4b Waterfowl Round Count

Zoological Museum, Finnish Museum of Natural History
Kuopio Science Museum
Finnish Game and Fisheries Research Institute, Game Division

Waterfowl census / Zoological Museum
P. Rautatiekatu 13
SF-00100 Helsinki

1. BACKGROUND AND AIMS. Systematic waterfowl censuses on lakes began in Finland in the 1920s and 1930s. Comparable data to the present studies, however, are not available before the 1960s since when the round count method has been used basically in its present manner. The nation-wide monitoring scheme started in 1986.

The principal aim of round counts is to collect data on the population size and abundance of waterfowl over entire water bodies or clearly defined parts of them. The censuses should include representative samples of different water types and geographical areas. Divers, grebes, swans, geese, ducks, gulls, terns and Coot are the main subjects of the counts.

Round count is more time-consuming than point count. Round counts aim at estimating the total breeding populations of a study area, so that the effects of area, eutrophication, vegetation and other environmental factors on waterfowl can be studied. On the other hand, the results obtained from round counts made in successive years can be used in environment-al monitoring.

The following instructions are suited as such to censuses of small and medium-sized lakes, ponds and sea bays. Details for waterfowl and archipelago birds censuses on large lakes are given in Sect. 12.

2. EQUIPMENT AND TIME NEEDED. Besides binoculars, a survey map (1:20 000) and a notebook, an enlarged map showing the most important landmarks and the shape of the shore line is useful when censusing large water bodies with luxurious vegetation and a broken shoreline. If one walks round the water body, a telescope is useful. A boat or a canoe is necessary at least on the largest lakes. It is possible to count ca. 50 ha per hour by boat, even more on large oligotrophic lakes.

3. CHOOSING A CENSUS ROUTE AND AREAS. Ponds, lakes, bays, rivers and also seashores are suitable census areas. To ensure the representativeness of the data, it is desirable that all types of water bodies found in an area (also oligotrophic waters which abound in Finland) are censused.

Plan a census route on a map using field knowledge. Each route should include one or more water bodies which can be censused completely. All water bodies along the route have to lie (at least partly) in the same 10\|10 km square of national grid. – Send a map showing your census waters to the Museum after the first census year.

4. CENSUS PERIODS. Count the same water body (1–) 2 times in late spring depending on the breeding waterfowl; the first census should be during the first half of May and the second in late May or early June (see Form 4C). If only Mallards, Teals, Goldeneyes, Pochards and/or Goosanders breed in the census area, one count during the first half of May is enough. If, in addition to these species, several pairs of Garganeys, Wigeons, Tufted Ducks and/or Red-breasted Mergansers breed, another count in late May or early June is needed. Pintail and Shoveler can be censused most reliably either during the first or the second period depending on the geographical area and the type of the water body. Pintail pairs breeding in the north can be observed often on lakes in southern Finland during the first census period. It is recommended that both censuses are made, because it is difficult to know the breeding waterfowl species beforehand. In practice, one count is enough on oligotrophic waters (preferably at the end of the first period or a little later), but elsewhere two counts per season are necessary.

The census should coincide with the short period when the breeding population has settled but pair bonds have not yet broken. On the other hand, migrating birds should not be allowed to bias the censuses (no passing flocks left). The timing of the best census period depends on the geographical location of the census area, advancement of spring, the type of water body and the species of breeding waterfowl. The core period is best to define locally on the basis of the breaking up of the ice, migration of waterfowl and the flocking of males. If males have already formed large circling flocks (more than four individuals), the round counts of that species will no longer be reliable. The censuses should take place during a period favourable to as many species as possible.

Thus, consider carefully the best time for the censuses every year. Pay special attention to the fact that the migrating flocks of the species to be counted should have already disappeared. The most difficult species when two censuses are taken, are the Teal (in late spring the birds still live in flocks during the first count, if it is done too early), Wigeon (non-breeding birds and migrants can make it difficult to define the right census period), Shoveler and Garganey (part of the population is laying eggs while the rest is still settling on territories) and Pintail (migrants can still be seen, especially on eutrophic lakes in southern Finland, during the first census period and even later). When the spring comes late, in northern Finland it is especially difficult to time the censuses right, because both the species to be counted during the first period and those of the second one start their breeding about the same time due to the late break-up of ice.

5. TIME OF DAY. Count the birds in the morning or noon but not in the evening. The birds should not have been disturbed by fishing or other human activities before the census.

6. WEATHER. Count the birds only in good weather: a sunny or lightly clouded day is the best. Do not count in mist or rain with poor visibility or in windy conditions.

7. FIELD WORK. Choose the counting route and direction according to light conditions, vegetation and the resting places preferred by the birds. Start the census in areas where there are few birds and end it where the numbers are highest.

Enter the census area without disturbing the birds. Write down on your notebook the name of the water body censused, weather, observer, date and starting time.

Count the birds by rowing or walking round the entire water body near the shore line. Only small lakes and those with rich vegetation or flooded shores can be censused on foot. Two observers are useful especially when censusing large stretches of water by boat; one rows and observes the movements of birds while the other identifies the species and writes down the data. Use suitable observation sites when counting the (diving) species of open water so that identification is possible before the birds escape.

Carefully study the whole area. Pay special attention to bays, mouths of ditches, edges of reed beds and other places preferred by waterfowl. Check the shores as far as the bush zone when a flood is up. If some part of the study area can be observed reliably with binoculars or a telescope, one does not necessarily have to go there. Coots should be counted from as far away as possible, because they readily hide in vegetation once they spot the observer.

Identify the species and sex (in species where sexing is possible) and write down the individuals and groups while you are observing. Write down the birds according to the following example: Mallard oo + o + oo + o + 3oo +2oo 1o, where o = a single male, 3oo = a group of three males. Write down also the birds in flocks and on migration (e.g. 5oo 3oo, a flock of 10 ind.). These should be mentioned on the form, but they are not accounted for when estimating the numbers of breeding pairs (see Form 4A).

Be especially careful with birds flying or swimming from one place to another: write down the flying directions and sites of alighting. Take care not to count any individual repeatedly. Use enlarged maps on large lakes with rich vegetation and a broken shore line (separate maps for each census period). If nearby areas are censused in succession during the same day, take into account the birds moving from one lake to another (e.g. *Aythya* species). The moving individuals are included in the results of the census area where they finally stay.

Be careful but quick when censusing so as to avoid bias caused by movements of birds.

Despite detailed observations it may occasionally be difficult to decide whether an individual was observed and written down or not. Use common sense when interpreting such cases and follow the same routine from year to year. After returning to the starting point write down the time.

8. INTERPRETING OBSERVATIONS. The unit analysed is a pair, not an individual. Interpret the observations you have written on Form 4D as pair numbers according to the instructions in Form 4A.

9. FILLING IN THE FORMS. The information about the census route is given on Route Form 4A and the census results from separate water bodies on Site Forms 4C–D. The instructions for filling in the forms can be found overleaf on Route Form (page 4B). Send the route form and all its site forms together. In the first census year, include a map showing the census areas also.

10. REPEATING THE CENSUS. Census the same areas during as many successive years as possible (at least two). To ensure the comparability of the results, make the censuses exactly in the same way each year:

- exactly the same census area
- the same observer(s)
- good weather
- in each area use the same time of the year in relation to the advancement of spring and migration during both the first and the second census periods (in practice the census dates can differ by a couple of days between the years)
- the same counting route, direction and speed of movement.

If the counting practice changes markedly, it should be mentioned on Route Form 4A and in "remarks" of Site Form 4D.

11. ROUND COUNTS OF SHORE BIRDS. Shore birds may be censused within the round counts if this does not limit the attention paid to the waterfowl. Such extra data contributes significantly to the monitoring of certain waders and passerines, because shores are their main habitats.

The species to be counted are the waders and passerines listed on Form 4D (only the individuals observed in wetlands, shore meadows and scrub, silty shores etc. are included, not those in shore forests and fields). Additional species may also be counted (the pair numbers are added to "additional species").

If one is not able to cover the whole shore zone from boat or a walking route, define a census belt of certain width and count the birds within it from year to year. In general, the same routine should be followed in shore bird censuses annually to ensure the comparability of results. If it changes, write a note in "remarks" on Form 4D.

12. WATERFOWL AND ARCHIPELAGO BIRDS CENSUSES ON LARGE LAKES. On large lakes the field work should be done as follows (see also the instructions for censusing archipelago birds, Ch. 5 in this Manual):

You need a rowing or a motor boat, a survey map and an enlarged map for visiting. Because the census areas are large, each count takes several hours. A telescope is useful for observing birds further away.

One can census a whole lake or a part of it, which should be a meaningful, separable subarea from the rest of the lake. Shores, peninsulas, mouths of bays, large open water areas, islands etc. are suitable boundaries. The size of the area may vary from a few to tens of square kilometres.

Divide the census area to subareas of different size, based on the characteristics of the shores, vegetation and breeding bird fauna. Put each subarea in one of the following main habitat types:

1) Archipelago with open islets (pelagial waters); typical species include Black-throated Diver, *Mergus* spp., gulls and terns (mark type 1 in Form 4C).

2) Archipelago with forested islands, or forested lake shores; typical species include Goldeneye, Common Sandpiper and Common Gull (mark type 8 and write a short description of the site on Form 4C).

3) Oligotrophic bay; typical species as in type 2 above (mark type 8 and write a short description of the site on Form 4C).

4) Eutrophicated bay; typical species include Great Crested Grebe and Wigeon (mark type 2 on Form 4C).

5) Highly eutrophicated, shallow bay; typical species as in type 4 above, plus many reedbed birds (mark type 4 on Form 4C).

The census area has to be a meaningful entity also as regards field work; i.e. it needs to be workable in one day and in a coherent manner. Valuable breeding sites (islands, peninsulas and bays) should be taken as separate census areas.

The census area is counted once or twice depending on the breeding waterfowl and the time period the observer has available. Besides the phenology of the waterfowl pay attention to the break-up of the ice when determining the annual census period. If most of the species breeding in the area can be counted in the first period (see Sect. 4 and Form 4D), a satisfactory result is obtained in one visit only. In southern Finland the best period is from about 20 May to 25 May and in northern Finland at the turn of May and June. If one concentrates on early-breeding species (see Form 4D) and the Herring Gull (or there are no later-breeding species), one can start ca. five days earlier. A second visit from about 1 to 5 June gives a more reliable result for later-breeding species (e.g. Wigeon, Tufted Duck, Black-throated Diver, grebes, Lesser Black-backed Gull) and is therefore recommended. Be careful not to interpret the late migrants of e.g. Black-throated Diver and Red-breasted Merganser as breeding pairs. A third visit from about 15 June to 20 June is necessary to count the number of terns and late-breeding gulls reliably (especially Lesser Black-backed Gull; if done, write the results in "remarks" on Form 4D. All species and observations are written down on every visit and the pair numbers are estimated according to the observations of the most suitable species-specific census period (see Sect. 4, Forms 4B–D).

The total census area is covered subarea by subarea. Plan beforehand as rapid a route as possible from which one is able to check open water areas, shores and islands thoroughly and carefully. Often it is easiest to first check the mainland shores and after that to go round the islands. All birds are marked on an enlarged map. Pay special attention to the moving of birds to avoid counting the same individuals repeatedly. Check bays and other sites preferred by birds further away with binoculars or a telescope, to avoid disturbance. In general, the birds should be observed before they take flight. Count the incubating gulls and terns before they take off from their nests. If one is not able to count the birds further away because an island under observation is large, stony or has rich vegetation, one should land and count the nests.

The census results of separate subareas are written down separately on Site Forms 4C and the pair numbers are interpreted according to the instructions on Form 4A. The total census area forms a route (see also Form 4B).

The census should be made in the same area in successive years exactly in the same way. To get comparable results, the observer must have experience of waterfowl counting on large lakes already in the first year.

During the waterfowl censuses one can also count the shore birds (see Sect. 11).

13. WATERFOWL BROOD COUNT. The aim of the brood count is to monitor the annual changes in the breeding success of waterfowl (number of broods, proportion of females with young etc.). Brood counting should be done on the same water bodies as the spring censuses of the breeding population. Broods may be counted by the same route count method as the breeding populations (see Sect. 7). All waterfowl seen are written down separately: lone adults, young and broods with their parents (also the age class of the young). Broods are counted once from about 1 to 20 July depending on the geographical locality, breeding waterfowl fauna and the breeding phenology of the year (see also Sect. 4). Pay special attention to shores covered by aquatic vegetation, because duck broods prefer to hide there.

Detailed instructions for the brood and late summer censuses are available from the Finnish Game and Fisheries Research Institute, Game Division, Turunlinnantie 8, SF-00930 Helsinki, Finland.

Return the waterfowl forms to the Museum as soon as possible (at latest before mid-June)!. The results are used the same summer, e.g. for making hunting recommendations. Results of brood counts should be sent immediately after the count.

SELECTED REFERENCES

Kauppinen, J. 1980: Sources of error in estimation methods of breeding waterfowl populations (in Finnish with English summary). – Lintumies 15:74–82.

Kauppinen, J. 1983: Methods used in the census of breeding ducks in northern Savo (Finland) at the beginning of the breeding season. – Finnish Game Res. 40:49–81.

Koskimies, P. & Pöysä, H. 1989: Waterfowl censusing in environmental monitoring: a comparison between point and round counts. – Ann. Zool. Fennici 26:201–206.

Lammi, E., Kauppinen, J., Koskimies, P., Pöysä, H. & Väisänen, R.A. 1988: Population monitoring of the Finnish waterfowl in 1986–87 (in Finnish with English summary). – Lintumies 23:61–65.

Lammi, E., Väisänen, R.A. & Koskimies, P. 1988: Population monitoring of the Finnish waterfowl in 1987–88 (in Finnish with English summary). – Lintumies 23:138–145.

Lammi, E., Pöysä, H. & Väisänen, R.A. 1990: Monitoring breeding populations of the Finnish waterfowl in 1986–89 (in Finnish with English summary). – Lintumies 25:25–32.

Nilsson, L. 1978: Parräkning. inlandsvatten (in Swedish). – *In* Statens Naturvårdsverk: BIN Fåglar. Biologiska inventeringsnormer, pp. F11.1:1–10. Liber, Stockholm.

WATERFOWL ROUTE FORM Waterfowl censuses / Zoological Museum **Return before mid-June!**

4A Version III/1990

P. Rautatiekatu 13, SF-00100 Helsinki

ROUTE NUMBER	YEAR	NUMBER OF CENSUS SITES	OBSERVER NUMBER
72	19 90	11	1234

REPEATING THE CENSUS (cross)

- [ ] New route
- [ ] Censused similarly last year
- [x] Census changed, how: SITE 11 IS NEW

Name: _____

Addr.: _____

_____

Tel.: _____

NATIONAL GRID 10x10 km

S - N	W - E
677	41

MUNICIPALITY (6-letter code): HOLLOL

NUMBER OF SITES CENSUSED BY

10	Point count method
1	Round count method

REPRESENTATIVENESS OF THE COUNTED LAKES IN THE RESPECTIVE 10x10 km SQUARE (circle one code):

0 Difficult to estimate
(1) Makes a representative sample
2 Surplus of oligotrophic waters
3 Surplus of eutrophic waters

INTERPRETATION OF CENSUS RESULTS. The following are counted as a breeding pair (field abbreviations in parenthesis):

In ducks (except in *Aythya* and *Bucephala* species)
- single pair (♂♀)
- lone male (♂)
- males in groups of 2-4 (2-4 ♂♂ = 2-4 pairs)
- small male groups chasing a female (2-4 ♂♂ 1♀ = 2-4 pairs)
- lone females (♀), if their total number is larger than that of males (♂).

In the **Tufted Duck** and **Pochard** (excess of males)
- the total number of females (♀♀).

In the **Goldeneye**
- adult male (♂)
- pair (♂♀).

In the **Coot**
- lone bird (near the shore)
- pair (two birds together)
- territorial dispute (= 2 pairs)
- calls of birds unseen.

In **divers** and **grebes**
- lone bird
- pair (= two birds together).

In grebe colonies some birds may hide in vegetation. If you are not able to count all birds (e.g. by disturbing them), give the total number of individuals near the colony without interpreting them as pairs.

In **gulls** and **terns**
- lone bird or pair near a probable nesting site (e.g. incubating or alarmed birds).

The size of colonies can be estimated by counting nests or incubating birds, or parents leaving their nests (both the male and the female are often present). Probable non-breeding groups are not interpreted as pairs.

In **all taxons**
- nest (be careful not to interprete the adults as a second pair!).

HOW TO FILL IN WATERFOWL CENSUS FORMS

4B

The forms should be filled in with clear hand-writing, a pencil and using BLOCK LETTERS. All numbers should be written so that they end at the right margin (e.g. date, area). All letter data are started from the left margin (e.g. municipality, site name).

WATERFOWL ROUTE FORM 4A

General information on the censuses is presented here. The ROUTE NUMBER is given at the Museum after the first census year. NUMBER OF CENSUS SITES: All the point or round counts (sites) within one 10x10 km square form a route. When the census covers a large lake, however, the route means the total area, and its subareas are treated as sites (see round count instructions: Sect. 12). The OBSERVER NUMBER remains the same in all monitoring projects. CHANGES OF THE CENSUS: If the census routine changed from the previous year, please inform how (e.g. there is one new site, or one or several remained uncounted). The NATIONAL GRID: The determination of the coordinates of your census square is shown in the general instructions of the Manual. The MUNICIPALITY codes are presented in Appendix 2 of the Manual. If there is more than one municipality within the square, the one including the highest number of sites is given. CENSUS METHODS: Write down how many of the sites were censused by the point count and how many by the round count method. REPRESENTATIVENESS. Estimate, how representative the counted waters are compared to the all lakes and ponds within the square.

WATERFOWL SITE FORM 4C-D

A separate site form 4C-D have to be filled in for each site (even if the sectors of several point count sites cover the whole lake). SITE NUMBER: Every site gets a permanent number starting from 1 within a route. Do not change the numbering of the sites from year to year, even if a site is left uncounted in some year. SITE NAME should be descriptive enough to enable another person to find the site, e.g. for special research purposes. If you census a large lake, its subareas are treated as individual sites and receive site numbers of their own (see round count instructions: Sect. 12). The name of the site should be kept constant from year to year also.

There is room for two census visits. DATE means the running number of the day from May 1st (e.g. 31st May = 31, 8th June = 39). The core census periods match in a "normal" year (the best period is given first and that given below is also suitable; the periods for North Finland are poorly known). After STARTING HOUR the DURATION of the count is filled in. Because the EQUIPMENT may affect census results, inform whether or not a telescope (in point and in round count) or a boat (in round count) was used.

TYPE OF THE COUNTED WATER BODY is identified with the help of the summer vegetation (in May it may lie under flood). The types used in the censuses of large lakes are given in the round count instructions (see Sect. 12).

AREAS. The total and the counted area of the water body can be measured from a survey map (e.g., 1:20 000). All the water and wetland area suitable for waterfowl is included except fairly dry shore meadows. If the area is 10 000 hectares or more, it is marked beside the box. COVERAGE: Inform if the count covered the whole water body or not. A round count usually covers the whole lake. If several sites (point count sectors or round count subareas in a large lake) cover the whole water body, give the numbers of these particular sites ("not determined" must often be used along a sea cost). GROUPS OF SPECIES COUNTED: Inform whether you counted all groups of species listed in Form 4D or only some of them. Write also a note in the lower margin of Form 4D if there were some other species present or not and whether they were counted (i.e. are there no additional species listed in Form 4C because there were none present or because they were not counted).

Rewrite the site name and number on the reverse side of the form (4D). OBSERVATIONS: All the observations are written down after the species name, each bird and group of birds separately (number and sex; see census instructions: Sect. 7). The estimation of pair numbers of all species from Mallard to Coot are based on the observations from the first visit and that of species from Tufted Duck to Red-breasted Merganser on the second visit (instructions for estimation: see Form 4A).

The PAIR NUMBERS estimated by the observer are marked before the species name. If there are over 99 pairs of a species, the extra amount is written on Form 4C (ADDITIONAL SPECIES; use the 3+3-letter species codes listed in Appendix 1 of the Manual). The number of pairs or territories of all species from Little Gull to Reed Bunting is written on the respective line after the species name (no separation of field observations is necessary). The number of pairs on the second visit is used as the final pair number except in Snipe and Reed Bunting whose pair numbers are estimated from the results of the first visit.

The observations of probable waterfowl species which are not listed in Form 4D are filled in "additional species" and the estimated pair numbers are written down after the 3+3-letter codes into 4C. The pair numbers of the swans, geese and Smew are estimated from the observations of the first visit , whereas those of the Red-throated Diver, Long-tailed Duck and Common Scoter from the records of the second visit. Other additional wetland species may also be marked.

Send Route Form and its Site Forms together! Also, include a map showing the counted water areas and sectors after the first census year.

WATERFOWL SITE FORM — Waterfowl censuses / Zoological Museum

4C Version III/1990

Route number: 72 Year: 1990

SITE NUMBER: 4

SITE NAME: KUTAJÄRVI 3

CENSUS METHOD (circle one code): (1) Point count, 2 Round count

CENSUS VISIT	DATE	START (hour)	DURATION (min)
1.	11	7	12
2.	25	8	10

EQUIPMENT used (circle):
TELESCOPE 0 no (1) yes
BOAT 0 no 1 yes

Core census periods in "normal" year:

A = southern and southwestern coast
B = South and Central Finland (inland)
C = North Finland

	1st visit	2nd visit
A	8-10 May (5-13 May)	20-25 May (19-27 May)
B	10-15 May (8-16 May)	25-30 May (23-31 May)
C	20-25 May (18-26 May)	30 May - 6 June (30 May - about 10 June)

TYPE OF THE COUNTED WATER BODY (circle one code):

1 Barren oligotrophic lake or pond with forest or mire shores
2 Deep, partly eutrophicated lake, wide reed-beds in bays
3 Shallow eutrophicated lake with forest or peatland shores
(4) Eutrophic lake in agricultural or urban area
5 Barren, oligotrophic sea coast
6 More eutrophic sea coast, some reed-beds
7 Eutrophic sea bay
8 Other, what (e.g. artificial pond, river; describe the amount of vegetation):

Additional characters:

- Black-throated Diver and *Mergus* spp. typical in lakes over 1 km²
- Great Crested Grebe abundant in South and Central Finland
- Brown, dystrophic water; horsetail abundant; lots of birds; usually the water level has been lowered
- Quite shallow; usually reed beds and lots of birds; most common in South and Southwest Finland
- Both shallow and deep shores
- Respective to the type 4 bird lake

AREA OF THE WATER BODY (lake, pond, etc.): 180 hectares

WATER AREA COUNTED (sector in point count or lake etc. in round count): 14 hectares

DID THE COUNT COVER THE WHOLE WATER BODY (circle one code):
0 No/not determined
1 Yes
(2) Following sites covered the whole water body (numbers):

No	Yes	SPECIES COUNTED: (circle codes; see the reverse side)
1	(2)	Waterfowl etc. (Mallard - Red-breasted Merganser)
1	(2)	Larids (Little Gull - Arctic Tern)

ADDITIONAL SPECIES

(3+3-letter code)	pairs
LARRID	321
TRIGLA	1

4D 4 SITE NUMBER **SITE NAME:** KUTAJÄRVI LAKE, SITE 3

		1st visit	2nd visit
2	Mallard	1♂ + 1♂♀	1♂
2	Teal	2♂♂	
	Pintail		
	Shoveler		
0	Pochard	2♂♂	21 ♂♂
	Eider		
4	Goldeneye	2♀♀ + 1♂♀ + 2♂♀ + 1♂	16♂♂ + 4♀♀ + 1♂
	Goosander		
3	Coot	1+1+2	

		1st visit	2nd visit
1	Tufted Duck	14♂♂ 3♀♀ + 5♂♂ 1♀	15♂♂ 1♀
2	Wigeon	2♂♂ 1♀ + 1♂♀	2♂♂
	Garganey		
	Black-throated Diver		
5	Great Crested Grebe	1+2+2+1	1+2+1+2+1 INCUBATING + 1
	Red-necked Grebe		
2	Slavonian Grebe	2+2	1+2
	Velvet Scoter		
0	Red-breasted Merganser	1♂♀	

		1st visit	2nd visit
2	Little Gull		2 ON NESTS
99	Black-headed Gull	APPR. 600	APPR. 700* exx
	Common Gull		
	Lesser Black-backed Gull		
	Herring Gull		
2	Common Tern		2 ON NESTS

		1st visit	2nd visit
	Arctic Tern		
	Snipe		
	Redshank		
1	Common Sandpiper	1	2
15	Sedge Warbler		15 TERRIT.
9	Reed Bunting	8 TERRIT.	9 TERRIT.

ADDITIONAL SPECIES:	1st visit	2nd visit
TRI GLA	1	1

REMARKS: