Version 4 – 9th December 2021.

METHODOLOGY BOOKLET – FIELD WORK

TOV - Extensive monitoring of breeding birds in Norway

NB! Provide feedback to tov-e@nina.no if you have comments to this methodology booklet.

FIELD METHODS - Summary of the most important factors

Point Sampling (*must be completed*)

- The samples are made in grids (also called routes) with 20 counting points (some grids have fewer points due to lack of accessibility to points, first-year sampling have determined any points which should be excluded).
- Counting points are found by the use of a GPS. The exact counting point used should be chosen within a distance of up to 20 m to the point that the GPS indicates. Be sure to bring extra battery to the GPS.
- Perform counting even when the counting point is covered by snow. If one point cannot be reached (eg. due to disturbing bird, closed area, building activity, angry bulls, etc.), count as close to the counting point as possible, and report relocation information in the comments field. Specify if the counting point must be moved permanently.
- Each grid should be sampled in a very specific standardized manner. Each count grid has its established '***Standard procedure'*** which can be downloaded from: http://tov-e.nina.no/fugl. Log in and find 'Standard Procedures' for your grid.
- The samples should be undertaken within a specific date interval and between 04 a.m. and 10:00 a.m. approximately (for a few routes with difficult access 11:00 a.m.). Each grid has its specific date interval for sampling and a time for the start of sampling. The start time of the sampling ***must not deviate more than +/-30 minutes*** from this specified start time.
- When arriving to a sampling point, behaviour must be quiet with as little disturbance for birds as possible. Allow things to settle down for a few minutes after arrival before starting the sampling.
- ***Exactly 5 minutes*** with registration at each point.
- Number of pairs of birds of each species is recorded ***within and outside the 50 m*** distance from the point.
- The unit in the registration is the ***number of pairs*** (not individuals), reported for area respectively within and outside 50 m distance from the point.
- The same bird/pair registered from several different points should only be reported for the first point (relevant for e.g. cuckoo). For species with a very high number of singing males at one counting point, it can be difficult to find the true number for pairs (e.g. willow warbler). Use the approx. 2 first minutes primarily to get an estimate of the number of such species and then spend the rest of the time listening for other species.
- When sampling the point in subsequent years, ***extensive habitat changes*** over the last year within the nearest 50 m should be reported (see web-reporting of habitat), for example, clear cutting, landslides, road construction, etc.
- Make sure that ***the registrations on all relevant forms follow our specific point number*** (which is not necessarily the same as the order for the sampling).
- Each grid is sampled only once each year.

Line Sampling (*must be completed*)

- Records are made of rare bird species when you move between the sampling points, i.e. ***from first to last counting point***. ***See form C for which species*** that are to be included. Neither the distance from the line nor the description of vegetation should be given for the line samplings.
- The unit for the line registrations is ***number of pair of birds*** (not individuals). The summed number of pairs of each bird species for the entire route is reported in form C. Pairs that are also registered on a counting point shall be registered for the current point and should ***not be included*** for line transect report.
- Report also the number of ***mammals*** (number of individuals, see form D) observed from start counting at the first sampling point to stop counting at the last counting point.

Details about the point samplings

A) About the route and the points.

- The routes must be sampled according to a specific system defined separately for each route, see '***Standard Procedures'***. Those who take the samples will be provided with a GPS with uploaded coordinates for the points, or coordinates for all the sampling points can be downloaded from our webpage http://tov-e.nina.no/fugl.
- The points must be as near as possible the same each year. The description of the sampling point (see Form Q) is of help to ensure the same sampling position is used each year. Avoid placing labels in trees and terrain. Such markings are environmentally unfriendly and can irritate property owners and others who use the area.
- The sampling point itself can be adjusted by ***up to 20 m from*** the GPS coordinate position. This is in order to provide a more favourable location to achieve sampling, thus making it easier to find the actual sampling point (by a stone, stump, etc.). Such adjustments are not considered as moving the sampling point.
- Some points will be on snow/ice. Point on snow/ice will initially not be moved or omitted (only if it is dangerous to walk on the snow/ice or is inaccessible). The occurrence of snow is a natural part of our environment. Climate change could affect this and thus pose changes in presence of birds. This monitoring aims to shed light also on such changes.
- The starting point and order for the sampling are specified in the '***Standard Procedures'***. Make sure that the registrations on all relevant forms follow our specific point numbers (which are not necessarily the same as the order for the sampling).

B) Which bird details are to be registered?

- All ***pairs*** (not individuals) of each bird species observed ***within a radius of 50 m*** should be reported in one column, and pairs ***outside the 50 m radius*** in a separate column.
- The unit for the registrations is ***the number of pairs (not individuals).*** One pair is defined as:
    1. one male heard or seen
    2. one pair observed
    3. one single female observed
    4. a group of fledglings
    5. nest from the current year
    6. See also under 'flocks' below
- Distances ***less than and more than 50 m*** must be as accurate as possible. For the determination of the 50 m distance it can be helpful to bring a 50 m long rope (fastened around the waist or backpack). It may also be necessary to note where the birds are singing and measure the distance after the five-minute count is ended. It is important to train yourself in the assessment of distances in order to save time. It is difficult to know exactly how far 50 m is when standing for example in a forest, and even more difficult knowing exactly how far away a bird is when one only hears its sound. The information about birds which are within or outside the 50 m limit provides valuable information about bird species biotope preferences and how populations are changed in different habitats, and the data can be used to calculate densities for some species. Estimate distance as well as possible. If you are completely unsure about the distance, report it as 'outside 50 m'.
- Birds that fly over the area and any flocks are included in the category 'outside the 50 m' radius.
- Flocks are reported with an F and the number, e.g. F7 is a flock of seven birds with no knowledge of gender or age of the birds. As long as the individual birds are not gender or age specific, both the ' F1 ' and ' F2 ' will mean one pair. F3 is therefore the smallest flock size that can be reported. Birds that simply fly overhead shall not be designated with an F if the individual birds are gender and age specific (then you can estimate the number of

pairs), but enter F and a number if you cannot identify the number of pairs. If a flock consists only of males (or some other known sex distribution) then you must write the number of pairs, and e.g. a flock of 15 males and one female of Common Goldeneye is 15 pairs.

- At some sites, it may be impossible to get the exact number of pairs. For example, estimating the number of pairs if you are close to breeding colonies of gulls or colonies of sand swallows, or boats with a trail of seagulls behind. Make the estimate here as well as you can.
- All species must be recorded, including the number of registered pairs of birds without a definite species (unknown species).
- Duplicate registrations should be avoided. If you think that you hear the same bird/pair from two different points, they should not be listed again. Point sampling is prioritized. In other words, ***a bird you hear both on a line sampling and a point sampling should only be reported for the point samplings***. See Form C for which species are to be included during line samplings. Remember that you should be quite sure that it is the same pair that is registered at two points for the pair to only be listed at the first point. This can be difficult for some species, such as Golden Plover, Whimbrel, Cuckoo, etc., but do not reduce the number of observed pairs without a high probability that it is the same pair you are registering. Song coming from the same geographical position also at subsequent points should only be recorded for the first point it is heard from. This can mean that fewer pairs are noted than there actually are, but we consider this to be the best option.
- It must also be reported if there are no observations of birds at a point that is being sampled. This must be done so that we know that the point was sampled and not excluded.

C) Duration, time period and weather conditions during the samplings.

- ***Exactly 5 minutes*** registration is made at each point (is strongly recommended to have a watch that indicates seconds and a small alarm which sounds when the time is up)***.*** Counting of birds starts after the observer is in place at the point and things have calmed down. Birds frightened away by the observer shall not be recorded at the sampling point if they are not observed within the five minutes the registration takes place. Such cases are recorded in the line sampling if the species is relevant there.
- With 5 minutes at each point and a couple of minutes to settle down before counting start, the point sampling itself will take about 2 hours and 30 minutes. The duration for the movement between the points will vary according to the terrain.
- The best sampling time of the day is between about 04:00 and 9:30. The samplings should usually not be performed after 10:30 a.m., but for some routes with particularly difficult access to some of the sampling points (about 10 routes), the counting period may continue until 11:00 (see Standard Procedures).
- The best sampling periods will depend on the region and altitude. For example, in lower parts of southern Norway the period 23 May-5 June is usually best. Areas at a higher altitude should be sampled a little later, around 1-30 June and in some northern mountain areas not until early July, but rarely later than 10 July. Start as early as possible in the given period for your route to avoid samplings when the bird song has culminated. There is a 14-day interval for each route, but 1-3 day deviations beyond this can be accepted in special situations (e.g. very early or very late spring).
- ***After the first year's experiences each route is assigned a default period and interval*** for when the sampling should be performed, see 'Standard Procedures'. Samplings performed outside the specified time period (date) and interval (time) cannot be used for analyses of changes for our bird populations. If later experience shows that the 'given' period is not appropriate, the regional manager should be notified of proposed adjustments.
- Best conditions for counting are calm winds without precipitation. With winds of more than a fresh breeze in strength, bothersome rain or cold temperatures the sampling should not

be made. This means that one must consider interrupting the sampling when trees begin to sway, or small waves have white tops or if there is heavy rainfall. If the weather deteriorates and the sampling must be interrupted, it is preferable that the valuation if possible is continued on another day at the same time as the interruption occurs. A sampling route that lacks sampling for some of the sampling points cannot be used in our analyses of changes in bird populations for the current year.
- Make a note if you experience unfavourable weather conditions in any of points 1 to 20 in a sampling route without cancelling the sampling.

Details about the line sampling of birds

- Make registrations of more rarely occurring bird species while moving between the points (lines sampling).
- ***Species to be registered*** are ***all non-passerines*** (except seagulls and Wood pigeons), and ***nine passerine bird species*** (see Form C).
- The purpose of the line samplings is to increase the amount of data for rarer species. These are species that ornithologists will notice anyway and should therefore involve little additional work.
- You move in ordinary walking speed between the sampling points, and you follow the descriptions given in 'Route description' (Form Q), or the GPS. The intention is to use approximately the same route every year so that the results are comparable.
- Line sampling of birds means nothing more than reporting the number of pairs of various rare species observed as you walk between sampling points, and you should only report ***those pairs that are in addition to*** what you have registered during the point samplings. You should not report the distance to the observation or make any form of vegetation description.
- It must also be reported if there are no additional observations of birds along the line that is being sampled. This must be done so that we know that the line was sampled and not excluded.
- It is essential that the line sampling is carried out, otherwise we cannot use the route in our analyses of changes in bird populations for the current year.

Details about registration of mammals

- Report all observation of ***terrestrial mammals*** from start counting at the first counting point to the counting period is terminated at the last counting point.
- All terrestrial mammals (including livestock) should be included (see Form D).
- If there are observed very many individuals of a species on a route (for example livestock or rodents) indicate number over 10 roughly to the nearest 10's or 100-numbers. For groups of species where species identification is difficult in the field, report groups (Ex. Bats sp.; shrew sp.; for rodents we distinguish between mouse sp. and lemmus).
- Only observed individuals that are ***alive*** are to be reported, and do not specify gender or age groups.
- It must also be reported if there are no observations of mammals. This must be done so that we know that mammals were sampled and not excluded.

Maps, GPS and other information

Maps

On the maps you download from the web-page or are sent from NINA the location of the sampling points is indicated (12-20 points). Because of the approximate location of the points on the map, a GPS with uploaded coordinates must be used to find the exact location of the sampling points (see guidelines for the use of GPS). If you think there is lack of correspondence between the map and GPS, the GPS coordinates take precedence. Contact John Atle Kålås at NINA, (john.kalas@nina.no, +47 92291437) if you discover such cases.

Although the map data are new, they can be made from old aerial photographs. Several places therefore have roads that are closer to the sampling route than the M-711 series suggests. Be especially aware of toll roads and whether it is possible to obtain keys for those that are locked (remember some cash to pay any toll roads). It may also be appropriate to use a bike on roads where one cannot get hold of the key.

Feel free to use Google maps, NAF's guidebook or other road maps for studying the most appropriate way to the sampling route.

GPS

On http://tov-e.nina.no/fugl you will find descriptions of the use of GPS. Different types are described since new versions are constantly being released on to the market. Those who do not have internet will get the description sent by ordinary mail.

The GPS will be able to store data for an entire year, but check well in advance before the field season if everything looks OK. ***Bring extra batteries during fieldwork.*** Before the first sampling it is strongly recommended to train yourself in the use of GPS so that this is clear before you start.

Some terrain formations and dense forests can reduce the number of satellites the GPS has contact with. Positioning may therefore be in-accurate. Therefore, you should consider as well as you can where the point is while you still have good satellite coverage, and describe more accurately (in Form Q) how to get there and what the sampling point looks like. This will make it easier to find the same place in later years despite a poor GPS signal.

Other uses of the registered data

Do not mention sightings of rare species that can encourage more people to come to the area. This may eventually change occurrence and breeding success of some species.

Threatened species

Detailed information about location for threatened species will not be available to the public via our databases.

Bird knowledge

The website www.birdid.no is maintained by Nord University as a tool for training in the knowledge of bird species. On this web-site it is possible to take an exam about the appearance and sounds of birds. It is recommended that all of you who carry out fieldwork in TOV-E should take these two exams. The result is of course kept confidential, as are all exams from universities, so that no one else will know the result. The rate for fieldwork is higher for those who have taken both exams. It is also possible to participate in a study on Bird knowledge about which you can read more on the website.

Appendix 1. Summary – Standard Procedures for Sampling

- Keep track of your dates and times so you know when to go out. This information is available on the website http://tov-e.nina.no/fugl.
- Read carefully the methodology booklet (new version December 2021), and brush up on the details before going out.
- For routes where implementation has been established Forms A, B, C and D should be reported (and Form P for points where there have been changes in habitat from the previous year).
- For some of the routes there may be changes to Standard Procedures from one year to the next. On our website, you will find information about which standards to use for the different routes (i.e. date, time, sampling order, etc.). ***Check the*** '***Standard Procedures' well before you start the fieldwork,*** and report back if it does not match what you believe to be a correct implementation.
- ***Do not exclude a counting point,*** even though there are major changes at the point or snow-cover. If the site is not available, select a new counting point as close to the original point as possible and enter location information (UTM coordinates) in the Comment box. Also, report whether this change of location must be permanent or is only for this year. If the change is permanent, changes to 'Habitat description' (form P), and 'Route and Point description' (form Q) should also be made.
- Double-check the forms (B, C, and D) before sending the results. A relatively common mistake is that a number has become 11 instead of 1, which is avoided by reading a review.
- For those who do not use the website: Use the most recent version of the sampling forms and not old forms you have from previous years. The same also applies to travel expenses so that you avoid getting the old rates.

Appendix 2. Information and forms

The table below provides an overview of the various forms designed for this work. This will either be a form that can be used during the recordings and/or which provide information about the work. Information and forms can be downloaded from http://tov-e.nina.no/fugl. Those who do not have e-mail and internet access may have the forms sent by ordinary mail.

Form	Contents	Comments
A	Implementation of bird inventories: Date, time, weather conditions, etc.	WEB entry
B	Point sampling of birds	WEB entry
C	Line sampling of birds	WEB entry, even though no actual birds have been observed between the points
D	Mammal sampling	WEB entry, even though no mammals have been observed
P	Habitat description	WEB entry, only the first year, subsequently for changes.
Q	Grid and point description (description of choice of route and the point)	WEB entry, first year only
R	Evaluation form	Report via email, first year only

Information	Contents	Comments
	Methodology booklet	For information
	Default Route Information/Sampling procedures.	It is important that the procedures described here are followed. The routines are available after implementation has been tested in the first sampling year.
	Map (1:15000 and 1:50000)	For information
	Coordinate form	For information
	GPX files	For possible uploading of coordinates for sampling points to a separate GPS unit
	Guidance for use of GPS	For information
	Contract	For information
	Travel expenses	To be sent by mail (or scanned as an attachment) because of need of signature

Form A - Implementation of bird samplings
Contains information about the person doing the samplings, time, weather conditions etc. To be reported via the webpage: http://tov-e.nina.no/fugl. For those who do not report via the web: Naming of the form being sent by standard mail is first the form code and then the route number (e.g. A105 for Route 5 in county 1 which is ØF, and A1510 for Route 10 in county 15 which is MR).

Form B - Point sampling
This is for the results of the point counts of birds. Should be reported via the internet. For those who do not submit through the web: The results from the point sampling should be entered in the B-form and sent as an attachment to the regional coordinator. The online form with auto summation is recommended since it will save you a lot of work.

It is recommended that you divide up your field note book in the same way as on Form B, with the points across and the species downwards. Perhaps you could write the species you

may be sure to find before you go out. Then it is very straightforward to transfer from your notebook to form B.

Form C - Line sampling
This is for the results of the line transect of birds. To be registered via the internet. If you do not have internet access, please download the form from the website and send the file as an attachment. In any case, the form provides information about which species should be recorded. This is simply a short selection of passerine bird species as well as all other species except gulls and wood pigeons.

Form D - Mammals
This is the results of the registration of mammals. To be registered via the internet. If you do not have internet access, please download the form from the website and send the file as an attachment.

Form P - Habitat descriptions
The habitat description is reported only in the first year and involves a description of the area within 50 m from the sampling point. To be registered via the internet. Use the given habitat classes as well as you can. If none of them suit, you can specify 'Other' or 'Mixture of habitats'. In such cases, provide a brief description in the comment field. Remember to provide the most common habitat in the first column, etc. The sum of the percentages may never exceed 100%, but might be lower if you have four or more different habitats and the area is only specified for the three habitats with the greatest area coverage.

If there have been large changes in habitat between two years, this should be reported via the website.

Schedule Q - Route and sampling description
Route and sampling description should be reported the first year the route is visited. To be registered via the webpage. The reason for this is to describe how you have walked so this route also can be followed in later years. Here you can also enter details about the actual point, so that in later years you can use the description instead of GPS for the last few meters to the point, which is usually the fastest. With only a GPS it may be difficult in some places to get exactly the same location in different years.

Form R – Evaluation form
The evaluation form must be reported the first year the route is visited. To be sent by email to the regional manager. This provides the necessary information about the implementation of the samplings, and together with other information about the route provide a basis for determining which standard procedures are applicable for the route. Suggestions for improvement/simplification for censusing the route should be written in this form.

Coordinate form
The coordinate form must be completed in the first year that the route is visited. To be sent by email to the regional manager. This provides necessary information for establishing Standard procedures for the route (sampling order, information about where to locate the points that need to be moved, which points are recommended excluded, etc.).

Appendix 3. Details about location of counting routes/points

(see also: http://tov-e.nina.no/fugl)

A) The route and points.

- The sampling routes are randomly selected from an extensive route system covering the whole of Europe (LUCAS, UTM Zone 33). The routes are sampled according to a very specific system in relation to the centre for the route. The point coordinates are defined by the UTM system. Zone Indication (Zone 32, 33, 34 or 35) is determined by where the route is situated. The points of a route are set as x and y coordinates, where the last number indicates meters, the next number 10 m, and so on. For example, a point in Levanger municipality can have the coordinates (x) 306000 and (y) 7056000 (in UTM 33).
- The standard layout of a sampling route is a 1.5 km x 1.5 km square, with 20 sampling points situated with 300 m distance. Those who take the samples are provided with GPS with uploaded coordinates for the points, and the coordinates and a form with coordinates for all the sampling points for the specific routes can be downloaded for the web-page.
- Because of lakes, sea, or inaccessible terrain the number of points can be lower than 20. As many points as possible are sampled - for most routes this will be 20. It is the first year's sampling that decides whether the given point is practicable to sample. In case of inaccessibility, relocation has been done according to a set of criteria, before the point eventually is classified as not possible to sample. If any single points are positioned in such a way that it takes a disproportionate amount of time to reach them (> 30 minutes longer than normal time) they also can be removed. If the number of possible points is lower than 12, the route is taken out of the project. Which points that are included and the exact location of the points are finally determined based on experiences from the first year the route is assessed.
- The standard point numbering is as follows:

6	7	8	9	10	11
5					12
4					13
3					14
2					15
1	20	19	18	17	16

- Some routes are relocated due to poor accessibility for the standard location. It is then rotated clockwise around point 1, either 90, 180 or 270°, and keeps the numerical order.
- For some routes (approx. 70), the terrain is so difficult that the used route does not follow the square of 1.5 x 1.5 km, but has a completely different shape. Such routes are placed within or as closely as possible to the original route (max distance 2,5 km, see 'Standard Procedures' for the specific routes).
- The sampling points must be, as near as possible, the same each year. In the first year therefore, the field worker must report the accurate GPS positions used for the sampling points (on the 'Coordinates form'). For deviations less than 20 m, we keep the original coordinates, while new coordinates are recorded in our databases if the deviation is > 20 m. A description of the sampling point (see Form Q) is also of help to ensure the same sampling position is used each year. We avoid placing labels in trees and terrain. Such markings are environmentally unfriendly and can irritate property owners and others who use the area.

Appendix 4: Supplements for routes that have not been assessed previously *(you will be notified if this is the case for any of your routes)*

- If the sampling route has not been visited before, the points should be sampled preferably clockwise (in ascending numbers in the figure above), but a reverse order, or other order combinations can also be used if it makes the route easier to implement. The way you move between points can be chosen freely. Most movements have to be carried out on foot, but in some routes, parts may be accessible by car, especially where one needs to cross a river and continue samplings on the other side. For some routes it may be useful to use a boat or a bicycle to reach the sampling point. After the first year's visit a standard procedure will be established for how the route is to be sampled, and this will be followed in subsequent years.
- In case of inaccessibility to the point as listed (e.g. because of lake/sea, crop fields, houses, rock cliffs, steep terrain) you should try to find an alternative sampling point nearby. If a new sampling station must be chosen, it must be a maximum of 100 m from the specified point and a minimum of 250 m from the nearest neighbouring sampling point. If this is not possible, the point is omitted from the samplings. Try to get the most possible sampling points without endangering life or health.
- Samplings in areas that border against other countries may mean that certain points are not in Norway. In such cases, you should only include points that lie on the Norwegian side of the border.
- In the first year, the samplers must record on the 'Coordinates form' accurate GPS positions for the sampling points ***used*** so that we can register them in our database of positions for sampling points that are used. For deviations less than 20 m, we keep the original coordinates, while new coordinates are recorded in our databases if the deviation is more than 20 m.
- Around a point we will naturally get a variety of different vegetation types. In the first sampling year the percent of coverage in the area should be provided for the three most common types of vegetation within a radius of 50 m from the point. Form P provides an overview of 30 different vegetation types, and it is possible to specify other types of biotopes. Habitat codes to be used for each point are indicated on Form P. Remember that the sum cannot be more than 100%, but it can be lower if, for example, there are four different habitat types within the closest 50 m, and only the three most common habitats are included.
- In the first year's evaluation, you should describe the movement between the points (Form Q) so that exactly the same route can be used in later years. Thereby the line samples will be comparable from year to year. In addition, describe each point so that it for later years is easier to find the exact sampling point.
- In the first year's assessment, you should also fill inn a Feedback form (Form R) which we need to develop appropriate information in the 'Standard procedures' for the route.

TOV - Extensive monitoring of breeding birds – a national cooperation between

BirdLife Norway, Norwegian Environment Agency and Norwegian Institute for Nature Research