WILDLIFE MANAGEMENT AND RESEARCH NOTES

| No. | | DATE |
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| 945 | **AUTHOR:** W. Adam Phelps, Waterfowl Research Biologist | 11/01/2007 |
| | **TITLE:** Waterfowl Population Surveys 2006-07 | |

***Abstract:*** *The peak number of ducks observed in Indiana's Weekly Waterfowl Inventory during fall and winter has consistently decreased since 2002, though harvest has not. Two hundred five plots were surveyed for geese and duck during April 2007. The estimated statewide population of breeding giant Canada geese (*Branta canadensis*) was 125,300 during the 2007 breeding season. The estimated number of breeding pairs was 56,375. These estimates include geese in urban areas. No estimates of mallard breeding population was possible this year, due to large numbers of migrants remaining in the state during the survey period.*

## History

The objective of this study was to provide annual spring population estimates, within ± 25%, of breeding Canada geese and ducks in Indiana, and to provide an annual index of fall and winter migratory waterfowl populations in Indiana. We use three different surveys for these purposes. The Weekly Waterfowl Inventory (WWI) is conducted in the fall and winter to track migration. The Spring Canada Goose Survey is an aerial survey to count breeding Canada geese in the state. Finally, the Spring Duck Survey is an aerial survey, conducted at the same time as the Canada Goose survey, to count breeding ducks.

## Methods

2006-2007 Weekly Waterfowl Inventory. Waterfowl and other wetland-associated migratory birds are counted weekly from late August through late January on participating state fish and wildlife areas, reservoirs, national wildlife refuges and select private lands. Modes of transportation vary by property (i.e., automobile, boat, or walking), but all participants count all waterfowl seen on established routes. Participants conduct counts early in the week to avoid duplicate counting of the same birds at different areas.

2007 Spring Canada Goose Survey. This survey is normally conducted during the peak incubation period (early- to mid-April). During 2007, the surveys were flown on 13, 16, 18, 23, 27, and 30 April 2007. The state is divided into low (0-1 breeding pairs), medium (2-4 breeding pairs), and high goose density (more than 5 breeding pairs) plots. These

divisions are based on a combination of a 1992 estimate of goose density across the state and updates provided from annual survey results. These data are housed in a geographic Information System (GIS), which divides the state into one square mile plots and allows for annual updates from survey data. Survey plots are two square miles (1 mi x 2 mi) and are maintained using a DeLorme mapping system. Surveys are flown from a helicopter during favorable weather conditions (winds # 15 mph, survey not conducted or is discontinued if moderate to heavy rain, fog, or snow occurs) (USFWS and CWS 1987).

An urban survey was also performed for breeding Canada geese. 2007 was the second year of these surveys. The following areas were surveyed in 2007: northwest Indiana (St. John to Gary); South Bend and Mishawaka; Ft. Wayne; Muncie; Anderson; Indianapolis; Kokomo; Terre Haute; Lafayette; Bloomington; Clarksville; and Evansville. Vincennes was surveyed separately (see below). Four high density, 14 medium-density, and 20 low-density routes, along with six routes in the Vincennes area (described below), were selected. Points of the same density were connected using roads within the urban zones. All geese within 100m of the roadway were counted. The area surveyed and densities of geese were calculated to estimate urban populations.

Vincennes was surveyed via road separately. Due to a special agreement with the city of Vincennes, a six route survey was undertaken there to determine goose populations before and after a new management regime in the city. This will be followed up by surveying the same routes in spring 2008.

All Canada geese seen were categorized in one of the following categories: single bird with a nest; single with no nest; pair with a nest; pair with no nest; or group. The number of breeding pairs in each plot is determined by summing the number of pairs with a nest and either the number of singles or the number of singles with a nest (whichever is greatest).

2007 Spring Duck Survey. As a result of limited funding, this survey is typically conducted in conjunction with spring Canada goose surveys. These surveys normally occur in early- to mid-April, at a time when many ducks are beginning incubation. Duck counts are conducted in the same plots as the spring Canada goose survey.

**Results**

2006-2007 Fall and Winter Survey. Conditions were unusually warm well into November. A cold snap in early December froze most of the water in northern Indiana, but only for 7 – 10 days. The entire state was ice-free for the last week of the north zone's duck season (which ended 19 December), a rare event. Indiana experienced the fifth wettest fall (September – December) in 113 years, so most rivers were running full or flooded during much of December and January, providing ample habitat for migrating waterfowl statewide, especially on private lands. Marshes on public lands had plenty of water and many were flooded above normal pool. This extremely wet fall, combined with very mild temperatures, left most of the state ice-free during all but the last week of January.

Property managers observed that large influxes of ducks were not seen this season, but rather the ducks seemed to arrive in numerous smaller waves. Mallards peaked in mid-December, the same week as during 2005. The peak mallard count was 18,865, down 6% from 2005, but up 3% from the 5-year average. Wood ducks peaked the second week of October, the same week as in 2005. The peak wood duck count was 6,145, up 76% from 2005 and up 38% from the 5-year average. The peak black duck count of 625 occurred during the first week of December, four weeks earlier than 2005. The number of black ducks decreased 29% from 2005 and was down 23% from the 5-year average. Green-winged teal peaked at 1,265, which was 4% lower than 2005 but 22% higher than the 5-year average. Peak numbers of green-winged teal were observed in mid-October, about six weeks earlier than 2005 (which was much later than 2004, so 2006 was probably close to average timing). Blue-winged teal peaked during the last week of September, which was seven weeks earlier than 2005 (again, 2005 was a late migration year for teal). The peak count of blue-winged teal (1,005) was only five birds less than 2005's peak count, and was 7% higher than the 5-year average. Divers peaked mid-November at 2,568 birds, two weeks earlier than 2005. This was a 9% increase from 2005, and a 2% increase from the 5-year mean.

Canada goose migration through Indiana seemed to occur in many small waves, with a peak count of only 8,864 birds the week of 6 December, nearly two months earlier than in recent years. However, the South Zone peaked the week of 3 January at only 3,318 birds. The statewide peak of 8,864 was 12% lower than 2005, and 9% below the 5-year average.

These numbers are likely not representative of the number of ducks and geese in the state, as many rivers were flooded, forming backwater areas that are heavily used by waterfowl but not surveyed. Reports from hunters state that, in some cases, the Wabash and White Rivers and associated backwaters (South Zone) held more birds than some of them ever recalled seeing in Indiana. While there is some concern that the WWI is becoming less accurate over time, it is actually likely that this year it was not very useful, due to the huge numbers of birds holding off of surveyed areas.

The peak numbers of waterfowl observed on the survey areas have been decreasing since the late 1990s (Figures 8a and b). This could be related to birds spending time off of traditionally surveyed areas (that is, spending more time on private land, such as power company cooling ponds, than on public lands containing good habitat). Because harvest has not decreased over the same period, it seems unlikely that we are actually seeing fewer birds pass through Indiana (Figures 9 and 10).

2007 Spring Canada Goose Survey. A total of 205 plots were surveyed during 13, 16, 18, 23, 27, and 30 April 2007. In addition, 38 urban road surveys were driven in early to mid-April. The estimated statewide population of giant Canada geese was 125,300, compared to 175,900 in 2006 (Table 2). The estimated number of breeding pairs was 56,375, compared to 49,907 (CI ± 38,979) in 2006.

2007 Spring Duck Survey. Large numbers of migrant ducks remained in Indiana during the survey period in 2007. Because separation of migrant mallards from Indiana breeders is not possible under these conditions, breeding duck estimates were not derived this year.

## Discussion and Recommendations

The number of waterfowl observed migrating through Indiana has been consistently decreasing since 2002, although harvest has actually increased. It appears that in recent years, ducks have been less likely to use public hunting areas where the WWI is performed. It is likely that the WWI is still an adequate indicator of migration timing, although it seems unlikely to be a good indicator of total waterfowl abundance in the state, especially in years with a wet fall and winter. An evaluation of available waterfowl winter habitat on state-owned properties needs to occur. The possibility of conducting statewide waterfowl surveys should be considered, though it is likely that comprehensive statewide surveys would be prohibitively expensive.

The 2006 (last year) population estimate of breeding Canada geese in Indiana is almost certainly an overestimate. The timing of the survey, coupled with fewer flights than normal, resulted in huge potential error. It is crucial that the surveys are flown in April, and that at least six flights are conducted to have confidence in the estimates.

Spring duck surveys have been combined with goose surveys since 2003. The duck surveys should be separated from the goose surveys, because the goose surveys occur too early in the season to reliably provide estimates of breeding ducks. These duck surveys should be flown during the middle two weeks of May. Efforts should be made to fly two separate sets of surveys each spring: one set in April for geese, and another in May for breeding ducks. However, increases in the cost of flight time will likely preclude this.

The practice of only estimating the breeding population of mallards north of 41° latitude has been discarded, since mallards now consistently breed statewide. We will continue to estimate breeding populations for northern areas and statewide separately for the foreseeable future, when it is possible to derive population estimates for ducks at all.

To increase the accuracy of the breeding goose survey, methods should continue to be refined to target the urban resident goose population that cannot be surveyed from the air. This will mean increasing the number of routes driven in these areas until an acceptable level of confidence is reached. Next year, survey stratification by habitat will be evaluated to determine if such stratification is feasible for these urban routes.

## Literature Cited

USFWS (U.S. Fish and Wildlife Service) and CWS (Canadian Wildlife Service). 1987. Standard operating procedures for aerial waterfowl breeding ground population and habitat surveys in North America.

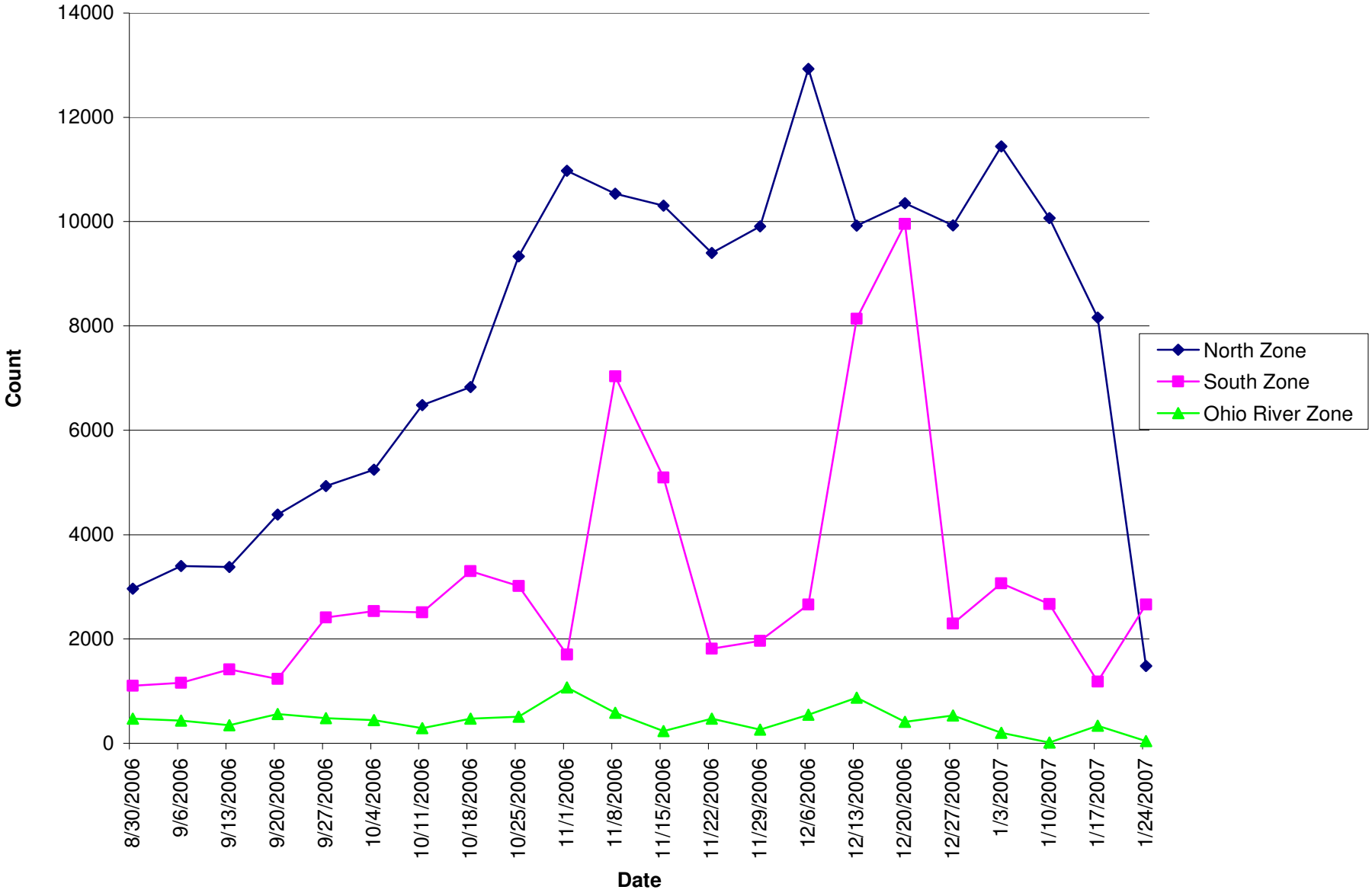


Figure 1. Migration timing of all dabbling ducks in Indiana by zone between 30 August 2006 and 24 January 2007.

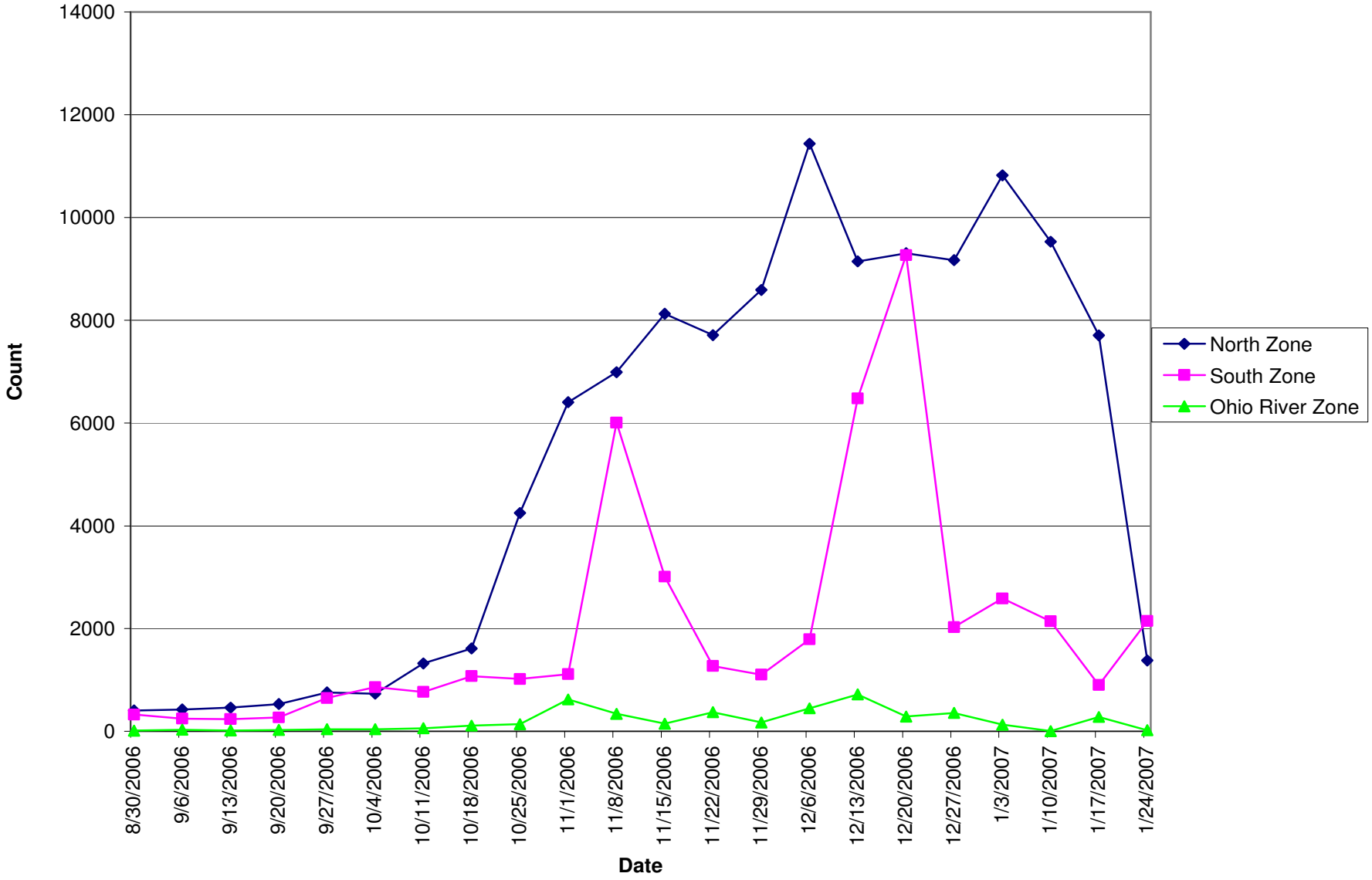


Figure 2. Migration timing of mallards in Indiana by zone between 30 August 2006 and 24 January 2007.

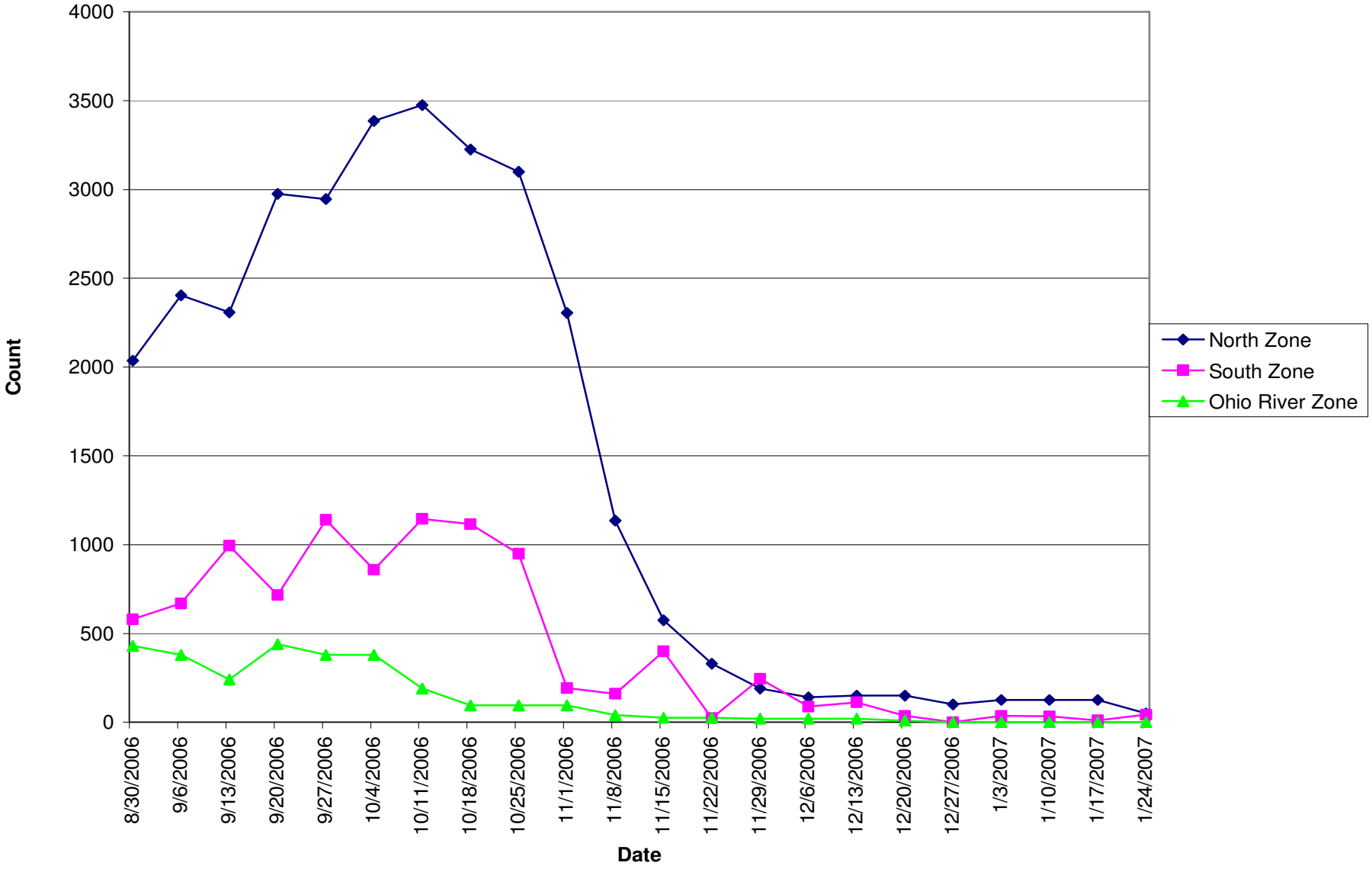


Figure 3. Migration timing of wood ducks in Indiana by zone between 30 August 2006 and 24 January 2007.

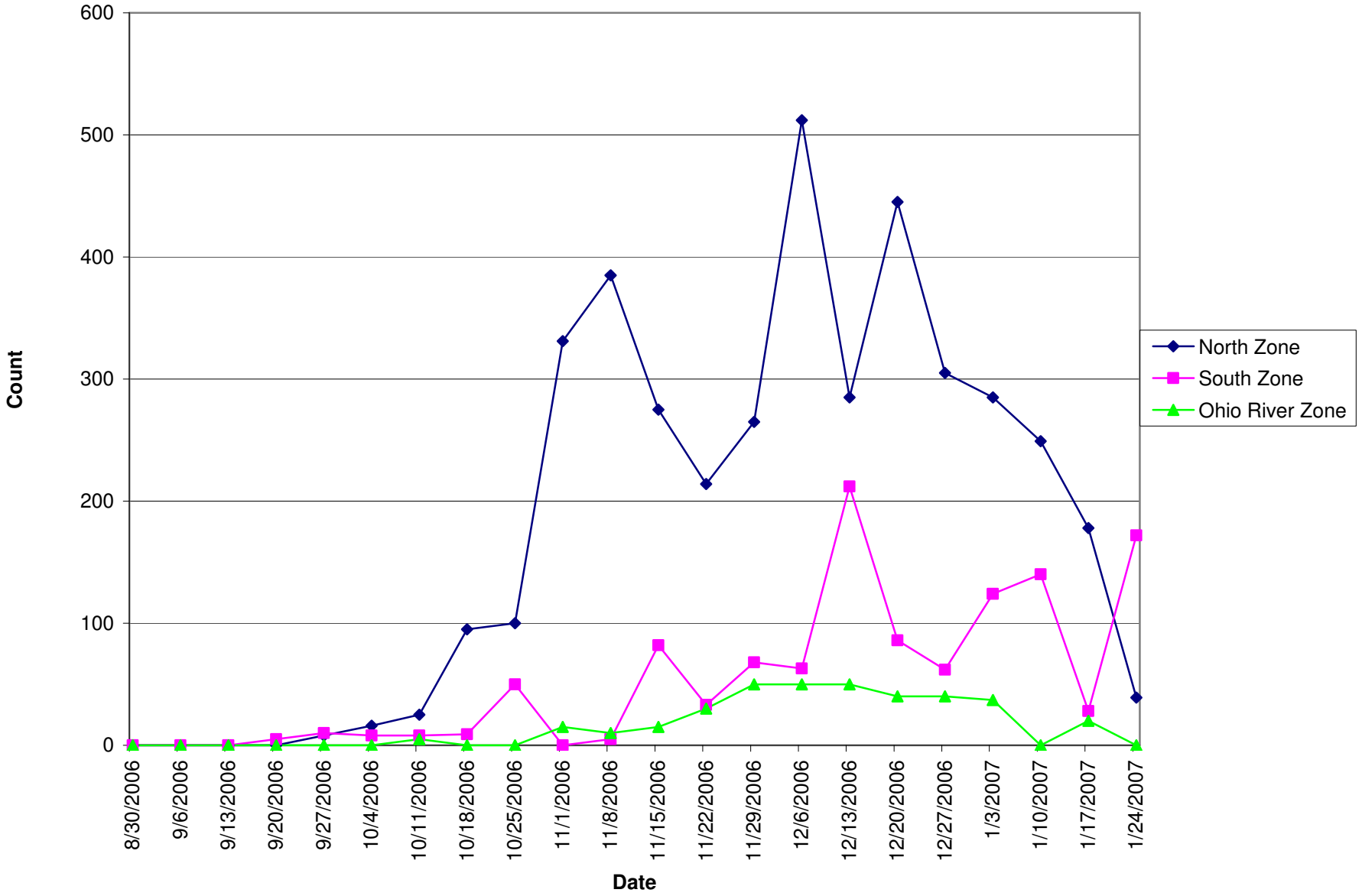


Figure 4. Migration timing of black ducks in Indiana by zone between 30 August 2006 and 24 January 2007.

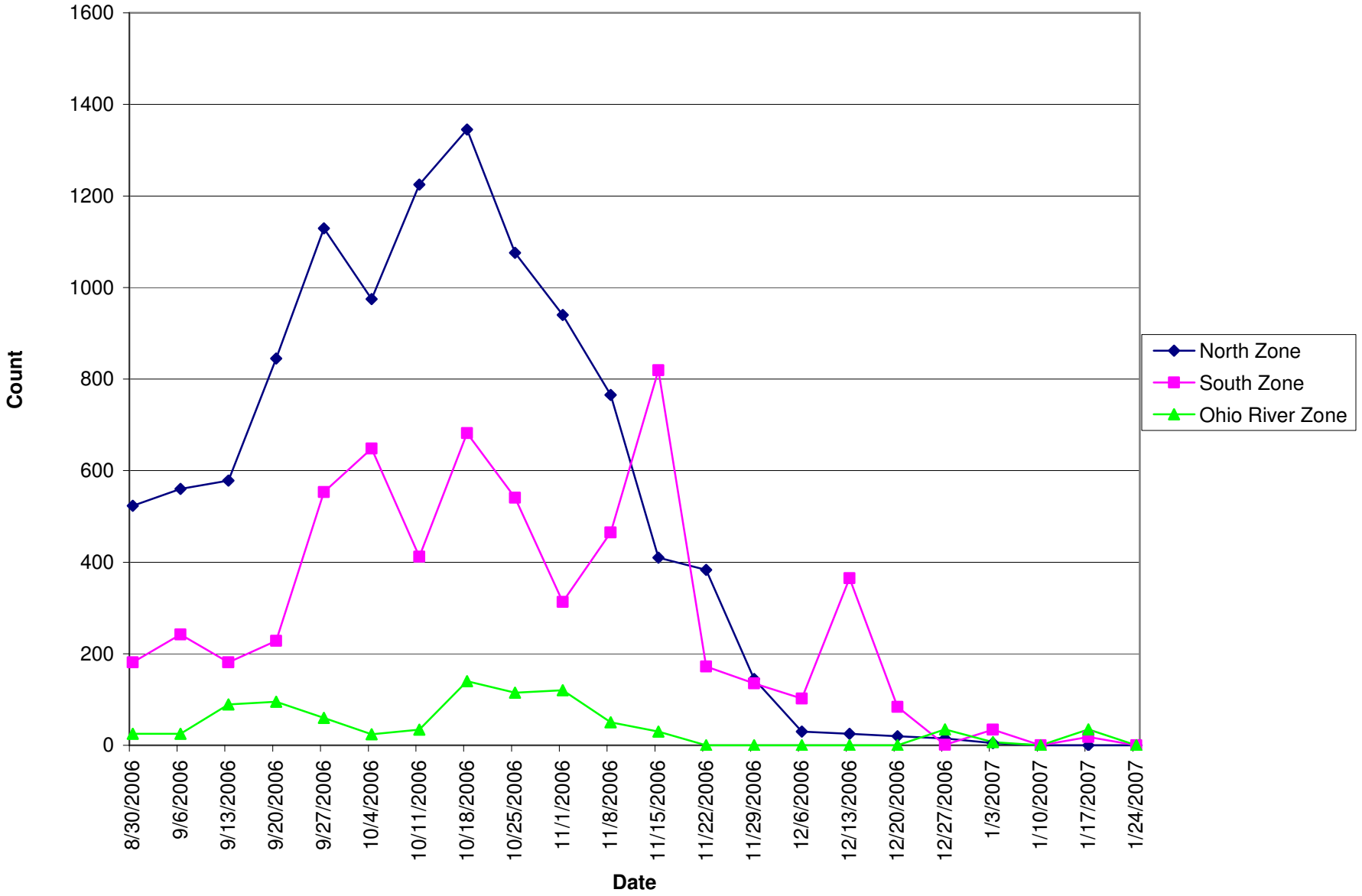


Figure 5. Migration timing of teal (both species) in Indiana between 30 August 2006 and 24 January 2007.

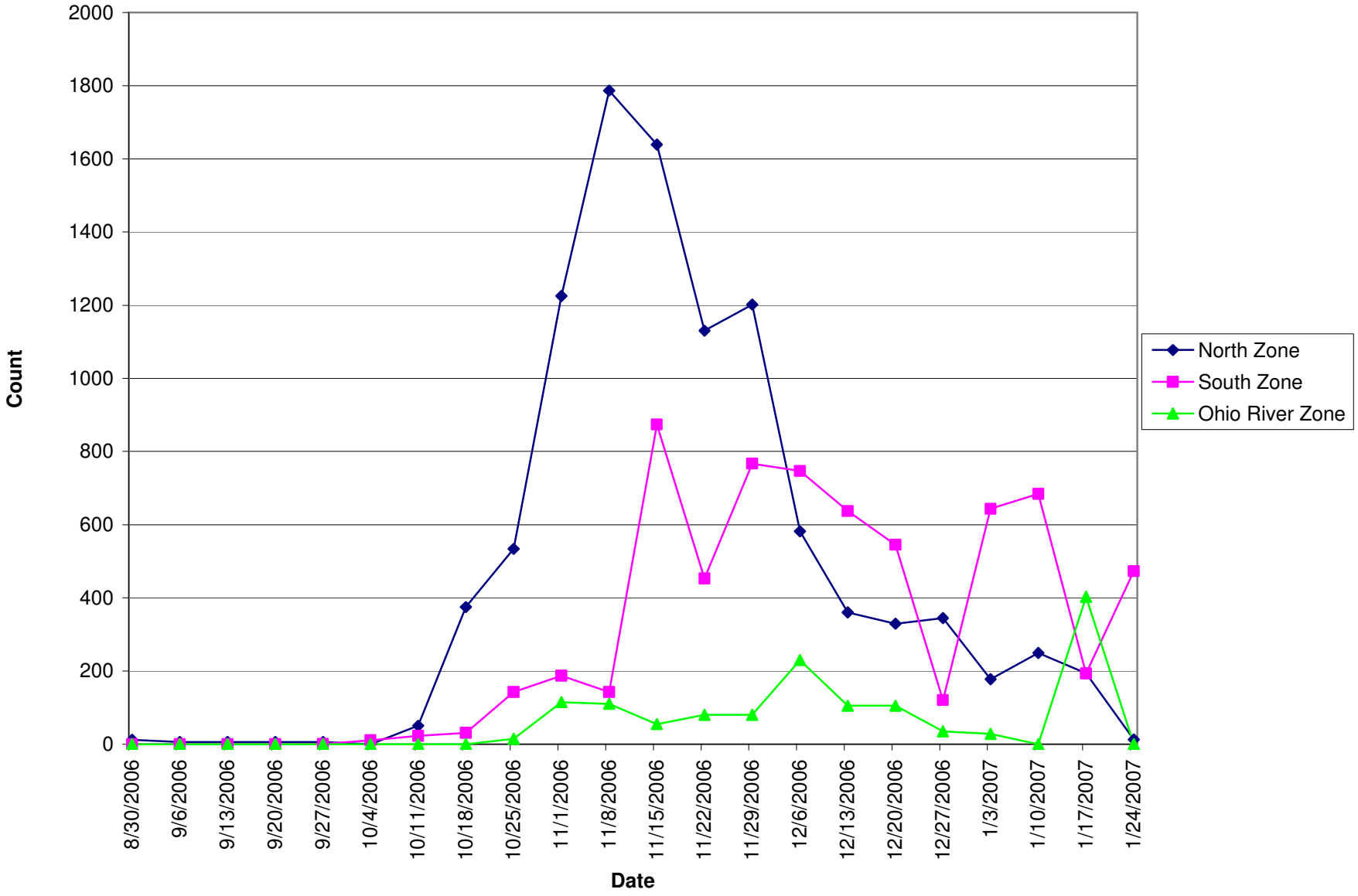


Figure 6. Migration timing of diving ducks in Indiana by zone between 30 August 2006 and 24 January 2007.

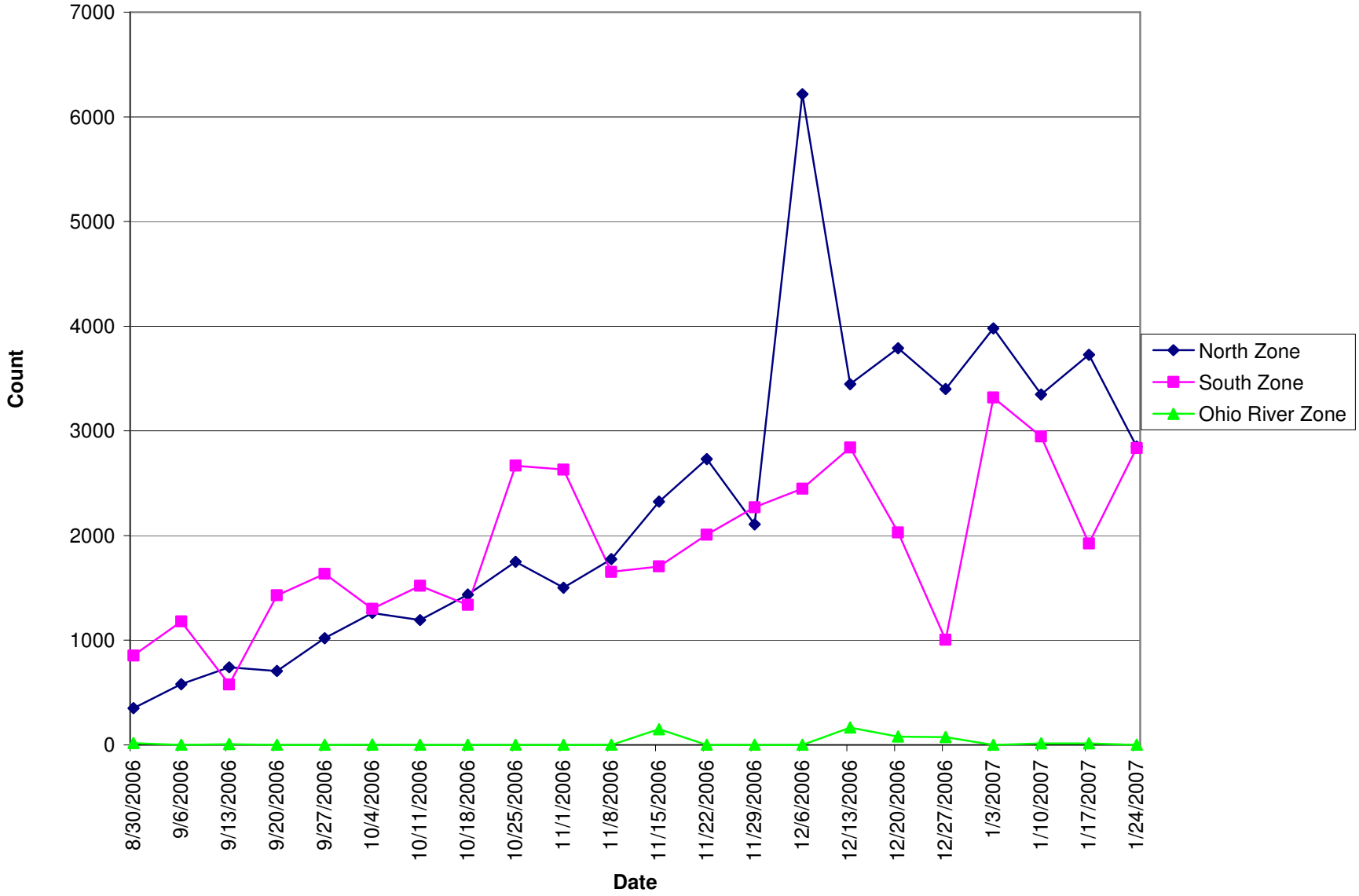


Figure 7. Migration timing of Canada geese in Indiana by zone between 30 August 2006 and 24 January 2007.

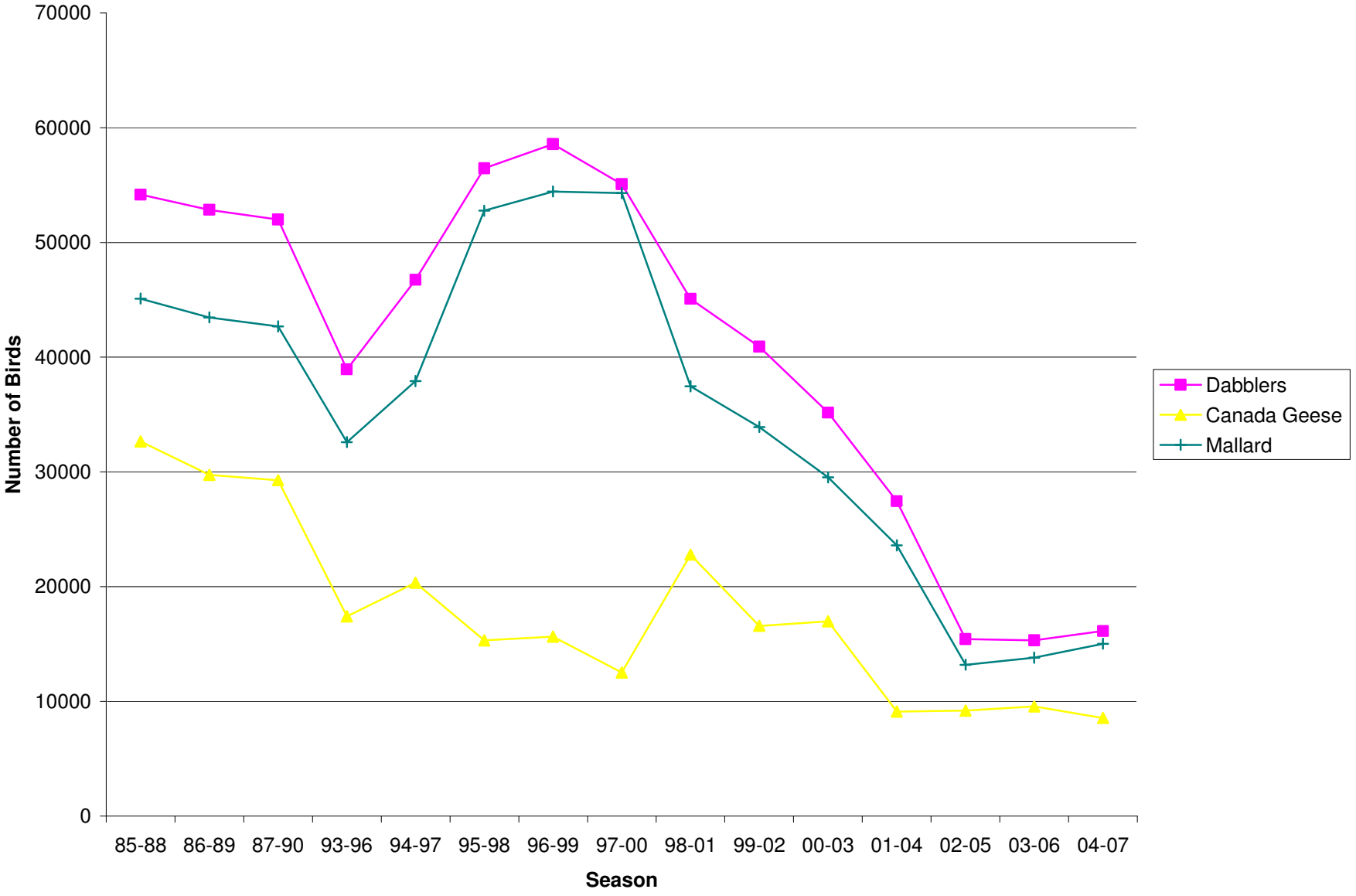


Figure 8a. Three year average peak waterfowl counts in Indiana 1985-86 – 2006-07.

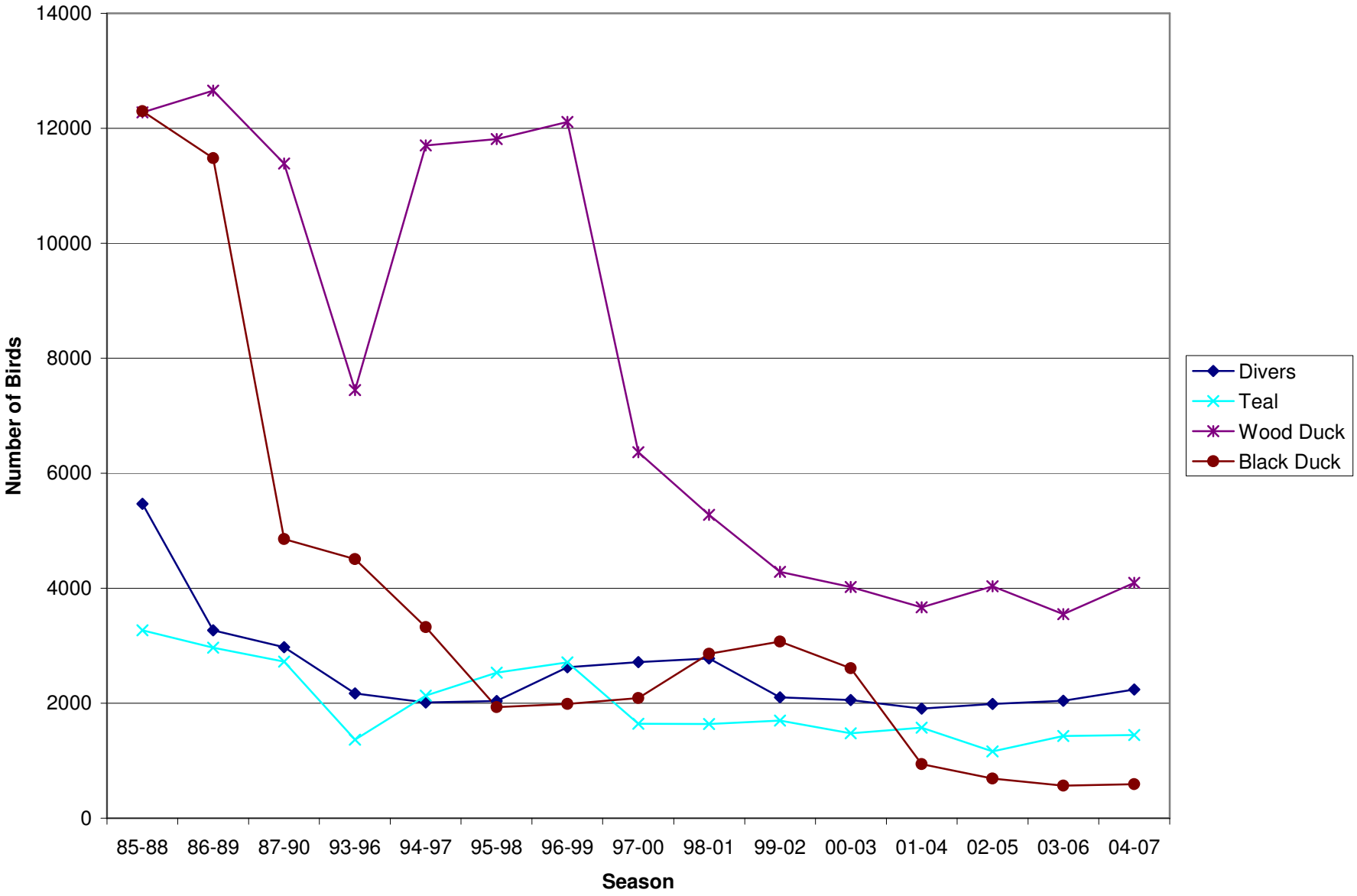


Figure 8b. Three year average peak waterfowl counts in Indiana 1985-86 – 2006-07.

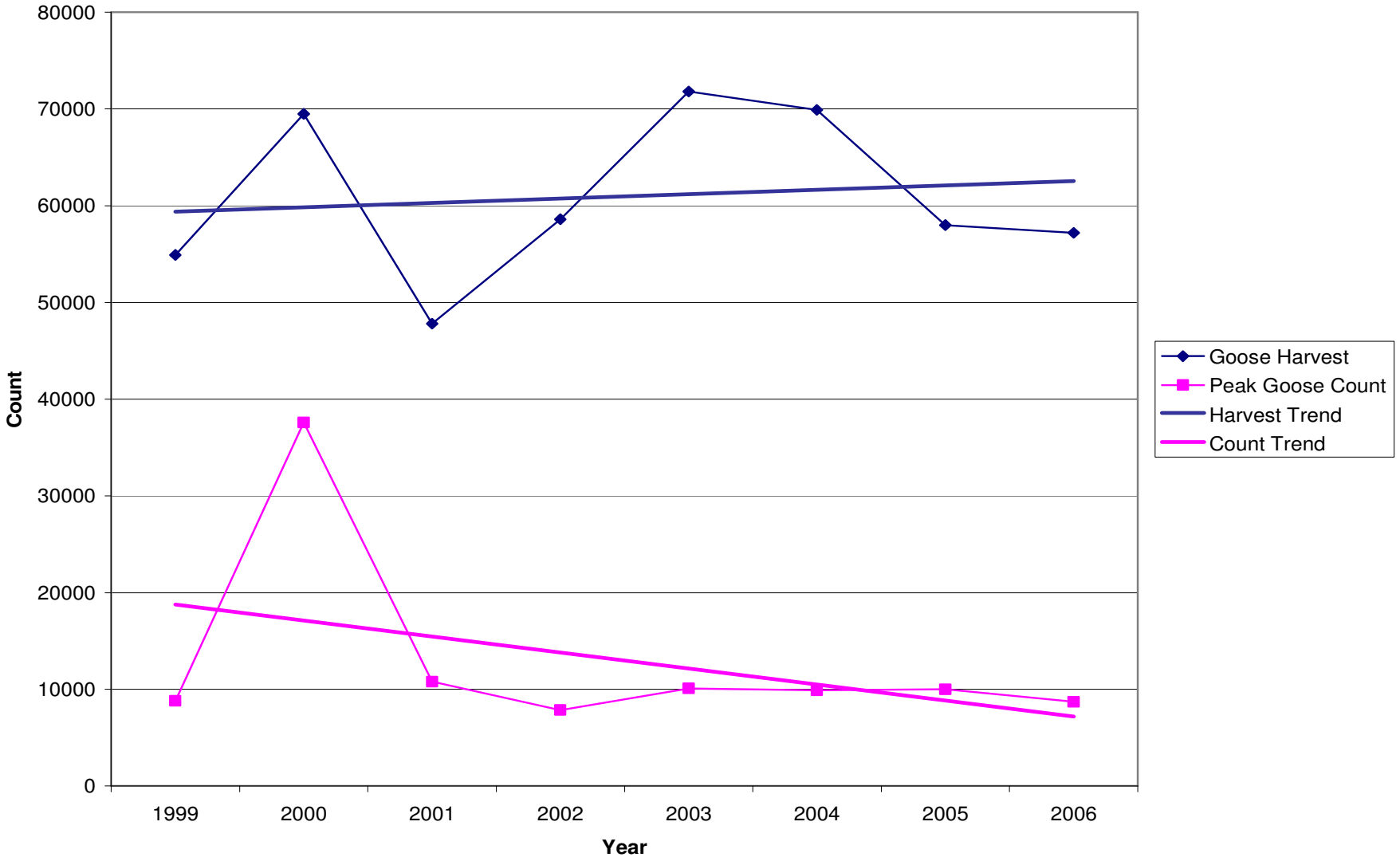


Figure 9. Canada goose harvest and peak survey count (statewide). Harvest is estimated from HIP. Notice that harvest continues to increase despite a decrease in total peak count during the survey. This likely indicates that many birds are not being counted.


Figure 10.Total duck harvest and peak survey count (statewide). Harvest is estimated from HIP. Notice that harvest continues to increase despite a decrease in total peak count during the survey. This likely indicates that many birds are not being counted.

Table 1. Peak waterfowl migration counts on survey areas in Indiana, September through January 2001-2006.

| Group/Subgroup/Species | 2002-03 | 2003-04 | 2004-05 | 2005-06 | 2006-07 | 5 Year Avg | % Change 2005-2006 | % Change from 5yr avg |
|---|---|---|---|---|---|---|---|---|
| All dabblers | 31,399 | 16,101 | 11,140 | 22,443 | 20,718 | 20,360 | -8% | +2% |
| Mallards | 29,975 | 14,092 | 8,684 | 20,064 | 18,865 | 18,336 | -6% | +3% |
| Wood duck | 4,213 | 3,445 | 4,997 | 3,489 | 4,810 | 4,191 | +38% | 15% |
| Black duck | 1,250 | 903 | 412 | 877 | 625 | 813 | -29% | -23% |
| Green-winged teal | 1,196 | 997 | 411 | 1,324 | 1,265 | 1,039 | 0 | +22% |
| Blue-winged teal | 912 | 898 | 994 | 1,010 | 1,005 | 964 | 0 | 0 |
| Divers and mergansers | 2,103 | 1,536 | 4,079 | 2,349 | 2,568 | 2,527 | +9% | 0 |
| Canada goose | 7,848 | 10,095 | 9,914 | 10,039 | 8,664 | 9,312 | -14% | -7% |

Table 2. Estimates of total and breeding pairs of Canada geese in Indiana.

| Year | Estimated Statewide Population | 95% C.I. | Breeding Pairs | 95% C.I. |
|---|---|---|---|---|
| 2007 | 125,300 | 87,739 – 162,861 | 56,375 | 39,125 – 73,625 |
| 2006 | 175,900 | 87,277 – 264,163 | 49,907 | 10,928 – 88,886 |
| 2005 | 94,979 | 66,982 – 122,976 | 33,378 | 23,960 – 42,796 |
| 2004 | 80,200 | 50,777 – 109,623 | 30,839 | Not available |
| 2003 | 95,640 | 63,808 – 127,472 | 50,638 | 30,969 – 70,307 |
| 2002 | ----- NO SURVEY ----- | | | |
| 2001 | 121,052 | 72,212 – 169,892 | 53,391 | 35,102 – 71,680 |
| 2000 | 121,340 | 75,219 – 167,461 | 47,872 | 33,662 – 62,082 |
| 1999 | 88,966 | 54,824 – 123,108 | 37,807 | 24,490 – 51,124 |
| 1998 | 78,857 | 56,918 – 100,796 | 34,655 | 25,777 – 43,533 |
| 1997 | 87,633 | 75,555 – 99,711 | 37,591 | 32,013 – 43,169 |
| 1996 | ----- NO SURVEY ----- | | | |
| 1995 | 63,033 | 39,793 – 86,273 | 24,005 | 16,107 – 31,903 |
| 1994 | 69,650 | 46,350 – 92,950 | 11,900 | 6,550 – 17,250 |
| 1993 | 67,491 | Not calculated | --- | --- |

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