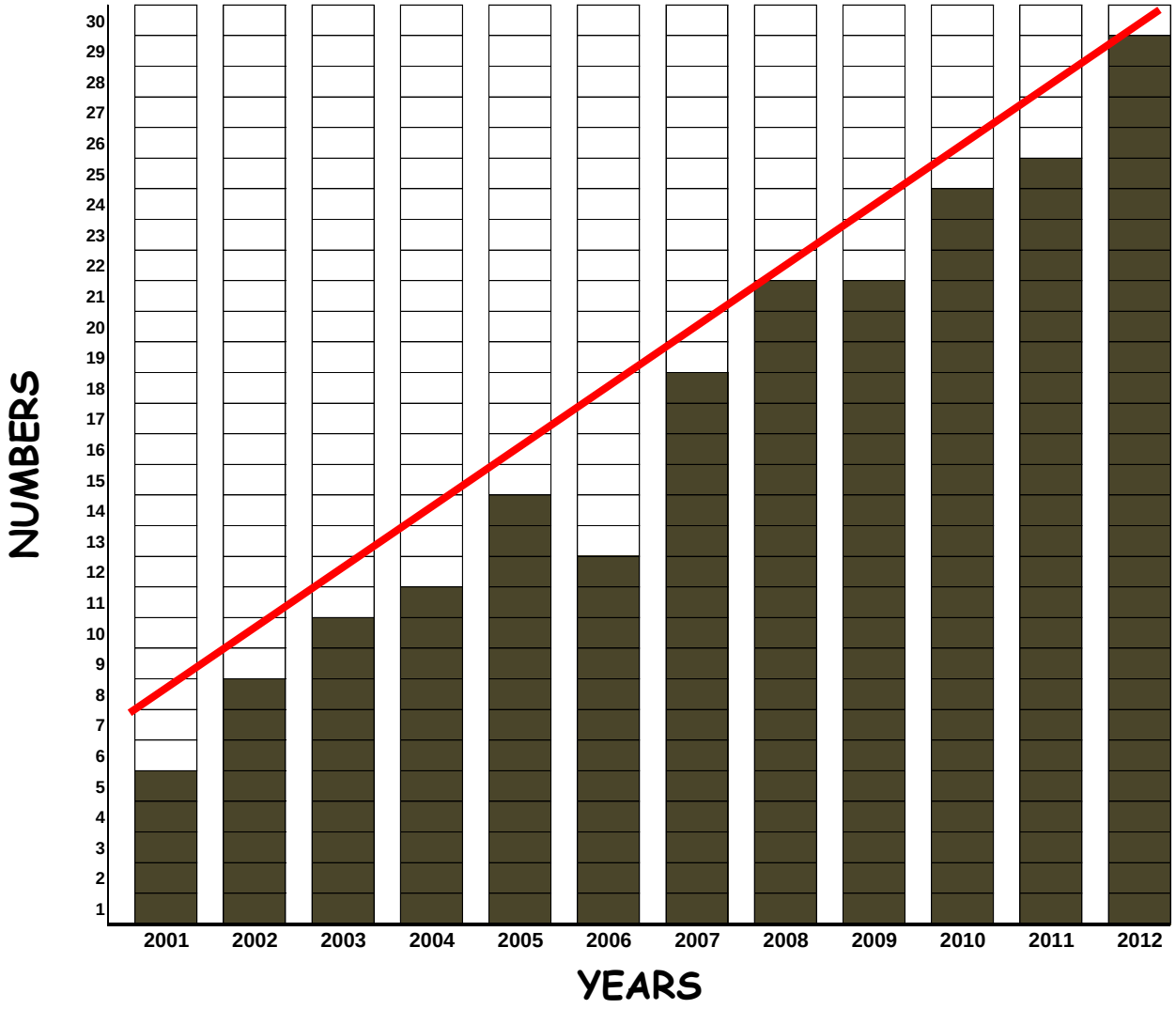
MODULE 3.2, HANDOUT #1: The difference between a population estimate and a trend

Population estimate = a number of animals: e.g., 1,000 springbok

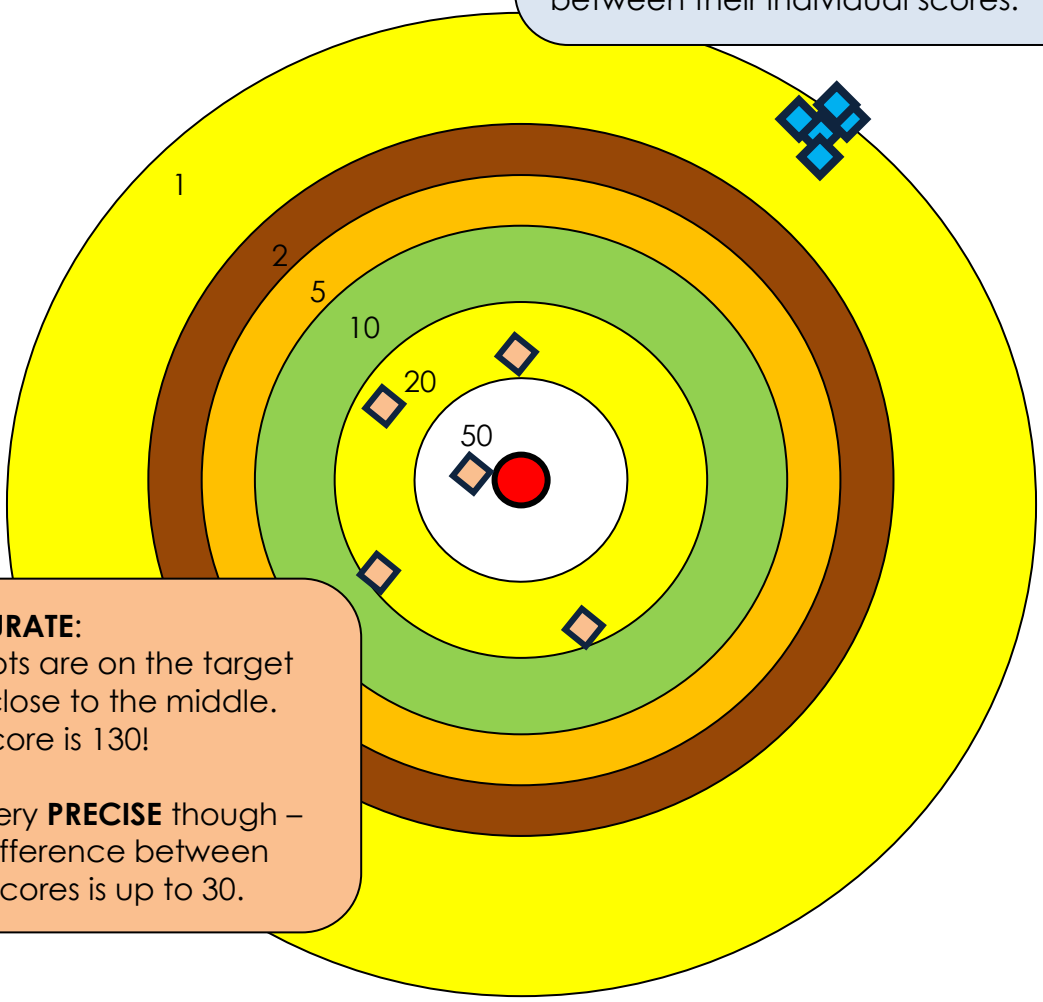
Trend = changes in numbers of animals over years: e.g., shown on graph below



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

PRECISE:
All shots are close together.

NOT ACCURATE – they're a long way from the middle. They only score 5 altogether but there's no difference between their individual scores.



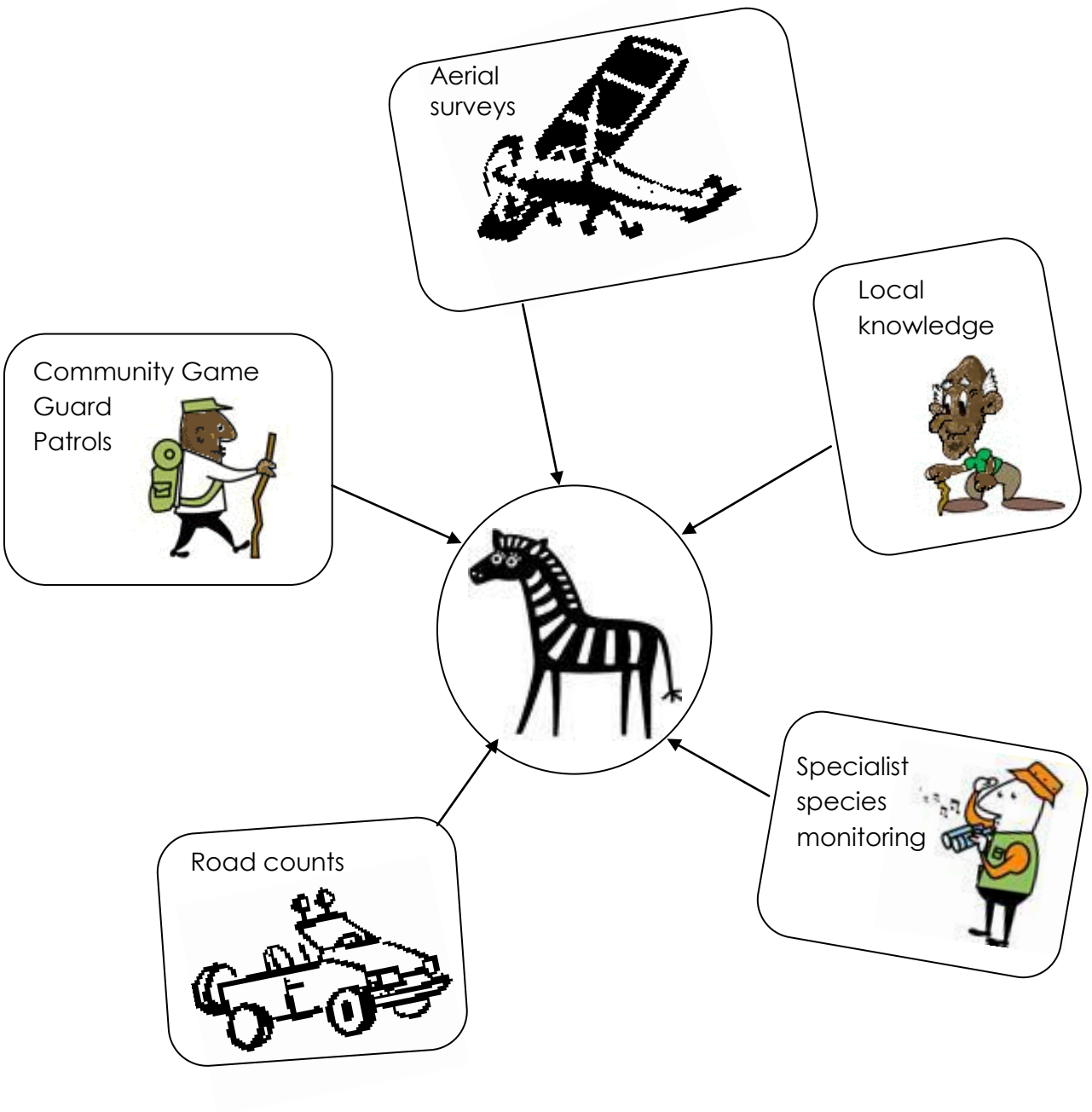
ACCURATE:
All shots are on the target and close to the middle. The score is 130!

Not very **PRECISE** though – the difference between their scores is up to 30.

ACCURACY: needed for population estimates (numbers of animals).

PRECISION: needed for trends (comparing numbers from year to year).

MODULE 3.2, HANDOUT #3: Game count methods



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

SPECIES	CALCULATED POPULATION SIZE			Usable population estimate	Notes
	Transect Method	Distance Method	Aerial Census		
Elephant	272	–	–	150	Local intensive survey estimated a population of 150
Rhino	–	–	–	1	A known individual in the XX river valley
Springbok	7,756	5,788	4,415	5,500	Aerial census under-estimates springbok
Gemsbok	1,718	1,236	1,907	1,800	
Zebra (H)	261	–	530	500	Ground counts do not access the mountains
Kudu	–	–	54	100	Ground counts missed kudu but they are present
Ostrich	1,143	980	853	1,000	
Giraffe	52	–	24	30	Ground counts over-estimated giraffe

MODULE 3.2, HANDOUT #5: Counting rules (page 1 of 2)

Road and foot counts

1. Count from directly in front outwards – the priority area is the track (getting less important as one looks away from the track to the sides).
2. Measure the distance to where the animal was when you first saw it before it ran away.
3. Measure the distance from the animal to the track (at right angles) and not from you to the track.
4. Measure the distance to the centre of a herd, not to the nearest or any other animal.
5. Count adults and sub-adults only, but make a note of the numbers of new-born animals.
6. Start counting at the same time every day.
7. Don't use binoculars.
8. Constantly locate yourselves on the map (if necessary use the GPS or route odometer).

Road counts

1. All count teams start at sunrise.
2. If the track runs next to a fence, count the animals inside the fence and for the analysis use half of the length of that section of track.
3. Even if you know there are no animals in an area it must be included in the count – try to sample all habitats in the same proportions as they occur.
4. When calculating the estimated numbers for the whole conservancy, exclude areas that are inaccessible and where it is therefore not possible to sample. This means the numbers calculated for the whole area will be under-estimated but correct.
5. Measure the strip width for each route.
6. Count from the back of an open bakkie.
7. Don't go faster than 35km/hr.

For obtaining information about population trends:

- Use the same routes every year.

For obtaining information about wildlife distributions:

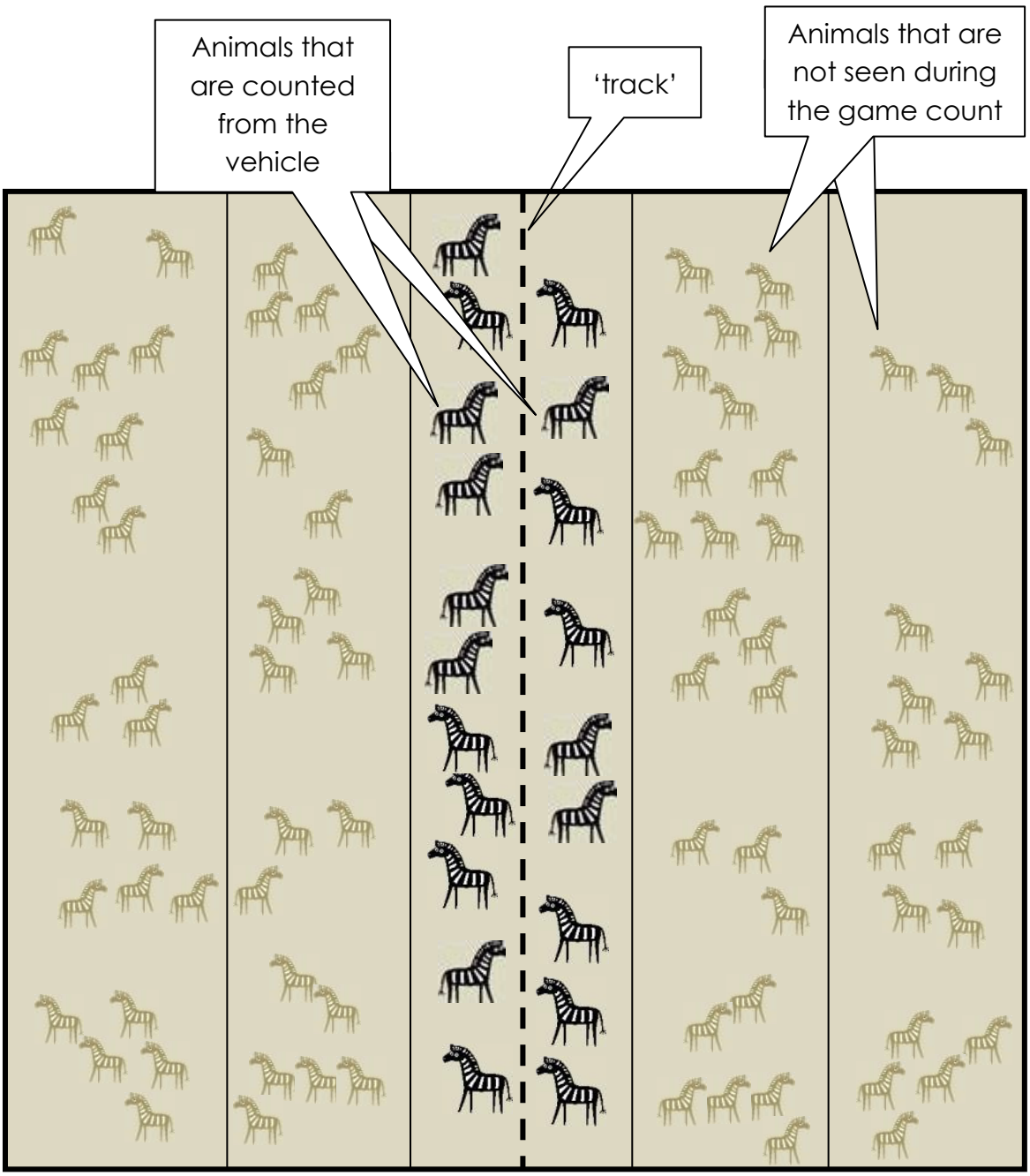
- For each sighting, locate the position on the map of the conservancy and make a note of the cell number (from the grid identifiers).

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

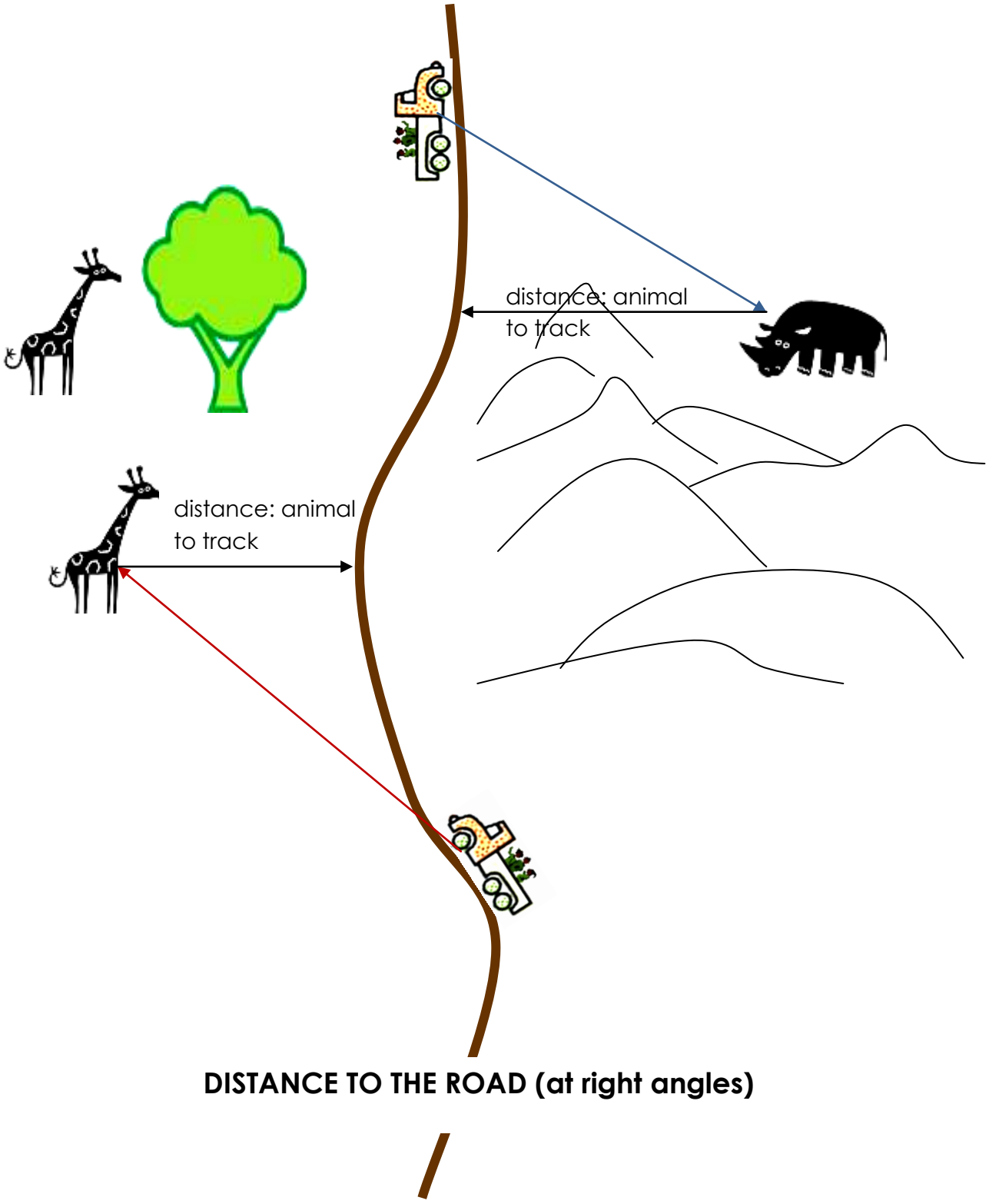
Foot counts

1. All counts start at 07.00am. Drivers and count leaders must ensure they give themselves plenty of time to get to their start point on time.
2. The team leader and driver must ensure that their team has been dropped off at the correct start point.
3. Once the team has been dropped off the driver must proceed to the pick-up point at the end of the transect line.
4. Before starting his/her transect at 07.00am the scribe must ensure that the following details are captured on the count form: a.) Name of the conservancy; b.) the date; c.) the transect number; d.) names of the observers; e.) the start time; f.) the start kilometres on the GPS.
5. Talking on the transect line should be keep to an absolute minimum.
6. Always keep downwind of dangerous game.
7. Always look well ahead and to the side. Too many counters tend to look for spoor on the ground in front of them while walking and fail to notice animals up ahead.
8. When an animal/animals or spoor have been spotted the team should all stop while the scribe writes down: a.) the species name; b.) the number of animals or spoor seen; c.) the distance (this may have to be done once the team has walked up to a point at right angles to the animal); d.) the GPS reading.
9. Only spoor less than one day old must be recorded.

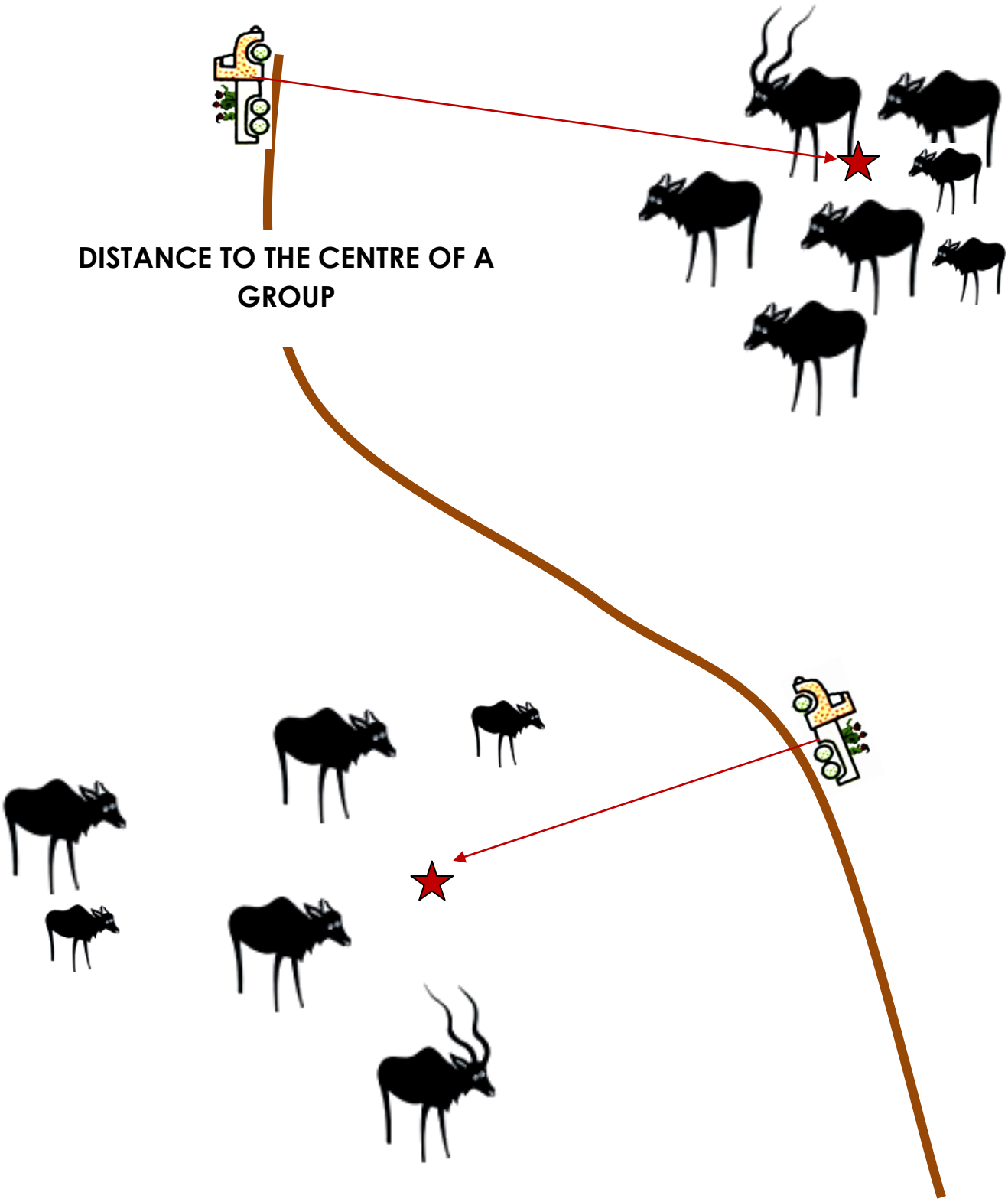
MODULE 3.2, HANDOUT #6: **Road strip sampling**



MODULE 3.2, HANDOUT #7: How to measure distances (page 1 of 2)



DISTANCE TO THE ROAD (at right angles)


DISTANCE TO THE CENTRE OF A GROUP

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

Inbuilt conservatism in estimating game populations is not all good.

Because 28% of the count area (the combination of the NW conservancies) is excluded due to inaccessibility, and assumed to have no animals when calculating population estimates, the results imply that stocking rates are less than they actually are. This can provide a false sense of security when it comes to evaluating drought risk.

This may lead to overuse of the vegetation and to under-estimation of competition with other herbivores, such as endangered black rhino and people's livestock.

Conservation workers in the area have an inbuilt bias favouring conservative population estimates. This follows from a history of overuse of wildlife in the area that necessitated extreme precaution when it came to wildlife utilisation.

The situation has changed. There was a period of at least a decade with little or no use and almost no poaching. Game numbers have increased sharply to the point that some workers believe that the area has reached ecological carrying capacity and over-stocking related mortalities are imminent.

Thus, a major weakness in the road count is that the underestimation bias in population estimates may perpetuate the impression that there are fewer animals than there actually are.

(Taken from: 'Road Game Counts in NW Namibia; Background and Methods', Natural Resource Working Group, NACSO.)

MODULE 3.2, HANDOUT #9: Checklist for road strip count materials

		CHECK
Large A3 bag containing	**Clipboards** (to hold game count data sheets, a copy of the game count RULES, a copy of instructions on what to check the night before the count, what to do on arrival and what to do at the end of the count) **A pen attached by string to the clipboard** **A3 flip file** (to store game count maps) **Laminated Maps** (route maps – 3 for each route – and orthophoto maps – 3 for each route)	
Large laminated overview map	These are essential for game count planning in the field. There must be one for each game count area. They must show all routes and GPS points	
Small A4 bag containing	**Stationery** (masking tape, staples, PresStick, paper punch, spare pens, thinner fluid to clean maps & charts, permanent marker pens, white board marker pens, calculator with new batteries, binder clips, paper clips	
Flipchart	One **flipchart** for each area	
Table	Essential for working on – for checking count data or using the computer to capture data	
Computer	To be used to capture game count data	
Report back charts	A set of laminated report back charts is required by every area. Requirements are as follows: Area 1a: 1 set Area 1b: 1 set Area 2: 3 sets (3 areas report back at same time) Area 3: 4 sets (4 areas report back at same time) Area 4: 1 set Area 5: re-use from other areas (for Torra and Khoadi //Hoas, count teams come in from other areas and bring report-back charts with them A set of report back charts is made up as follows: 1. Preliminary Population Estimates Chart 2. Estimated Populations Chart 3. Counts – Numbers Of Animals Seen Chart 4. Transect Statistics Also check that there is an overview map showing routes	

MODULE 3.2, HANDOUT #10: Road strip counts (page 1 of 2)

1. PREPARING FOR COUNTS

Support NGOs, MET and conservancy members:

- Conservancy tracks and features mapped.
- Routes selected (these are fixed but re-surveyed every year).
- Training game count participants in understanding sampling.
- Training game count participants as observers/data recorders.
- Training selected game count participants in analysing data.

Technical support team:

- Stratification of conservancy into counting zones.
- Develop database for game count analysis.
- Develop field analytical tools.

2. ANNUAL PLANNING

Technical support team:

- Conducts a game count planning workshop.
- Sources funds for conducting the game counts.
- Prepares game count materials (maps/data sheets/count files).
- Develops the support programme.

3. THE GAME COUNT

- Logistics arranged by conservancies with support from NGOs and government.
- Game count time fixed each year.
- Game count teams selected from various stakeholders.
- Refresher training conducted before the game count.
- Route debrief (after each route).

4. LOCAL ANALYSIS: Game count debrief (after each conservancy count) at which:

- Data sheets are checked.
- Numbers of animals seen are discussed and verified.
- Population estimates calculated (rough field method).
- Trend graphs (red level Event Book charts) updated.
- Distribution maps drawn.

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

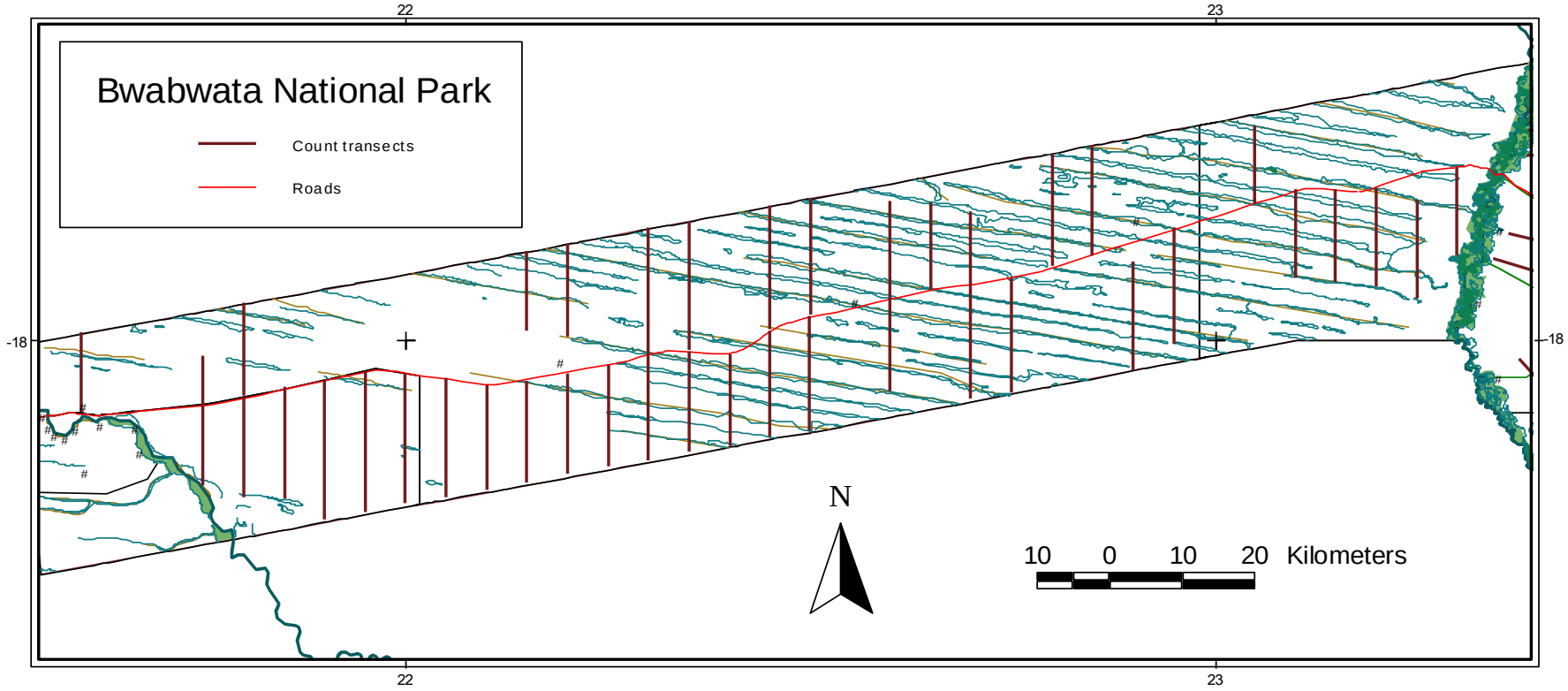
5. REGIONAL-LEVEL ANALYSIS

- Copies of data sheets taken to relevant support NGO (e.g., WWF) Windhoek.
- Data captured onto database.
- Population estimates calculated using DISTANCE.
- Population trends calculated as numbers seen per 100km.
- Distribution maps generated by GIS.

6. FEEDBACK

- Poster report generated for entire game count area.
- Reviewed by technical support team from government and NGOs.
- Distributed to all stakeholders and conservancies.

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

		CHECK
A few months before the game count	Commercial printing of game count data forms must be done a few months before the count if they are to be ready on time.	

In the days before the game count		
Material to go into tin trunk	All game count materials must be packed in a large tin trunk. It is preferable to have one large tin trunk than many smaller cardboard boxes. The truck can be locked, which will prevent unauthorised people from helping themselves to GPSs and batteries etc.	
	The following materials must be acquired and packed in the trunk: • Count forms, clipboards, ball point pens, stapler with spare staples, paper punch, calculators, marking pens and flipchart.	
GPS equipment	Enough GPSs for game count teams need to be packed. All GPSs should be checked carefully to ensure that they are working and if not replaced with a new one.	
	Plenty of good quality AA batteries (preferably Duracell) must be bought for the GPSs.	
Maps and files	Laminated A4 game count maps showing all numbered transects with their GPS co-ordinates must be packed. It is important to make plenty of these maps.	
	A large map for training and planning each day's count. This map should be put up in a central part of the camp for the duration of the count.	
	A special file must be made to store all completed game count data forms.	
Other equipment	Range finders with fresh batteries. (Only a well-trained team leader should be issued a range finder as they are unreliable in untrained hands.)	
	A lap-top computer (with all cables and mouse included) with the latest count database on it must be prepared. This computer should have an inverter with it so it can be run off a car battery if necessary.	
At the end of the game count		
	Feedback posters will be needed for a feedback meeting on the last day of the game count involving all participants.	

MODULE 3.2, HANDOUT #13: Fixed transect foot counts (page 1 of 3)

1. PLANNING THE COUNT

1. At least six weeks before the game count is due to start, a planning meeting is held with all stakeholders (MET, senior conservancy staff and support NGOs).
2. At this meeting a game count schedule is drawn up.
3. A list of MET and support NGO staff who will attend the game count is made - the roles and responsibilities of these people during the game count have to be made very clear.
4. A list of vehicles and drivers that will be needed for the game count should be made.
5. Funding for fuel, food and other items such as stationery and GPS batteries is discussed and a person elected to source this funding from support NGOs.
6. NGO staff will have to appoint people who will be responsible for buying food for the game count.
7. A person is selected to take charge of preparing all the materials for the game count.
8. A central base camp with water is agreed upon.
9. A typed up schedule should be given to every participant at the planning meeting before they leave.

2. ORGANISING THE GAME COUNT

1. The organiser goes through the rules with the counters to make sure they aren't forgotten during the game count.
2. Game count teams (of no more than five people each) are selected and in each a team leader is chosen (he/she usually operates the GPS).
3. The names of everyone in the team are recorded on a flipchart, along with which team they are in.
4. Each team selects a scribe whose job it is to record the sightings and other data onto the data sheet.
5. On foot counts, the scribe and GPS operator walk together so that the scribe can record the GPS position of sightings.
6. From the whole group, a game count controller is chosen to take responsibility for collecting all data sheets at the end of the day's count; for checking that they're correct; and for filing the data sheets and keeping them safe.
7. The game count team leaders and NGOs appoint camp cooks who also look after the food and camp while the counters are out in the field.

MODULE 3.2, HANDOUT #13: Fixed transect foot counts (page 2 of 3)

3. GAME COUNT PREPARATIONS

1. It is very important to do all preparation for a game count the day/evening before.
2. Each team must know what route or transect line they will be doing the next day.
3. For foot counts, each team must be allocated a vehicle with driver to take them to their start position. The driver must know where the team is to be picked up at the end of the transect line. For this reason, it is essential that all drivers have a GPS and a game count map and are able to use them. The driver must agree on a departure time from camp with the team that will allow plenty of time to get to the start point.
4. A responsible person should be appointed to wake the team in the morning.
5. It is the driver's responsibility to check that his vehicle has a spare wheel, jack, wheel spanner, pump, tools and fuel. It is very important that the driver has water on his vehicle for the game count team at the end of the transect line.
6. The team leader must ensure he/she has a clipboard containing plenty of data sheets, a pen and game count map. He/she must see that he/she has a GPS with spare batteries and that the GPS is working.
7. All counters must ensure that they have water bottles, food, hats and warm clothing (if it is cold) Good walking boots/shoes are essential.
8. In areas with large numbers of dangerous game, a competent MET officer with a firearm may be required on each team. On no account should a firearm be carried by any team member who has not been trained to handle firearms.

4. CONDUCTING THE GAME COUNT

1. At the end of the transect line, the scribe must ensure that the following details are captured on the data sheet: a.) the end time b.) the end kilometres.
2. Once back at camp, the team leader and the scribe need to sit together and add up the total numbers of animals counted and complete the game count summary. When they are satisfied that the game count form has been correctly completed, the form must be handed in to the game count controller.
3. The game count controller must recheck the forms for any discrepancies and if any are found must immediately find the team leader to rectify the problem.
4. Once the game count controller is satisfied that the game count forms are correct, the carbon copy of the game count form (the blue copy) can be removed and put into the conservancies' game count file. The original form (green copy) can then be stored in the game count file at NNF
5. The game count data can then be captured on computer by the game count controller or some other appointed person.
6. Game counts are normally completed by midday so that plenty of time remains for preparation for the next day's game count.

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

5. GAME COUNT FEEDBACK

1. On the last day of the game count, a feedback session should be held for the participants on the count.
2. A poster template is available for this feedback session that shows the total numbers of animals seen on the game count for all transects.
3. The feedback session is important to record participants' comments on improvements that could be made for the next game count and to record local knowledge of game numbers.

6. GAME COUNT RESULTS

1. Once all the game count data has been captured on computer and checked for mistakes, a game count results poster (A3) is produced.
2. This poster is laminated and distributed to all the stakeholders concerned. The poster shows numbers of animals seen on the game count per conservancy as well as population estimates for each area.
3. Trend graphs to show population change over the years are also included as well as game count statistics.

LINES OF LATITUDE

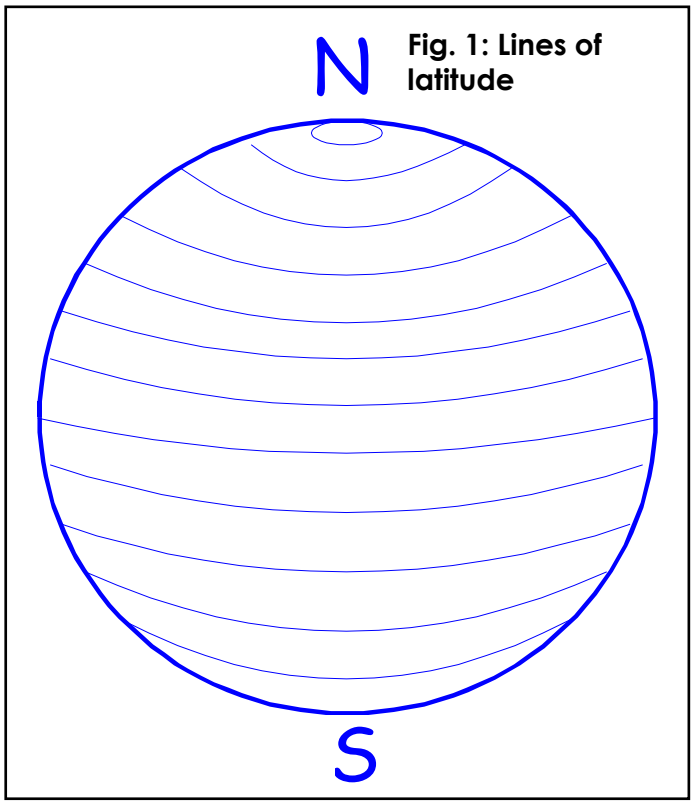


Fig. 1: Lines of latitude

On a globe of the Earth, lines of latitude (or parallels) are circles of different sizes (Fig. 1). The longest is the equator whose latitude is 0°, round the middle of the Earth. All lines of latitude are parallel with the equator.

North and south of the equator the circles shrink until at the poles, (90°N and 90°S) they are mere points.

Important latitudes

The Tropic of Cancer (23°27′ N), the Tropic of Capricorn (23°27′ S), the Arctic Circle (66°33′ N), and the Antarctic Circle (66°33′ S).

Each degree of latitude is sub-divided into 60 'minutes', each of which in turn is divided into 60 'seconds'. A latitude is thus given as, for example, 19° 58' 59''S. Alternatively it can be given in decimal degrees (in this example, 19.983056°S). Latitudes above or below the equator are measured north or south, respectively.

A degree of latitude always corresponds to exactly 111km. Thus the distance between two points along a line of longitude can be measured from the difference between the degrees of latitude.

LINES OF LONGITUDE

On the globe, lines of longitude (or meridians) run through the north and south poles (Fig. 2). Each meridian crosses the equator, which runs round the centre of the Earth. All lines of longitude are the same length.

As the equator is a circle, it can be divided into 360 equal parts (degrees). Lines of longitude are therefore divided into a total of 360 degrees. They are further sub-divided into 60 'minutes' and each of these is divided into 60 'seconds'. A longitude is therefore given as, for example, 23° 12' 31''E or, in this example, 23.208611°E.

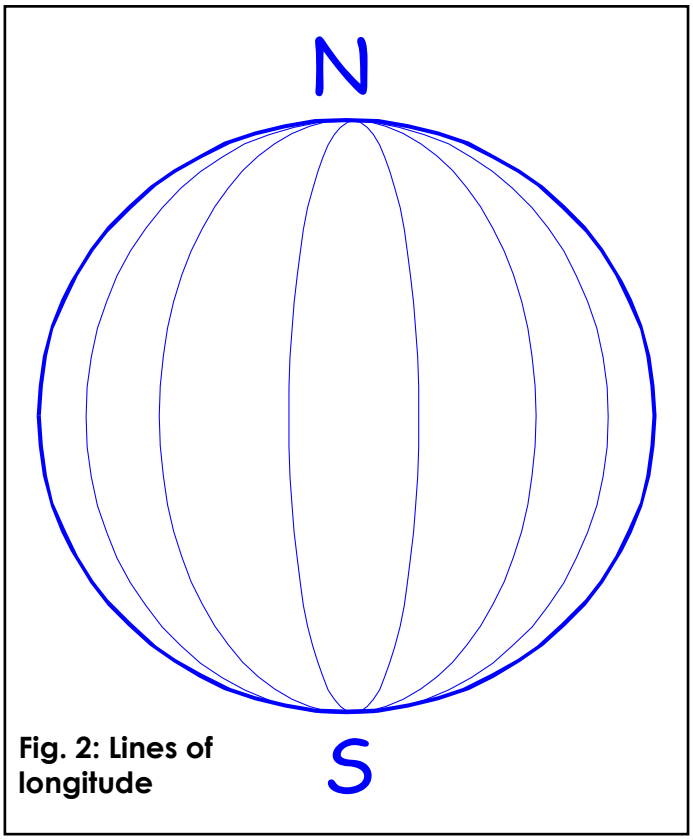


Fig. 2: Lines of longitude

The zero degree meridian runs through Greenwich in England. Longitude is measured east or west of Greenwich. For example, Botswana lies east of Greenwich and therefore all longitudes within that country are °E.

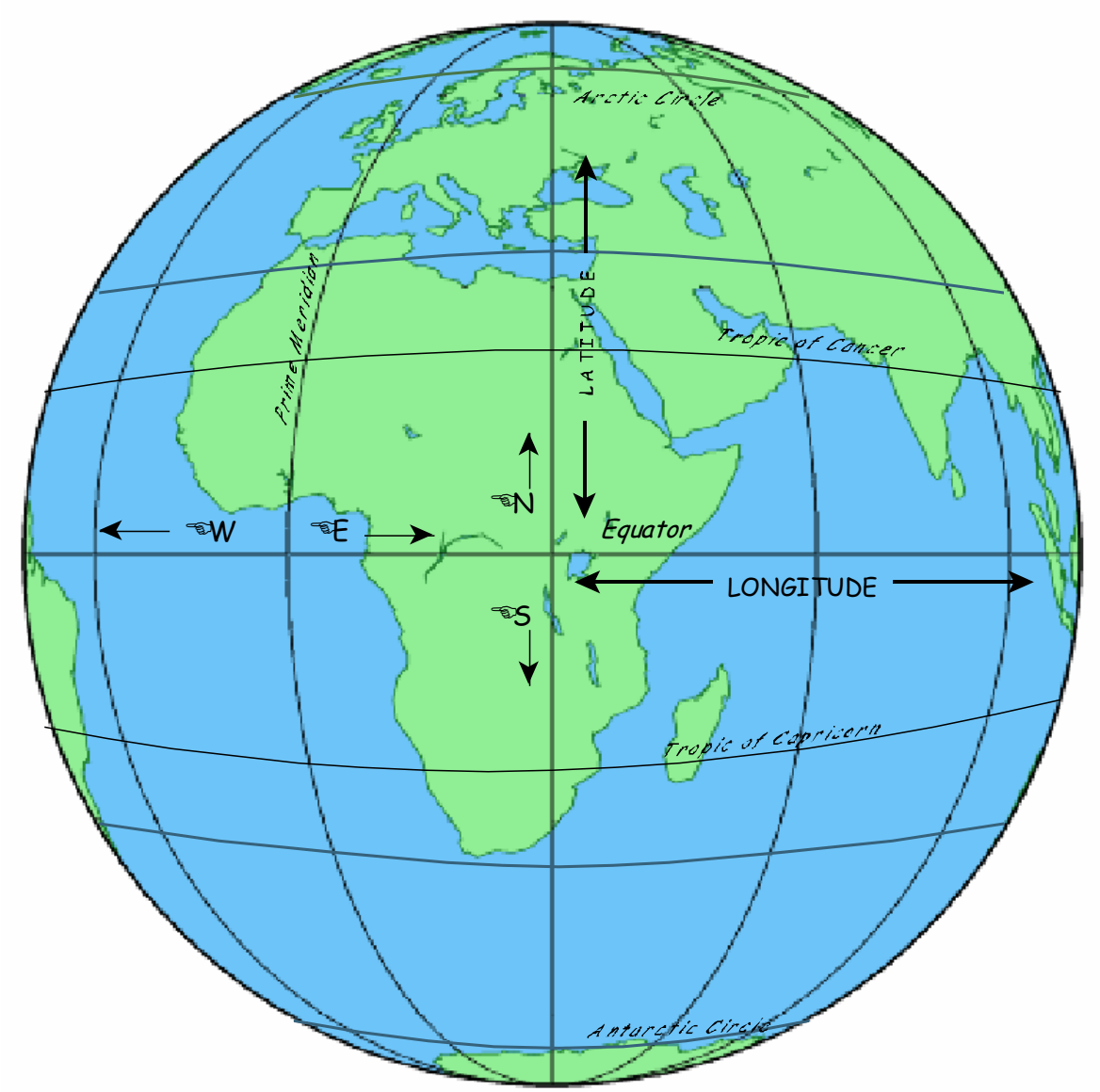
Unlike a degree of latitude, a degree of longitude decreases from a maximum at the equator of 111km to 0km at the poles. The distance between two points along a line of latitude can be calculated as 111km times the cosine of the latitude.

Important longitudes

The zero point of longitude (the Greenwich meridian) also known as the Universal Prime Meridian.

SUMMARY

The terms described above are all summarised in the following diagram.



MODULE 3.2, HANDOUT #15: Using a map (page 1 of 2)

1. Most **maps are static, two-dimensional, geometrically accurate (or approximately accurate) representations of three-dimensional space** – i.e., they are drawings on a piece of paper of the spherical Earth.

2. Most **maps are drawn to a scale**, expressed as a ratio such as 1:10,000, meaning that 1 of any unit of measurement on the map corresponds exactly, or approximately, to 10,000 of that same unit on the ground.

3. When an area that is drawn on a map is small, the curvature of the Earth doesn't distort the map too much and can be ignored. It is then possible to **draw the coordinates on the map to represent a position on the Earth**.

4. The **lines of latitude are drawn on the map as straight horizontal lines**, and the **lines of longitude are drawn as straight vertical lines**.

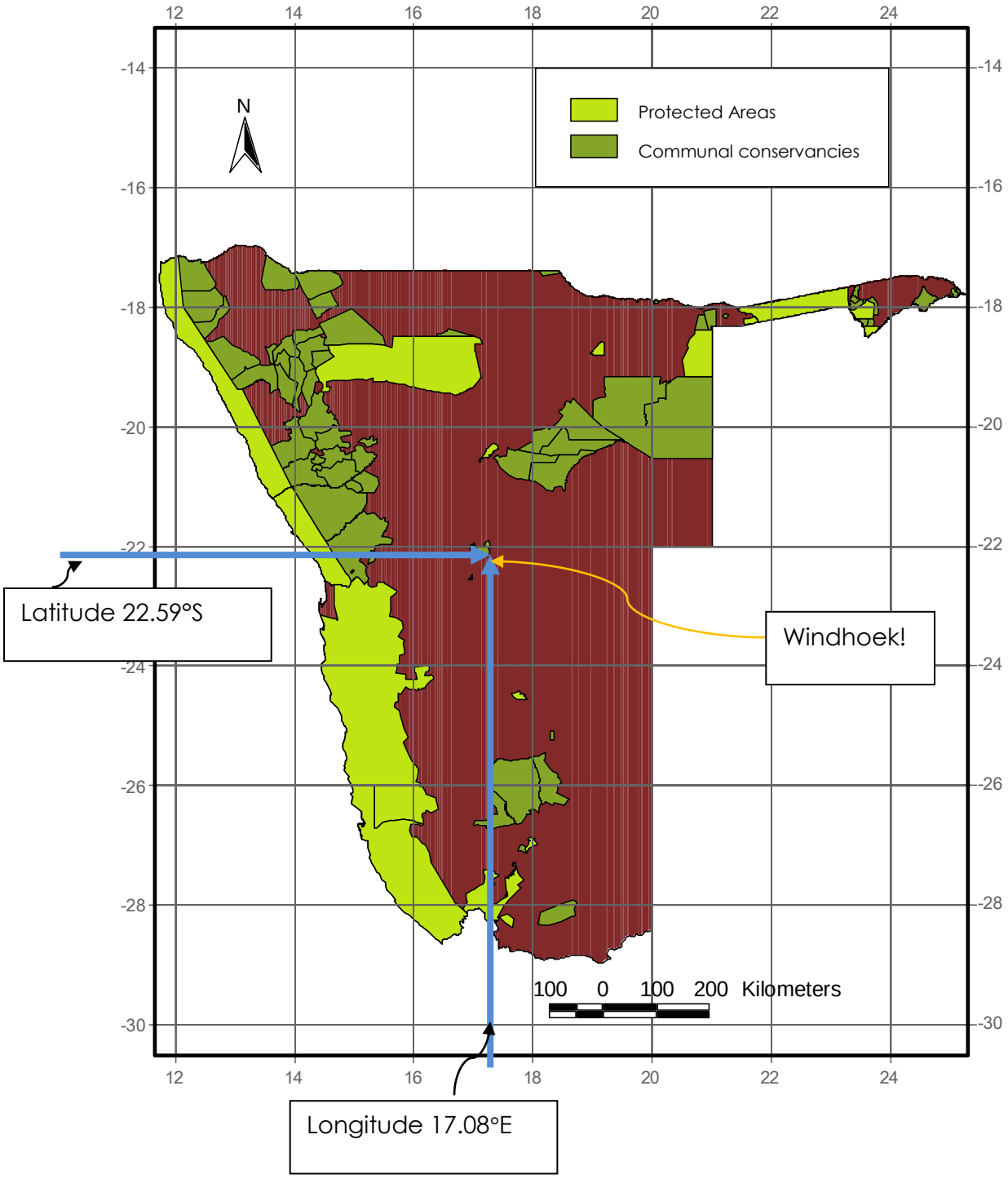
5. To find out where you are from your GPS, you look for the **corresponding degrees of latitude and longitude on the map**.

EXAMPLE:

On the GPS, the coordinates are 22.59°S, 17.08°E. On the map of Namibia on the next page, find 22° latitude, and then move downward (south) about quarter of a square (.59°S). Now find the 17° longitude. Where these two lines meet is the location given on the GPS (for Windhoek!).

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

USING LATITUDE AND LONGITUDE TO LOCATE A POSITION ON A MAP

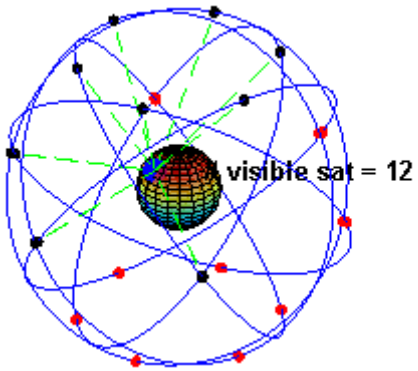


MODULE 3.2, HANDOUT #16: GPS equipment (page 1 of 2)

TECHNICAL STUFF

This is copied from the Internet Wikipedia for those interested in technical details of GPS satellites and how they're controlled.

SATELLITES



A visual example of the GPS constellation in motion with the Earth rotating. Notice how the number of *satellites in view* from a given point on the Earth's surface, in this example at 45°N, changes with time.

The space segment (SS) is composed of the orbiting GPS satellites – or Space Vehicles (SV) in GPS parlance. The GPS design originally called for 24 SVs, eight each in three circular **orbital planes**, but this was modified to six planes with four satellites each. The orbital planes are centred on the Earth, not rotating with respect to the distant stars. The six planes have approximately 55° **inclination** (tilt relative to Earth's equator) and are separated by 60° **right ascension** of the **ascending node** (angle along the equator from a reference point to the orbit's intersection). The orbits are arranged so that at least six satellites are always within line of sight from almost everywhere on Earth's surface. The result of this objective is that the four satellites are not evenly spaced (90 degrees) apart within each orbit. In general terms, the angular difference between satellites in each orbit is 30, 105, 120, and 105 degrees apart which, of course, sum to 360 degrees.

Orbiting at an altitude of approximately 20,200 kilometres – about 12,550 miles or 10,900 nautical miles; orbital radius of approximately 26,600 km (about 16,500 mi or 14,400 NM) – each SV makes two complete orbits each **sidereal day**, repeating the same ground track each day. This was very helpful during development because even with only four satellites, correct alignment means all four are visible from one spot for a few hours each day. For military operations, the ground track repeat can be used to ensure good coverage in combat zones.

As of March 2008,there were 31 actively broadcasting satellites in the GPS **constellation**, and two older, retired from active service satellites kept in the constellation as orbital spares. The additional satellites improve the precision of GPS receiver calculations by providing redundant measurements. With the increased number of satellites, the constellation was changed to a non -uniform arrangement. Such an arrangement was shown to improve reliability and availability of the system, relative to a uniform system, when multiple satellites fail. About eight satellites are visible from any point on the ground at any one time.

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

CONTROL

Figure 1: An early ground monitor station

The control segment is composed of

1. A master control station (MCS),
2. An alternate master control station,
3. Four dedicated ground antennas, and
4. Six dedicated monitor stations.

The flight paths of the satellites are tracked by dedicated U.S. Air Force monitoring stations.

The tracking information is sent to the Air Force Space Command's MCS. Each GPS satellite is contacted regularly with a navigational update that synchronises the atomic clocks on board the satellites and adjusts each satellite's internal orbital model.

GPS RECEIVERS

There are a lot of different kinds of GPSs. There are some that are part of phones and watches, some in cars and aircraft, and some – like the ones used on game counts in Namibia – that are purely for navigation.

USES OF GPSs

Originally GPSs were designed for military use but they are now also used for civilian purposes.

GPS has become a widely-deployed and useful tool for commerce, scientific uses, tracking, and surveillance. The GPS's accurate time facilitates everyday activities such as banking, mobile phone operations, and even the control of power grids, by allowing well-synchronised hand-off switching (remote control to link separate grids and ensure simultaneous action). Farmers, surveyors, geologists, and countless others perform their work more efficiently, safely, economically, and accurately.

MODULE 3.2, HANDOUT #17: Using the Garmin 12 GPS (page 1 of 7)

A. SYSTEM SETUP

- ✓ Open the Main Menu page.
- ✓ Scroll down to **Setup Menu** and press 'ENTER' twice and the **system setup mode** appears on the screen.
- ✓ You can then set the; Operating mode, Time offset, Time format, Screen contrast, Backlighting timeout, and Tone setting.

SYSTEM SETUP
MODE **NORMAL**
DATE O8 MARCH O5 TIME 12:20:55 OFFSET: **+02:00** HOURS: **12**
CONTRAST   
LIGHT: **30 SEC** TONE: **MSG, KEY**

- ***Normal mode*** *operates the unit (GPS) at maximum performance.*
- ***Simulator mode*** *allows you to operate the unit without acquiring satellites and is ideal for practising, or entering way points or routes when not navigating.*
- ***Time offset*** *enables you to set the local time of your area/country.*
- ***Hours (time format)*** *this allows you set time to either 24 or 12 hour clock.*
- ***Screen contrast*** *allows you to either increase or decrease screen contrast.*
- ***Backlighting timeout*** *allows you to set the length of time the screen will remain lit after the last entry.*
- ***Tone setting*** *this is used to select a tone for messages and keystrokes or no tone at all.*

To set any of the above options:

- ✓ Highlight the option.
- ✓ Press 'ENTER'.
- ✓ Use the arrow keypad to move either up/down or backward/forward to select the desired setting.
- ✓ Press 'ENTER'.

B. NAVIGATION SETUP (in the Main Menu page under 'Setup Menu')

The navigation setup page enables you to set:

NAVIGATION SETUP
POSITION FORMAT Hddd. ddddd*
MAP DATUM WGS 84
CDI SCALE ±0.25
UNITS: Metric
HEADING Auto Mag E004

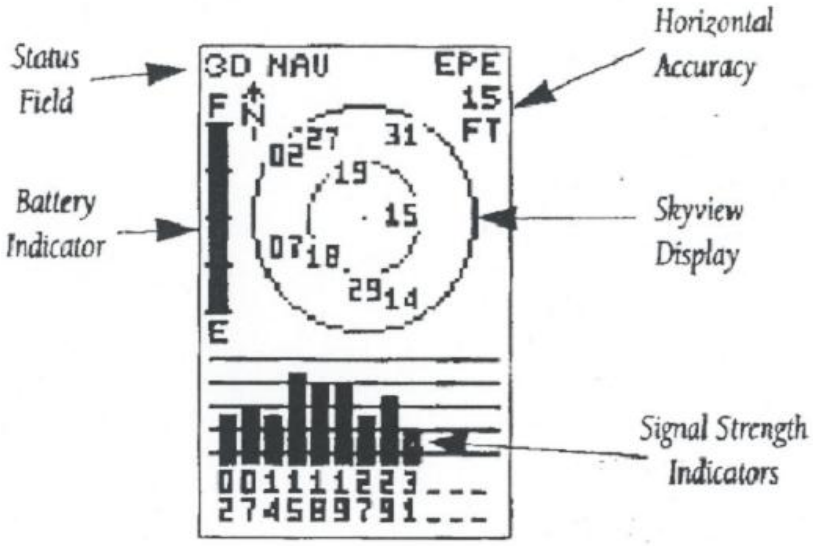
- **Position Format** in latitudes and longitude in degrees and minutes (*hddd° mm. mmm'*); degrees, minutes and seconds (hddd° mm'ss.s"**);** Decimal degrees **(hddd. ddddd°);** Universal Traverse Mercator (UTM/UPS) and others.
- **Map Datums** help to provide the best positioning. In our case, use ***WGS 84***. Map datum is usually indicated on maps.
- **Course Deviation Indicator** (CDI) lets you select the range of the CDI bar on the highway page. The ±0.02 & 0.25 scales are commonly used.
- **Units of Measure** allows you to select either ***Metric*** or ***Statute*** or ***Nautical*** system of measurement.
- **Heading Reference** is used to select ***Magnetic north*** (automatic or user defined), ***True north*** or calculated grid headings. The default setting is automatically-calculated magnetic north, which is suitable for most applications.

- **Set the options as in A. 'SYSTEM SETUP' above.**

MODULE 3.2, HANDOUT #17: Using the Garmin 12 GPS (page 3 of 7)

PRIMARY PAGES:

C. The 'SATELLITE PAGE' display shows satellite positions and signal strength. Satellite positions are displayed using two circles and centre point.

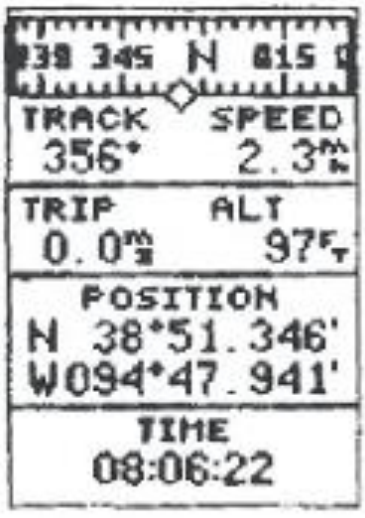


- The outer circle shows satellites level with the horizon; the inner circle is 45˚ above the horizon; and the centre point represents satellites directly overhead.
- The bottom of the page contains a row of signal strength bars of each satellite being used.

D. The 'POSITION PAGE' display shows your:

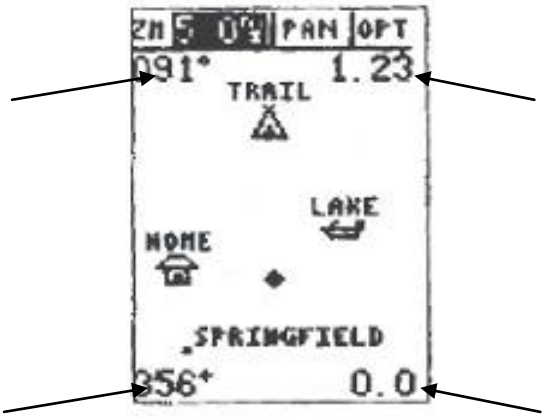
1. Position in latitude and longitude altitude;
2. What direction you are heading (your bearing);
3. Your speed; and
4. Time.

The top of the page contains a compass tape which is a graphic representation of your heading (or track).



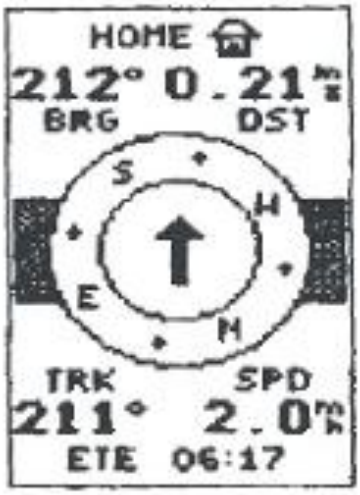
MODULE 3.2, HANDOUT #17: Using the Garmin 12 GPS (page 4 of 7)

E. The 'MAP PAGE' display shows your current position and track log with a diamond icon and a black line respectively. Saved nearby waypoints and routes also appear on the screen.



Map

- Your current track bearing and speed are shown at the bottom corners of the screen. The distance and bearing to the waypoint you are going to are shown in the top corners.
- The scale window allows you to change the scale of the map. To do this, highlight the map scale, press 'ENTER' and increase/decrease the scale with the arrow keys.



F. The 'COMPASS PAGE' display shows:

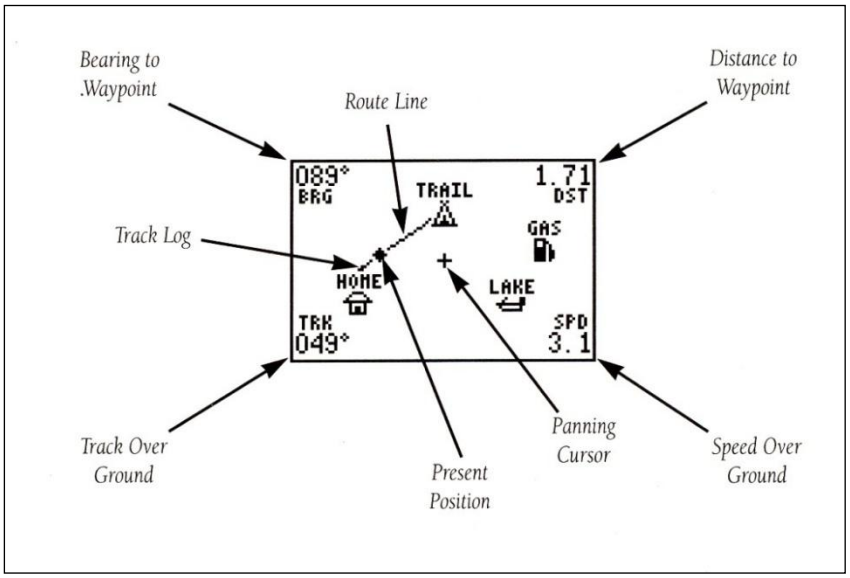
1. The waypoint you are going to;
2. The bearing; and
3. The distance to the waypoint (your destination).

The centre of the page contains a compass ring and arrow to show you the direction of the waypoint from the direction you are heading. The bottom of the page gives your track, speed and estimated time en route.

G. The 'MENU PAGE' display gives you access to the GPS waypoint management, route, track-log, and setup features through a list of submenus.

MODULE 3.2, HANDOUT #17: Using the Garmin 12 GPS (page 5 of 7)

H. The 'MAP PAGE' display shows you where you are. It can be used to plot your course and route, and as well as other features it can show you the distance and bearing to a waypoint and lets you mark new waypoints on the map. Your speed and track are also shown on this page.



Your present position is shown as a diamond.

If you have set a route or used the 'Go To' feature, this will show as a line across the screen and you can use it to navigate very accurately by looking at how far the diamond (you) are from the line.

You can 'zoom' in or out for more detailed navigation.

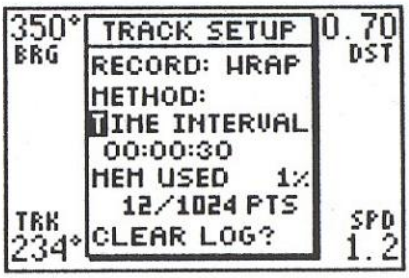
Zooming is done by pressing the 'IN' or 'OUT' key. The scale you have zoomed to is shown briefly on the map – you can show this for longer by holding down the IN or OUT keys.

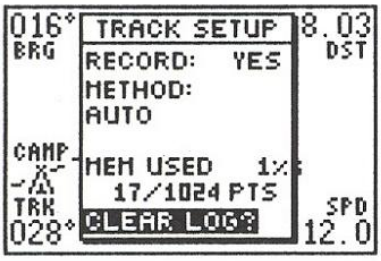
Panning lets you move the display about on the map page by pressing the key pad in whatever direction you wish. When you do this, a cross (target) appears on the screen and the distance and bearing at the top of the page are now related to the distance and bearing between your present position (diamond) and the target (cross). You can pan until the cross snaps onto a destination waypoint, at which time the waypoint name will be highlighted.

MODULE 3.2, HANDOUT #17: Using the Garmin 12 GPS (page 6 of 7)

I. The 'TRACK LOG' display is one of the most useful features of a GPS. It records the route taken so that wherever you've travelled is recorded. This enables you to show the positions of roads or fence lines etc., or to prove that a patrol has been completed.

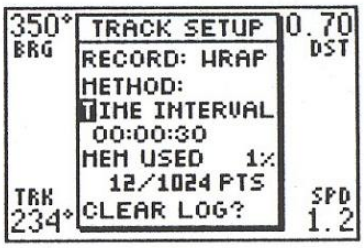
1. Activate the map page.
2. Press 'ENTER' – the 'TRACK SETUP' appears.
3. If you are certain that you do not need the track log that has already been recorded, clear the log to ensure you have enough space in the GPS to record your whole trip.



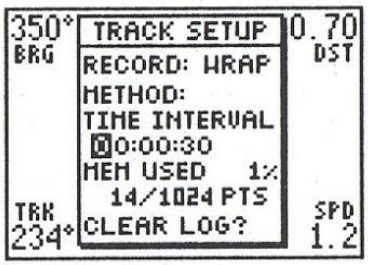


- Move the cursor so that 'CLEAR LOG?' is highlighted and press 'ENTER'.
- Move the cursor so that 'YES' is highlighted and press 'ENTER'.

4. Move the cursor upward to highlight 'METHOD' and press 'ENTER'. Press the key pad up or down until 'TIME INTERVAL' is highlighted and press 'ENTER' twice.



5. Below this will be a row of figures: 00:00:00 denoting hours: minutes: seconds. Changing this allows you to change the speed at which your position is recorded. If you have set it to 00:01:30, your position will be recorded every minute and a half.



6. Move the cursor (right or left on the key pad) to highlight the appropriate interval and change the number by using up or down on the key pad. Press 'ENTER' when the correct number/s show.

If you are on foot, and walking reasonably quickly, you should set the time interval to 1 minute (00:01:00); it will then take a reading approximately once every 80 to 100 metres. If you are in a vehicle and moving quite quickly, set the interval to 20 seconds (00:00:20).

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

NOTE:

- The shorter the interval, the more positions are recorded and the more detailed your track log.
- The maximum you can store is 1024points. At a 1 minute time interval, you will only fill up the memory after 17 hours. At 20 seconds it will be full after 5.7 hours.

7. Move the cursor to the top of the page so that 'RECORD' is highlighted and press 'ENTER'. Press the key pad up or down and you will see the display change from 'OFF' through 'WRAP' to 'FILL'. 'WRAP' means that once the memory has reached 1024 records, it will start at the beginning and write over the beginning records. 'FILL' means that once the memory has reached 1024 records, it will stop logging the track. It is best to use 'FILL' and to try to download the track log into a computer before the memory is full.

NOTE:

- As soon as you press 'ENTER' after selecting 'WRAP' or 'FILL', the track log will start recording.
- To avoid wasting track log memory, if you stop moving, change the 'RECORD' to 'OFF' until you start again. Otherwise it will continue to take a record of the same position over and over at the time interval you have set.

8. Once you've set up the track log as you prefer, press 'QUIT' and you will be returned to the 'MAP' page.

9. The route you take after you have started the track log will show as a line on the screen. This will not delete your route line, although if you are navigating very accurately, both lines may be together and appear to be only one line.

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

Rough field population estimates

Year: _____

Conservancy: Orupupa

Route	1	2	3	4	5	6	7	8	9	10	11	12
Route C. Factor	2.8	5.0	6.6									

Species	Population Estimate X 1 km belt transect	Species C. Factor	= Population Estimate Using DISTANCE	Trends 2010	Trends 2009	Trends 3 Yr Mean	Local Estimate
Zebra		1.45					
Duiker		9.00		60			
Gemsbok		1.50					
Giraffe		1.78					
Klipspringer		7.48					
Kudu		2.16		18	169		
Ostrich		2.18		33	757		
Steenbok		13.44		596	813		
Springbok < 100 = number x R. C. F. ≥ 100 = number		1.97		748	1715	add and divide by 3	

Note:
====
- The route correction factor corrects for the total area represented by the transect (the stratum).
- The estimate using a 1km belt transect represents the lowest estimate for the species as it is based on the maximum effective detection width of 500 m either side of the transect line (i.e. the distance within which 96% of all game count sightings fall). To stop at this point would be to make the assumption that all animals within this strip are detected.
- As this is not a valid assumption, the species correction factor is used to increase the estimate using the effective strip width (ESW) calculated from DISTANCE for each species.

For Field Feedback

For advanced analysis only

MODULE 3.2, HANDOUT #19: Field analysis tables

ROUTE STATISTICS (road count)

	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	TOTAL
Transect length (km)	78	59	54	53.3	51	54.5	350
Transect width (km)	1	1	1	1	1	1	1
Hours and minutes	4h 15m	2h 25m	3h 05m	4h 15m	2h 50m	3h 20m	20h 10m
Area sampled (km^2)	78	59	54	53.3	51	54.5	350
Area represented (km^2)	522	458	352	316	396	648	2,692
Area excluded (km^2)	188	98	444	110	-	-	840
% sample	15%	13%	15%	17%	13%	8%	13%
Route correction factor	**6.7**	**7.8**	**8.1**	**6.5**	**7.8**	**11.9**	

24%

NUMBER OF ANIMALS SEEN PER ROUTE (road count)

SPECIES	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	TOTAL SEEN
Gemsbok							
Kudu							
Ostrich							
Springbok							
Steenbok							
Zebra							

CALCULATING POPULATIONS (road count)

SPECIES	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	TOTAL SEEN
Gemsbok							
Kudu							
Ostrich							
Springbok							
Steenbok							
Zebra							

MODULE 3.2, HANDOUT #20: Game count files

Every area has a green and blue game count file.

GREEN COUNT FILE. This file is made up of:

1. A set of colour dividers labelled with the conservancy name with:
   - A copy of last year's Game Count Report.
   - A copy of last year's participants/conservancy name list.
   - A copy of last year's participants per route name list.
2. Blank game count forms (green in colour). These are the originals and should be returned to Windhoek once completed in the field).
3. Blank game count forms (blue in colour). These are copies of the green forms and should be filled in and stored in the BLUE GAME COUNT FILE. This ensures we have a second copy for safety purposes and the BLUE form eventually becomes the conservancy copy for their files.
4. A summary back up set of forms (in case the field computer packs up or to be used if no computer is available). These forms comprise:
   - A copy of relevant TRANSECT STATISTICS form.
   - A copy of the NUMBER OF ANIMALS ACTUALLY SEEN form.
   - A copy of the NUMBER OF GROUPS SEEN form.
   - A copy of the PRELIMINARY POPULATION ESTIMATES form.
   - A copy of the POPULATION TREND form (numbers of animals actually seen on the last year's count should be updated with the numbers from this count).

BLUE COUNT FILE. This file is made up of:

(Temporary file – this information is in transit to the conservancy BLUE FILE.)

1. A set of colour dividers labelled with the conservancy name with three sets of summary back-up forms to be given out as DRAFT handouts to:
   - Conservancy
   - NGO
   - MET

These are to provide something to take away from the count until the reports are completed and distributed.

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

Participants receiving training in Module 3.2 are not subject to formal assessment. However, in order for you to assess the knowledge and skills you have acquired on game counting, and for the trainer to ascertain how effective the training has been, you are encouraged to answer for yourself the following questions and discuss your answers – as part of a group or individually – with your trainer.

1. **Can I identify the game counts either used, or that might be useful, in my conservancy?**
2. **Can I list the objectives for conducting these game counts?**
3. **Can I describe, in general terms, why these game counts are important for the conservancy?**
4. **Do I understand why sample counts are conducted?**
5. **Can I explain what a 'correction factor' is?**
6. **Can I explain why we measure the distance to animals observed during strip counts?**
7. **Do I know where vehicle and foot counts are conducted in Namibian conservancies and the reasons that these methods are preferred?**
8. **Do I know why it is very important to have skilled trackers on foot counts?**
9. **Can I describe what happens during the 'feedback' session after a count?**
10. **Do I understand why the feedback sessions are important?**
11. **Can I explain what coordinates are and why they are used?**
12. **Do I know how big each cell is on the 'grid maps'?**
13. **Can I explain how a GPS receiver is able to plot my position?**
14. **Can I use a GPS receiver for anything else other than plotting my position?**