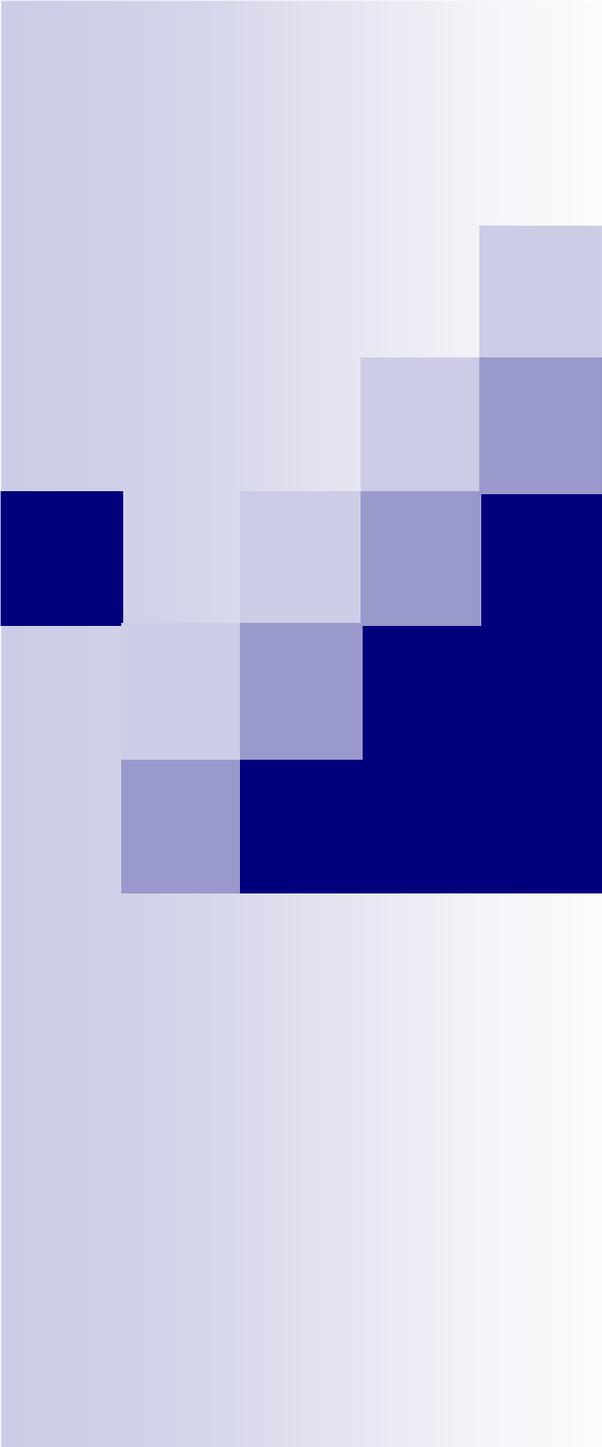




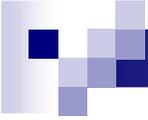
Introduction to discovering Latitude and Longitudes References

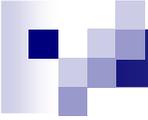
- How to calculate latitudes and longitudes
- To be used with the Kurrajong 1:25000 Topographic Map
- GDA94 Edition
- May not be used without the writer's permission
- Presentation by Peter Coffill – “*Ropes*” Grose Vale
- Contact peter@firecom.com.au for use rights

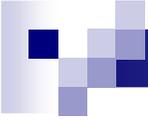


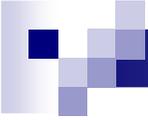
Latitude & Longitude

Not as hard as you thought!

- 
- Normally abbreviated to **Lat Lon**
 - We give the **Lat first** – this is the angle from the equator
 - The equator is 0°
 - Around here is about 33° S or -33°
 - “Circles of Latitude” are not the same size
 - They get smaller as they get closer to the poles
 - What is the Latitude at the poles?

- 
- Degrees are broken down into minutes with 60 minutes making a degree
 - We break the minutes down into tenths. This is the best accuracy we can get from a topo map and is enough to give us a ‘ball park’ figure
 - Computers and GPS units will break it down into 100s and 1,000s

- 
- We use the representation of
 - $DD^{\circ} MM.mmm'$
 - Which means
Degrees Minutes.decimal minutes
 - The above format is what to look for on a GPS. Yes there are 2 other formats we do not use

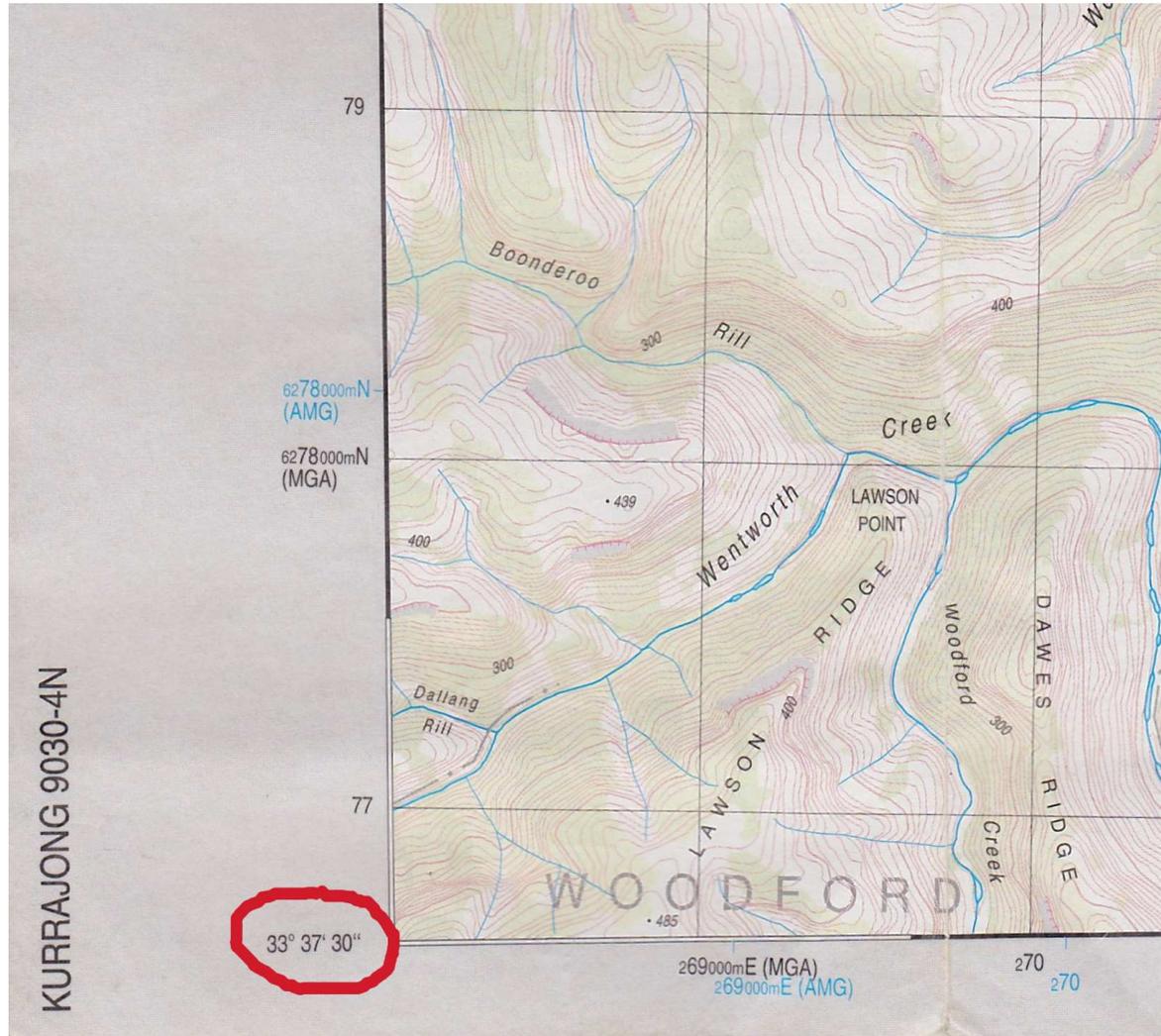
- 
- So how do we plot lat/lon on a topo map?
 - Let's start with LATITUDE
 - We begin at the TOP LEFT hand corner
 - We find the numbers which look like
 - $33^{\circ} 30' xx$
 - Yes, been there all this time! Just never noticed them...



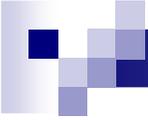
Now notice the black and white bars running down the side

- The **TOP** end of the first black bar is...
- $33^{\circ} 30.000'$
- The **TOP** end of the next white bar will be ...
- $33^{\circ} 31.000'$
- Now you realise the black/white bars are in fact **MINUTES** of the degrees

Now go to the LOWER LEFT hand corner
and we see $33^{\circ} 37' xx$



- 
- Now count down the bars and see if you agree with the number at the bottom **LEFT HAND** corner
 - Remember the whole black or white bar is **ONE MINUTE** and half of **ONE** minute is 30 seconds or 30" ! (Hint for the end!)
 - And **ALWAYS** start at the **TOP** of the bar and work down

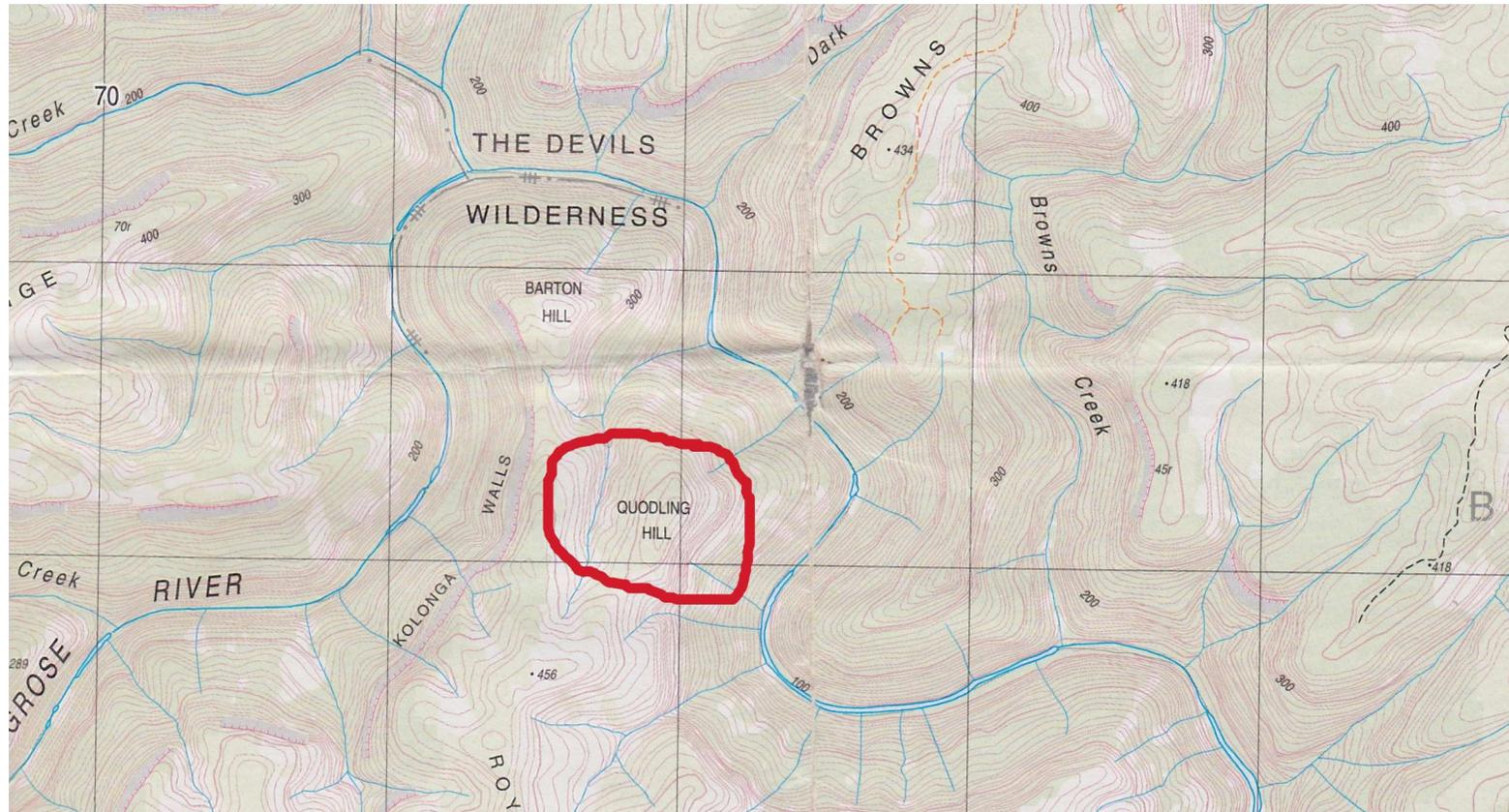


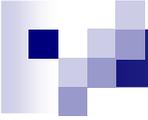
Now for the bits which make it tricky!

- Locate the TOP of any bar on the LEFT HAND SIDE of you map
- Find the corresponding TOP of the same bar on the RIGHT HAND side of the map
- Run a piece of string between the two points and voila!
- What do you deduce?
- What is the relationship between our grid lines? This is why the string!

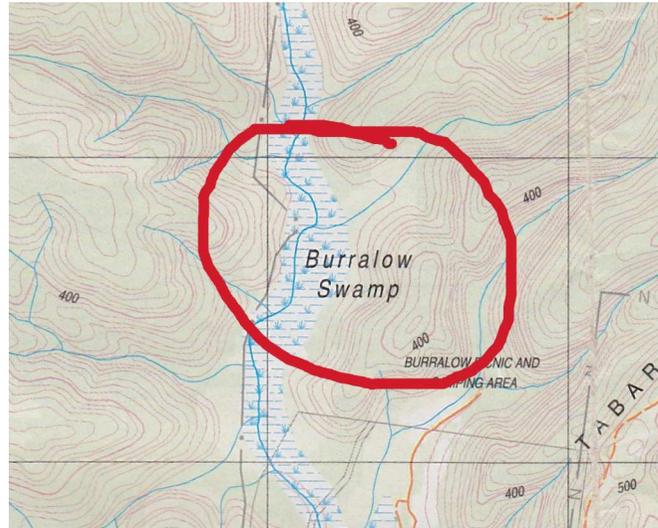
- 
- So how do we get a latitude number?
 - Join the **TOP** of the 34' bars on each side of the map with your string
 - What feature is approx 4kms in from the left, on the string line ...

Check... Quodling Hill??



- 
- The Lat for Quodling Hill is therefore...
 - $-33^{\circ} 34.000'$
 - Read as
 - minus three three degrees three
four decimal zero zero zero
minutes

- See if you can determine the Lat for Burrelow Swamp (run string between the 2 words)



- Tips...
- Keep the string even in both side bars
- Estimate to the tenth of a minute
- Remember to start zero from the **top** of a bar and go downwards



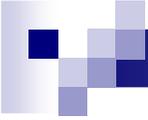
Check....

- Did you get close to
- $33^{\circ} 32.7' S$?
- Read as...
- Three three degrees three two decimal seven minutes south



Now for the longitude...

- We give the **Lon** second
- Remember these are the '**long**' lines that run from pole to pole and are all the same size
- Around here is about 150°
- These are the black/white bars **across** the top and bottom of our map



Now for the bits which make it tricky!

- Firstly ... compare the size of the black/white Latitude minute bars (down the sides) with those of the black/white Longitude minute bars (across the top and bottom)
- What is your discovery??



Longitude....

- Find the other number on the TOP LEFT hand corner of the map ...
- The one around 150 ...



Check...

- In fact $150^{\circ} 30' 00''$
- Remember the map is showing this using seconds... we will not use seconds, but will use decimals/tenths of a minute
 - (= $150^{\circ} 30.000'$)
- Now go to the TOP RIGHT hand corner and the number is



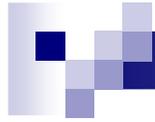
Check ...

- $150^{\circ} 45' 00''$ or for us $150^{\circ} 45.0'$
- So ... how wide or many minutes of longitude is our map?



Check ...

- Did you get 15 minutes??
- Well done!
- Now we can start combining our findings to ascertain Lat and Lons



Any questions at this
point?



Fantastic – travelling well....

- Now...
- Determine the Lat Lon for North Richmond Bridge....



Check...

- I got

- $-33^{\circ} 35.1'$

- $150^{\circ} 43.4'$

- How did you go?



Next...

- Now try Bells Rd x Grose Vale Road intersection, Kurrajong end.
- Powerlines crossing Redbank Road near Kurrajong



Check...

- Bells

- $33^{\circ} 34.7' S$ $150^{\circ} 39.3' E$

- Powerlines

- $33^{\circ} 34.0' S$ $150^{\circ} 41.0' E$



Challenge....

- We need to land an aircraft at the Grose River end of Donna's track

(this is the track running south from Pattersons Range Trail, about 2kms west of the Burrellow Bridge)

- What do we give the pilot?

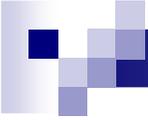


Check...

- I got ...

- $33^{\circ} 35.1' S$ $150^{\circ} 34.3' E$

- Where did you land it???



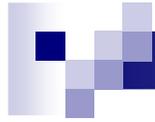
Now plot this smoke sighting ...

- We have been given this lat/lon from an aircraft on its way to land at Richmond Airbase...
- $33^{\circ} 36.430 \text{ S}$ $150^{\circ} 41.980$
- Where is the fire?



Check ...

- And the fire is pretty close to
- Navua Reserve
- Where did you plot it??



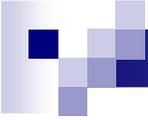
Any further questions??

Great going...



Wow...

- I trust you have enjoyed your exposure to the wonders of Latitude and Longitude
- Remember key points...



First thing....

- FORGET about UTM and Grid References when determining Lat/Lons
- WHY???
- We start at a different corner and go DOWN FIRST
- We give Lat then Lon
- We cannot use the grid lines on a map



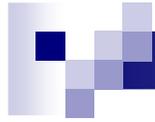
Remember....

- Start at the TOP LEFT of a topographic map
- Work DOWN for latitude
- 0° at the equator and 90° at the poles, we are about 1/3 of the way!
- Include either – (minus) or use S (south)
- Work LEFT to RIGHT for longitude



Remember...

- Use degrees minutes.decimal minutes
- DD^o MM.mmm'
- We can usually only get to one decimal figure, computers and GPS will usually go to three.
- Lines do NOT correlate with Grid Lines
- Use a piece of string or two
- Practise often!



Happy Navigating!!

See you in the bush....