1
- Others had variable intervals

### Prebreeding Assessments

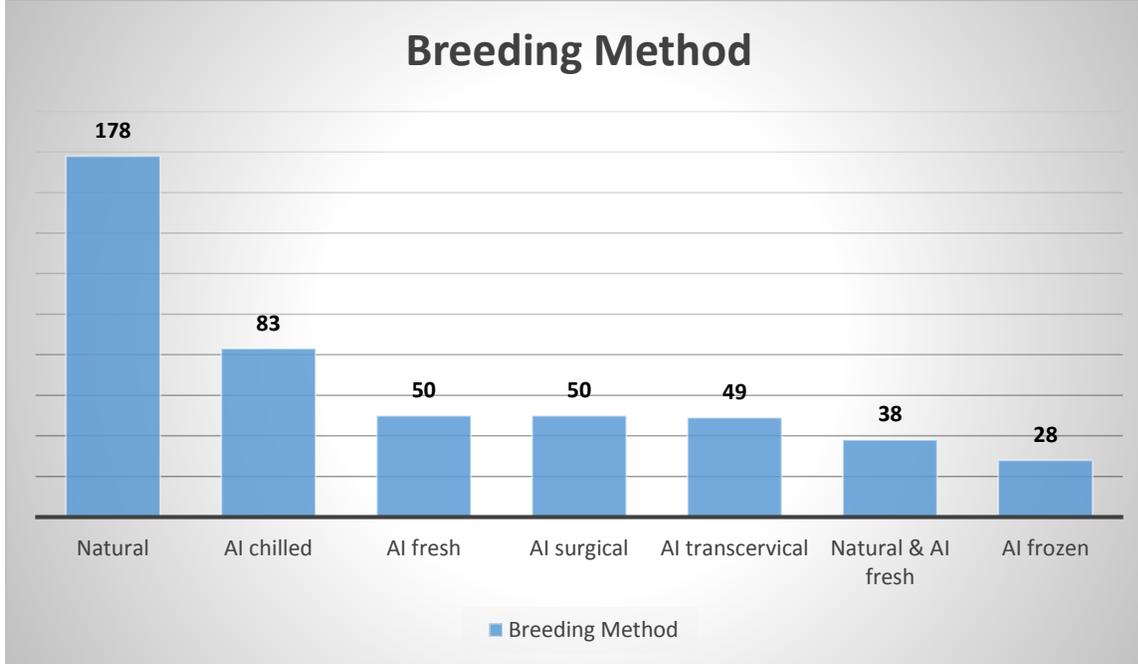
Assessment	#	%
Brucellosis screening	224	75
Progesterone	218	73
Vaginal exam	117	39
Thyroid	87	29
Bacterial culture	73	25
Estrogen	44	15
Mycoplasma	17	6
Brucellosis confirmatory test	4	

Comments about other exams done were mostly the required health screening tests.

### Breeding Methods

Of the 297 dams there were 281 who were bred.

The graph below shows the number of different breeding methods used. Not all dams had this information provided and some dams had multiple breeding methods listed.



Semen used for AI transcervical was extended chilled (43), frozen (41), and fresh (23).

#### Litters and Puppies

The total number of breedings was 710, the total number of litters produced was 614, and the total number of puppies was 4373.

Litter #	# Pups	# Litters	Av # Pups/Litter*
1	1961	272	7.2
2	1389	189	7.4
3	717	105	6.8
4	244	39	6.3
5	50	7	7.1
6	12	1	

\*AKC Puppy Registration Statistics for PWDs (see Appendix II) had an average of 6.9 pups/litter.

#### Reproductive Issues

Issue	# with Issue	% dams (n=297) with Issue
Infection during pregnancy		
Herpes simplex	0	
Mycoplasma	0	
Brucellosis	0	
Other*	7	
Reproductive problems**		
Stillbirths	47	15.8
C-section, unplanned	33	11.1

Issue	# with Issue	% dams (n=297) with Issue
Failure to conceive	24	8.1
C-section, planned	23	7.7
Difficulty whelping	19	6.4
Resorption after 30 days	18	6
Mastitis	12	4
Uterine inertia	11	3.7
Pyometra	10	3.4
Irregular heat cycles	8	
Mummies	5	
Eclampsia	3	
Abortion	1	

\*Infection was suspected in these 7 with loss of some or all fetuses, either resorbed or later loss

\*\*Other reproductive problems included: 3 each prematurity and unable to maintain progesterone so treated for that, 2 pyometra when older, cervical stricture, infected horn, silent seasons, multiple ovarian cysts found at spay (4 breedings, no litters), and grainy uterus at spay (3 breedings, 1 litter of 6 puppies).

For comparison, in the 05 survey with 583 dams, the more common reproductive problems in descending order were failure to conceive and unplanned C-section each 11%, difficulty whelping 8.6%, abortion/resorption 7.6%, irregular heat cycles 7.4%, mastitis 5.5%, pyometra 4.1%, and primary uterine inertia 2.4%. Stillbirths were 10% of litters.

#### Problems in Dam's Pups

Issue	# with Issue	% puppies (n=4373)
Under shot jaw	58	1.3
Base narrow	33	0.9
Hip dysplasia	29	0.7
Monorchid	25	0.6
Umbilical hernia	18	0.4
Cryptorchid	16	0.4
Addison's disease	13	
Heart defects	12	
Skeletal deformities	9	
Lymphedema*	7	
Missing teeth	6	
Cleft palate	5	
Over shot jaw	5	
Small eyes	5	
Juvenile renal dysplasia	4	
Puppy eye syndrome	4	
Tooth buds/supernumerary teeth	3	
Small teeth	0	
Other*	62	

\*5 of the 7 were in one litter

\*\*Other problems included heart murmurs outgrown (3), failure to thrive (3), incorrect coat (2), sterility

(2), JDCM (2), megaesophagus (2), spina bifida (2 in 1 litter), anasarca, bad knees, cherry eye, persisting murmur, idiopathic epilepsy, allergies, immune mediate thrombocytopenia, pancreatitis, IBD, cleft palate, dry eye, pancreatic enzyme deficiency, club foot, microphthalmic eye (also no tail, shallow hip socket), narrow pelvis, seizures, lazy eye, probable patent ductus arteriosus (also wet lungs).

## Male Reproduction (n=140)

### Prebreeding Assessments

Assessment	#	%
Brucellosis screening	95	68
Sperm count	92	66
Sperm motility	92	66
Sperm morphology	69	49
Sperm color	61	44
Exam of external organs	52	37
Thyroid	36	26
Mycoplasma	7	5
Brucellosis confirmatory test	1	
Other*	9	

\*Other included required health screening tests, CBC, did what breeder said to do

### Infections Documented

There were 2 cases of mycoplasma, 1 of herpes simplex, and 1 other which was not specified.

### Reproductive Problems

These were infrequent with 4 cases of prostatic disease, 2 lack of libido and 1 infertile. There were no cases of aspermia or hypospermia.

For comparison, the 2005 survey found these problems in 234 dogs: prostatic disease 6.4%, subfertile/infertile 6.4%, abnormal semen 3.9%, and lack of libido 1.7%.

### Use at Stud

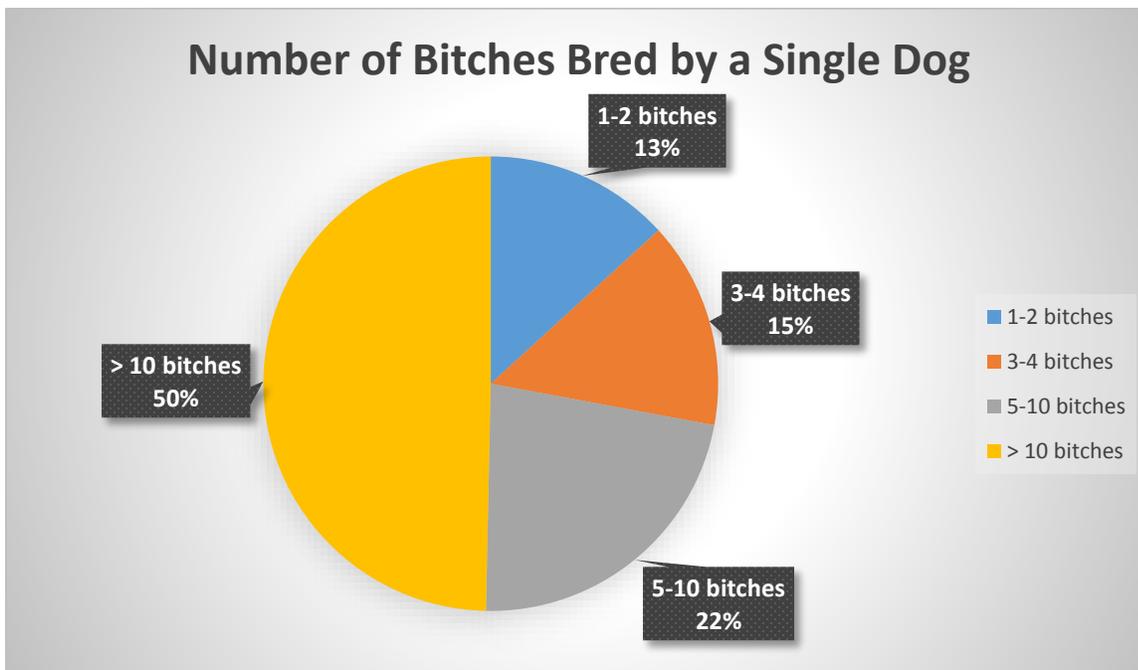
Information was provided for 123 dogs. A total of 620 bitches were bred and 598 litters produced (no number of litters were given for some dogs. It is unknown if those blanks should have been a zero (no litter produced) or the information was not known.

Number bitches bred	Number dogs	# litters
1	41	44**
2	18	35**
3	22	66**
4	6	22
5	7	28
6	7	49**
7	3	20
8	2	18**
9	1	9

Number bitches bred	Number dogs	# litters
10	1	10
11	1	11
12	1	11
13	1	12
15	3	47**
16	1	16
17	1	17
18	2	39**
20	1	18
22	2	40
25	2	44
51	1	42

\*\*repeat breedings for different pregnancies.

If one looks at the number of litters produced by the number of dogs, it is obvious that 16/123 dogs (11.4%) were responsible for 50% of the litters. This popular sire effect is not unusual in dog breeding, yet it should be recognized that over time this reduces genetic diversity in a breed and the accompanying disadvantages.



## Problems in Pups Sired by Dog

Since the number of puppies produced is not known, a percentage for problems couldn't be calculated.

Issue	#
Under shot jaw	21
Hip dysplasia	14
Addison's disease	10
Cryptorchid	9
Monorchid	8
Base narrow	8
Over shot jaw	2
Umbilical hernia	2
Cleft palate	2
Heart defects	2
Puppy eye syndrome	2
Small eyes	2
Tooth buds/supernumerary teeth	1
Juvenile renal dysplasia	1
Skeletal deformities	0
Small teeth	0
Other*	23

\*3 incorrect coats, 2 each megaesophagus and hypothyroidism, JDCM, pulmonic stenosis, Addison's in 1 litter, lymphoma, leukemia/lymphoma, AIHA after vaccination reaction, dry eye, pancreatic enzyme insufficiency. Other comments not relevant to puppy problems.

## Mortality (# = 357)

### Mode of death

- Natural - 64
- Euthanasia - 272
- Accidental - 12
- Unknown - 9

### Necropsy (# = 108, 32% of 336)

- Georgie - 62
- Local vet - 20
- University hospital - 18
- Referral hospital - 7

### Georgie Project

#### Did you contact Georgie?

- Yes (# = 99; 27.7% deaths)
- No (# = 243; 68% deaths)

Of 24 who provided comments, 23 said that Georgia responded; several noted that dogs from out of country couldn't be accepted; some were able to send a dog on a weekend while others were not; some had been previously registered with Georgie.

The necropsy rate is excellent in comparison with other breeds whose health surveys I have worked on. The Georgie project performed 57% of the necropsies. Without Georgie and its uniform and detailed approach to PWD necropsies, the necropsy rate would have been 13% and we would know much less about clinical and subclinical findings at the time of death. This is a valuable resource and one that can benefit from improved education and logistics coordination with the PWDCA.

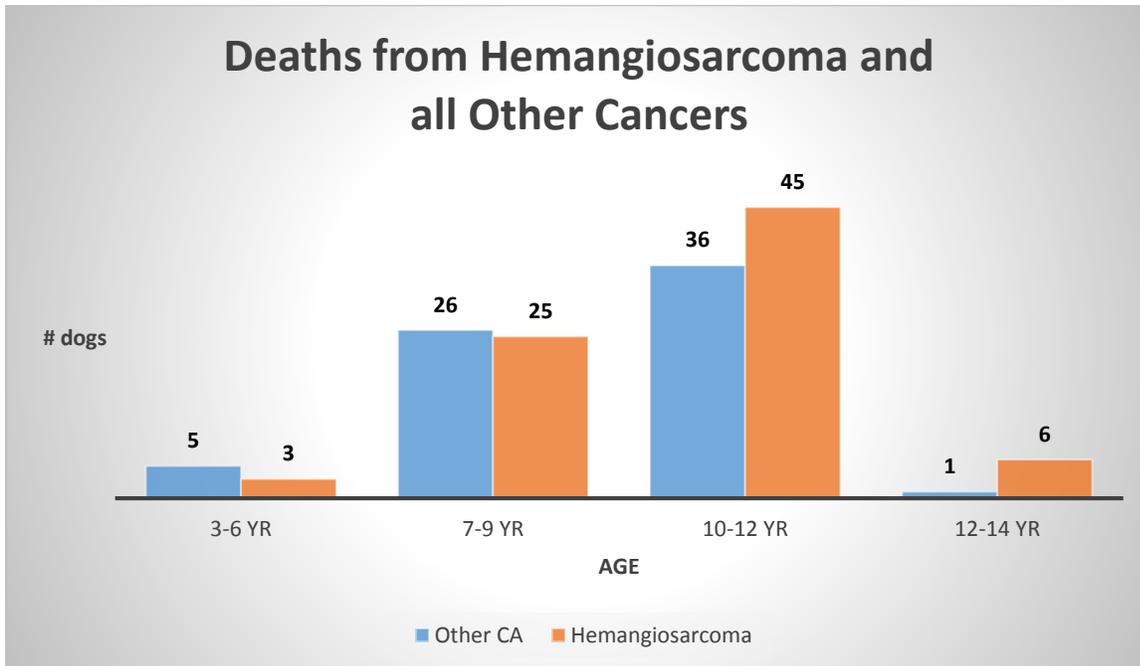
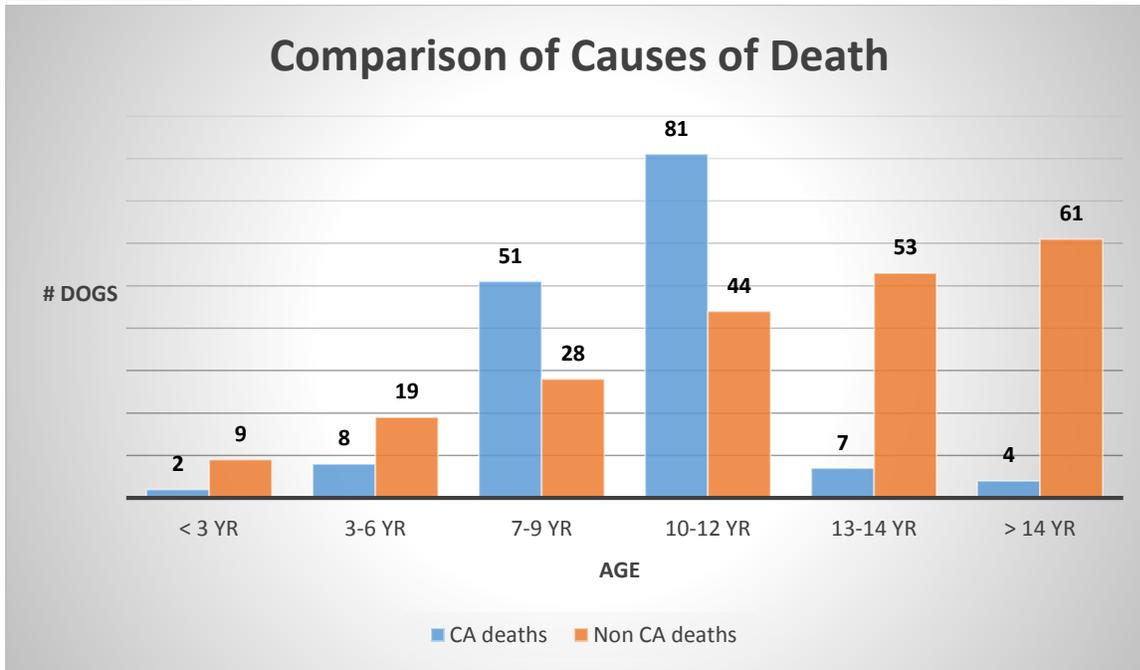
#### Percentage Deceased by Birth Decade

<b>Years Born</b>	<b># dogs (% deceased)</b>
Before 1990	26 (100%)
1990-1999	205 (92.7%)
2000-2009	741 (18.6%)
After 2009	411 (0.7%)

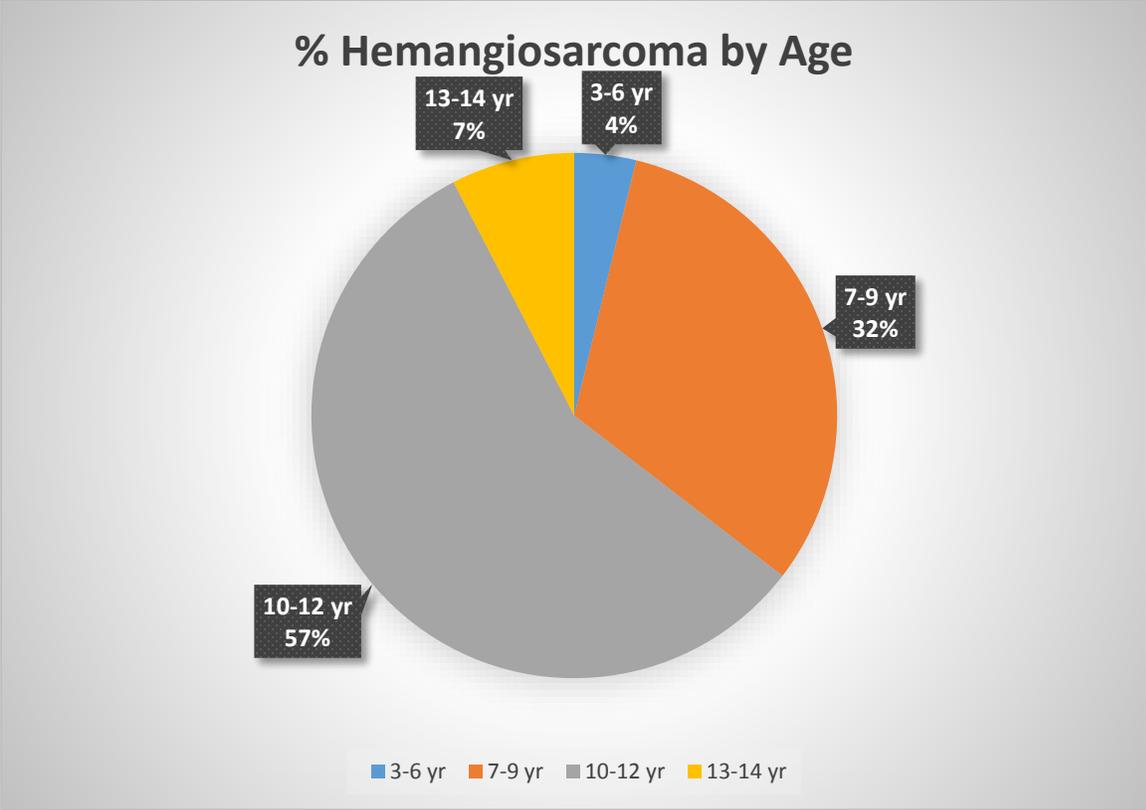
#### Cause of Death by Age

<b>Age group</b>	<b>#</b>	<b>Cause</b>
<1	3	1 each JRD, JDCM, ruptured spleen
1-2	8	2 each accidental, cancer 1 each poison, JRD, idiopathic epilepsy
3-6	27	8 cancer (3 hemangiosarcoma, 1 each lymphoma, brain, liver, lymphosarcoma, other) 6 aggression 2 unknown 2 each Addison's, multiple organ failure 1 each AIHA, IBD, heart failure, kidney failure, vaccination reaction, botulism, pyometra
7-9	79	51 cancer (25 hemangiosarcoma; 7 lymphoma; 5 lymphosarcoma) 5 kidney failure, unknown cause 2 each AIHA, IBD, Addison's 1 aggression 16 miscellaneous
10-12	125	81 cancer (45 hemangiosarcoma, 7 liver, 4 lymphoma, 5 lymphosarcoma, 4 mammary, 15 miscellaneous others) 7 old age 2 each stroke, unknown 33 miscellaneous
13-14	60	34 old age 7 cancer (6 hemangiosarcoma) 5 unknown 14 miscellaneous
>14	67	48 old age 4 cancer 2 unknown 1 seizures probably associated with Addison's disease 11 miscellaneous

Cancer Deaths



Of the 151 cancer death causes, the two most common were hemangiosarcoma (# 79, 52%) and lymphoma or lymphosarcoma (# 16, 10.5%).



**Owner Concerns and Experience**

Experience with Problems. Owners listed having 693 dogs without health problems and 649 with health problems. The problems are given in the following table; these dogs may or may not have been reported in the survey.

Problem	Number (%) of Owners	Number of Dogs Owned with Problem			
		1	2	3	4 or more
Temperament or behavior	123 (16.4)	97	22	3	1
Food intolerance/allergy	99 (13.2)	87	9	2	1
Hemangiosarcoma	94 (12.5)	73	19	1	1
Hip dysplasia	90 (12)	72	15	2	1
Hypothyroidism	58 (7.7)	42	12	2	1
IBD	40 (5.3)	34	5	1	
Addison's disease	38 (5.1)	35	3		
Lymphosarcoma	28 (3.7)	23	4	1	
Cataract, hereditary	21	20	1		
Atopy	18	17	1		
Follicular dysplasia	17	14	3		
Kidney failure, unknown cause	16	15	1		

Problem	# (%) of Owners	Number of Dogs Owned with Problem			
		1	2	3	4 or more
PRA	8	8			
Sebaceous adenitis	8	6	1	1	
JRD	3	3			
Lymphedema	3	3			
PES	3	3			
JCDM	2	2			
GM1	1	1			

#### Concerns for the Breed as a Whole (n=769)

Problem	N	%
Cancer	343	44.6
Temperament	171	22.3
Allergies in general	161	20.9
Hip dysplasia	142	18.5
Addison's disease	80	10.4
Skin and coat	74	9.6
PRA	69	9.0
Chronic ear infections	67	8.7
Sebaceous cysts	60	7.8
Cardiomyopathy	46	6.0
APS-2	28	3.6
JRD	17	2.2
Other	30	

#### Health Problems That Deserve Research Efforts

419 people answered this question, often listing more than one problem. The responses can be divided into non-specific and disease specific suggestions. A few mentioned the need to include environment, diet, and/or vaccinations in research on a disease.

Among the non-specific suggestions are:

- Most prevalent, top 5 identified by survey, top 10% identified by survey
- Potentially fatal
- Heritable
- Affect longevity
- Affect quality of life
- Those occurring more recently or are more common

Specific disease suggestions for research are listed in next table. 39 people said “all” listed below and that number was added to each problem.

Problem	% of 419
Cancer	42.5 cancer generally; an additional 11.7% mentioned hemangiosarcoma
Addison’s disease**	34
Allergies	17
Temperament	14.3
Cardiomyopathy	13.6
Hip dysplasia	13.6
PRA (some specified PRA2)	13.4
Autoimmune polyglandular syndrome, type II	10
Juvenile renal dysplasia	9.2
Skin/coat	8
Chronic ear infection	8.2
Sebaceous cysts	8.2
Others*	20

\*Other diagnoses (number of cases for the more common ones) were: temperament behavior (21), autoimmune diseases (18), inflammatory bowel disease (11), puppy eye syndrome (9), lymphedema or thyroid (6 each), and gladder stones, epilepsy, chronic pancreatitis, cutaneous lymphoma, cysts, hydrocephalus, protein losing encephalopathy, vaccination reactions, chronic renal failure, heart, Cushing’s disease. Not each single problem has been listed.

\*\*Have a quality research project, not the Georgie project. (Note: a reminder that two studies on Addison’s disease have been done under AKC CHF administration.) One at UC Davis had Dr. Anita Oberbauer as the Principle Investigator.) The findings were that “that Addison’s disease is an inherited disorder in the Portuguese Water Dog with an estimate of heritability of 0.49 ( $\pm$  0.16); there were no differences in risk for disease across sexes ( $p > 0.49$ ). Further, the complex segregation analysis provides suggestive evidence that Addison’s disease in the Portuguese Water Dog is inherited under the control of a single, autosomal recessive locus.” <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1481556/>

Lark’s group at University of Utah conducted the other research project on Addison’s disease under AKC CHF administration. “Using both new and existing data, we propose to identify regions of the PWD genome that contain genes regulating the frequency of Addison’s disease. Within those large regions we propose to identify the specific DNA sequence variants that are associated with Addison’s. To date we have obtained DNA from about 90 Addisonian PWDs, as well as a number of unaffected PWDs, for which no family history of Addison’s is reported. We have already identified two genomic regions, on canine chromosomes 12 and 37, which appear to be associated with the disease. To identify candidate genes, we will make selections using the newly available canine genome sequence, as well as the more detailed human genome sequence. Once affected gene disease frequency is identified, our long term hope is that prognostic tests can be developed that will aid breeders in selecting the most genetically compatible dogs for future breeding” - <http://www.akcchf.org/research/funded-research/0589.html#sthash.4I2TuCC6.dpuf>)

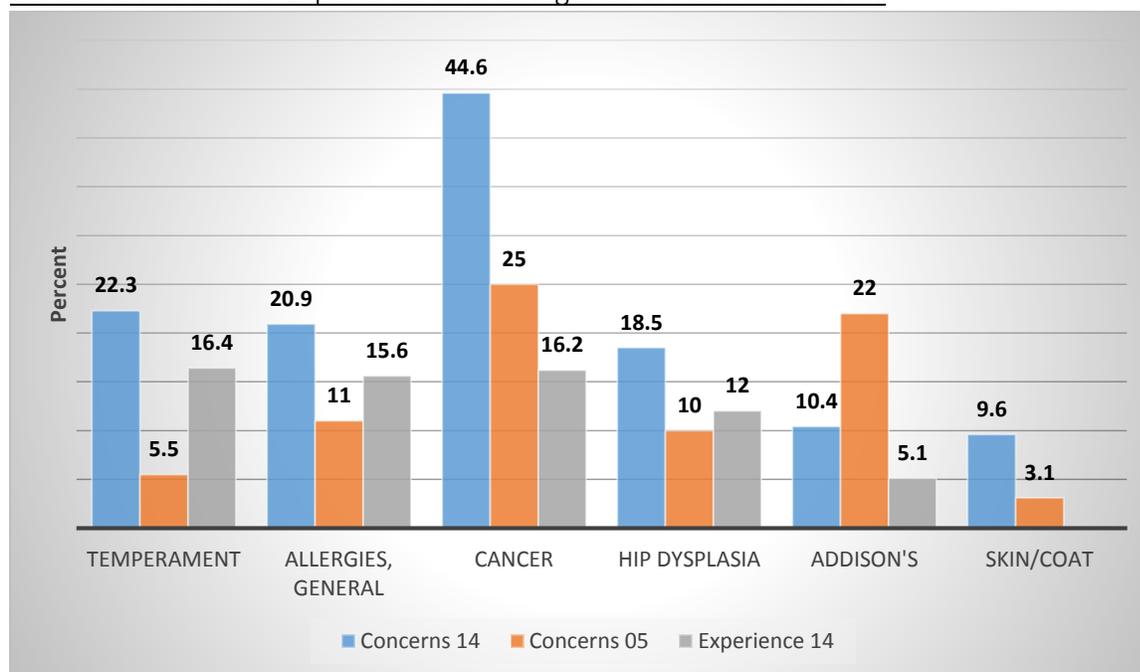
## Comparison of Problem Frequency

Several sources were compared with respect to frequency of the more common problems. The sources were the 2014 survey, owner concerns in the 2005 and 2014 surveys, owner experience (2014), the 2005 survey, and the HLD. For reasonable comparisons with other sources, for the 14 survey, owner experience for cancer = hemangiosarcoma + lymphosarcoma; allergies, general = food intolerance/allergy + atopy.

The 05 survey was an anonymous survey and owner based survey where numbers of dogs owned with a problem were recorded.

There is no behavior/temperament category in the HLD reports, although aggression is reported under “other”. A denominator of 6170 was used to calculate the frequency of problems in the HLD; that is the number of submitted diseases and diagnoses.

### Concerns and Owner Experience with Categories of Health Problems



Concern about temperament, allergies in general, cancer, skin/coat conditions and hip dysplasia were higher in the current survey than in 2005, whereas concern about Addison’s disease was lower. That might mean that the perceived frequency of Addison’s disease today is lower thus less concern; however, that is not borne out the reported frequency of Addison’s disease – 1.7% in both surveys.

### Comparison of Individual Disease Frequency

The most frequent individual problems in the 2014 survey with data available from at least one other source are shown in the next table.

<b>Problem</b>	<b>14 Survey</b>	<b>05 Survey</b>	<b>HLD</b>	<b>Experience</b>	<b>OFA</b>
Aggression, dog-dog	7.4	7.4	0.4		
Noise phobias	5.5	7.1			
Hypothyroid	5.4	4.3	1.4		1.6*
Hip dysplasia	4.4	6.9	2.1	12	12.5**
Sebaceous cysts	4.3	10	0.1		
Food intolerance	3.9	6.2			
Hemangiosarcoma	3.7	3.1	1.3		
IBD	1.9	2.1	0.7		
Addison's	1.7	1.7	2.0	5.1	

\*Based on 64 exams, there were 3.1% with autoimmune thyroiditis, 1.6% with idiopathic hypothyroidism, and 14.1% with equivocal test results.

\*\*Cumulative data for 1974-December 2013 based on 8187 exams. 14.3% are excellent.

Frequency of problems varies across the sources yet there is enough similarity of between the data from the two health surveys to view those findings as likely representative of the breed experience. In contrast, the frequency of most problems for the HLD are lower than in the health surveys or owner experience, except for cancer for which the HLD rate is higher. This may reflect a tendency to report the more lethal conditions in the HLD.

The frequency of hip dysplasia is the same in OFA and owner experience and those are higher than in either health survey or the HLD.

The frequency of Addison's disease is the lowest frequency, even though more have concern about the problem. This may reflect concern about a disease that requires lifelong medical care or because it has a heritable component.

### Comparison of Disease Category Frequency

The most frequent categories of problems with data available from at least one source other than the 2014 survey are shown in the next table.

	<b>14 Survey</b>	<b>05 Survey</b>	<b>HLD</b>	<b>Experience</b>
Temperament and behavior	17.2	47		22.3
Allergies*	11.8	19	18.3	20.9
Orthopedic	8.8	17		
Cancer	6.3	12	19.2	16.2
GI and Liver	7.1	7.8	1.5	
Ear	5.2	9.8		
Renal	5.0	12	1.5	

\*for 14 survey this category allergies + food intolerance/allergy which might account for a lower frequency

## Comments

### General Comments by Participants.

There were many positive comments about their PWD, temperament, and intelligence. Several noted that a dog's environment, people (and knowledge about dog training), or trainer (and method) all can have a significant impact on the dog. Other comments:

- There was no in the survey to note health trends that are important for tracking – e.g., 4 gen OFA or maternal instinct. Those are things that livestock breeders seek information about; why wouldn't dog owners also want the same information?
- Hepatocutaneous syndrome in a mother and her daughter
- Attention should be paid to breeding parti color dogs and a relationship with deafness
- Criticism that the Georgie project is not a high quality research program. (Then why did the AKC CHF award a grant to this project for one of the two Addison's study?)
- Criticism of the breeder of merit program because achieving that status doesn't always mean quality breeding.
- Wouldn't breed a dog who is a carrier of any of the problems we have a genetic test for. This individual doesn't fully understand the process of selective breeding with a known simple recessive disorder (there is ample literature by geneticists on this topic). If a carrier is bred to a normal, no affecteds will be produced; the best of the resulting progeny then are tested for the disorder and again if the very best in all other characteristics is a carrier, that one can be bred to a normal. If the very best were normal, then that bred to a normal gives all normal. The procedure is followed until the very best to be used for breeding are normal for the genetic trait. Geneticists say that 2-3 generations should be sufficient to have an impact and reduce the carrier rate (unless that rate is very high to begin with) – without losing genetic diversity that is guaranteed to happen if all carriers are immediately removed from the breeding pool after a genetic test is made available.

### Research.

Any research needs data about frequency of disease in the breed and this survey begins to establish that foundation. Research does not necessarily have to be lab bench research in search of a genetic marker for a likely heritable disease. It can also be the collection pedigrees of affected dogs and then developing family pedigrees (with software such as Progeny) as a first step to demonstrate interrelationships among the dogs and possible inheritance of the disorder. This epidemiologic approach is very tedious work as it requires gathering health information on littermates of affected dogs, which is sometimes not forthcoming. The effort is worthwhile because that kind of information is very useful for a research team responding to a request for proposals from an institution that awards grant funds.

Those involved in the funding decisions to support research programs will hopefully find this survey data on age of onset, problem frequency, and causes of mortality of utility.

Temperament and Behavior Problems. What is to be made of the findings? Temperament and behavior problems were the most frequent category of problems in this survey, were the problem most experienced by owners, the fourth most common problem thought in need of research, and were the second highest concern in this survey. It was also the most frequent problem reported in the 2005 health survey. Consequently, temperament and behavioral issues should have everyone's attention.

Most temperament problems started before three years of age and most do not occur as an isolated problem. Over half the dogs with a temperament problem received one or more interventions yet just 53% of those showed improvement. This either means the intervention was appropriate yet ineffective or that the interventionist had insufficient experience to help. Sixty-one dogs (24%) with a temperament problem were bred although there was no mention of a similar problem in progeny. While it is conceivable that some behaviors are inherent in the PWD and are exacerbated by environmental circumstances, owners still have to grapple with how to management them. As one owner commented: "If a dog has a bad or aggressive temperament, it is a huge challenge to deal with."

It is interesting that the leading problems identified in the 05 survey (albeit owner based) were also temperament and behavioral. Then followed a two year series of educational articles in the Courier about the topics. Still this survey identified temperament and behavioral problems as the top set of problems although the percentage was lower than in 2005 (17% vs 47%). It is not known if that can be attributed to the survey methodology or is a real decline.

#### Rabies Vaccination Issues.

*Waivers for Rabies Vaccination.* The American Veterinary Medical Association (AVMA) policy of rabies vaccination (<https://www.avma.org/KB/Policies/Pages/Annual-Rabies-Vaccination-Waiver.aspx>) recognizes the need for a waiver from rabies for vaccination for some animals in whom vaccination poses an unacceptably high risk. Both the licensed veterinarian who has a client-patient relationship and the appropriate public health authorities need to concur that the waiver should be issued.

**THE CLIENT MUST BE INFORMED THAT THE WAIVER ONLY SERVES TO LET THE ANIMAL BE LICENSED IN COMPLIANCE WITH ANIMAL CONTROL REGULATIONS.** Thus, if the animal is involved in a potential rabies exposure event, the animal is considered unvaccinated against rabies for the purpose of public health regulation. The policy states that rabies waivers should be reconsidered yearly.

Currently there are 18 states with waivers for rabies vaccination: Alabama, California, Colorado, Connecticut, Florida, Illinois, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, Nevada, New York, Oregon, Pennsylvania, Vermont, Virginia, Wisconsin. See <http://www.rabieschallengefund.org/latest/states-with-medical-exemptions-in-lieu-of-rabies-vaccination> for details of each state's code.

*Know Your Pet's Risk For Rabies.* (Wall Street Journal, by Nathan Koppel, p A3, April 6, 2012). If you live in Carlsbad, NM or other areas afflicted by severe drought (SD, TX, KS) and a mild winter, you are probably aware of an increase in rabid skunks. The outbreak in the county where Carlsbad is located has so far documented 33 skunks testing for rabies in 2011-12. This is in contrast to no confirmed rabies cases in the past 15 years. The encounters of rabid skunks have involved dogs, cats, and sheep. An unfortunate outcome has been euthanasia of over 30 pets and farm animals. Twelve people have received shots as a precaution and fortunately none have exhibited symptoms of rabies. The disease can be fatal if not treated quickly. It is speculated that the drought has caused skunks to migrate to locations in a search for water.

*(Note (E Sell): Since the drought in Texas and other areas of the west has persisted and new areas have been affected, the increase of rabid wildlife likely has persisted. If you and your PWD live in affected drought areas, become informed by talking with your veterinarian.)*

## HLD

The data about HLD participation, while perhaps not representative of the membership or PWD owners in general, provide some areas that could be addressed and pose some questions for discussion.

1. How to counter the beliefs that the HLD is only for breeder data entry, or litters, or breeding dogs, or show dogs, or dogs with health problems, or PWDCAs members. Non-breeder and non-member PWD owners have just as much vested interest in having a healthy PWD with good temperament and behavior as do breeders.
  - a. A healthy discussion about for whom the HLD exists, and thereby who participates, would be productive.
  - b. It needs to be understood that without an ample number of healthy dogs, it is impossible to calculate frequency for any problem that is applicable to the broader population of PWDs.
  - c. A major educational effort across several settings (regional and informal clubs, website, and internet lists) could help in this regard. Where the responsibility for an educational endeavor rests is unclear.
2. Developing a guide for people in finding the HLD and entering data would be useful.
3. Reworking the HLD software to allow for searches at by dog, disease, owner, or breeder would enhance usability. This effort is to be underway in the near future with establishment of an ad hoc HLD committee. Reference has been made on PWDCAs-L to the Berner-Garde Health Database which has searches by owners, relatives, litters, health certifications/tests, health, physical, study participation (e.g., tissue repository), titles, photos, pedigree, Coefficient of Inbreeding and more. Reports are available on some of the search topics and several other topics, including performance.
4. Intertwined with the requirement of HLD participation for various PWDCAs programs and volunteer work is that of enforcement of the policy. Is it vital that participation be required for these activities? If so, is there a solution to ensure that the policy be followed in a mature and responsible way? In the long term interest of the breed's wellbeing doesn't gathering data on health issues, wellness, longevity, or progeny on as many PWDs as possible far outweigh the short term benefits of required participation?

## Definition of Health Problem

One individual commented they did not consider bad temperament, allergies, and some other issues to be health problems. Used in the context of this survey, health problem was intended to mean a state in which the dog is unable to function normally. Allergies are a health problem and bad temperament is also a health problem. A dog with those "issues" does not function normally and his family knows it and has to find interventions at cost in time, money, and emotional energy to resolve or at least control the problem.

## **Recommendations**

The most common set of issues was temperament and behavior. The PWDCAs should establish a committee to assist owners in obtaining professional help early on and to work with the HLD committee as it restructures to assure that a complete list of temperament and behavioral diagnoses are available for check off in the HLD. Additionally, breeders may want to consider history of these problems in progeny when planning a breeding.

Utilize the data on disease frequency and cause of mortality in considerations of funding for research programs administered by granting agencies.

Health committees should determine if the confidentially reported data they have matches the survey data and work to understand any differences.

Conduct another dog based survey in five years with very similar content to allow for comparison unless the HLD restructuring would provide collection of the same data points and unless there is improved participation in the HLD. At that time, dogs should have been born 15 years ago or less, because that would allow comparison with findings in the 2014 survey as an indicator of change over time. Survey methodology should be changed to use a server based database. That would let owners log in, enter as many dogs as desired without having different survey structures, and make changes at a later time. Data analysis would be far easier with this approach. Finally, it is imperative that innovative approaches be devised to engage much wider participation by both PWDCA members and the many non-member puppy buyers.

## Appendix I. Who Diagnosed Problems and How

### *Orthopedic*

Diagnosis (# dogs)	Specialist vet	Regular vet	Owner
Hip dysplasia (61)	29	31	
Arthritis (43)	8	26	7
ACL (16)	7	8	
Transitional vertebrae (9)	7 (1 OFA)		
Elbow dysplasia (5)	4	1	
Panosteitis (5)	2	3	
Osteochondritis dessicans (OCD) (2)	2		

### *Gastrointestinal, who*

Diagnosis (# dogs)	Specialist vet	Regular vet	Owner
Food intolerance/allergy (54)	7	27	18
IBD (26)	15	10	
Pancreatic disease (15)	6	8	
Colitis (7)	1	4	1
Hemorrhagic gastroenteritis (6)		6	
Protein losing enteropathy (6)	5	1	

### *Gastrointestinal, how*

Diagnosis (# dogs)	How diagnosed	
	Clinical and/or lab	Dietary exclusion
Food intolerance/allergy (54)	15 (1 with biopsy)	35
IBD (26)	21 (10 with biopsy)	2
Pancreatic disease (15)	14 (2 with biopsy)	
Colitis (7)	5	
Hemorrhagic gastroenteritis (6)	6	
Protein losing enteropathy (6)	6 (4 with biopsy)	

### *Cancer*

Diagnosis	Who Made Diagnosis		How diagnosed	
	Specialist vet	Regular vet	Biopsy	Xray/CT
Hemangiosarcoma	32	15	9	26
Lymphosarcoma	10	5	12	2
Mammary		10	9	1
Liver	4	1	4	1

### Kidney

Diagnosis (# dogs)	Who Made Diagnosis			How diagnosed	
	Specialist vet	Regular vet	Owner	Clinical & lab	Biopsy or US
Recurrent UTI (25)	1	21	1	23	
Bladder stones (16)	3	12		10	6
Incontinent post spay (12)	1	5	3	7	1 US

### Neurological

Diagnosis (# dogs)	Who Made Diagnosis			How diagnosed	
	Specialist vet	Regular vet	Owner	Clinical	Clinical & lab
Vestibular syndrome (15)	4	9	2	10	4
Idiopathic epilepsy (15)	7	8		8	7
Alzheimer's (12)		6	4	9	1
Stroke (7)	4	3		3	4

### Autoimmune

Diagnosis (# dogs)	Who Made Diagnosis			How diagnosed	
	Specialist vet	Regular vet	Owner	Clinical	Clinical & lab
Addison's disease (23)	7	16			22*
Dry eye (11)	8	2	1	10	1
Vaccination reaction (7)		6	1	6	
AI thyroiditis (5)	2	3			5

\*One was diagnosed at necropsy

### Eye

Diagnosis (# dogs)	Who Made Diagnosis	
	Specialist vet	Regular vet
Cataract, punctate (26)	24	2
Distichiasis (11)	11	
Cataract, hereditary* (10)	7	3
Persistent pupillary membranes (5)	5	
PRA (5)	5	

\*Five were over the age of 9 when diagnosed.

### Skin/Coat

Diagnosis (# dogs)	Who Made Diagnosis			How diagnosed		
	Specialist vet	Regular vet	Owner	Biopsy*	Clinical	Clinical & lab
Sebaceous cyst (60)		52	8	10	26	18
Lipoma (31)	2	23	5	11	10	8
Hair loss (13)	4	5	3	1	5	5
Viral papilloma (9)	1	7	1	1	3	3
Follicular dysplasia (7)	2	4		2	2	2
Sebaceous adenitis (5)		3	2	2	1	

\*Biopsy read by certified veterinary pathologist

### Allergies

Diagnosis (# dogs)	Who Made Diagnosis			How diagnosed	
	Specialist vet	Regular vet	Owner	Clinical	Clinical & lab
Dietary (53)	9	23	19	4	*
Contact dermatitis (32)	9	20	3	9	**
Atopy (29)	12	11	1	5	***
Flea (8)	2	3	3	1	****

\*Dietary allergy diagnosed by: blood assay 9, process of elimination 39, skin test 1

\*\*Contact dermatitis diagnosed by: blood assay 5, process of elimination 8, skin test 9

\*\*\*Atopy diagnosed by: blood assay 9, process of elimination 2, skin test 7

\*\*\*\*Flea allergy diagnosed by: process of elimination 5, skin test 2

### Ear

Diagnosis (# dogs)	Who Made Diagnosis			How diagnosed	
	Specialist vet	Regular vet	Owner	Clinical	Clinical & lab
Chronic ear infection (32)	2	22	8	23	
Deafness (21)		2	16	13	
Hematoma (8)		1	6	7	

## Appendix II. AKC Portuguese Water Dog Litter Registrations

Year	# Litters	# Puppies	Av # Pups/Litter
1983	12	83	6.9
1984	28	194	6.9
1985	37	257	7.0
1986	57	408	7.2
1987	70	494	7.1
1988	65	403	6.2
1989	86	629	7.3
1990	115	855	7.4
1991	121	844	7.0
1992	142	971	6.8
1993	150	924	6.2
1994	153	1084	7.1
1995	172	1169	6.8
1996	221	1473	6.7
1997	193	1290	6.7
1998	199	1366	6.9
1999	215	1428	6.6
2000	204	1432	7.0
2001	239	1630	6.8
2002	296	2045	6.9
2003	281	1937	6.9
2004	312	2191	7.0
2005	304	2119	7.0
2006	321	2287	7.1
2007	317	2255	7.1
2008	299	2068	6.9
2009	340	2410	7.1
2010	333	2345	7.0
2011	293	1981	6.8
2012	321	2300	7.2
2013	280	1975	7.1