# Annual cycle of waders at the Firth of Thames

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## ABSTRACT

Waders were counted monthly for six years at the three high tide roosts which are normally used by more than 50% of the waders in the Firth of Thames. The annual cycle of wader numbers is shown for all waders and selected species. The data are used to "correct" wader count data and demonstrate that such "correction" changes apparent population trends. Timing of future bi-annual wader censuses can be improved to maximise counts and/or to minimise variability.

KEYWORDS: waders, Charadrii, annual cycle, numbers, Firth of Thames

## INTRODUCTION

Waders (birds of the Order Charadriiformes, suborder Charadrii) using high tide roosts around the shores of the Firth of Thames, have been counted in summer and winter by members of the Ornithological Society of New Zealand since November 1960. These counts are generally referred to here as the wader "census" (Veitch 1978, Veitch & Habraken 1999).

The winter census has taken place between 17 May and 26 July (median date 26 June) - a period after Palearctic migrants have departed and presumed to be before New Zealand migrants move off to breeding grounds. The summer census has taken place between 18 October and 16 December (median date 19 November) which is after the return of most Palearctic migrants and before the return of the New Zealand breeding migrants.

In choosing these times for counting waders it was assumed that the number of birds on the Firth of Thames between the perceived major migratory movements of February - March and October for Palearctic migrants and January - March and August for New Zealand migrants was relatively static and hence differing count dates would not significantly alter the data obtained (Ross McKenzie, pers. comm.). A similar assumption has been made in interpreting and presenting data from these counts (Veitch 1978).

Studies of seasonal fluctuations of waders at other locations (e.g., Sagar 1976, Hale 1980, Pierce 1980) showed numbers of waders fluctuated at all times of the year, with fluctuations having the greatest rate of change when the count location is at a migration staging post, and the longest periods without change when the count location is at the end of a migration route. New Zealand, and hence each wader site within New Zealand, has been assumed to be at the end of the migration route.

 

This study sought to determine the changes in numbers of waders present on the Firth of Thames through monthly counts of part of the Firth of Thames from February 1985 to January 1991. This paper presents the findings of the study, seeks to determine future timing for the bi-annual census and provides 'correction' factors to standardize previous data.

## METHODS

For each census, the Firth of Thames was divided into eight count areas (Fig. 1). All waders present in those areas were counted at the time of high tide. In order to cover all parts of each count area adequately some parts were counted shortly before or after high tide. To ensure that such counts were correctly included or excluded a note was kept of any flying birds and observers compared these notes later to adjust totals.

Three of the count areas along the west coast of the Firth (Taramaire, Spit & Pools and Limeworks) were readily accessible and were the preferred roost for more than 50% of the waders at the times of the censuses. This area was chosen for the monthly counts. No checks were made to determine whether the same percentage of the Firth of Thames wader population used these roosts at all times of the year.

Within each month, one weekend was selected for counting. This had to be a weekend when the tide was predicted to be at maximum height for that month between about 0900 hrs and 1600 hrs. Counts took place in almost all selected weekends; occasionally two were done.

Counters were provided with a map which clearly defined the count area (Fig. 2) and a standardised recording sheet. They were instructed to count all waders at high tide within the defined counting areas. Emphasis was to be placed on counting the 16 most abundant species rather than searching for rarities.

## RESULTS

The average of the combined counts at the three roosts (Fig. 3) shows the changes in numbers of birds present from month to month and the range of numbers present in any one month.

Of the two censuses each year, the winter count period, which has varied from 17 May to 26 July, was in a period of rapid population change. The average count on 17 May was 39% higher than counts done on the median date of 26 June. The average count on 26 July was 46% lower than those on the median date. This change was not linear, nor was it constant for all species (Fig. 7). The summer count period has varied in time from 18 October to 16 December. The average count on 18 October was 13% higher than counts on the median date of 19 November). Counts on 16 December were similar to those on the median date.

In the winter count period, about 9% were Palearctic species while in the summer count period about 17% were New Zealand native species (Fig. 4).

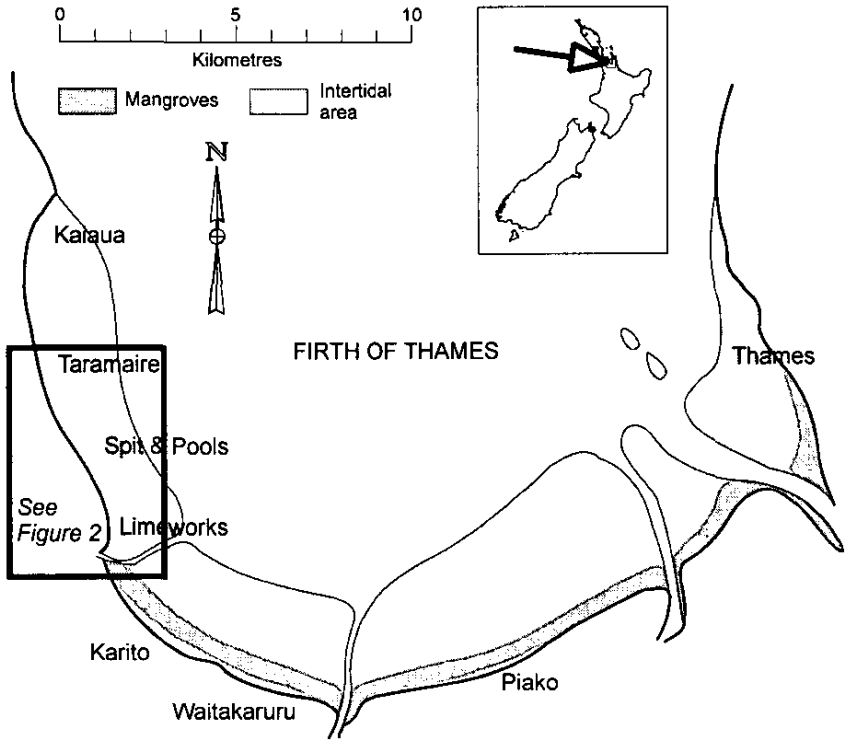


FIGURE 1 - The Firth of Thames showing the eight wader count areas and identifying the three areas counted monthly which are shown in more detail in Fig. 2.

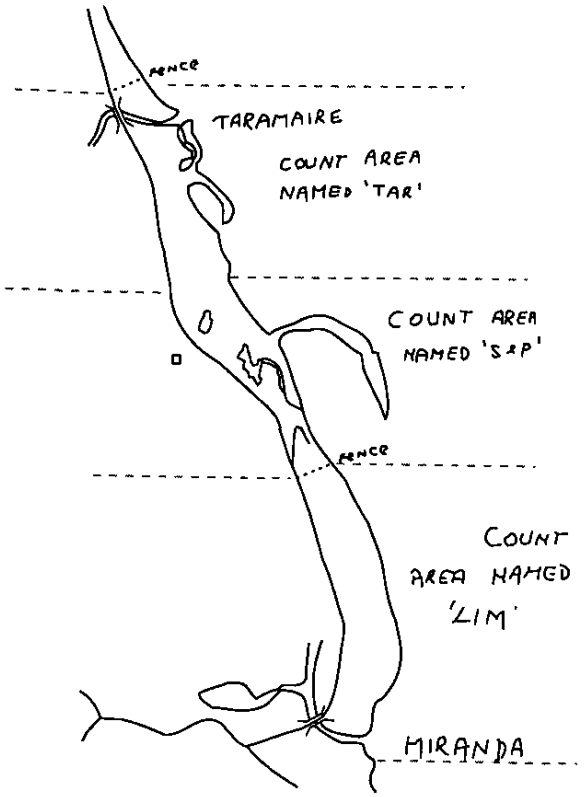


FIGURE 2 - The defined areas (referred to as the three roosts) in the Firth of Thames which were counted monthly, shown here as given to the bird counters.

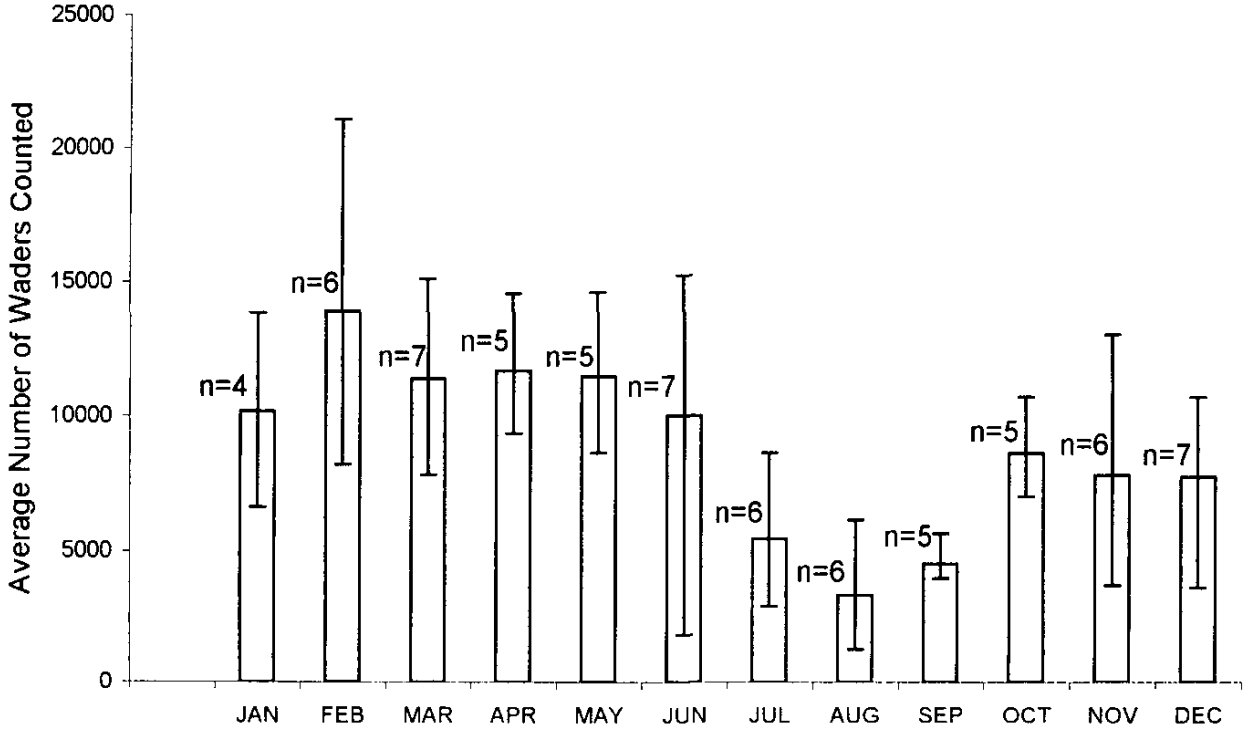


FIGURE 3 – Five-yearly average, range and number of counts of waders at the three roosts combined.

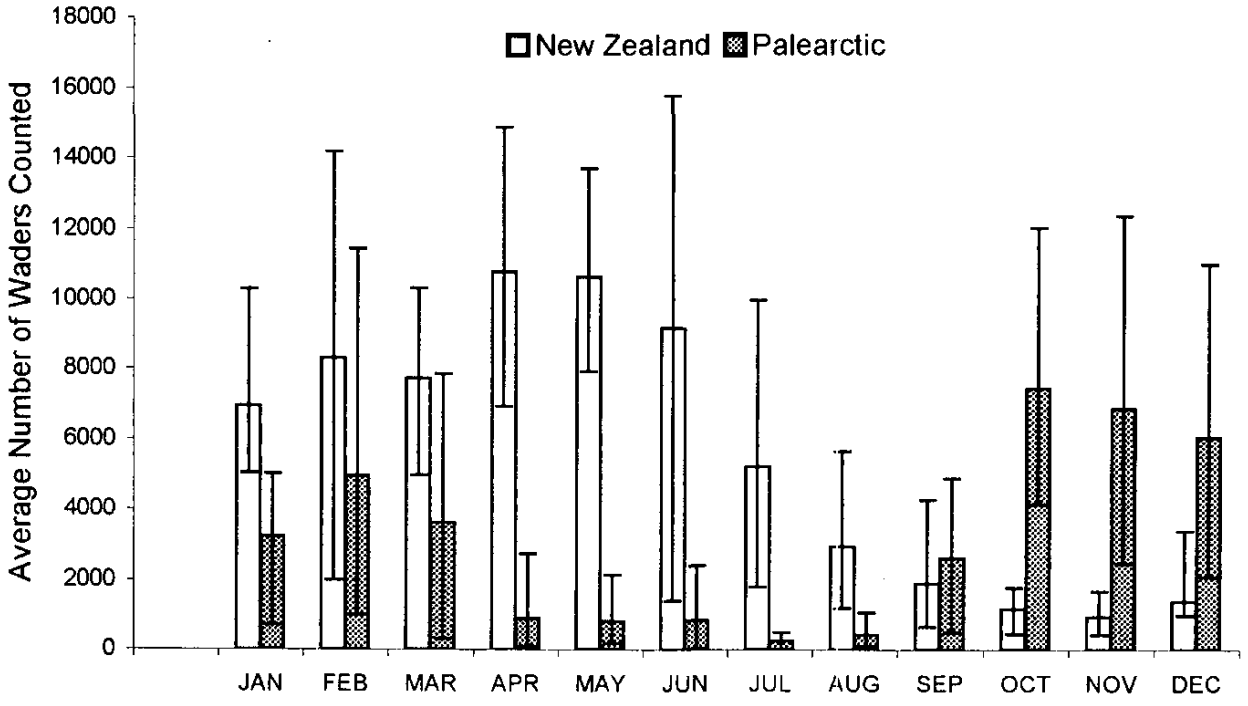


FIGURE 4 – Average and range of numbers of New Zealand (open) and Palearctic waders (hatched) at the three roosts.

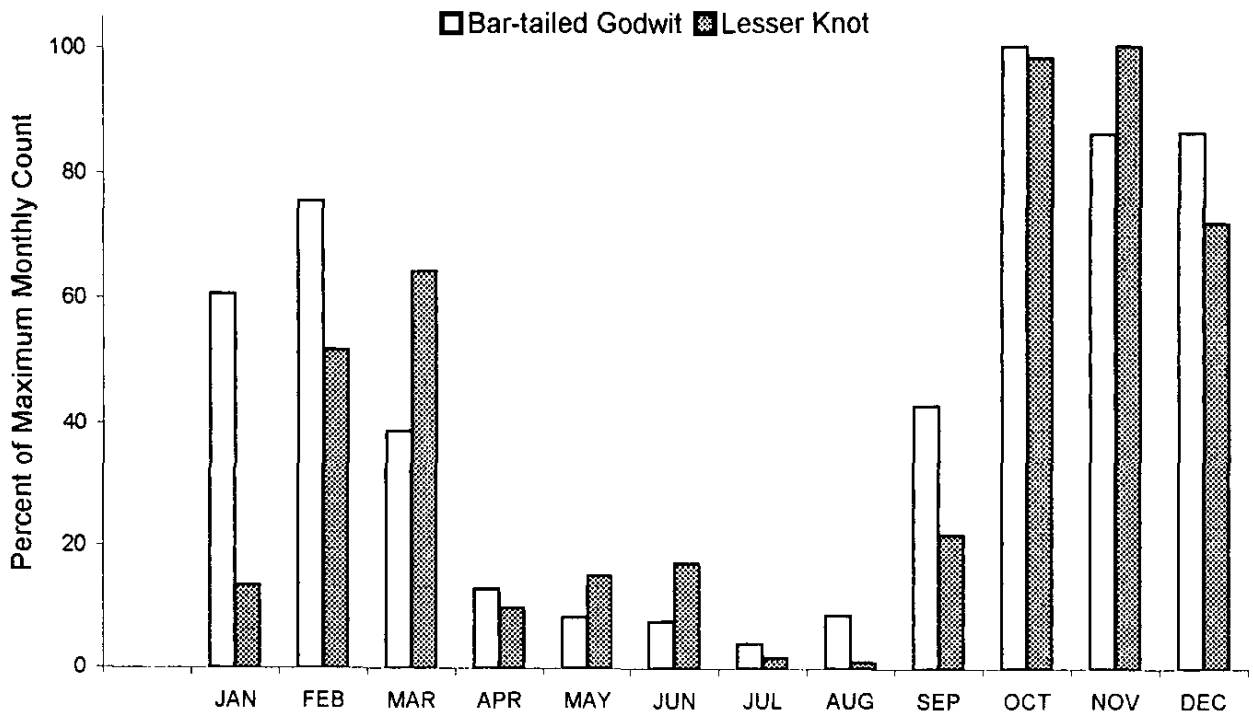


FIGURE 5 – Bar-tailed Godwit and Lesser Knot at the three roosts, with data shown as a percentage of the maximum mean monthly count; 4560 in October and 2796 in November respectively.

On average over the 60 counts there were seven species which had more than 20 individuals present. Banded Dotterel (*Charadrius bicinctus*) reached an average peak of 59 birds over the five years studied, and Turnstone (*Arenaria interpres*) had an average peak of 63. Pied Stilt (*Himantopus himantopus*) numbers varied erratically, changing by more than 100% from month to month, through the year. This species is not dependent on the inter-tidal area and their random presence can be due to changes in food supply inland. These three species are not considered further in this paper.

Bar-tailed Godwit (*Limosa lapponica*), Lesser Knot (*Calidris canutus*), Pied Oystercatcher (*Haematopus ostralegus*) and Wrybill (*Anarhynchus frontalis*), were present in sufficient numbers to allow their seasonal use of the three selected roosts to be analysed. The overall abundance of these four species varied greatly over the five years of this study and so, to show the variation in numbers present over the year, the data are presented as percentages of the maximum mean monthly count for each species in Fig. 5 & 6.

## DISCUSSION

There was clearly continual change in the number of birds present at the three selected roosts, and presumably the entire Firth of Thames, throughout the year.

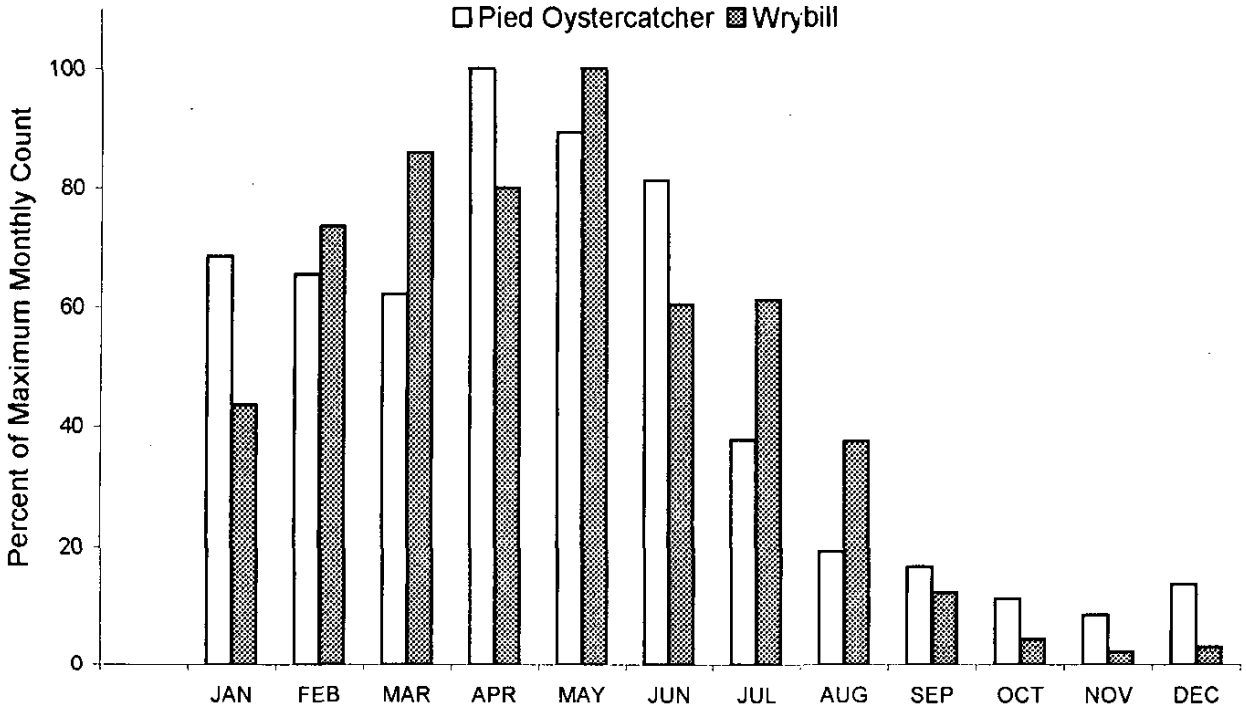


FIGURE 6 – Pied Oystercatcher and Wrybill at the three roosts, with data shown as a percentage of the maximum mean monthly count; 8129 in April and 2460 in May respectively.

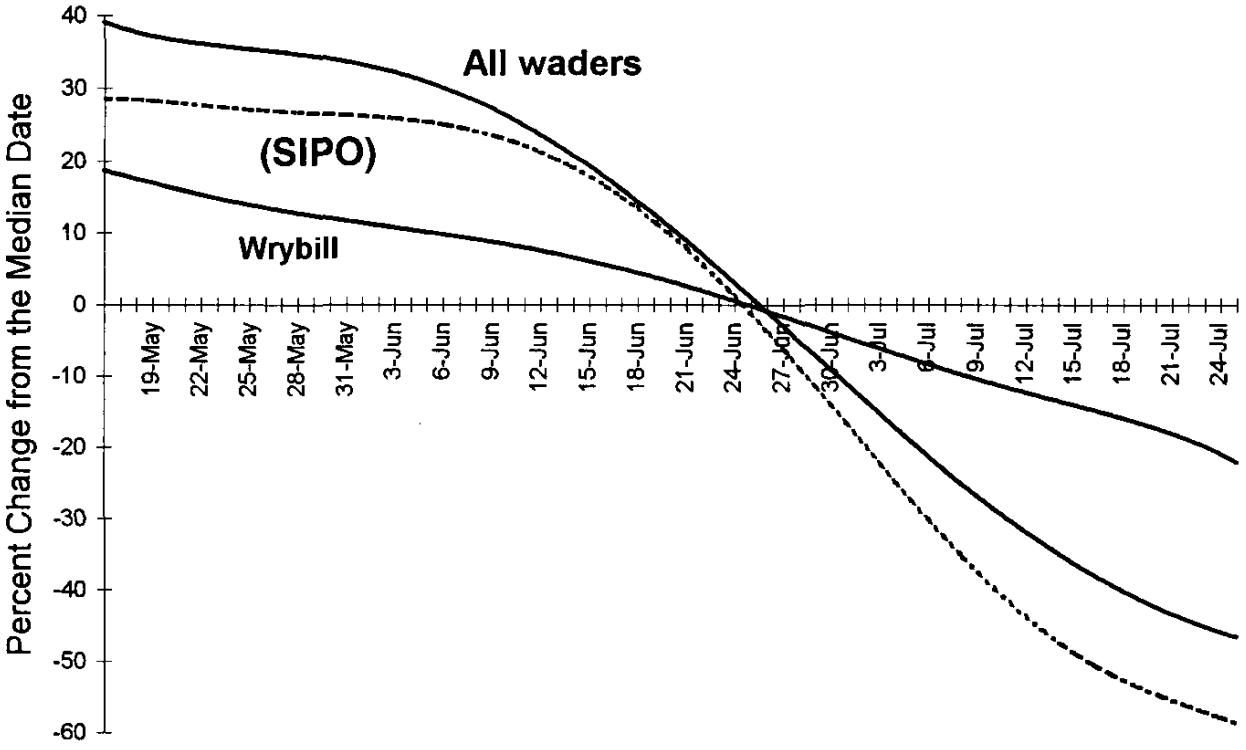


FIGURE 7 – The percentage change in abundance of all waders, Pied Oystercatcher and Wrybill at the three roosts over the winter census period.

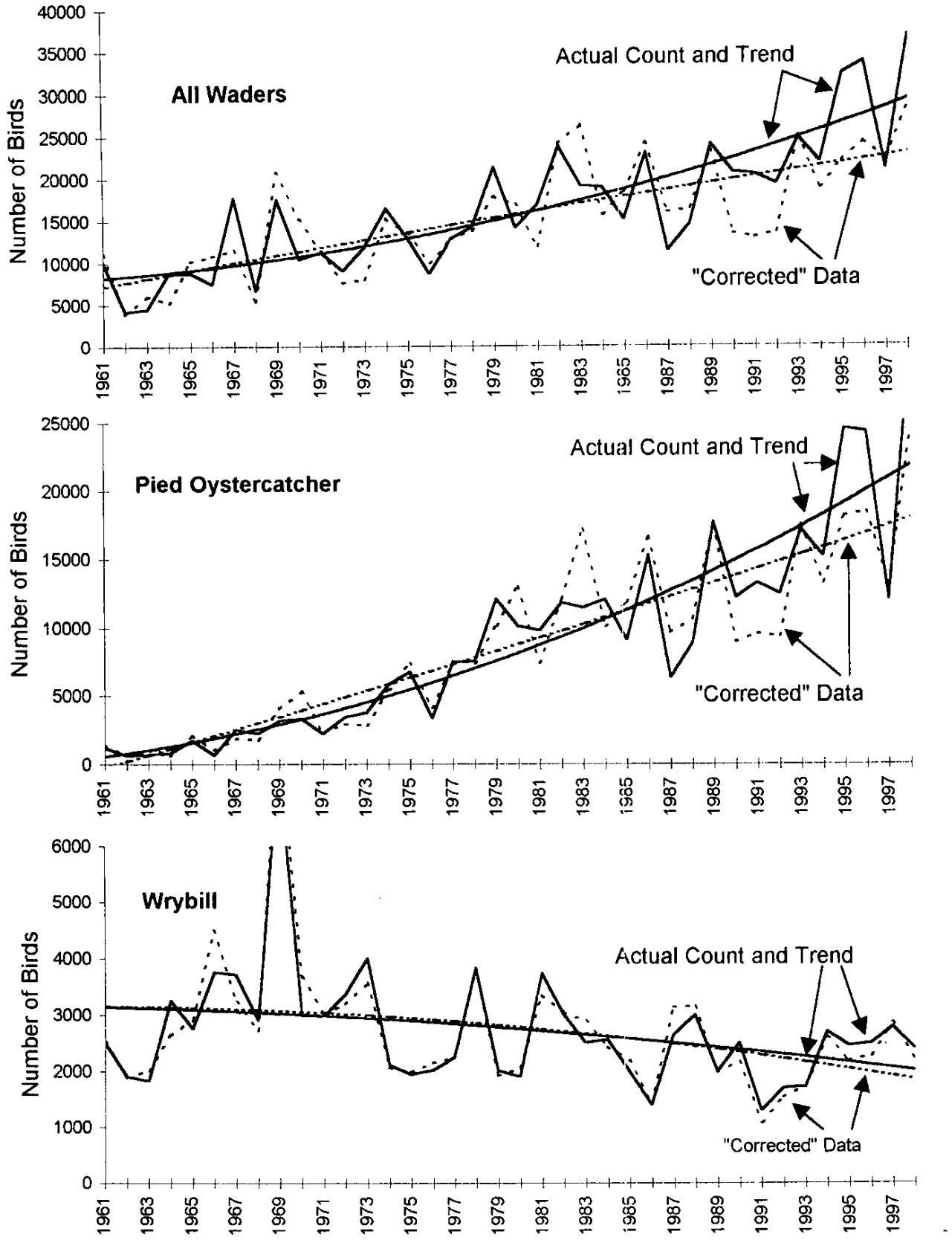


FIGURE 8 - Firth of Thames winter wader counts showing actual count data and "corrections" using the methods described in this paper. The trend lines are binomial lines fitted automatically by Microsoft Excel.

To reduce the effect of the seasonal change of bird numbers on future census results, and not lose the usefulness of continuity of data, the census dates selected should be as close as possible to the identified median dates of previous counts: 25 June and 19 November.

If new counts are planned then they should take place when either the population is stable, or maximum or minimum numbers of the target species, or group of species, are present, depending on the objectives for the new counts. The range of dates over which the count may take place should be determined before counting commences.

The data obtained from these monthly counts of the three roosts can be used to "correct" the census data in relation to the date of the count either for the entire count or for each species within the count. The winter count data have been used for this "correction" example as that is the time of greatest change in numbers of birds present.

This "correction" is achieved by taking the data shown in Fig. 3 for all waders, and those used in Fig. 6 for Pied Oystercatcher and Wrybill, and calculating the percentage above or below the figure obtained on 26 June, the median count date for winter counts (Fig. 7). Count data are then "corrected" by the percentage appropriate to the day of the count.

The "corrected" data in Fig. 8 still show significant fluctuations from year to year but this can be expected as breeding success, predation and natural phenomena impact on the population. The "correction" has slightly changed the apparent overall trend due largely to the counts for the period 1989 to 1996 all being on or before the median date for winter counts. More birds would have been present before the median date, thus the counts have been "corrected" downwards.

Other factors which might confound the accuracy of the counts have not been tested at this location. These include the influence of wind, rain, tide height, counter ability, flock size, flock composition and visibility of birds at different roosting locations.

## ACKNOWLEDGEMENTS

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