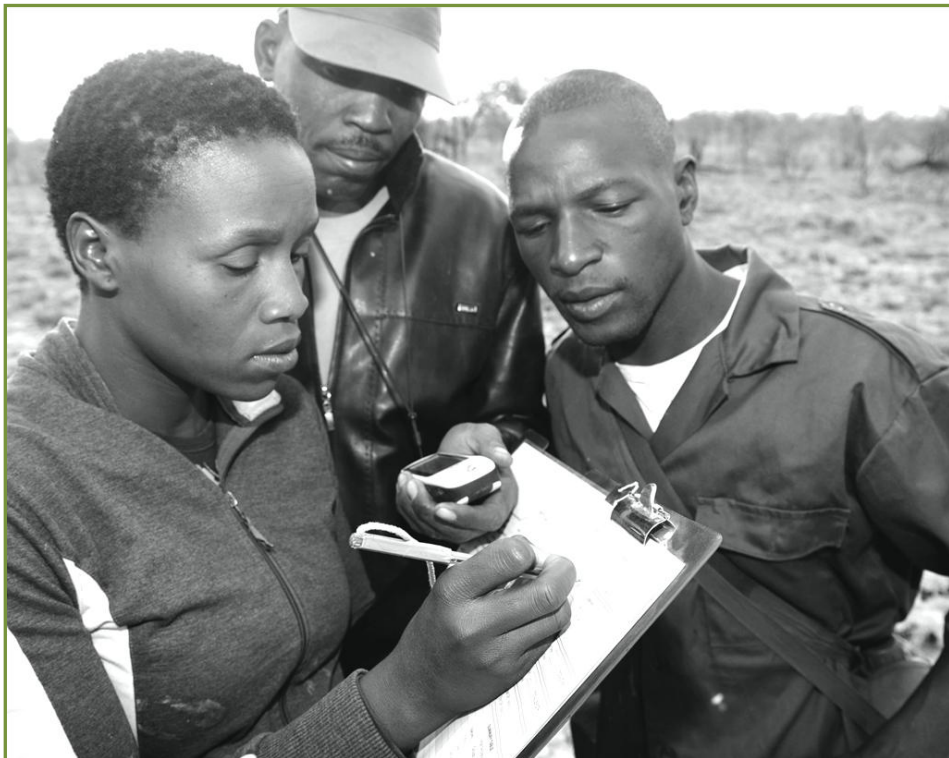


NATURAL RESOURCE MANAGEMENT TRAINING

Module 3.2: **GAME COUNT TRAINING**



ACKNOWLEDGEMENTS

The materials used to develop this training module were developed and compiled by a number of individuals and organisations over the past 15 years as part of the Namibian CBNRM Programme. Acknowledgement is thus given to all contributing NACSO members, NACSO's international development support partners, and the individual and collective experiences of the NACSO members and partners who made the production of this module possible. The further development of the training material has been made possible with support from MCA Namibia.



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GENERAL TRAINING TIPS

Preparation:

- Prepare each session in advance and ensure all necessary materials and visual aids are available (use visual aids wherever possible to enhance your training).
- Be aware of local customs – remember to open and close the training day with a prayer and give due recognition to any traditional leaders present.
- Provide translation services where necessary (this will need to be arranged in advance – it may not be appropriate to ask a participant to translate).

General training and presentation guidelines:

- Use good time management to ensure every aspect of your training is completed – but take into account the possible need for translation and be prepared to slow down if necessary to ensure that all participants understand.
- Maintain good eye contact with participants.
- Speak clearly.
- Keep your training language simple and appropriate to your audience.
- Bridge one topic to the next.
- Provide clear instructions for activities and check to see if your instructions are understood.
- Where appropriate, summarise each component of the module.
- Avoid reading from this trainer's manual.

Visual presentation:

- Write clearly and boldly if using flipchart sheets.
- Keep your visual aids clear – avoid blocking participants' view of visual aids.

Involving the participants:

- Encourage questions and participation.
- Ask questions to get participants thinking about the topic and key issues.
- Keep the group focused on the task, but take breaks if participants are tired and losing concentration – be aware of body language.
- Be patient and courteous with all participants.
- Talk to your participants and not to the flipchart.
- Acknowledge the comments and feedback from participants.



NB: Where we wish to indicate that text in this module refers to an activity that training participants are expected to undertake, we have employed this little icon.



ABOUT MODULE 3.2: GAME COUNT TRAINING

OBJECTIVES: People who receive training in MODULE 3.2 will gain knowledge on:	<ol style="list-style-type: none"> 1. Game count methods (including foot transects, vehicle-based road counts, sampling, data recording) 2. Navigation - map reading and GPS 3. Field-based data analysis for generating field population estimates and creating population trend charts
COMPETENCIES: People who receive training in MODULE 3.2 will be able to:	<ol style="list-style-type: none"> 1. Carry out game counts and record data accurately 2. Use a GPS 3. Produce population estimates 4. Update trend charts
MODULE 3.2 is intended for:	Community Game Guards and the Conservancy Manager
Duration of MODULE 3.2:	The training for this Module will usually last 2 days

To train this MODULE 3.2 you will need to have (enough for everyone):

To train this MODULE 3.2 you will need to have (enough for everyone):	Check
Flipchart stand, sheets and different coloured marker pens ("kokies")	<input type="checkbox"/>
Module 3.2 Handouts #1 – #21	<input type="checkbox"/>
Prepared Flipchart Sheets #1– #4 (can be laminated for duplicate use)	<input type="checkbox"/>
Paper and pens for participants	<input type="checkbox"/>
Apples and/or oranges, enough for each participant to have one	<input type="checkbox"/>
Blank data sheets	<input type="checkbox"/>
GPS receiver equipment	<input type="checkbox"/>
Photocopy of the 2x2km grid map for Torra Conservancy	<input type="checkbox"/>

For demonstration purposes:

Conservancy filing boxes and the game count files in them, showing the red trend charts	<input type="checkbox"/>
Pack of old and completed data sheets	<input type="checkbox"/>

References/other resources:

'North West Game Counts Background Information' (R1)	<input type="checkbox"/>
'North West Game Counts Training and Field Manual' (R2)	<input type="checkbox"/>



The training of this **MODULE 3.2** will generally follow this schedule:

TOPIC 1:	Methods used for counting game: background and theory
TOPIC 2:	Features common to both road and foot counts
TOPIC 3:	Road strip counts
TOPIC 4:	Fixed transect foot counts
TOPIC 5:	Navigation 1: Map reading
TOPIC 6:	Navigation 2: the GPS
TOPIC 7:	Field-based data analysis
SELF-ASSESSMENT:	Assessing participants' understanding of this Module (Handout #21)



KEYWORDS and ACRONYMS for this MODULE

GIS	A geographic information system (also known as geographical information system, or geospatial information system) is any system that captures, stores, analyses, manages, and presents data that are linked to location(s)
GPS	Global Positioning System
latitude	The angular distance north or south of the earth's equator, measured in degrees
longitude	The angular distance on the earth's surface, measured east or west from the Prime Meridian at Greenwich, England
satellite	A man-made device orbiting around the earth, moon, or another planet transmitting to Earth scientific information or used for communication
transect	A path along which one records and counts each instance of the animal species being studied
trilateration	Involves the determination of absolute or relative locations of points by measurement of distances



INTRODUCTION

- 1** **LIST:** The **objectives** of Module 3.2 by writing them on a flipchart sheet. To save time you may prefer to have Flipchart Sheet #1 prepared in advance (or even laminate this one and others for duplicate use).

Participants attending this training will gain knowledge on:

1. Game count methods (including foot transects, vehicle-based road counts, sampling, data recording)
2. Navigation - map reading and GPS
3. Field-based data analysis for generating field population estimates and creating population trend charts

- 2** **LIST:** The **competencies** of Module 3.2 by writing them on a flipchart sheet. To save time you may prefer to have Flipchart Sheet #2 prepared in advance.


People who receive training in Module 3.2 will be able to:

1. Carry out game counts and record data accurately
2. Use a GPS
3. Produce population estimates
4. Update trend charts

ASK: Participants if they have any questions about the Module. Address any questions.

NOTE: If participants are unfamiliar with the concept of the game count, you may wish to start the training by explaining in simple terms what a game count is, and why it is important.

ASK: What information can you get from a game count?


- 3**  Divide participants into pairs and ask them to think about this question. Each pair presents their answers while the rest listen. The first few pairs write their contributions on a flipchart sheet under the heading 'What information do game counts provide?' and then the rest of the pairs can add any different ideas.



NOTE: Out of the suggestions made by the participants, emphasise those that identify:

- Wildlife numbers
- Wildlife distribution
- Wildlife population trends and changes

ASK: Why is this information important?

- 4**  Ask participants in plenary to think about why information is important in terms of **how many animals there are, where are they, and what changes there have been in their populations**. Guide the discussion so as to arrive at the answers below, and talk about the importance of each one:

EXPLAIN: We need to gather information on wildlife numbers for the following reasons:

1. **Numbers:** a.) for sustainable quotas; b.) to have an understanding of the numbers (biomass) of wild animals (which could provide information for rangeland management); c.) to know how many there are.
2. **Distributions:** a.) to know where main wildlife concentrations are to maximise benefits from them and avoid conflict (land-use planning and zonation); b.) to identify changes resulting from climatic or human influences – rain, disturbance, food etc.
3. **Trends:** to know whether management activities are having the desired outcome of reducing, increasing or maintaining populations over an extended time period.

- 5** **NOTE:** You may have to explain what is meant by 'trend' and perhaps go over the basic steps of adaptive management in relation to population changes.

EXPLAIN: While population estimates are the NUMBER of animals, a trend is CHANGES IN NUMBERS over the years.

DISTRIBUTE: Handout #1 to participants and discuss together the difference between estimates and trends.



TOPIC 1: Methods used for counting game: background and theory

Session 1: Different game count methods for different objectives

1 **EXPLAIN:** Achieving your game count objective, whether to calculate numbers, trends or distributions, depends on the ability of the different methods to produce the necessary type of information. To obtain:

1. **Numbers:** it is important that the count is **accurate**, covers a large enough area, and represents all habitat types – it's possible to get an idea of how many animals there are from a single count although it is preferable to repeat the counts to account for anomalies.
2. **Distributions:** the most important attribute of the count must be that it covers a large enough area (preferably the whole area in question) and represents all habitat types – it's possible to get an idea where animals are from a single count although there may be seasonal or annual differences that would be shown by repeated counts.
3. **Trends:** accuracy and coverage are not that important, but repeatability ('**precision**') is – to produce a trend, a count has to be done in the same way year after year and it is for this reason that fixed routes are used.

NOTE: *As an example of the importance of doing counts in the same way each time, tell the participants that using binoculars would definitely improve the accuracy of a count. However, because they might not always be available for later counts, it is not permissible to use them because then successive counts – when they are not available – would not be comparable (trends would be difficult to show).*

2 **EXPLAIN:** Not all game count methods are **accurate**, while others may not be **repeatable** (precise). Briefly, the difference between these two attributes is that:

- Accuracy gives a result close to the true number.
- Precision gives results that are similar to each other but may not be close to the true number.

DISTRIBUTE: *Handout #2 to participants and discuss together the differences between accuracy and precision.*



3 EXPLAIN: It is important to choose the game count method that will best achieve your objective (accurate, or precise, or covering a large area etc.) but at the same time the cost, technical skills, species, habitat and practicality will also guide the choice.

Wildlife can be well managed and utilised using count methods that may not be ideal and may be incomplete for other purposes, but that provide enough information to achieve the count's specific objectives:

1. **Trend information** from repeated counts can provide adequate data that show whether the off-take is sustainable for the conditions and species in question – knowing the actual numbers is unimportant.
2. Using **spatial harvesting techniques** – no-hunting/hunting zones – can be sufficient for good management in the absence of complete coverage by the game counts.
3. Sometimes it is difficult to obtain good results using sample counts – for example, large herds are difficult to count and surveys of species such as buffalo and springbok may be both inaccurate and imprecise – **special care** needs to be taken in counting the animals in such cases.

Session 2: What are the different game count methods?

DISTRIBUTE: Handout #3 to participants.

1 EXPLAIN: There are a number of different ways in which wildlife can be counted – some methods are better for certain species but all have their merits - for example:

1. **Vehicle and foot counts** are good for large and small animals – elephant, large and small antelope and zebras, but are likely to miss nocturnal species. Vehicle methods often have poor coverage of the area. Foot counts, whilst potentially having good coverage, are extremely time-consuming and impractical for large areas.
2. **Aerial surveys** are good for large animals and are particularly useful for covering big areas, but they tend to miss small animals, nocturnal animals, and those that hide. They are expensive, demanding, and likely to be beyond the resources of conservancies.
3. **Monthly Community Game Guard patrols** along fixed routes are good for collecting long-term trends and seasonal changes for a variety of large and small animals. However, these normally cover only certain parts of the conservancy because it's often impractical to cover large areas on a regular basis (same as foot counts).



4. **Local field knowledge** can give a very good idea of numbers but only for rare animals that congregate in what are called 'known groups' (e.g., wild dogs, black-faced impala etc.). Local knowledge is also good for identifying whether certain species are present or not, and can include animals that are usually missed by other methods. Local field knowledge may also be obtained from speaking with conservancy members – not only can valuable information be obtained but this may also build local participation and ultimately 'ownership'.
5. **Special scientific surveys** are required to get information on rare, secretive and nocturnal animals (such as predators) but these are extremely costly in time and money, are often aimed at only one species, and may need sophisticated equipment.
6. **Drive counts** – where the entire area is counted in one sweep with the counters spread along a line in such a manner that they see one another. As the counters move across the area they count all animals passing them. This method is only practicable in small areas that have good visibility and – if conducted on foot – where dangerous game are absent or very rare. (This has been done in Mahango and in the Uuklwahuudi game camp.)
7. **Waterhole counts** – where all the water points in the area are observed for an extended period over the dry season (three to four days) and all animals that come to drink are counted. This method relies on knowing the various species' drinking frequencies and assumes that the count teams at the water holes do not disturb the animals. Drinking frequencies are poorly predictable and disturbance is almost impossible to avoid. Added to this, it's an extremely intensive and demanding survey method and, of course, only works on species that are water dependent.


2 EXPLAIN:

- The first three methods are essentially the same – they involve moving through the area along a line and counting what one sees and then calculating a population. The differences between them are really just about how one moves through the area – it's about the 'counting platform' – being either a vehicle, an aircraft, a bicycle, a boat or feet!
- All these methods are important. The choice will depend on what information is needed, what the conservancy can afford, whether people and equipment are available, and whether the conservancy has the capacity to continue using the method without outside assistance.



NOTE: Both the road counts (using a vehicle) and foot counts use the same principles. For the purposes of this Module the track along which the counters move will be referred to as 'the track', even if it is in fact a transect.

ASK: Do you think you could count all the animals in your area?

3  Ask participants in plenary to consider if they think it would be practical to **count all the game in their conservancy area**. Write answers down under the heading 'Can we count all the conservancy game?'

EXPLAIN: It is extremely difficult to count every animal (i.e., undertake a total count) because, for example:

- Some animals can't be seen – they might be hidden in the bush or too far away.
- Big herds are difficult to count accurately, especially if they're running away.
- Animals may be living in inaccessible places.

EXPLAIN:

1. There are a few methods that are effectively total counts:
 - a. Drive counts.
 - b. Counts of known herds.
2. Because it's usually not possible to count every single animal in the whole conservancy, people carrying out the game count have to take a 'sample' and assume that this represents the whole population.
3. A sample involves counting a proportion of the animals in question. To arrive at the **estimated** number of animals in the whole conservancy, you need a **correction factor** that depends on the size of the sampling area.

NB: It is important to remember that the numbers of animals that you count are only **a sample of the total population for the entire area**.

DISTRIBUTE: Handout #4 to participants and discuss together how wildlife populations' estimates can vary according to the method used.

4 **EXPLAIN:** In Namibian conservancies, vehicle-based road counts and fixed transect foot counts are used (aerial surveys are conducted by MET). These are **sample counts**. These methods have been chosen because (you may wish to explain these following points verbally, write them on a flipchart sheet, or prepare this in advance as Flipchart Sheet #3):





- The data collection (the actual counts) can be done by conservancies with very little outside help.
- They are cost effective, sustainable and repeatable.
- They meet the objectives of individual conservancies.
- They allow 'scaling-up' to a regional picture.
- They balance local ownership with scientific rigor.
- They work synergistically with other methods.
- The analysis can be done locally using simple methods, although there are more sophisticated analyses which need computer software.

5 **EXPLAIN:** There are other methods used in conservancies, such as fixed route counts, the MET aerial surveys and species-specific counts. If they have been conducted in the same year as the road or foot counts, then it is useful to show all the results in one table for that year.

6 **SUMMARISE/LINK:** In this first topic we have looked at how the objectives of a game count will be reflected in the method used, and we have discussed together the various ways of carrying out a game count, including the sample method you will learn later in the workshop. Let's just go back and look at our first objective for this workshop to confirm that we have begun to be 'on track' (*refer back to the first flipchart sheet – or prepared Flipchart Sheet #1*). Does anyone have any questions?

TOPIC 2: Features common to both road and foot counts

1 **DISTRIBUTE:** Handout #5 (2 pages) to participants and go through the counting rules together, explaining each one.

2 **EXPLAIN:** Although vehicle and foot counts are quite easy to do, there are a number of facts that have to be assumed. These are:

- All animals actually on the track, or near it, are seen and counted.
- The distance that is measured is from the observer to the place the animal was first seen before it ran away.
- Distances are measured accurately.
- Routes go through all areas in the count area – even those in which people know there are few, or no, animals. Areas that can't be sampled must be left out of the calculations and, to be safe, when calculating quotas we assume there are no animals in these areas.

3 **DISTRIBUTE:** Handout #6 to participants

4 Together with the participants, set up a **simulated sample count** (e.g., strip count):



1. Participants collect at least 50 stones/bottle tops/leaves/berries (whatever is available).
2. Draw a big square – about 5x5m – on the ground.
3. Divide the square into 5 equal strips and draw a thick line down the middle of one to represent a track.
4. Participants place about 10 of the stones within the strip – these are the 'animals' that will be seen during the count.
5. Throw the rest of the stones randomly into the rest of the square (without any falling into the strip) – these are the 'animals' that also live in the conservancy but couldn't be seen during the count.
6. One of the participants moves along the 'track' and counts the 'animals' within the strip on each side of the track.



5 ASK participants how many times the strip can fit into the whole area.

EXPLAIN: The answer should be 5 (assuming that you drew 5 strips in the square) so the **correction factor** is 5, and therefore the number of animals must be multiplied by 5 to estimate the number in the whole square.

➔ Participants should do the calculation and then should count all the 'animals' in the whole square – the total number counted should be the same, or nearly the same, as the number calculated.

Participants can do the same exercise on Handout #6. They may notice that there are 103 animals in the Handout #6 and not the estimated 100 as calculated from multiplying the 20 animals in the strip by 5. Explain that the estimated number will never be 100% accurate. ←

6 DISTRIBUTE: Samples of the data sheets to participants and discuss.

EXPLAIN: We are now going to do some training in estimating the distance between the animal/s and the track (range finders are not recommended as they can be unreliable if not used correctly).

➔ Participants should practise estimating distances using trees, buildings, tents etc. – they should concentrate on the distance between two objects (or an object and a track) rather than on the distances from themselves to the objects.

NOTE: Remember to actually measure these distances until people are used to doing this and are getting close to the correct distances. **NB:** Conduct distance training on a soccer field (100m long) if there's one available – it's a convenient size for getting people used to judging distances by eye.

7 DISTRIBUTE: Handout #7 (2 pages) to participants and discuss together how to measure distances using the methods depicted.

EXPLAIN how to:

1. Measure the distance when the animal runs away (mark the spot at which it was seen before moving).
2. Measure the distance when there's a herd of animals together (choose the centre of the herd).
3. Record everything when there's a herd and it runs away (one person remembers where the centre of the herd was when first seen, the others count the animals).





Each member of a participant counting team makes an estimate of the distance, and the recorded distance is the **average** of all of these (not the distance estimated by any one individual). If there's too much disagreement about distance, get participants to check by pacing it out. They should stop for a careful look if necessary, and look for animals on both sides of the vehicle.

9

EXPLAIN: Now we are going to look at how to complete the data sheets correctly. **NB:** Most mistakes made during the count are on the data sheets and the effort spent training reduces the time spent correcting errors after the count.

- During the training, go through the process of completing blank data sheets step by step, although most of it is obvious.
- Play out different scenarios – use tricks to make sure the observers are marking where the group of animals are first seen and that the distance is to the centre of the group and is properly recorded (right angles to the track). Discuss the identification of different groups and ensure each group is recorded separately (**NB** for distance analysis).



TOPIC 3: Road strip counts

1 **EXPLAIN:** Road strip counts are vehicle-based counts along established tracks:

- **Advantage:** a large area can be covered.
- **Disadvantage:** dependent on roads and tracks (which generally do not cover mountains and rough terrain which are therefore under-sampled) but often follow river courses which are well sampled.

2 **EXPLAIN:** The conservancy is divided up into 'zones' or strata according to the terrain and the expected relative densities of animals in each. Some routes follow river courses and are therefore almost total counts. Most, however, sample a portion of the zone but are intended to traverse the various habitats in equal proportions.

Where there are no tracks, for example in mountains, there will be no sample and therefore populations living there will be excluded from the overall estimate for the conservancy.

1. Because some (mountainous) areas are excluded, the overall numbers of animals are under-estimated – it is 'assumed' that there are no animals in these areas.
2. The distribution maps suggest a total absence of animals in some areas (although they make it clear that the gaps are due to no sampling).
3. Neither of these is correct – but the bias leads to conservative quotas, which is generally accepted.

NOTE: *Decide whether it is appropriate to give out Handout #8 now and to discuss the implications of bias with the participants.*

3 **EXPLAIN:** To improve the accuracy of the estimate and for the more sophisticated 'distance' analysis, the practice is to work out the average strip width of each route (i.e., the width of the strip). This is done by measuring the distance between the animal and the track/transect.

4 **DISTRIBUTE:** *Handout #9 (2 pages) to participants and discuss together the checklist for road strip count materials.*

EXPLAIN: It's really important to go through the checklist before leaving for the count (anything left behind will not be replaced). The checklist is mainly for the person in charge of preparing the count materials but everyone can assist with ensuring everything is in place.



5

DISTRIBUTE: Handout #10 (2 pages) to participants and discuss together the process for road strip counts in detail. Explain what needs to be done **before the road strip count** (although participants at this workshop may not be involved) and then **go through each step in turn**.

LIST: The next steps for conducting the count:

1. As the count sets off, the scribe records the start time, start km (on the vehicle's odometer for a vehicle count), and the start GPS reading (generally NOT used for the vehicle-based counts).
2. When animals are seen their species, number, distance to the track and location are recorded.

EXPLAIN: Making rules for each step of the count is essential if it is to be done properly and efficiently. Now let's look at what's needed on the day of the road strip game count.

6

DESCRIBE: What needs to be done on the day of the count by referring to Handout #10, then describe the feedback session and presentation of results.

EXPLAIN: To ensure that there is local 'ownership' by the conservancy and to achieve scientific acceptability, **two methods of analysis** are used to obtain estimates of population numbers:

- The **field method**, which provides a quick estimate of population size that can be conducted by the conservancies or concessions.
- The **distance method**, which is more sophisticated, relies on computers, and provides a more statistically robust method for further analyses.



TOPIC 4: Fixed transect foot counts

1 **EXPLAIN:** Here is an example outline of the **process for fixed transect foot counts**:

1. Transects (straight lines) run north/south 3 minutes (about 5.5km) apart across the Bwabwata National Park.
2. Count teams walk along these transects, navigating with the use of a GPS.
3. Each team comprises a GPS operator, a scribe and observers.
4. Live sightings are recorded.
5. Fresh spoor (less than 24 hours old as determined by skilled trackers) are also recorded.

2 **DISTRIBUTE:** Handout #11 to participants. Explain the count maps and discuss how they shall be used for the count.

EXPLAIN:

- The team leaders must be able to identify the transect line and its number, or track and identifier, and to read the GPS coordinates or block numbers correctly – particularly for foot counts so that the counters walk on the correct transect.

DISTRIBUTE: Handout #12 and go through the checklist of fixed transit foot count materials together briefly. Explain that the checklist is mainly for the person in charge of preparing the game count materials but everyone can assist with ensuring everything is in place.

3 **EXPLAIN:** How the **fixed transect foot counts** shall be carried out while allowing discussion and inputs, especially from those who have participated before. Now we are going to look together at how we carry out the **fixed transect foot counts themselves**:

DISTRIBUTE: Handout #13 (3 pages).

1. Explain in detail what will be done **before a fixed transect foot count** (although the trainees of this workshop may not be involved) and go through each step on Handout #13.
2. Describe the next steps for **organising** the game count and **starting** the game count.




3. Explain that **making rules for each step of the count is essential** if it is to be done properly and efficiently – now describe what's needed on the day of the count.
4. Finally describe the **feedback session** and presentation of results.

4 **SUMMARISE/LINK:** The last three topics have looked at two methods for counting game that can be used at the conservancy level. We have had some practice in estimating distances and have thought about overcoming problems associated with counting game in herds and/or on the move. We have also discussed areas suitable and unsuitable for road strip counts, and the steps for using this method, as well as the steps for carrying out a fixed transect foot count. Let's just go back and look again at our first objective for this workshop to confirm that we remain 'on track' at this stage of the workshop (*refer back to the first flipchart sheet – or prepared Flipchart Sheet #1*). Does anyone have any questions?




TOPIC 5: Navigation 1: Map reading

ASK: Why do we need maps?

- 1  Ask participants as a group to consider this question, and then ask for participants to suggest answers while the rest listen. Write contributions on a flipchart sheet under the heading 'What are maps for?'.

EXPLAIN: Maps are used for recording the position of anything in two dimensions (i.e., on a piece of paper).

- 2  Ask participants as a group to consider how this is done, i.e., how can you describe the position of something on the surface of the earth? Ask for participants to suggest answers while the rest listen. Write contributions on a flipchart sheet under the heading 'How do maps show us information?'.

EXPLAIN: The most common way is by using two numbers – the latitude and longitude of a feature – called its 'coordinates', which are measured in degrees, and represent angular distances calculated from the centre of the Earth.

- 3 **DISTRIBUTE:** Handout #14 (3 pages). Go through the handout together and explain about the lines of latitude and longitude. If you are able to do so, distribute apples or oranges and ask participants to draw the various lines on the fruit.

- 4 **DISTRIBUTE:** Handout #15 (2 pages), which will assist participants in learning how to read a map. Use a flipchart sheet to help you to illustrate this activity. It may be a good idea to pause after each step to make sure participants have followed your explanation, and to ask if they have any questions.

1. Write a pair of coordinates (say 20°S and 14°E) to represent a town, on the flipchart sheet. Draw a polygon to represent a conservancy and some vertical and horizontal lines over this. Label the horizontals (say 15° to 25°).
2. Do the same along the bottom of the 'map' to represent the longitudes from (say) 10° to 20°.
3. Move your finger down the side to 20°. With the other hand, move a finger along the bottom to 14°. Move both fingers horizontally and vertically over the 'map' along these lines of latitude and longitude. Where they meet is the position on the map of the site of the town.



4. Explain that for conservancies in the northwest of Namibia, special maps have been provided to allow navigation and point location without a GPS, for game counts and Event Book monitoring. If at all possible use a map for the conservancy receiving the training – these maps are included in the game count resource packages.

5 EXPLAIN:


- Maps for the whole country have been overlaid with a 2 x 2km grid.
- Along the horizontal and vertical sides of the map, numbers have been allocated to each cell so that each cell has a unique number by combining the vertical and horizontal (S and E) locator numbers.

6 EXPLAIN: During the pre-count training session, there will be field training on how to use the GPS and map.



TOPIC 6: Navigation 2: the GPS

ASK: What is a GPS used for?


1  Ask participants as a group to consider this question, and then ask for participants to suggest answers while the rest listen. Write contributions on a flipchart sheet under the heading 'GPS uses'.

NOTE: Make sure that it is understood that in the context of a conservancy game count, the GPS is used for **recording the position of sightings** and also for **locating and recording the start and end points of the transects**.

EXPLAIN: The GPS has other civilian uses – in tracking wild animals wearing radio collars, in trucks to prevent theft, in aircraft and cars for navigation etc. **The Global Positioning System (GPS) is a satellite-based navigation system:**

- GPS was originally intended for military applications, but in the 1980s, the USA government made the system available for civilian use.
- GPS works in any weather conditions, anywhere in the world, 24 hours a day.
- It's free!

ASK: Does anyone know why it is called 'global positioning system'?

2  Participants should respond if they can. The key is 'satellites', and that it can be used literally anywhere.

3 **DISTRIBUTE:** Handout #16 (2 pages) and discuss GPS equipment together using the conservancy's GPS. Let the interest of participants guide you regarding the level of technical detail that you wish to go into.

EXPLAIN:

1. GPS satellites circle the earth twice a day in a very precise orbit and continuously transmit messages to Earth about the time the message was transmitted and the satellite's position in orbit.
2. The GPS receiver takes this information and uses 'trilateration' to calculate the user's exact location.
3. The GPS receiver then displays its position on an electronic map or just as latitude, longitude and height above sea level.
4. If the GPS receiver is moving (with its user), it can also show direction and speed.
5. The GPS receiver needs a minimum of four satellites to get a position, but can still give a (less accurate) position with three.
6. The GPS receiver can be used literally anywhere.



4 **DISTRIBUTE:** Handout #17 (7 pages) and discuss using the GPS equipment together.



Ask participants to divide themselves into groups so that everyone in the group can see a GPS (if there are too few GPSs, train only those people who will be operating a GPS on the count).

Ask the participants to switch on their GPSs and then go through the instructions in Handout #17 step by step, making sure everyone understands what is being shown and how the GPS is being used. **NB:** This will take quite a lot of time.



5 **ASK:** Participants to look at the blank data sheets.

EXPLAIN: We read the coordinates from the GPS and record them in the appropriate spaces on the data sheet. On the game count, the GPS operator will tell the scribe the coordinates at the start and end of the count, as well as for each sighting.

NOTE: Remember to show participants how to change the batteries when it becomes necessary to do so. Also show them how to change the contrast of the display.



TOPIC 7: Field-based data analysis

1 **DISTRIBUTE:** Handout #18. Remind participants that game count data can be analysed in two different ways and that the field-based method is designed to **provide a quick estimate of population numbers** immediately following the game count.

2 **DISTRIBUTE:** Handout #19 and discuss the field analysis tables together.


EXPLAIN: The sample area is calculated from multiplying strip width by route length. Strip width is difficult to calculate as it varies from species to species and in different habitats. A basic strip width of 1 km (500m each side of the track) is now accepted as a realistic generalisation.

- The **route correction factor** is based on the number of times the 1km strip will fit into the counting zone.
- There are also differences in the 'sightability' of different species (i.e., in seeing different species within the 1km strip) and it's therefore necessary to apply a **species correction factor** as well as the route correction factor.

3 **EXPLAIN:** The data sheets (route statistics, numbers of animals seen etc.) are completed at the end of the count for the day. These provide the route statistics needed for the following calculation:

Estimated population size = number seen x correction factors

NOTE: Trend data are important for management of wildlife populations, which is why the same fixed routes must be used every year.

4  Ask participants to think about what might be the best way to display trend data. Write their contributions on a flipchart sheet under the heading 'How do we display trend data?'.

EXPLAIN: As trend information is one of the most important objectives of the game count, the quickest and most effective way to display this information is to use the annual analysis charts from the Event Book monitoring system by simply filling in the blocks for the year (number/100km).


NOTE: Draw the participants' attention to the conservancy filing boxes and the game count files in them. Show the participants the red trend charts.



- 5** **EXPLAIN:** Because the routes (or the transects) are not the same length, it is important to standardise the results of the counts.

One of the best ways to do this is to **calculate the number of animals seen for a given distance**. In Namibian conservancies, for the past several years this has been given as the number of animals per 100km of track driven. This means that on average, you would expect to see about X number of animals if you drove 100km around the conservancy

ASK: How could you use this information on a day-to-day basis?

- 6**  Ask participants to think about ways that information obtained during game counts and analysed as trend data over time could be used by the conservancy. Write their contributions on a flipchart sheet under the heading 'How is trend data used in day-to-day conservancy management?'.
7 **LIST:** On the flipchart sheet list ways in which wildlife distributions can be shown on maps, all of which require GIS or a database. You may prefer to prepare this in advance as Flipchart Sheet #4:

EXPLAIN:

1. These figures (animals/100km) can be used to compare what's going on currently – any time a patrol goes out by vehicle, for instance - with what the game count figures say.
2. These figures can also be compared with the figures produced by neighbouring conservancies, which may be useful when marketing the conservancy's tourism product.

- 7** **LIST:** On the flipchart sheet list ways in which wildlife distributions can be shown on maps, all of which require GIS or a database. You may prefer to prepare this in advance as Flipchart Sheet #4:

Wildlife distribution can be shown by:

1. Mapping actual numbers seen in each 2x2km grid square.
2. Mapping wildlife densities (animals sighted per 100km driven) per route zone.
3. Mapping wildlife density change.



8 **EXPLAIN:** The other objective of the game count is to understand **where the animals are in a conservancy.**

- Maps will be generated from the data sheets in Windhoek by the Natural Resources Working Group and will be disseminated by the appropriate group member as the ultimate output.
- Conservancies can see for themselves how many animals were seen on individual routes/zones. The feedback on number of animals seen from each team following completion of a route is made available to the larger game count team and ultimately the conservancy management and Conservancy Committee.
- The handling of completed data sheets is therefore one of the most important steps.

9 **EXPLAIN:** Once each count team returns from their route, their first responsibility is to check the data. The count supervisor should then check the data with the team to make sure any odd recordings are explained and corrected, if possible.

DISTRIBUTE: Handout #20 to the participants and describe the filing system that ensures data forms and copies are stored correctly.

1. The **blue copies** of the data sheets should be stored in the conservancy's game count file and the game count file placed back in the conservancy's filing box.
2. The **green copies** of the data sheets must be collated and formally handed over to the count supervisor who is responsible for making sure the data gets to the institution in Windhoek tasked with managing the data.
3. Copies of data sheets are stored at various MET and NGO offices (**white files**).
4. Regular vehicle patrol counts are stored in the Event Book Archive File (**yellow files**).

DISTRIBUTE: A pack of old data forms so that participants can see what these look like once they are completed.

ASK: What is the value of these papers?

10



Ask participants to think about why the information captured in this process is of value. Write their contributions on a flipchart sheet under the heading 'Why is all this information so valuable?'.



EXPLAIN:

- The value for the conservancy lies at local level but the information also has practical management value regionally as well as nationally.
- Once the count is over the entire cost of the count is actually locked up in the data sheets. Accordingly, the completed data sheets are worth hundreds of thousands of Namibian dollars!

11 **SUMMARISE/LINK:** The last three topics have looked at aids to navigation that can be used while counting game, as well as ways of analysing field-based data and archiving it. Before we carry out a short and simple self-assessment of the training you have received in the course of this Module, let's just go back and look again at all the objectives for this training to confirm that we have covered all the key aspects of the workshop (*refer back to the first flipchart sheet – or prepared Flipchart Sheet #1*). Does anyone have any questions?



SELF-ASSESSMENT: Assessing participants' understanding of this Module

Handout #21 comprises a set of questions based on this Module and designed to evaluate the knowledge and skills that participants receiving this training have acquired. It is not intended as a formal test but is meant to help participants assess areas where they have sound knowledge and strong skills, and areas that require further work.

You can either use the questions as the basis of a plenary session with all the participants, or – if more suitable – ask them to write their answers out on some paper that you will provide for the purpose.

Although it will help you personally to modify your training approaches should you be able to discuss their answers with participants, they should not feel compelled to share their responses with you. If they are willing to share their responses, either collectively or individually, then use the information that you gather to assess your own training skills. Also note from participants' responses where these printed training materials might require amendment, for example, if an activity or section of the text is proving problematic.



List of Handouts that you should make available for this Module

MODULE 3.2, HANDOUT #1: The difference between a population estimate and a trend

MODULE 3.2, HANDOUT #2: The difference between accuracy and precision

MODULE 3.2, HANDOUT #3: Game count methods

MODULE 3.2, HANDOUT #4: Wildlife population estimates from different methods

MODULE 3.2, HANDOUT #5: Counting rules (2 pages)

MODULE 3.2, HANDOUT #6: Road strip sampling

MODULE 3.2, HANDOUT #7: How to measure distances (2 pages)

MODULE 3.2, HANDOUT #8: Implications of bias in the north-west road counts

MODULE 3.2, HANDOUT #9: Checklist for road strip count materials (2 pages)

MODULE 3.2, HANDOUT #10: Road strip counts (2 pages)

MODULE 3.2, HANDOUT #11: Map showing fixed foot transects in Bwabwata NP

MODULE 3.2, HANDOUT #12: Checklist of materials for fixed transect foot counts

MODULE 3.2, HANDOUT #13: Fixed transect foot counts (3 pages)

MODULE 3.2, HANDOUT #14: Coordinates (3 pages)

MODULE 3.2, HANDOUT #15: Using a map (2 pages)

MODULE 3.2, HANDOUT #16: GPS equipment (2 pages)

MODULE 3.2, HANDOUT #17: Using the Garmin 12 GPS (7 pages)

MODULE 3.2, HANDOUT #18: Rough field game population estimates

MODULE 3.2, HANDOUT #19: Field analysis tables

MODULE 3.2, HANDOUT #20: Game count files

MODULE 3.2, HANDOUT #21: *Self-assessment evaluation for participants*

Also make sure to bring:

- Apples and/or oranges, enough for each participant to have one
- Data sheets
- Old and completed data sheets
- Photocopies of the 2x2km grid map for Torra Conservancy

All Handouts are one page only, unless otherwise specified. Please make sure that you make enough copies for each trainee.





NOTES



