

**PENNSYLVANIA GAME COMMISSION  
BUREAU OF WILDLIFE MANAGEMENT  
RESEARCH DIVISION  
PROJECT ANNUAL JOB REPORT**

**PROJECT CODE NO:** 06510

**TITLE:** Waterfowl Research/Management

**JOB CODE NO.:** 51001

**TITLE:** Waterfowl Banding

**PERIOD COVERED:** 1 July 2006 to 30 June 2007

**COOPERATING AGENCIES:** U.S. Fish & Wildlife Service (USFWS); U.S. Geological Survey, Biological Resources Division (USGS-BRD); Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry and Bureau of State Parks

**WORK LOCATION(S):** Statewide

**PREPARED BY:** Kevin Jacobs

**DATE:** 20 March 2007

**Abstract:** The objective of this project is to band representative samples of wild waterfowl as part of a cooperative effort by state, provincial, and federal agencies in the Atlantic Flyway that provides crucial data for management of the waterfowl resource. During June 2006, 2,975 resident Canada geese (>100% of the state quota) were banded at 49 locations across 25 counties in Pennsylvania. Gosling production was below the 1991 to 2005 average. The use of 2 goose-banding crews since 2002 has enabled aggregate 5-year quotas for all 6 individual physiographic strata to be met. During the August-September 2006 preseason-banding period and spring 2006 nest checks, 3,916 ducks were banded including 2,410 mallards, 1,233 wood ducks, 34 American black ducks, and 239 individuals of 5 other species (blue-winged teal, green-winged teal, northern pintail, mallard x black duck hybrid, and hooded merganser). Banding quotas were obtained for mallards and wood ducks, but not for adult or juvenile black ducks. The proportion of juvenile mallards in the banded sample was below average while wood duck production was above average in 2006. Waterfowl banding should continue during 2007 in support of Atlantic Flyway banding program goals.

**OBJECTIVE**

To band representative samples of wild waterfowl as part of a cooperative effort by state, provincial, and federal agencies in the Atlantic Flyway that provides crucial data (survival and harvest rates, migration timing and destination, population changes, and production by local waterfowl) for waterfowl harvest management (e.g., Adaptive Harvest Management), habitat conservation programs (e.g., North American Waterfowl Management Plan), and other aspects of the stewardship of the waterfowl resource at state and flyway levels.

**METHODS**

During June 2006, resident Canada goose banding was conducted at 49 locations in 25 counties (Tables 1 and 2). To provide continuity and training while transitioning to regional responsibility for goose banding, experienced Bureau of Wildlife Management and regional personnel were organized into 2 banding crews operating in multiple regions (one crew in eastern and one in

western Pennsylvania), similar to previous years, while regional PGC participants were incorporated into the banding coordination and operations in their respective regions. Also, various volunteers from outside the agency assisted at most locations. Flightless geese (goslings and molting adults) were captured by driving them onto land and surrounding them with a temporary corral of portable panels (Costanzo et al. 1995). Age and sex were determined for each goose using plumage characteristics and cloacal examination, respectively (Hanson 1962). Following determination of sex and age, geese were banded with standard butt-end metal USFWS "1-800" leg bands.

Preseason (August through September) duck banding was conducted by Bureau of Wildlife Management biologists and biologist aides, PGC regional personnel (biologists, technicians, food & cover crew employees, and wildlife conservation officers), and banding volunteers at 26 sites in Erie, Crawford, Somerset, Bedford, Cumberland, Huntingdon, Pike, Susquehanna, Wayne, Berks, Dauphin, Lancaster, Schuylkill, and Northampton counties. Ducks were captured in portable and permanent shallow-water traps baited with corn. Also, during nest checks in April and May, 9 adult female wood ducks were banded in Berks County, and 8 adult female mallards were banded in Crawford, Lawrence, Mercer and Northampton counties. Age and sex of captured ducks were determined primarily from plumage characteristics (Bellrose 1976, Carney 1992), with cloacal examination (Dimmick and Pelton 1994) used to verify sex and age of individuals with questionable plumage. Following determination of sex and age, ducks were banded with standard butt-end metal USFWS "1-800" leg bands.

The transition to "1-800" bands (inscribed with a toll-free telephone number for reporting band recoveries), begun in 1996, appears to have been highly successful in increasing band-reporting rates (Garrettson et al. 2006, Moser 2006). Higher reporting rates, in turn, enhance the cost-effectiveness of banding efforts by increasing the amount of information gained per unit effort expended in banding operations. A necessary drawback to this program has been a period of time during which reporting rates were changing and uncertain, temporarily precluding direct estimation of harvest rates. With the "1-800" band program now fully implemented and reporting rates believed to have stabilized, a large-scale reassessment of reporting rates is underway to ensure that harvest rates are being accurately estimated from band returns. The USFWS initiated research on current band reporting rates (i.e., a reward-banding study) for mallards and black ducks in 2002. Wood ducks, some Canada goose populations, and other species were added to the study for 2003-2004 to address the possibility of different reporting rates for species other than mallards. Limited additional reward banding was conducted in 2006 to allow for further refinement of harvest and reporting rate estimates for select species. In support of this research, 161 adult mallards, and 18 black ducks banded in Pennsylvania during 2006 were included in the reporting rate study by marking with specified combinations of reward and standard/control bands. Large-scale reward banding for the national reporting rate study is now complete and data analysis is ongoing. Preliminary results suggest that Atlantic Flyway reporting rates are approximately 73% for mallards, wood ducks, and resident Canada geese while black ducks and migratory Canada geese are approximately 55%. Upon completion of the analyses, the information on current band reporting rates for various species will be used to help evaluate and, if necessary, revise banding quotas and geographical distribution of banding efforts at flyway and state levels to ensure that resources allocated to banding are addressing current information needs with maximum efficiency.

Following trapping efforts, banding data was compiled using Band Manager Version 3.1 software. Electronic files of banding schedules were submitted to the USGS-BRD Bird Banding Laboratory.

In November 2006, I began a transition from Band Manager computer software to the recently released Bandit software. The Bird Banding Laboratory will

support Bandit whereas Band Manager is no longer supported. Bandit offers numerous advantages, of which most important is that it will operate more reliably on current computer operating systems. This transition will take several months to import all historical data and complete training. We will use a combination of Bandit and Excel to manage banding data between field Banders and the Bird Banding Laboratory. We have also acquired new and improved banding pliers, which will improve consistent band application among Banders across the Commonwealth.

## **RESULTS**

### **Resident Canada Goose Banding**

Pennsylvania's 2006 banding quota for resident Canada geese (set to reflect approximately 1% of the running 3-year average of the estimated statewide spring population) was 2,701 birds. This quota was subdivided into goal amounts for physiographic strata (Figure 1) according to the percentage of the state's goose population located in each stratum. During the June 2006 resident Canada goose-banding period, 2,975 geese were banded, including 879 adult males, 872 adult females, 517 juvenile males, and 706 juvenile females (Table 1). The statewide total exceeded the overall quota by 10%. Geese were banded in 25 counties in all 6 PGC regions (Table 2). More than 100 geese were banded at 6 locations: Lake Marburg-Cordorus State Park, Muddy Run Reservoir, Ethel Springs Lake, Restlawn Cemetery, Pymatuning WMA, and Presque Isle State Park. Gosling production, as indexed by the proportion of juveniles in the banded sample (41%) was below the 2005 proportion of 49%. The number of juveniles per adult female banded was 1.32, below the 1991-2005 average of 1.68 and the lowest since 2000. This may indicate below average gosling recruitment rates in 2006. We suspect relatively cold, wet weather conditions and flooding that overlapped peak hatch dates in early to mid-May reduced gosling survival rates. High, relatively stable recruitment rates are typical of temperate-nesting goose populations.

The 2-crew approach was again highly successful in ensuring that the statewide quota was reached, and especially in maintaining adequate distribution of banding effort among the 6 physiographic strata. Stratum quotas were met or exceeded in 5 of the 6 strata in 2006. Weather related events hampered banding efforts in northeastern Pennsylvania. Since 2002, when we began using 2 banding crews, aggregate 5-year banding goals have been met in all 6 strata. This approach has greatly improved the distribution of the statewide banding sample than previously achieved using a single banding crew prior to 2002. This improves our ability to manage our resident Canada goose population at the strata level as additional years of banding and recovery information are obtained. Information drawn from band recovery data is more representative of Pennsylvania's entire resident Canada goose population than previously achieved using a single crew.

### **Duck Banding**

Pennsylvania's duck banding quotas as outlined in the North American Banding Program Document are 1,200 mallards (600 adult, 300 immature male and female each), 750 wood ducks (400 adult, 175 immature male and female each), and 100 black ducks (50 adult, 25 immature male and female each).

During the 2006 pre-season-banding period and spring nest checks, 3,916 ducks were banded in Pennsylvania (Tables 3 and 4). Quotas were met for adult and juvenile mallards and wood ducks, but not for adult or juvenile black ducks. Total bandings were 39% above the 2005 banding effort, but remained 7% below the annual average for the 1989-2005 period. Factors for the below-average 2006 totals include reduction or elimination of trapping effort at a number of banding stations due to budget constraints. Weather and precipitation patterns varied across Pennsylvania during the pre-season-banding period. Wet conditions prevailed

in northern parts of the state, while dryer conditions prevailed in southern Pennsylvania. Dry habitat prevented trapping efforts in southwestern Pennsylvania.

Mallards made up the largest proportion of the total with 2,410 individuals banded (Table 3). This total was up 35% from 2005, but down nearly 20% from the 1989-2005 annual average. Wood duck bandings increased 50% to 1,233 from 815 banded in 2005. Black ducks banded increased to 34 from a record low total of 22 in 2005. Black duck bandings continue to fall short of flyway quotas and well below average levels. In 2006, the Pennsylvania Game Commission was awarded a grant from the Black Duck Joint Venture (BDJV) Northeast States Black Duck Banding Project Fund to expand preseason-banding efforts targeting black ducks in northeastern Pennsylvania. While these efforts did not directly result in increased black duck bandings, they helped maintain and expand trapping efforts in this important state waterfowl production area. These efforts did result in achieving all statewide wood duck banding quotas in 2006. However, the continued declining trend in state black duck bandings and populations since 1997 point to real declines in breeding black duck abundance in the Commonwealth.

Duckling recruitment, as indexed by the number of juveniles banded per adult banded, was below the 1991-2005 average for mallards (1.84 in 2006 vs. 2.08 average) while wood ducks were above average (2.48 in 2006 vs. 1.73 average). Wetland habitat conditions for brood rearing and renesting was good due to above normal precipitation. However, flooding in late spring may have caused some mallard ground nest losses similar to that observed with Canada geese.

From 1989 to 2005 Pymatuning WMA accounted for 74% of the total statewide duck bandings each year. In 2006, the 1,793 ducks banded at Pymatuning WMA only accounted for 46% of the total Pennsylvania duck bandings. Numbers of mallards and especially wood ducks banded at Pymatuning has declined markedly since 2002. Still, Pymatuning was the top banding location for mallards in the Commonwealth with 68% of the statewide total. Compared with 2005 totals, bandings at Pymatuning increased 4% for mallards and 8% overall. Wood duck bandings accounted for less than 1% of the state total. There has been considerable effort expended to increase wood duck bandings at Pymatuning in recent years with declining success. We will continue efforts to improve banding performance of this important species at Pymatuning. Bandings of blue-winged and green-winged teal were near historic highs for both species in 2006.

Haldeman Island (Dauphin County) accounted for over 14% of the statewide banding total in 2006. This was 2.75 times greater than the 1996-2005 average for this banding station and set a new record high. Bandings of wood ducks and mallards accounted for 29% and 7.5% of the state totals respectively in 2006.

Middle Creek WMA and Presque Isle (Erie County) each accounted for approximately 12% of the total duck bandings. Middle Creek was down about 17% from the 1989 to 2005 average annual total banded while Presque Isle was up nearly 46% from the average over this period. Middle Creek WMA was the third and second highest producer of mallard and wood duck bandings respectively in the state with nearly 10% and 18% of the totals for each species. Presque Isle accounted for nearly 12% of state mallard bandings and over 9% of state wood duck bandings.

The 4 Pike County stations, Shohola Lake, Decker Pond, Pecks Pond, and Promised Land State Park, collectively accounted for over 6% of all duck bandings and nearly 16% of all wood duck bandings. Total ducks banded at these stations were down 23% from the historical average. The number of black ducks banded declined to 6 despite the additional banding effort in this region paid through the grant from the BDJV. New banding locations in Susquehanna and Wayne counties paid through the grant accounted for over 13% of statewide wood duck bandings and helped reach state banding quotas for wood ducks.

Because dabbling duck species other than mallards, black ducks, and wood ducks breed only in limited numbers in Pennsylvania, bandings of these less common species include a higher percentage of migrants relative to locally breeding/produced birds, and thus tend to be more variable from year to year due to the effects of weather conditions and food availability on migration patterns. An additional 239 individual blue-winged teal, green-winged teal, northern pintail, mallard X black duck hybrid, and hooded merganser. Teal bandings were above average for the second consecutive year. These unusually large numbers of teal were banded in northwestern Pennsylvania, while bandings increased slightly statewide for northern pintails and mallard x black duck hybrids.

Avian influenza monitoring was also an important component of the 2006 pre-season banding efforts. A sample of waterfowl were tested as part of combined state and federal early detection monitoring for the Asian H5N1 virus. Results of these tests can be found in the Avian Influence Activities Report No. 40002 (Cottrell 2007).

#### **RECOMMENDATIONS**

1. Continue waterfowl banding efforts during FY 07 in support of the Atlantic Flyway cooperative banding program. Continue efforts to distribute Canada goose bandings proportionally in each physiographic stratum, to increase the number of black ducks banded, and to maximize the geographic distribution of mallard and wood duck bandings.

2. Participate as needed with USFWS and Atlantic Flyway Technical Section Banding Committee and species committees in analysis of band reporting rate studies, and in reassessment of banding needs.

3. Transition to using Bandit software to manage banding database. Receive training on Bandit at 2007 Atlantic Flyway Technical Section Winter Meeting. Train agency-banding staff on electronic entry and submission of banding data for the 2007 field season.

4. Acquire and distribute bands and equipment to field biologists for 2007 pre-season banding program by June 2007.

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Table 1. Numbers of resident Canada geese, by age and sex category, banded in Pennsylvania during June 2006.

Location name or nearest town	New Captures					Recaptures			Total (New + Recaptures)	
	Adult		Juvenile			Local	Foreign	Total		
	Unk	Male	Female	Male	Female					Total
Strata 10 (quota 760)										
Grimes Farm near Cashtown		6	10	10	11	37	9	0	9	46
Knouse Foods near Gettysburg		18	16	3	6	43	0	0	0	43
Stony Point near Berlin		9	9	17	22	57	0	0	0	57
Wrightstown	1	34	25	4	32	96	18	3	21	117
Haldeman's Island SGL 290		2	4	3	9	18	1	0	1	19
Middle Creek WMA SGL 46		25	27	8	10	70	30	2	32	102
Muddy Run Reservoir		59	49	1	0	109	32	1	33	142
Deep Creek Reservoir		9	6	11	24	50	1	0	1	51
Lake Marburg, Cordorus S.P.		73	97	39	47	256	6	1	7	263
Sheppard-Meyers Reservoir		24	27	4	5	60	3	0	3	63
Long Arm Dam		19	23	7	10	59	13	0	13	72
Totals	1	278	293	107	176	855	113	7	120	975
Strata 13 (quota 353)										
Bypass Pond - Selinsgrove		3	1	7	12	23	4	0	4	27
Middleburg Park		5	5	6	19	35	0	0	0	35
New Berlin		11	10	23	32	76	0	0	0	76
Martinsburg		7	4	5	2	18	1	0	1	19
Sinking Valley Golf Club		2	2	7	8	19	0	0	0	19
Mill Hill Agway		6	5	15	13	39	0	0	0	39
Beltzville Lake		15	19	2	9	45	14	0	14	59
Tom Young Farm, near Saylorsburg		8	9	9	18	44	0	0	0	44
Letterkenny Army Depot		15	14	13	17	59	0	1	1	60
Zanylo Farm near Petersburg		9	8	15	26	58	0	0	0	58
Cole Farm - near Mooresville		7	8	8	9	32	0	0	0	32
Totals		88	85	110	165	448	19	1	20	468
Strata 22 (quota 439)										
Ligonier Church Camp		9	11	12	7	39	0	0	0	39
Ethel Springs Lake		43	60	0	0	103	0	0	0	103
Restlawn Cemetery		50	58	0	0	108	0	0	0	108
Allegheny River Aspinwall		28	36	2	10	76	0	0	0	76
Parks Industrial Park		12	7	14	22	55	0	0	0	55
Brady Run Park		27	26	23	18	94	21	0	21	115
Totals		169	198	51	57	475	21	0	21	496

Table 1 (cont.). Numbers of resident Canada geese, by age and sex category, banded in Pennsylvania during June 2006.

Location name or nearest town	New Captures					Recaptures			Total (New + Recaptures)	
	Adult		Juvenile			Local	Foreign	Total		
	Unk	Male	Female	Male	Female	Total				
Strata 24A (quota 459)										
SGL 151	14	11		27	28	80	8	0	8	88
S.N.P.J.	24	24		6	7	61	0	0	0	61
Pymatuning WMA SGL 214	34	22		90	103	249	59	0	59	308
Presque Isle S.P.	54	38		15	18	125	1	0	1	126
SGL 218	6	8		24	31	69	4	0	4	73
Rohrer Pond	25	19		0	0	44	0	0	0	44
Totals	157	122		162	187	628	72	0	72	700
Strata 24B (quota 402)										
Sinnemahoning S.P.	25	22		0	0	47	0	0	0	47
Calari Pond, near Pennfield	35	27		11	11	84	28	0	28	112
Dubois Reservoir	23	16		0	0	39	3	0	3	42
Shaggers Inn	5	3		5	5	18	10	0	10	28
Peterman, near Luthersburg	4	4		9	12	29	0	0	0	29
Phillipsburg	6	4		1	2	13	0	0	0	13
SGL 34 Duck Ponds & Munn Farm	43	43		2	4	92	3	0	3	95
Buzzards Swamp	13	17		23	29	82	38	0	38	120
Totals	154	136		51	63	404	82	0	82	486
Strata 24C (quota 288)										
Shohola Lake SGL 180	3	7		0	0	10	1	0	1	11
Lake Russel & Krautter Pond	10	10		8	12	40	32	0	32	72
Blooming Grove Hunt. & Fish. Club	6	4		2	10	22	0	0	0	22
Golf Park Drive	6	8		7	3	24	2	0	2	26
Paupacken Lake	3	1		7	12	23	4	0	4	27
School House & Laabs/Cricket Hill Rd.	5	8		7	13	33	0	0	3	36
Open Woods Pond	0	0		5	8	13	0	0	2	15
Totals	33	38		36	58	165	39	0	44	209
Statewide Grand Total	879	872		517	706	2975	346	8	359	3334



Table 2. Canada goose bandings and recaptures by PGC region and county, June 2006.

Region	County	Total New Bandings	Total Recaptures
NW	Crawford	249	59
	Erie	238	5
	Forest	82	38
	Lawrence	141	8
	NW Region Total	710	110
SW	Allegheny	184	0
	Armstrong	55	0
	Beaver	94	21
	Westmoreland	142	0
	SW Region Total	475	21
NC	Cameron	47	0
	Clearfield	275	44
	Union	76	0
	NC Region Total	398	44
SC	Blair	76	1
	Franklin	59	1
	Huntingdon	90	0
	Snyder	58	4
	SC Region Total	283	6
NE	Carbon	45	14
	Monroe	44	0
	Pike	72	33
	Wayne	93	11
	NE Region Total	254	58
SE	Adams	137	9
	Bucks	96	21
	Dauphin	18	1
	Lancaster	179	65
	Montgomery	50	1
	York	375	23
	SE Region Total	855	120

Table 3. Numbers of mallards, wood ducks, and black ducks, by age and sex category<sup>a</sup>, banded in Pennsylvania during the 2006 pre-season banding period.

Banding Location	Mallard					Wood Duck					Black Duck					Comb. Total
	AM	AF	JM	JF	Total	AM	AF	JM	JF	Total	AM	AF	JM	JF	Total	
NW Region																
Pymatuning WMA	329	215	612	483	1,639	2	0	2	3	7	5	2	12	1	20	1,666
Presque Isle	68	19	126	75	288	39	14	36	24	113	1	1	1	0	3	404
SW Region																
Somerset County	0	6	0	4	10	0	0	6	4	10	0	0	0	0	0	20
SC Region																
Haldeman Island	45	36	57	42	180	25	71	116	143	359 <sup>b</sup>	2	0	1	1	4	544
SGL 169 Cumberland	0	0	0	0	0	3	14	14	7	39 <sup>c</sup>	0	0	0	0	0	39
Bedford County	0	0	5	4	9	0	7	9	6	22	0	0	0	0	0	31
Huntingdon County	0	0	0	0	0	0	2	11	6	19	0	0	0	0	0	19
NE Region																
Shohola SGL 180	0	4	3	7	14	12	12	19	23	66	0	1	0	1	2	82
Decker Pond	0	0	0	0	0	1	2	15	11	29	0	0	0	0	0	29
Pecks Pond	0	0	0	0	0	14	15	29	18	76	0	0	0	4	4	80
Promised Land S.P.	1	4	2	16	23	3	2	10	9	24	0	0	0	0	0	47
Brady's Lake	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
Susquehanna County	0	0	0	0	0	9	6	16	16	47	0	0	0	0	0	47
Wayne County	1	1	0	6	8	18	27	41	29	115	0	0	0	0	0	123
SE Region																
Middle Creek WMA	36	82	60	60	238	21	66	83	49	219	1	0	0	0	1	458
Northampton County	0	1	0	0	1 <sup>d</sup>	8	10	15	13	46	0	0	0	0	0	47
Berks County	0	0	0	0	0	0	9	0	0	9 <sup>d</sup>	0	0	0	0	0	9
Schuylkill County	0	0	0	0	0	6	6	11	9	32	0	0	0	0	0	32
<b>Statewide Total</b>	<b>480</b>	<b>368</b>	<b>865</b>	<b>697</b>	<b>2,410</b>	<b>161</b>	<b>263</b>	<b>433</b>	<b>371</b>	<b>1,233</b>	<b>9</b>	<b>5</b>	<b>14</b>	<b>7</b>	<b>34</b>	<b>3,677</b>

<sup>a</sup> AM = adult male, AF = adult female, JM = juvenile male, JF = juvenile female.

<sup>b</sup> Totals include 1 unknown age/sex wood duck, 1 juvenile wood duck sex unknown, 1 male wood duck age unknown, and 2 female wood ducks age unknown.

<sup>c</sup> Totals include 1 juvenile wood duck, sex unknown.

<sup>d</sup> Captured on nest, spring 2006.

Table 4. Numbers of blue winged-teal, green-winged teal, northern pintails, mallard X black duck hybrids, and hooded mergansers banded in Pennsylvania during the 2006 pre-season banding period.

Banding Location	Region	Species				
		Blue-winged Teal	Green-winged Teal	Northern Pintail	Mallard X Black Duck Hybrid	Hooded Merganser
Pymatuning WMA	NW	95	14	17	1	0
Presque Isle	NW	61	19	0	0	0
Bedford County	SC	0	3	0	0	0
Haldeman Island	SC	17	5	0	0	0
Shohola Lake, SGL 180	NE	0	0	0	1	0
Pecks Pond	NE	0	0	0	1	0
Statewide Total		174	44	17	3	1

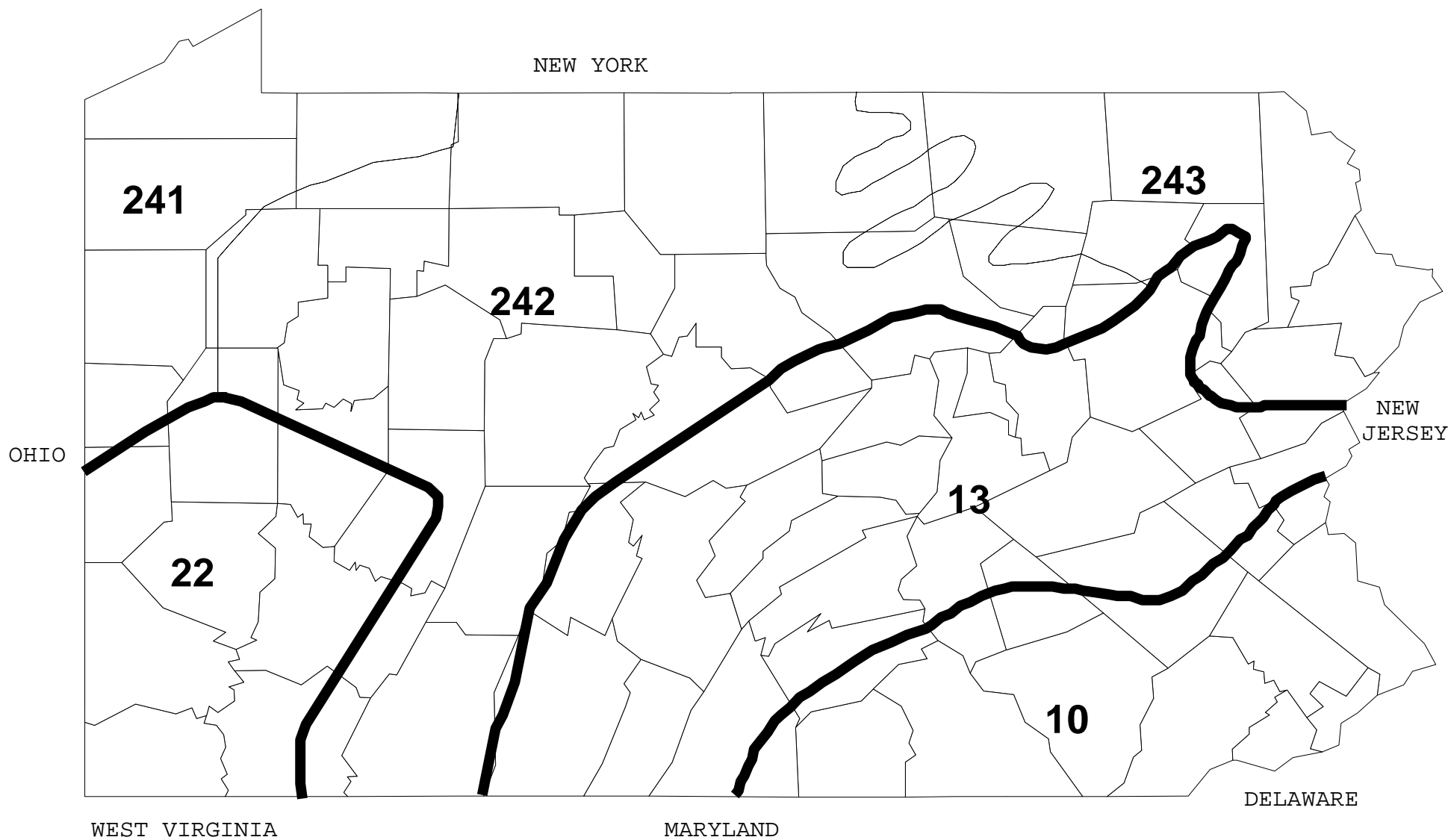


Figure 1. Physiographic strata used to subdivide Pennsylvania's resident Canada goose banding quota according to proportion of goose population.