Deer Population Estimation in Wisconsin

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Deer Population Estimates Have Long Been Controversial

- 1943 Aldo Leopold estimated 500,000 deer in Wisconsin

- Severely ridiculed by Roy Jorgensen, editor of *Save Wisconsin's Deer.* Said 200,000 was more realistic.

Wisconsin's Deer Harvest Management Program

- Deer Management Units
- Population Goals
- Population Surveys
- Population Estimates
- Variable Quota System

Deer Management Units

Areas of similar land use

Bounded by roads/rivers

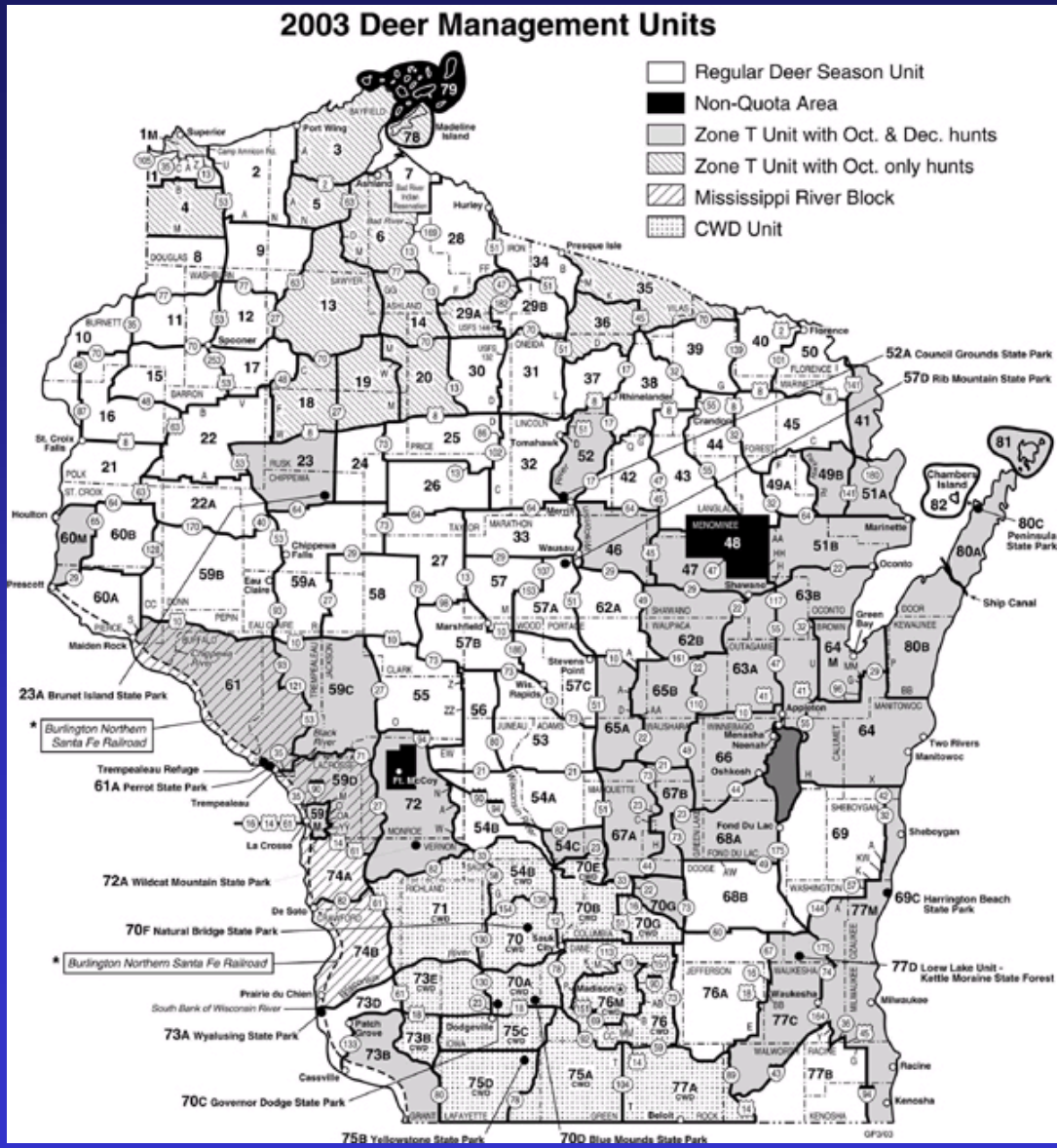
~130 DMUs

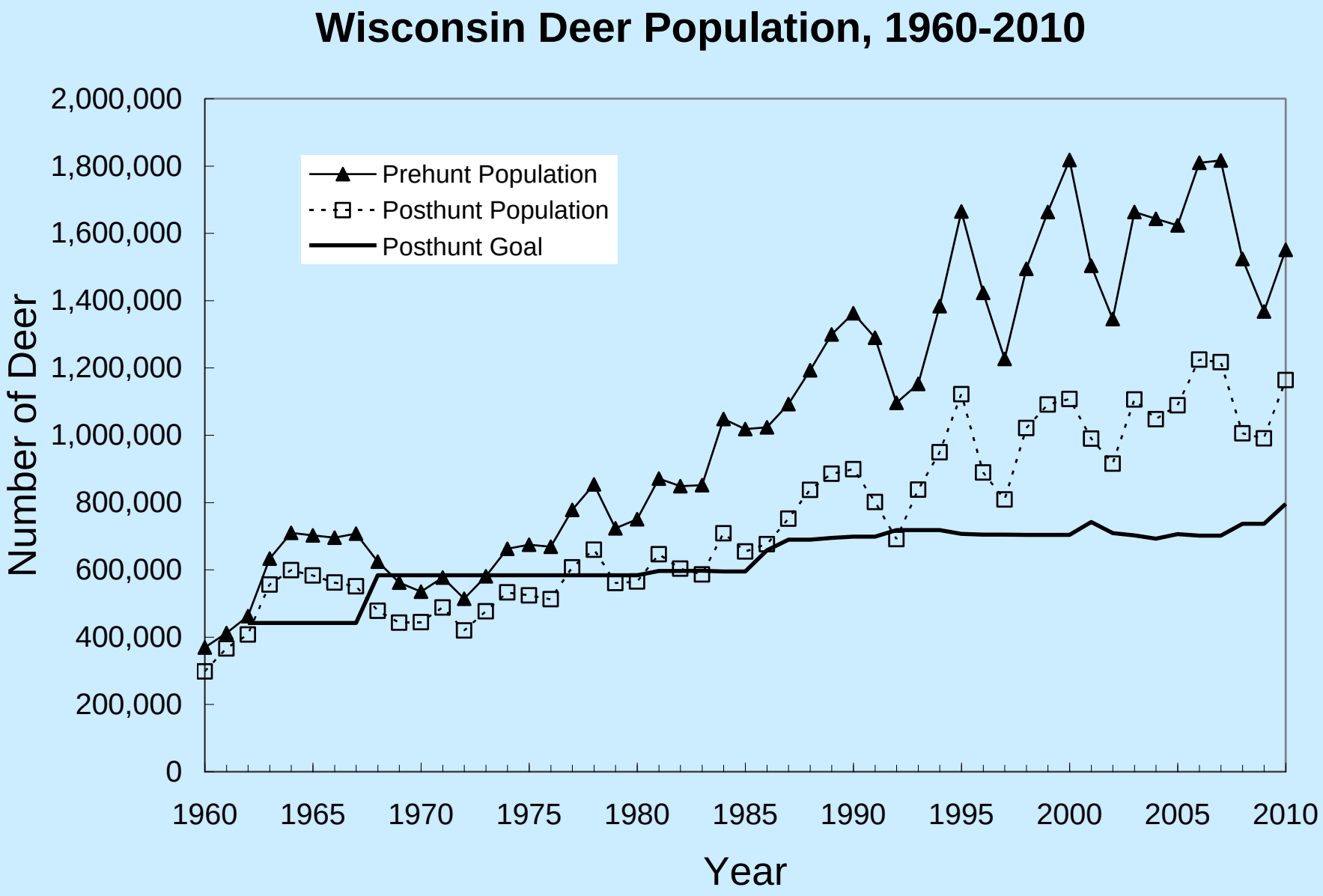
Overwinter population goals

10-30 deer/sq. mi. of habitat

Ecological and social carrying capacity

Goals in Administrative Code




Wisconsin Deer Population, 1960-2010
Prehunt Population
Posthunt Population
Posthunt Goal
Number of Deer
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
Year

Key to Abbreviations
SAK- Sex-Age-Kill
LCC- Land Conservation Committee
WM- Wildlife Management
VITTF- Voigt Intertribal Task Force
WS- Wildlife Section
BSD- Biological Services Division

2002 DEER QUOTA SETTING PROCESS

Wisconsin Department of Natural Resources (WDNR)
Great Lakes Indian Fish and Wildlife Commission (GLIFWC)

DNR Research Finalizes State Harvest Summaries
late Jan.

GLIFWC Finalizes Tribal Harvest Summaries
first week of Feb.

Finalize State and Tribal Harvest Summaries
early Feb.

DNR Research Sends Out SAK Starting Points
early Feb.

Statewide SAK Resolution with Research, WM, and GLIFWC
mid Feb

DNR Research Sends Out Quota Reference Values
late Feb

DNR Field Managers Prepare Initial Quota Recommendations
late Feb.

Gather Public Input on Quota Recommendations (informal)
late Feb

Preliminary Quotas Formulated (GLIFWC & DNR Managers)
late Feb.

GLIFWC Biologists Prepare Initial Quota Recommendations
late Feb.

WDNR Research Reviews Quota Recommendations
early March

Regional Quota Recommendations and Public Comments to WM Bureau *early March*

Public Meetings with Congress, LCC, Others to Review Quota/Permit Recs. *late Feb.- early*

Research Provides Formulas to Calculate Permits as Quotas Vary
late Feb. – early March

Statewide Resolution Meeting to Consolidate Regional Quota Recs.
mid March

Public Review
-Local Meetings (optional)
-Congress Spring Hearings
early April

GLIFWC Biologists Review Regional Quotas for Consistency
early March

VITTF Provided with Number of Antlerless Deer Available for Harvest *May 1*

VITTF Reps. Formulate Intertribal Antlerless Deer Declaration
May/June

GLIFWC, WS of BSD Notifies DNR of Tribal Declaration
June 15

DNR Adjusts Quota Based on Tribal Declaration & Determines Permit Levels *late June*

WM Bureau Makes Quota Recommendation to DNR Land Division/Secretary *April/May*

Winter Severity Index Final Adjustment
late April

Field and WM Bureau Review Feedback Received from Public Review
mid April

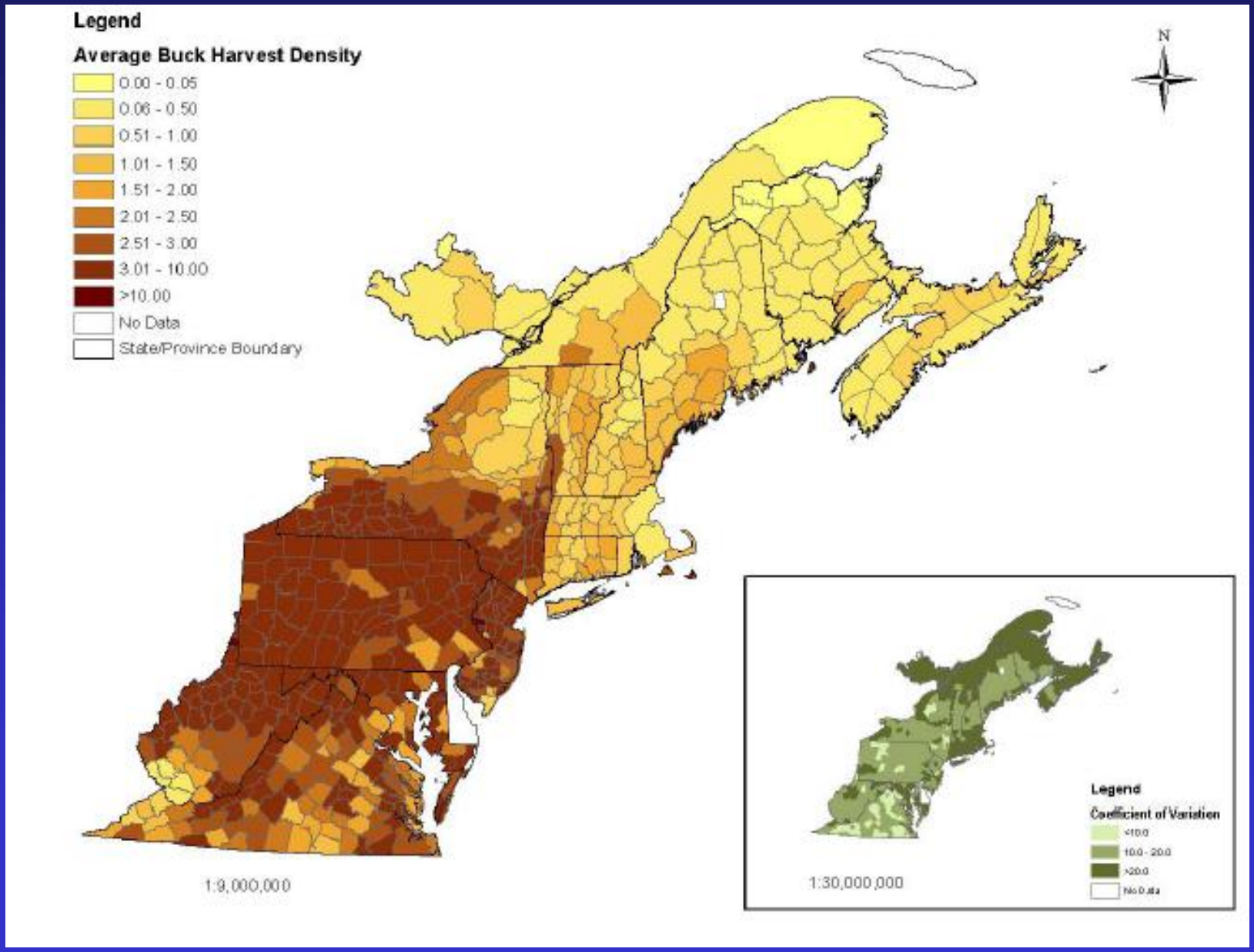
Final Permit and Quota Levels Published
late June

Hunter's Choice Application Deadline
July 20

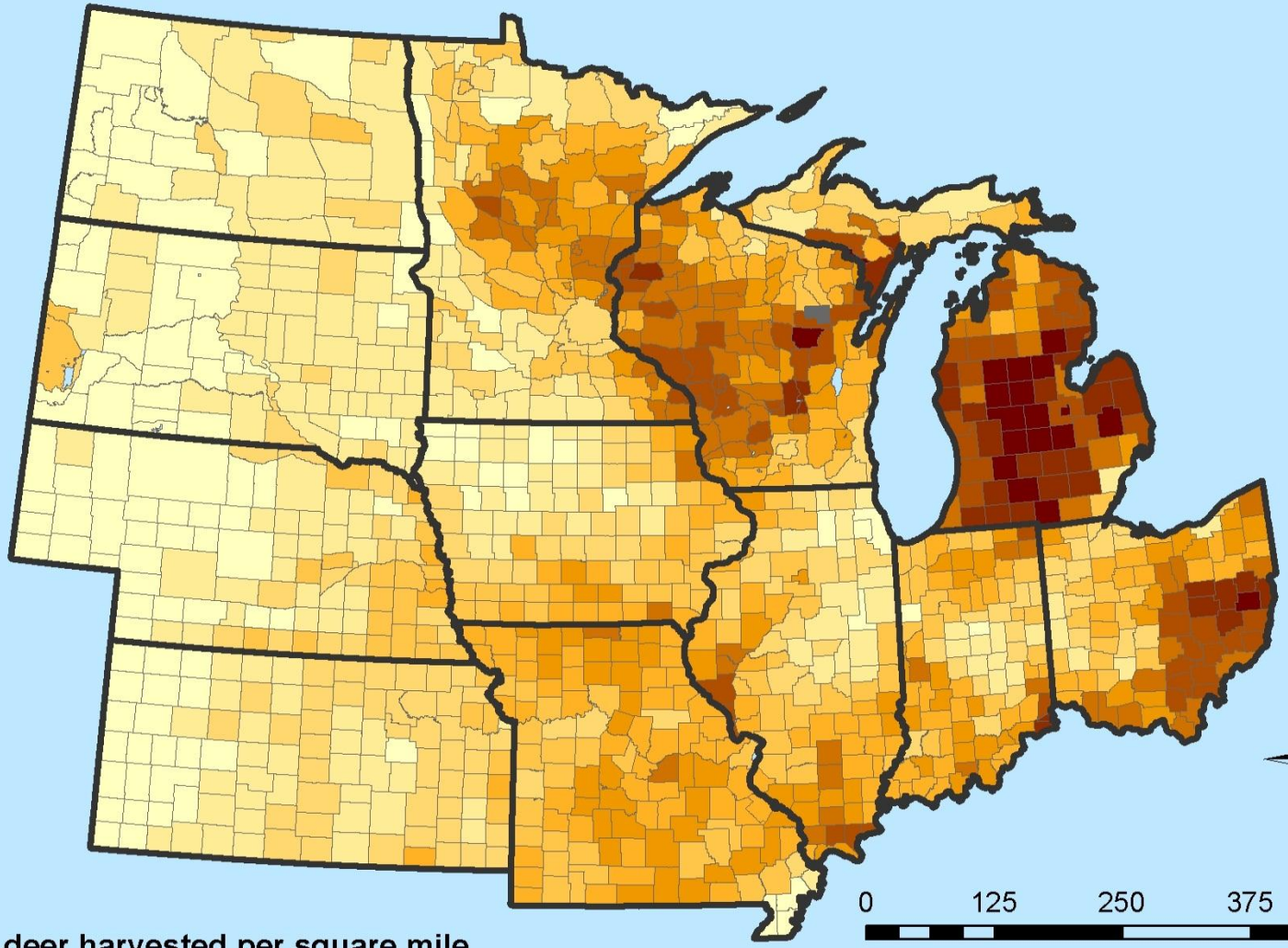
Sex-Age-Kill Procedure

- Population Reconstruction Procedure
- Eberhardt, L. 1960. Estimation of vital characteristics of Michigan deer herds. Michigan Dept. of Conservation. Game Div. Rept 2282.
- Used in Wisconsin since early 1960s
- The total buck kill is a good index of prehunt population size
  - Hunting seasons fairly stable
  - 9 day gun season since 1960
  - Number of hunters fairly stable year to year
  - Buck harvest rates tend to be fairly stable

Buck Harvest Density in Northeast, 1990-2000



2009 Antlered White-tailed Deer Harvest Density

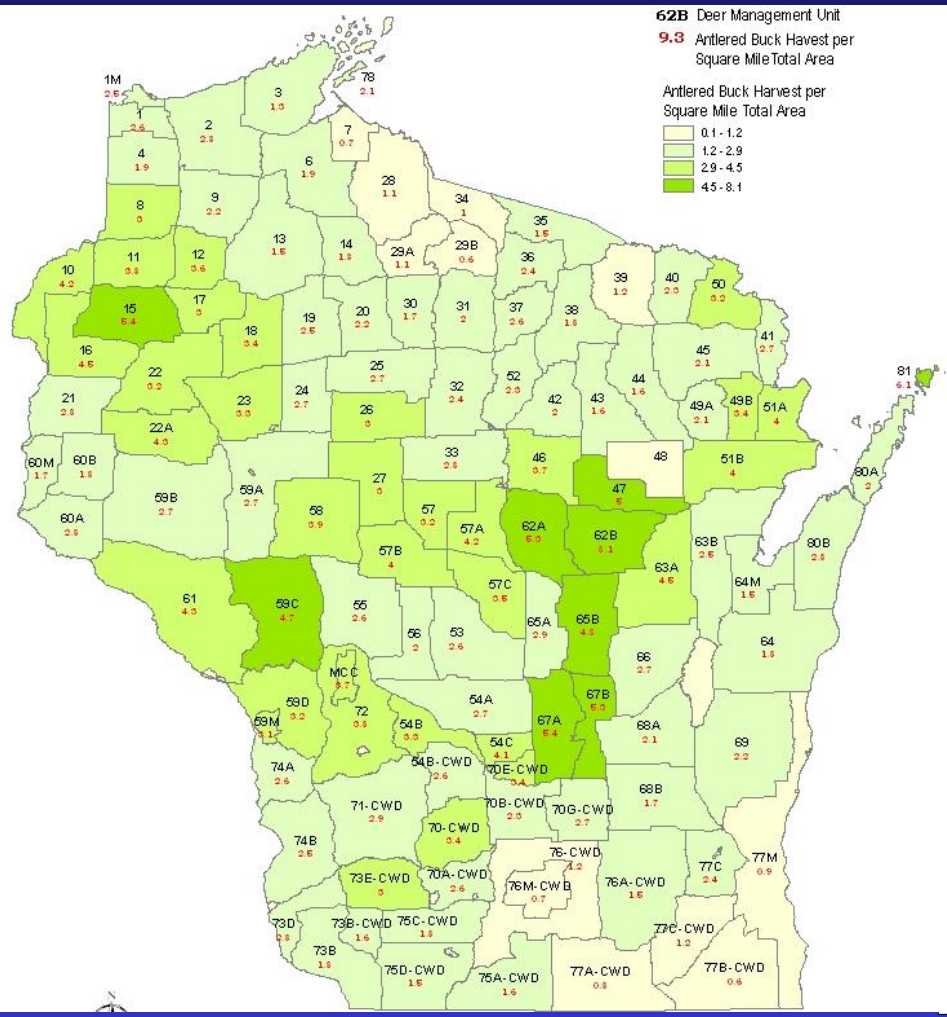


Antlered deer harvested per square mile

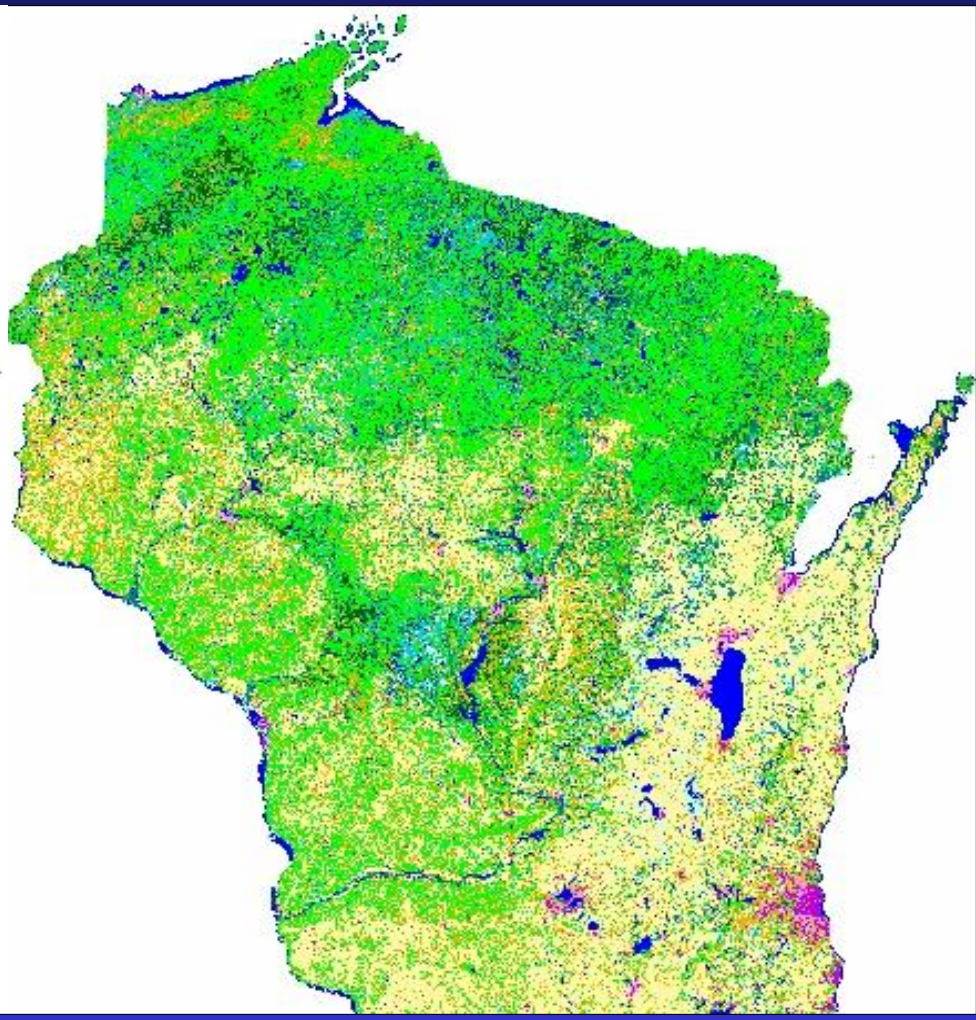
No Data	0.0 - 0.3	> 0.3 - 0.6	> 0.6 - 0.9	> 0.9 - 1.3	> 1.3 - 1.8	> 1.8 - 2.4	> 2.4 - 3.3	> 3.3 - 4.5	> 4.5 - 6.1	> 6.1 - 9.9

MIDWEST Association of Fish & Wildlife Agencies

Comparison of buck harvest density to land cover in Wisconsin



Buck harvest density, 2010



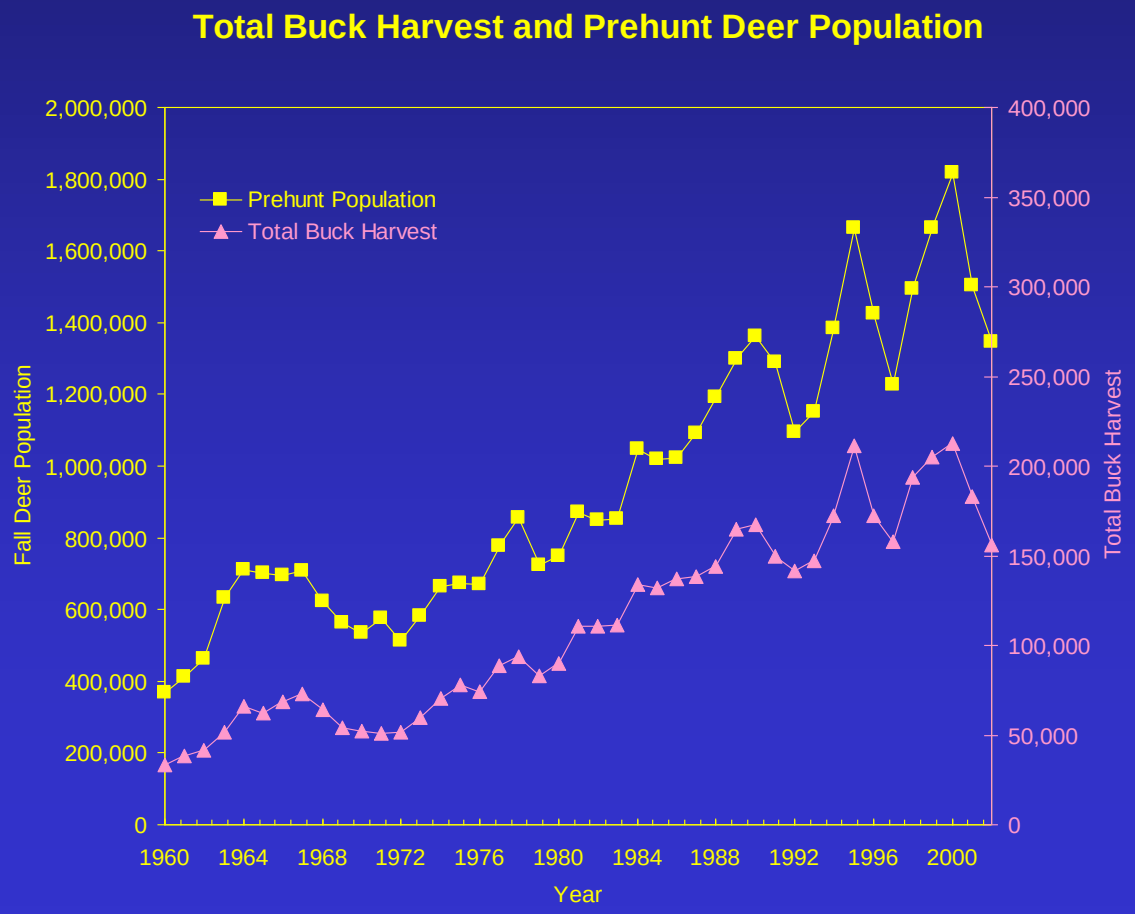
WISCLAND Land Cover

Buck Kill is Good but Not Perfect Index

- Percentage of bucks that are harvested can vary among years and areas
- Percentage of the fall deer population that is composed of adult bucks can vary among years and areas

Sex-Age-Kill Procedure

Uses information on the sex, age-structure of the harvest to estimate the proportion of fall population represented by the adult buck harvest



Sex-Age-Kill Procedure

Fall Deer Population = Bucks + Does + Fawns

- Prehunt Buck Population =

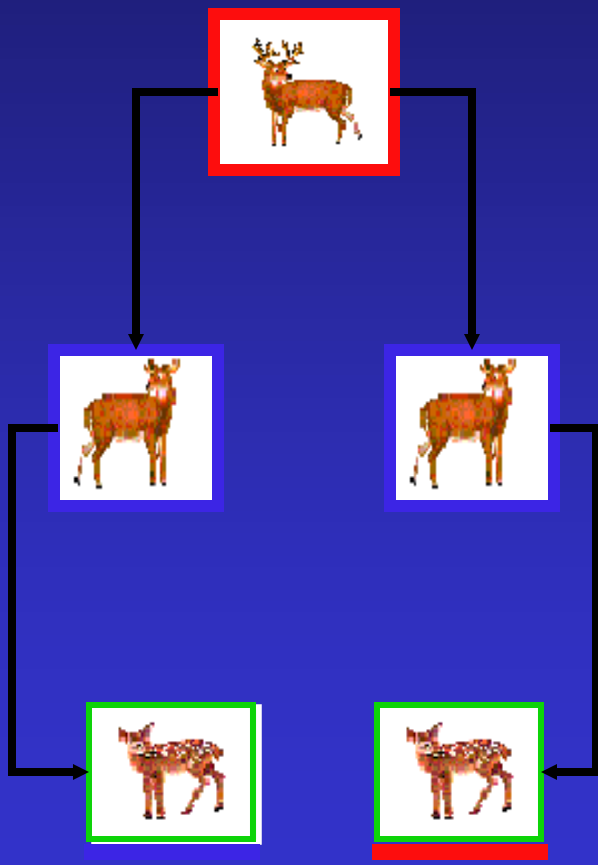
  Buck Harvest / % of bucks harvested

- Prehunt Doe Population =

  Buck Population x Doe:Buck Ratio

- Prehunt Fawn Population =

  Doe Population x Fawn:Doe Ratio

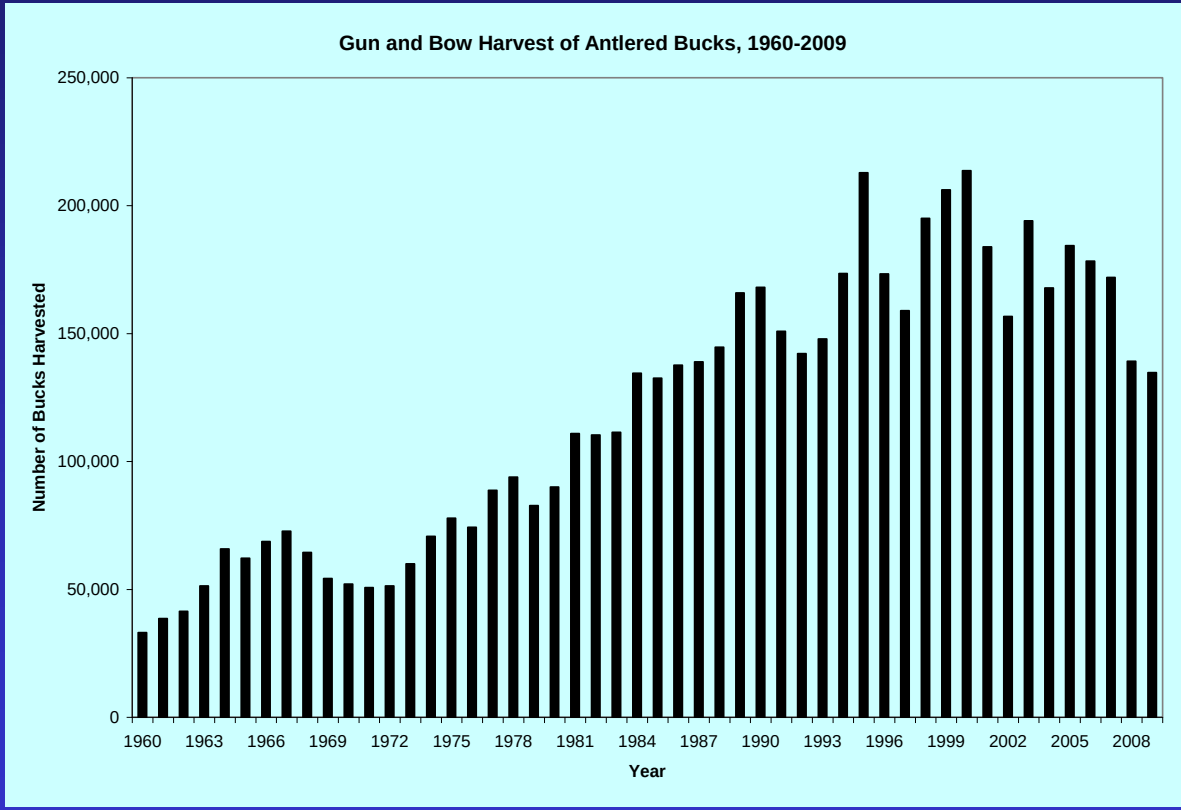


Parameters to Estimate

- Total Buck Harvest
- Buck Harvest Rate
- Adult Sex Ratio
- Fawn:Doe Ratio
- Total Deer Harvest

Total Buck Harvest

- Mandatory registration
  - Began 1953
  - ~600 registration stations
  - ~80 aging stations
  - ~20,000 deer aged



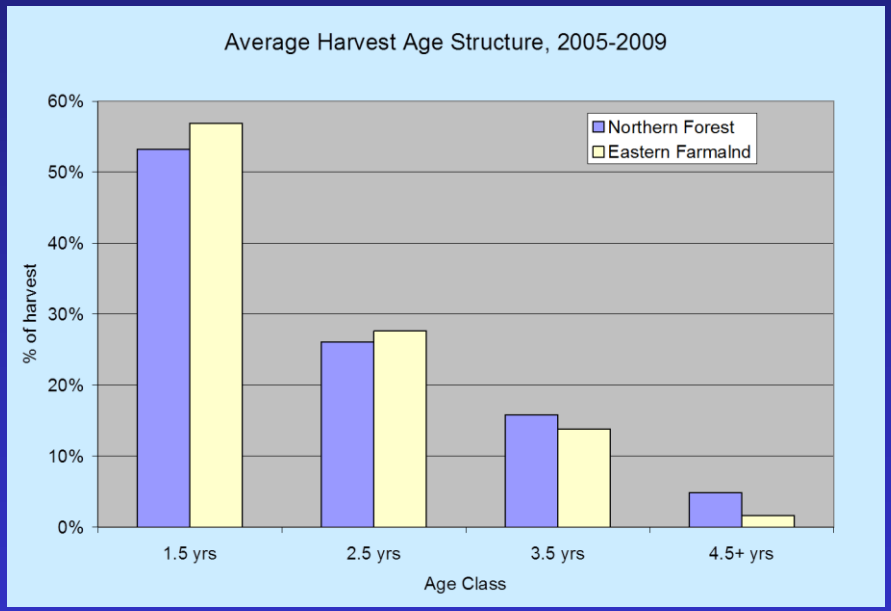
Buck Harvest Rate

Percentage of fall buck population that is harvested

Harvest Rate can be estimated directly using tagged or radio-collared animals

Indirect Estimate of Harvest Rate

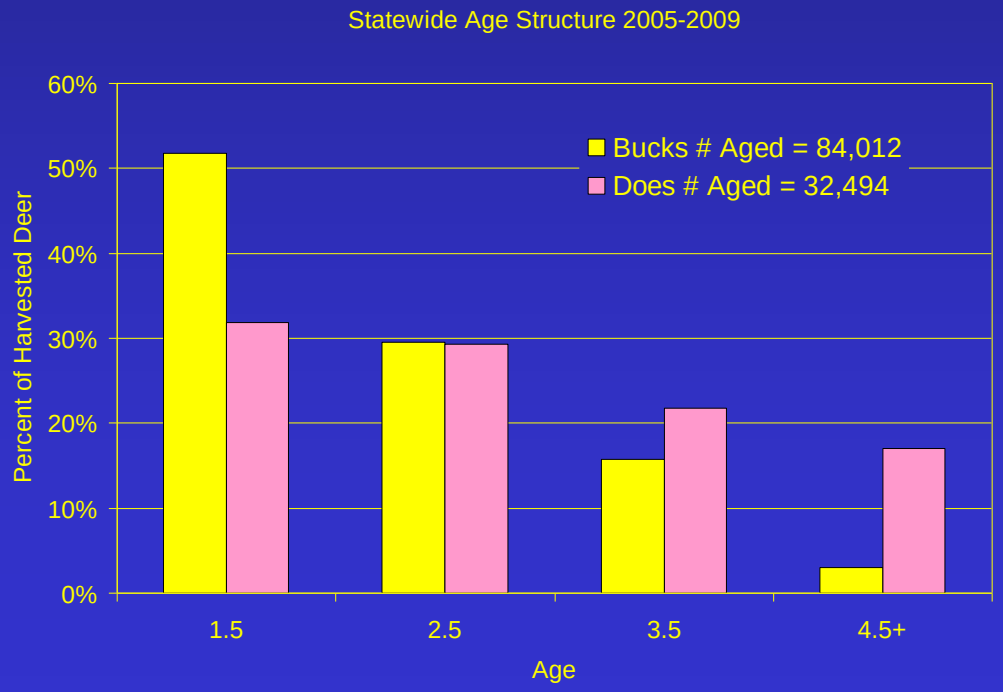
- Buck Mortality Rate x
- % of deaths due to legal harvest
- (Buck recovery rate)



Adult Sex Ratio (Does/Buck)

- Observations of deer yield biased sex ratios due to differences in habitat use and activity patterns
- Use differences in population age structure to determine sex ratio

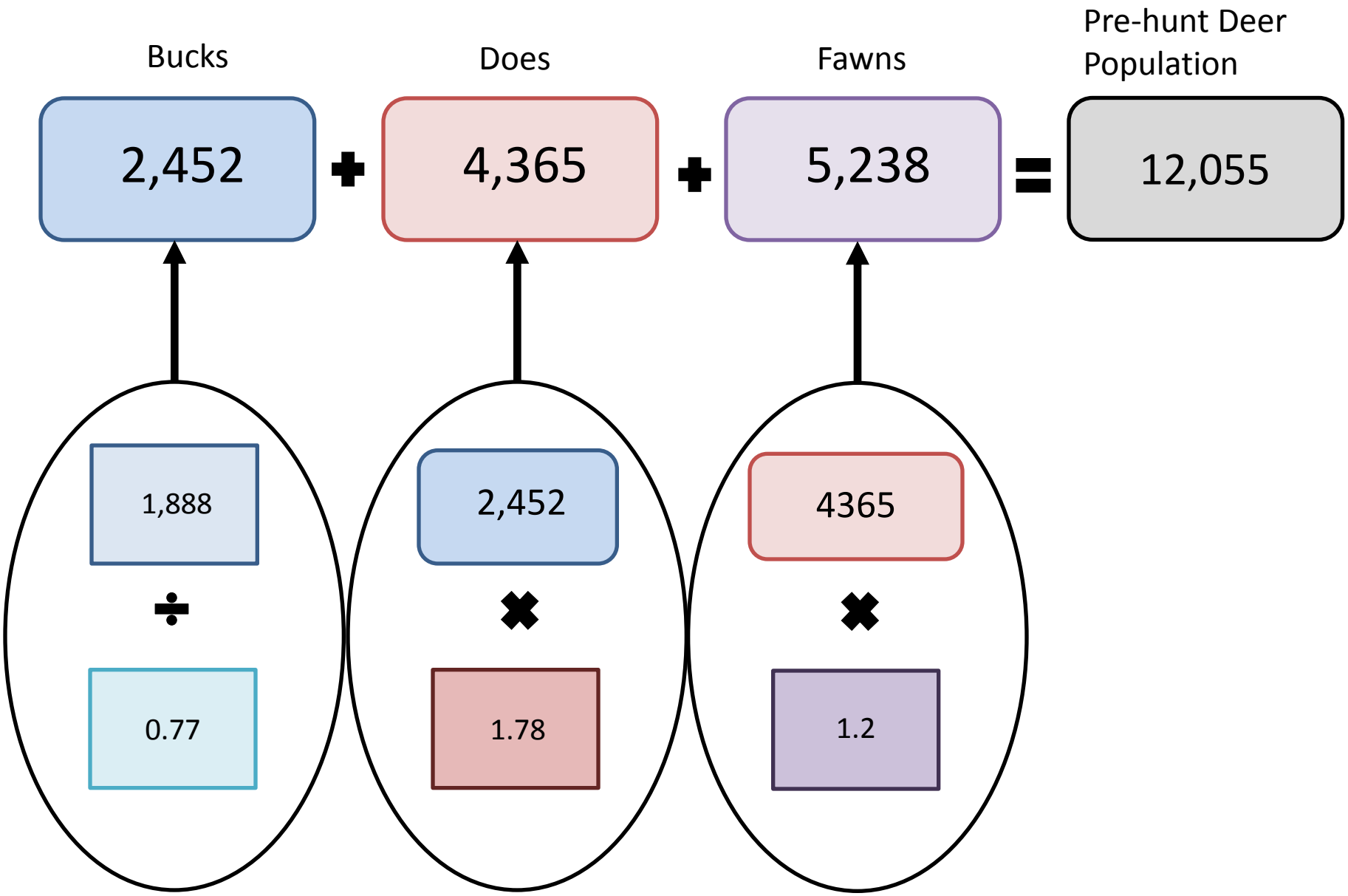
Average ~ 1.7
Range 1.2-2.1

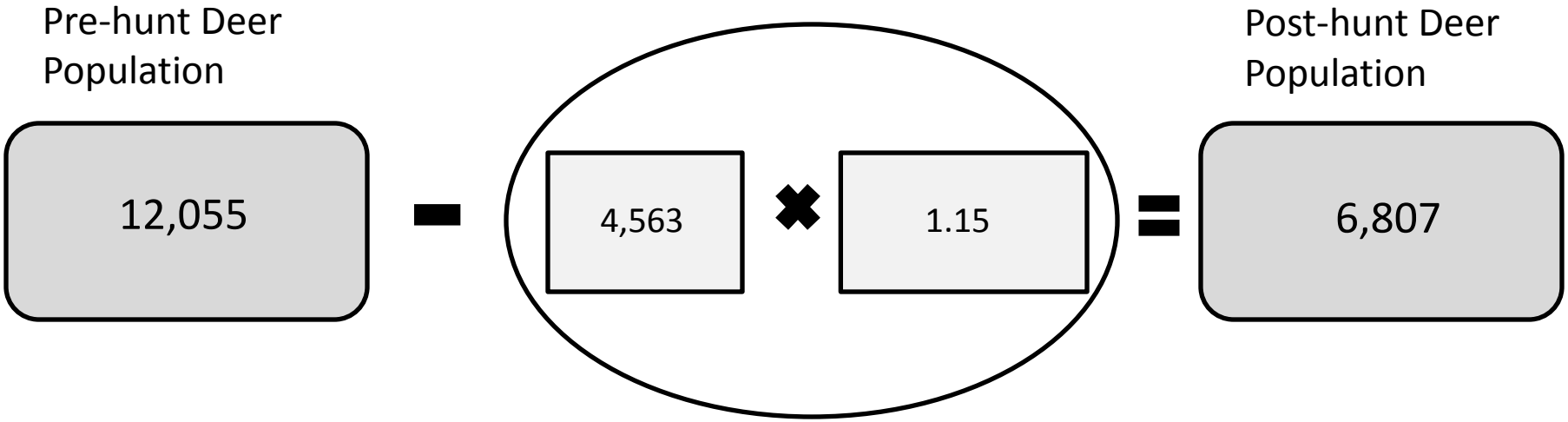


Fawn:Doe Ratio

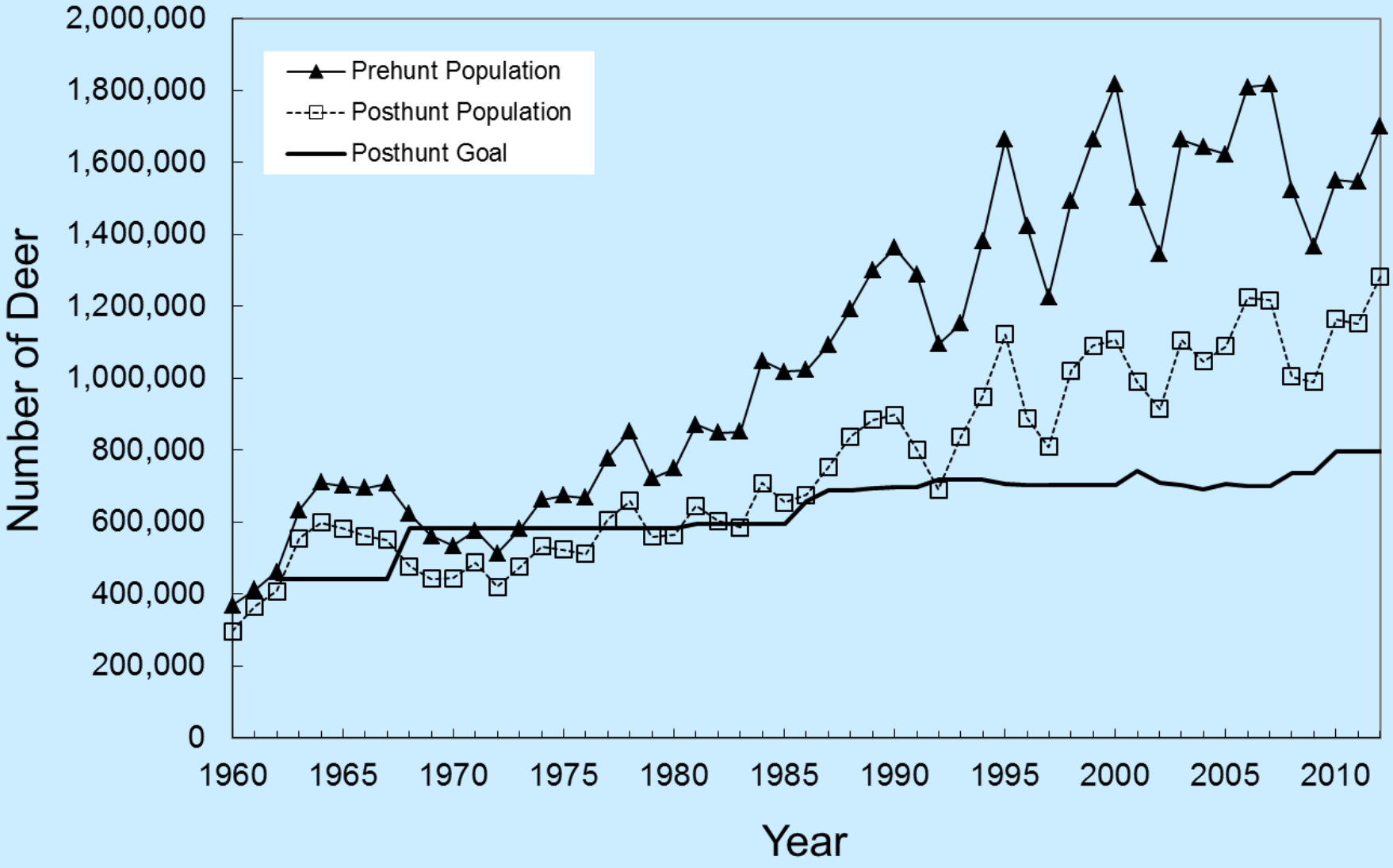
- Estimated from roadside observations in late summer in Northern and Central Forest
- Average ~5,700 does and fawns observed/year

- Northern Forest, range 0.76 – 1.05, mean 0.90
- Central Forest, range 0.73 – 1.33, mean 1.04
- Farmland regions
  - fairly stable
  - estimate from yearling doe %
  - range 1.0 – 1.2

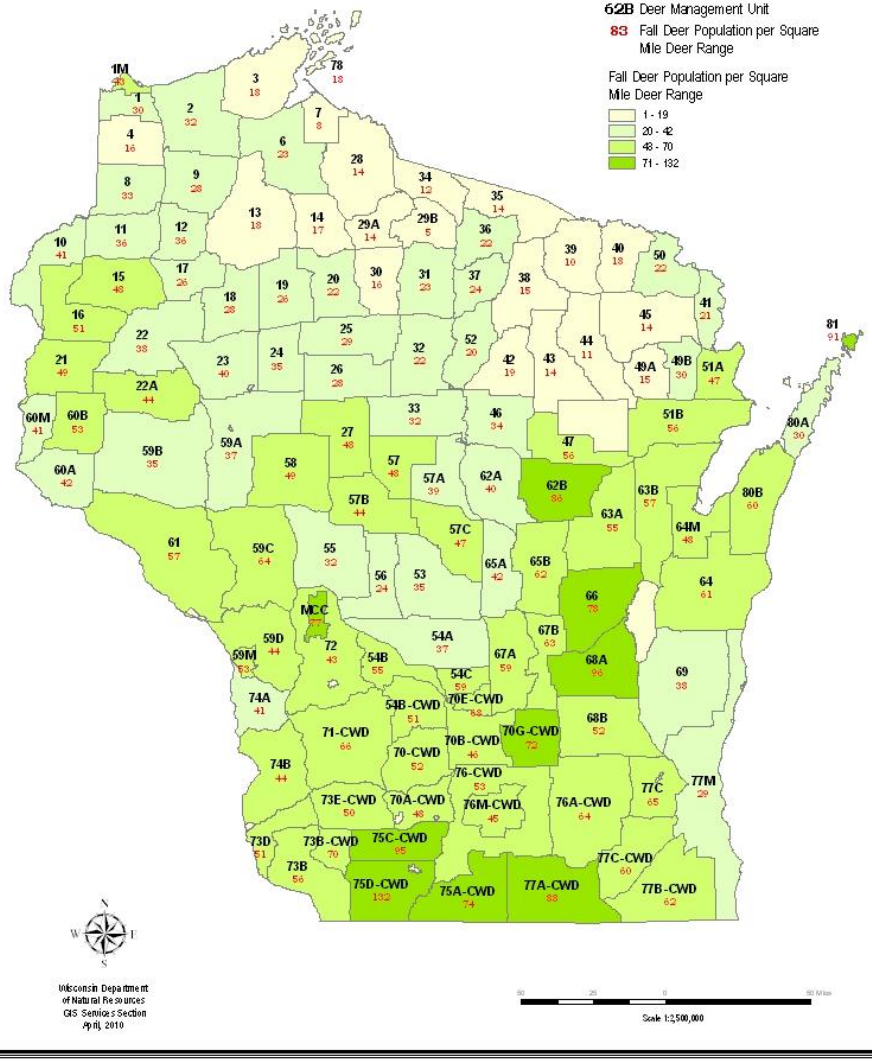

Bucks
Does
Fawns
Pre-hunt Deer Population
2,452
4,365
5,238
12,055
1,888
0.77
2,452
1.78
4365
1.2


Pre-hunt Deer Population
12,055
4,563
1.15
Post-hunt Deer Population
6,807

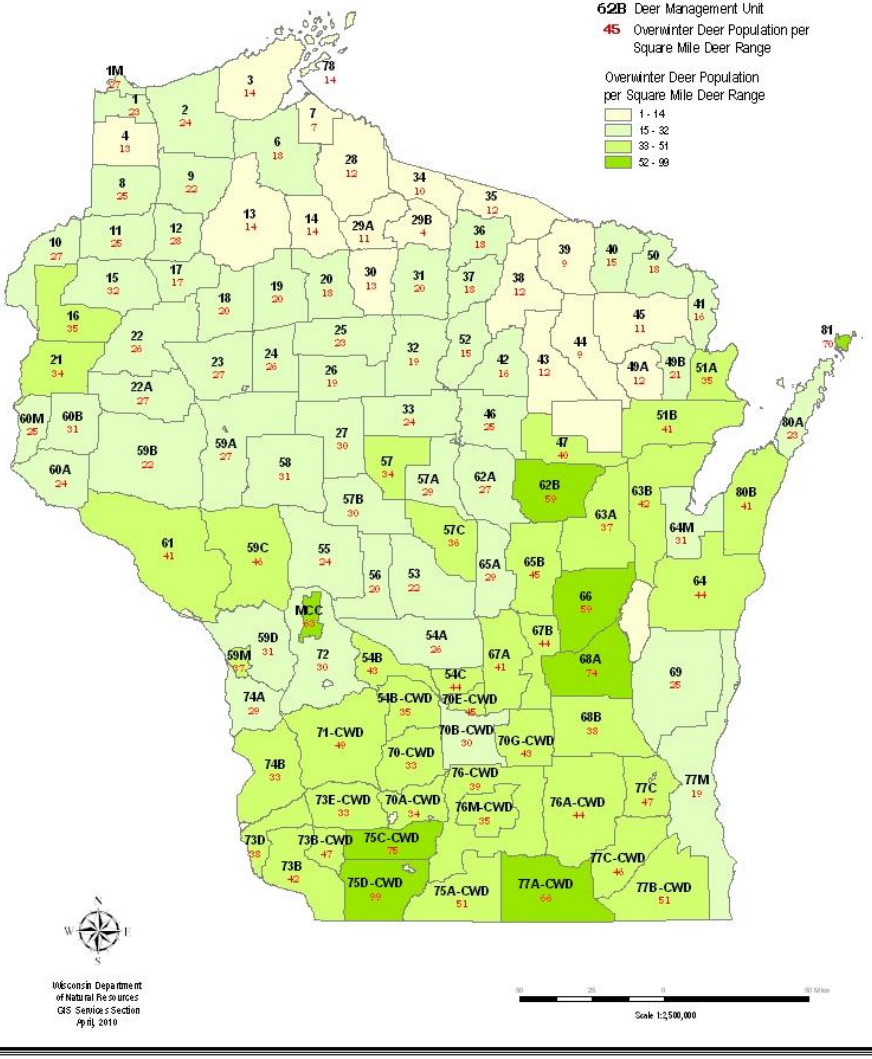
Wisconsin Deer Population, 1960-2012



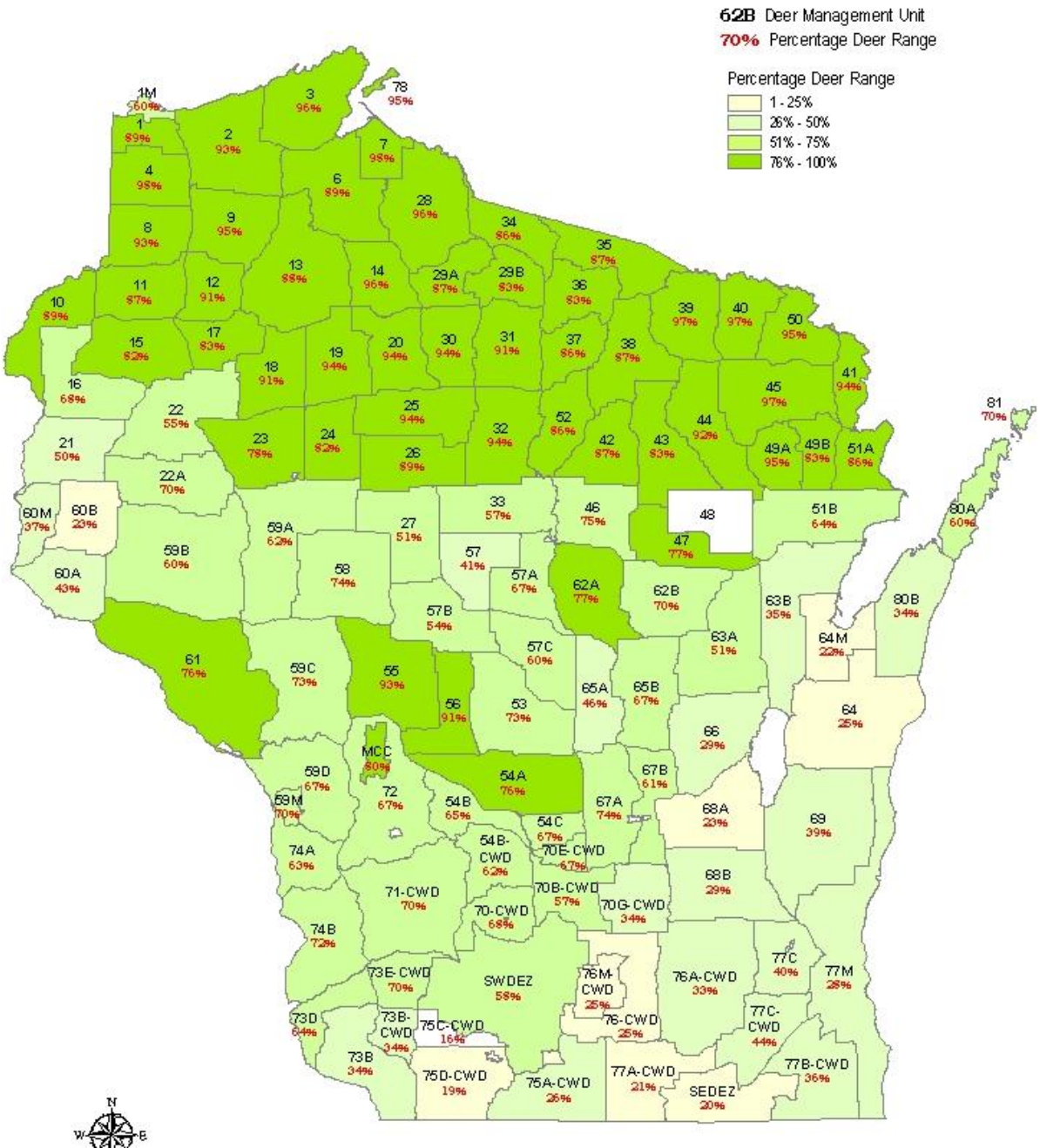
Fall Deer Population Density 2009, per Square Mile Deer Range



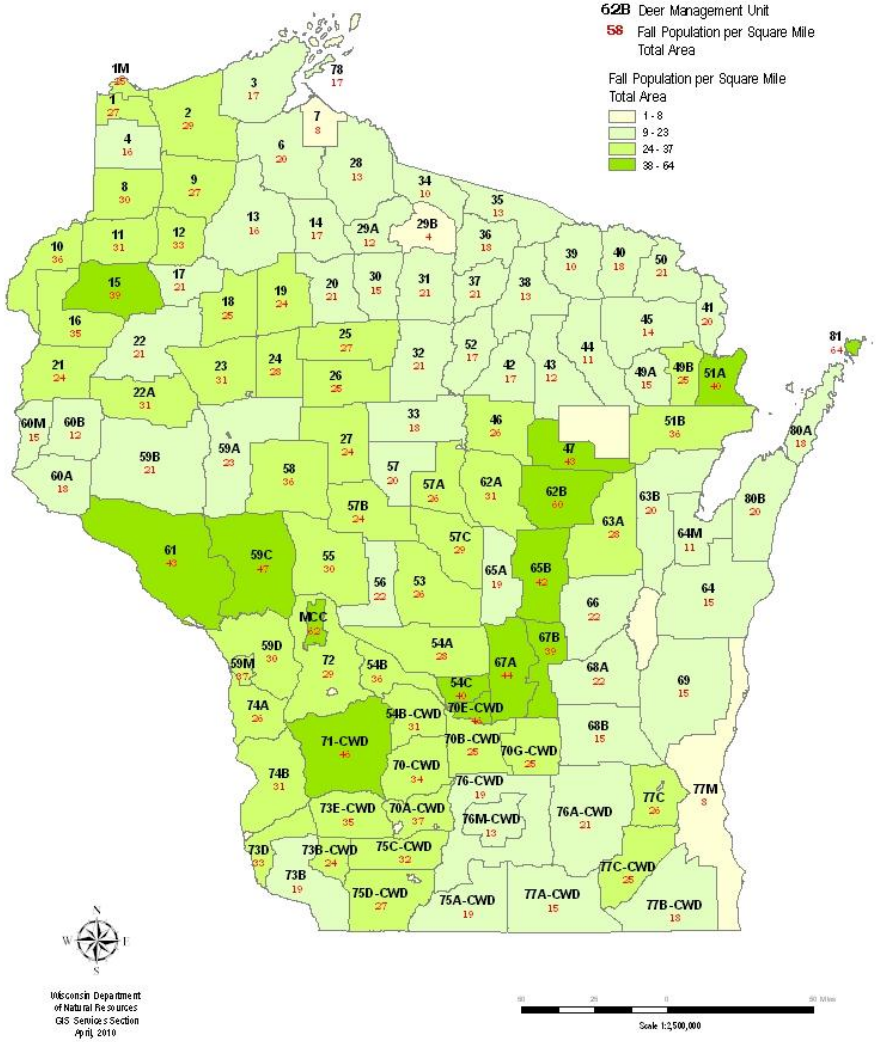
Overwinter Deer Population Density 2009, per Square Mile Deer Range



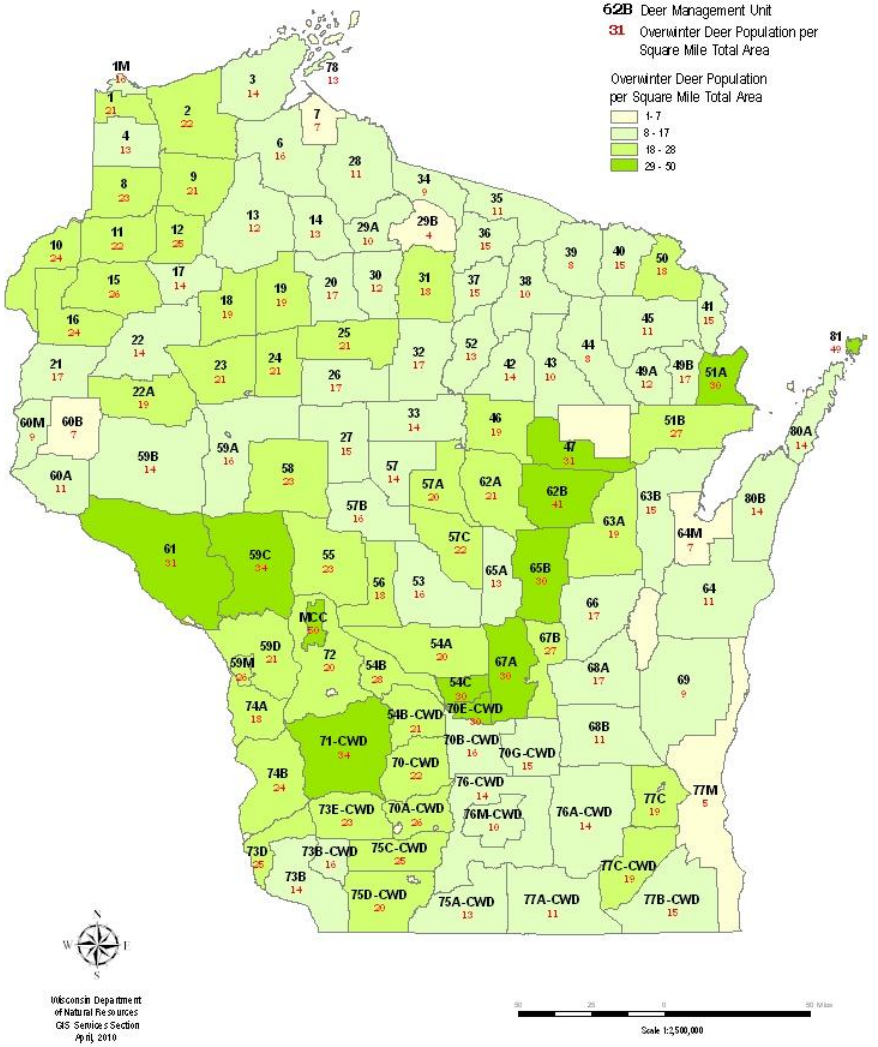
Percentage Deer Range, 2005



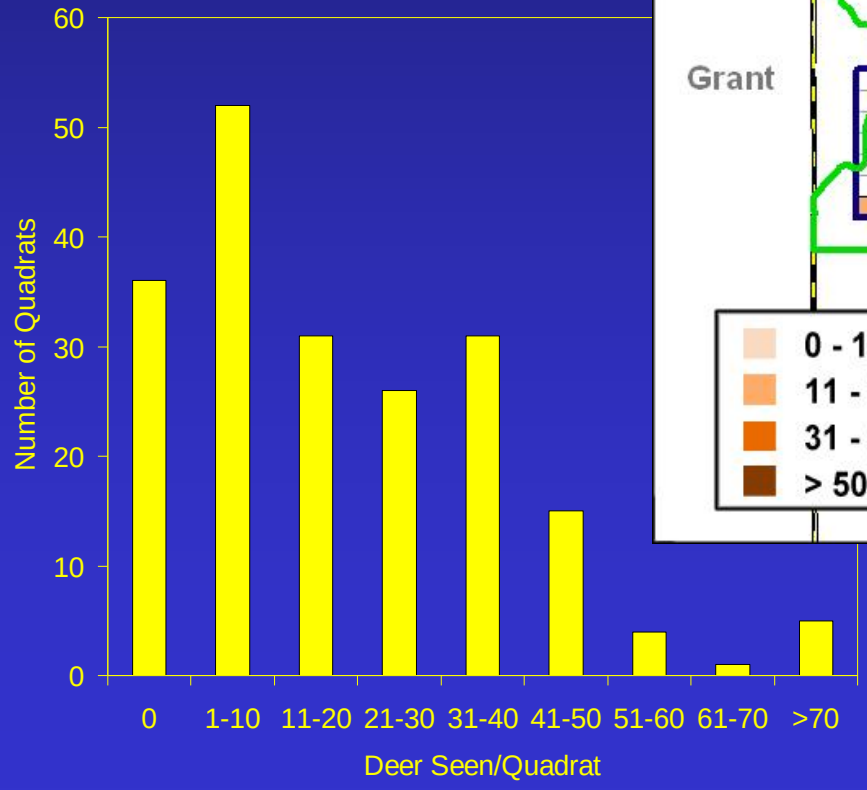
Fall Population Density 2009, per Square Mile Total Area

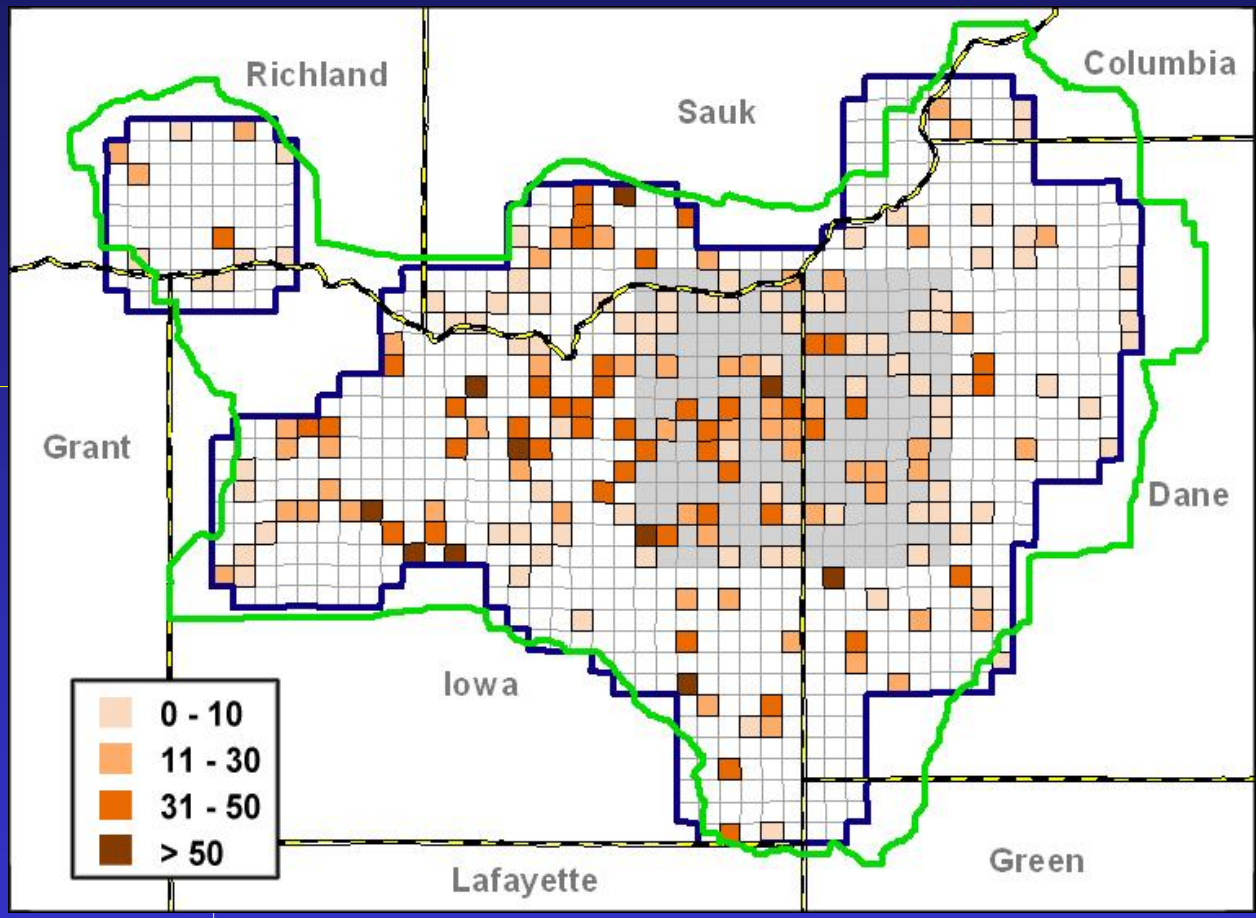


Overwinter Deer Population Density 2009, per Square Mile Total Area



Deer populations are not uniformly distributed within DMUs





Local factors can affect local density

QDMA's Whitetail Report 2013

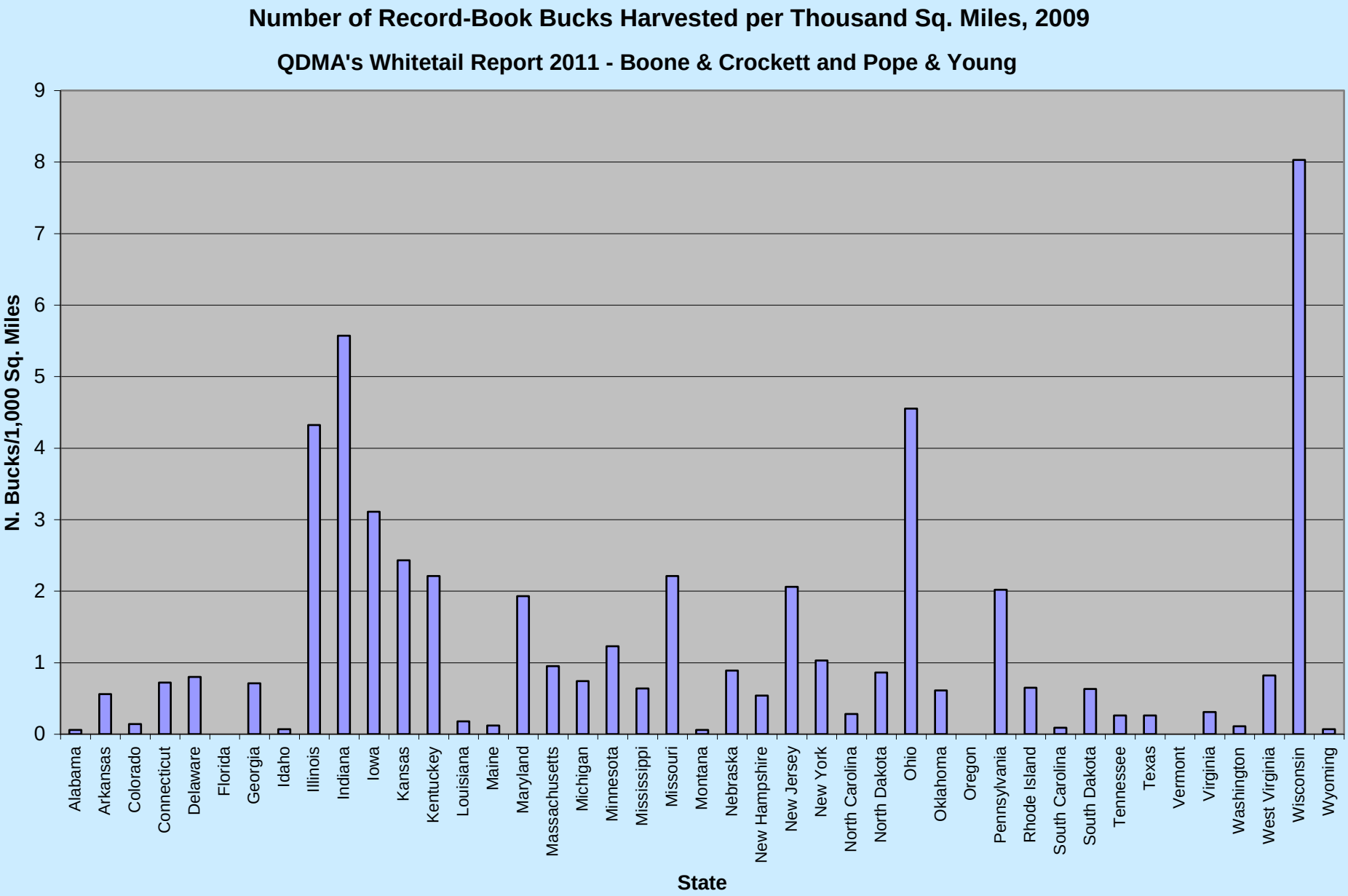
Estimated Buck Harvest

Antlered Bucks 1½ Years and Older

State/Province	2009	2010	2011	% Change '10 to '11	Bucks PSM**
Illinois	69,697	69,139	70,513	2	1.2
Indiana	52,981	53,007	50,717	-4	1.4
Iowa	49,612	48,749	46,212	-5	0.8
Kansas	39,629	43,047	45,025	5	0.5
Kentucky	55,290	59,170	65,932	11	1.6
Michigan	215,120	212,341	212,791	0	2.2
Minnesota	94,367	88,000	85,500	-3	1.0
Missouri	107,150	104,607	114,031	9	1.6
Nebraska	34,768	37,967	37,160	-2	0.5
North Dakota	29,707	30,900	22,688	-27	0.3
Ohio	93,905	86,017	81,721	-5	1.8
South Dakota	40,333	36,377	38,960	7	0.5
Wisconsin	134,696	148,378	150,839	2	2.3
Midwest Total	**1,017,255**	**1,017,699**	**1,022,089**	**0**	**1.2**

Estimated Antlerless Deer Harvest

State/Province	2009	2010	2011	% Change '10 to '11	Antlerless PSM**	Antlerless Per Antlered
Illinois	119,937	113,131	110,938	-2	1.9	1.6
Indiana	79,771	80,997	78,301	-3	2.2	1.5
Iowa	86,892	78,345	75,195	-4	1.3	1.6
Kansas	47,418	42,806	49,788	16	0.6	1.1
Kentucky	58,295	51,206	53,731	5	1.3	0.8
Michigan	220,916	205,509	203,930	-1	2.1	1.0
Minnesota	99,819	78,500	107,000	36	1.2	1.3
Missouri	189,647	170,592	174,563	2	2.5	1.5
Nebraska	29,711	39,198	39,283	0	0.5	1.1
North Dakota	45,119	38,400	29,823	-22	0.4	1.3
Ohio	167,355	153,458	138,027	-10	3.1	1.7
South Dakota	47,017	44,068	46,200	5	0.6	1.2
Wisconsin	192,557	185,211	193,954	5	3.0	1.3
Midwest Total	**1,384,454**	**1,281,421**	**1,300,733**	**2**	**1.6**	**1.3**


Number of Record-Book Bucks Harvested per Thousand Sq. Miles, 2009
QDMA's Whitetail Report 2011 - Boone & Crockett and Pope & Young
N. Bucks/1,000 Sq. Miles
0
1
2
3
4
5
6
7
8
9
Alabama
Arkansas
Colorado
Connecticut
Delaware
Florida
Georgia
Idaho
Illinois
Indiana
Iowa
Kansas
Kentuckey
Louisiana
Maine
Maryland
Massachusetts
Michigan
Minnesota
Mississippi
Missouri
Montana
Nebraska
New Hampshire
New Jersey
New York
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Vermont
Virginia
Washington
West Virginia
Wisconsin
Wyoming
State