V-GRASP Images and Rainfall Data

The V-GRASP project is a long-running (1988-2013) activity of the *Scientific Expedition Group* (SEG) that is being conducted in the Gammon Ranges of South Australia. The continuing activities that make up the V-GRASP project are:

- Installation, operation and maintenance of pluviometers located on the Gammon Ranges Plateau and along Arcoona Creek which drains the Plateau on its Western side. In recent years the V-GRASP team of volunteers has taken over responsibility for pluviometers on pastoral properties nearby.
- Photography of photopoints in the project area over the lifetime of the project. These are located along Arcoona Creek (photopoints 69W, 74M, 64W), on North Tusk Hill (photopoints 71B, 72B, 73B, 67M) and on the Plateau (photopoints 66B, 68B, 70B)
- Installation, operation and maintenance of a water level recorder near the point at which Arcoona Creek exits the ranges.
- Monitoring of a yellow-footed rock wallaby colony living in a tributary of Arcoona Creek.

This report describes some relationships seen when the photographic record of changes occurring at photopoints was compared with the rainfall data collected around the same time. The project area over which the comparison has been made is shown in the map with the locations of all photopoints shown and the locations of the two pluviometers that supplied the rainfall data also shown (Sambot pluviometer and Plateau pluviometer).



Rainfall 1989-2011(Plateau and Sambot Pluviometers)

The four charts below display rainfall data collected by the Plateau and Sambot pluviometers since 1989 for the Plateau and since 1992 for Sambot. Each chart displays rainfall for three month (quarterly) and 12 month (annual) periods. The 12 month period runs from 1 February in one year to 31 January in the next year. Photographs are now being taken in April and October each year and these have been common months for photography in past years. Another common month for photography in the past was July. Using the quarterly intervals as specified below sees many of the photographs being compared with rainfall in a 2-3 month period preceding the photograph. This was assumed to be an appropriate relationship between photographs and rainfall.

The raw rainfall figures of mm have been converted to percentages for display in the charts. These are percentages of the rainfall averaged over the entire period that the pluviometers have been operating. For example in the chart for the April quarter the two bars at the far left represent rainfall recorded at the Plateau pluviometer in the period 1 February 1989 to 31 January 1990 and this interval is labelled as the 89A interval. The blue bar is the rainfall for the April quarter of 1989 only expressed as a percentage of the average for all April quarters. This was about 430% so that in April 1989 more than four times the average rainfall for all April quarters was recorded. The green bar is the rainfall for the entire twelve month interval (89A). This was about 210% of the average for all of the twelve month periods making up the time for which the Plateau pluviometer has been operating.









From inspection of the charts it can be seen that:

- 1. The years 2006-2008 are the lowest rainfall years for any consecutive three years in the 1989-2011 interval. All three annual rainfalls were in the range 45-60% of the 22 year average. All quarterly rainfalls were in the range 4-94% of the 22 year average.
- 2. In 2009 the annual rainfalls were also below average but close (91% and 88%) and the January quarterly rainfalls were well above average.
- 3. In 2010 the annual rainfalls and all the quarterly rainfalls were well above average
- 4. In 2011 Annual rainfalls were well above average again with only the October quarterly rainfall being below average.
- In 2002 annual rainfall was less than 50% of average as were the quarterly rainfalls for April July and October. The rainfalls for the January quarter were 89% and 84% of average. So 2002 was a single bad year for rainfall
- 6. 1991 annual rainfall was 50% of average and only the July quarter was near average. So 1991 was another single bad year for rainfall.
- 7. 1989, the first year in which a full year's rainfall was collected at the Plateau Pluviometer was a good year for rainfall although the October quarter rainfall was only about 40% of average.

Images

The images held at 2011 were inspected by looking at slideshows of images in the archive that Garry Trethewey has created and compiled. Each slideshow was the set of images for a particular directional view at each site with the images appearing in the slideshow in chronological order. The ease of doing this shows that the effort of creating the archive has been worthwhile. The archive provides for other types of slideshow to be viewed conveniently.

A significant number of the earlier images are of poor quality. Once digital cameras with autofocus and autoexposure, and on which image quality can be seen immediately, began to be used image quality became more reliable. From this date also photographs have been taken almost exclusively by Garry and Michelle Trethewey.

Cautionary Note: the colours in the images will, to some extent, reflect the conditions applying when the original photograph was taken and the processing that followed. Where conclusions have been drawn about the significance of relatively small differences in colour these conclusions will be subject to doubt about their validity.

Human Impact Sites

Site 74M: Van den Burg camp. The images are the easterly views. October 1992 is fairly close to the beginning of frequent camping by SEG groups. It shows a fairly uniform green tinge on the ground and quite a lot of litter. October 2010 shows more green growth than 1992 but there is an obvious lack of green and litter in the places where tents would have been regularly set up and where people would have been walking back and forth.







October 2008



December 2000



October 2010

Site 65M: Plateau pluviometer. The north and south views show a dramatic drying out of vegetation in April 2008 compared to lush growth seen in October 1992 and again in April 2011. No evidence of human impact seen other than the pluviometer.

North Views



October 1992

South Views



October 1992





April 2008

April 2008





April 2011

April 2011

Site 67M: North tusk hill summit. The differences between 1992, 2008 and 2011 are not as striking as for site 65M but still substantial. The views shown are the northerly views and the differences are the most noticeable of the four different views taken. No evidence of human impact.





October 92

April 2008



April 2011

Sambot and Wild Ass waterholes

Site 64W: Sambot waterhole. The highest water level observed was in July 1990. In April 1990 Sambot had been empty (in the April 1990 quarter the rainfall recorded by the Plateau pluviometer was less than half the 22 year average. Data was not yet being collected at Sambot. By September 1990 the level had fallen substantially. The rainfall at Sambot in the July 1990 quarter was 250% of the 22 average and for the October 1990 quarter it was about 50% of average. In the next two quarters the rainfall was about 25% of average and then in the July 91 quarter rainfall was a bit above average. But Sambot was empty at July 1991. In the first three images on the next page there is a blue line that shows the change in water level from July 1990 to July 1991. The blue line is drawn at the same level on the rockface in all three images.

In 1989 rainfall in the April quarter was more than 400% of average but the water level in Sambot in April 1989 is less than (not much) for July 1990. The rainfall in the July quarter of 1989 was 200% of average and the July 1989 level is about the same as for July 1990. This suggests that the July 1990 level is a maximum level for the waterhole. The April 2009 image shows the difference between Sambot full and Sambot nearly empty.





July 1990

September 1990



July 1991

July 1989 (almost same water level as July 1990)



April 1989 (almost same water level as July 1990)



April 2009 water depth is 35 cm

Site 64W cont: Since 1988 the only year in which Sambot has been seen to hold a substantial amount of water for a full 12 month period is April 2010 – April 2011. Rainfall over this period was well above average. It appears that Sambot only has significant water in it when rainfall in the previous 3-6 months has been well above average.

The images held of Sambot could be used to measure depth when full and estimate rate of loss of water. This would require measurements to be made of the distance above the bottom of the waterhole of certain features visible in many photographs.

Site 69W: Wild Ass waterhole . Comparing levels in Wild Ass with Sambot for July and September 1989 we see that the level in Wild Ass dropped by much less than that in Sambot. This suggests that there is more loss from Sambot by leakage underground than from Wild Ass.





Sambot July 1989

Sambot September 1989



Wild Ass July 1989



Wild Ass September 1989

There is a Callitris lodged between two gum trunks at Wild Ass and it is hard to believe that water has ever flowed at a sufficiently high level in the creek to put it there. However, other explanations for how it got there seem just as unlikely. The photographic record shows that it took up its position sometime between February 1989 and July 1989. This is based on the photograph below which was apparently taken in February 1989 (but the date on the board is not readable). The rainfall at the Plateau Pluviometer in the April quarter for 1989 was 420% of the 22 year average. In absolute terms (mm of rainfall that fell) this was the highest quarterly rainfall seen from 1989 until 2011. Perhaps this was sufficient to fill the creek to a level

where the callitris was swept into place. Between October 2009 and April 2010 the callitris shifts position and is ends up resting at a lower position between the gum trunks. The rainfalls in the April 2010 and Jan 2010 quarters were 270% and 140% of average respectively.Perhaps this saw the creek level reach the callitris and refloat it then move it around so that it slipped lower as the water level dropped.





February 1989

April 2010

Site 68B. Mallee photopoint. There are 4 views of which the Southerly seems most informative. There is a substantial area of bare ground going off for some distance from the camera. In early photos there is low green growth evident that dies off and returns. But the 2010, 2011 images show striking levels of green growth much greater than seen in any other years. In 1990 the July quarter rainfall at the plateau was 250% of average. The july photograph shows some green bush near the camera and a green tinge on the ground going off into the distance. The bushes near the camera seem to have dried off by September but a green tinge is still evident on the ground going off into the distance.





July 1990



September 1990



Site 68B cont. In April 2008 the bushes close to the camera are very dry and there is no hint of green on the ground elsewhere. In April 2011 the bushes close to the camera look to be in better condition than at any other time during which photographs have been taken. There is also a relatively large amount of plant growth going off into the distance.

Site 66: Heath photopoint on the plateau. There are images for all four directions but only the Northerly images go beyond 2002. October 1992 easterly and westerly views show lots of flowers. Flowers are also in evidence in the October 2010 northerly image. The April 2008 northerly view shows the drying off of vegetation seen at other sites for this time. There are no images Easterly or Westerly images for 2007-2008 to compare with.







October 1992, Westerly view



April 2008, Northerly view



October 2010, Northerly view

Site 70B: Melaleuca photopoint, plateau. White flowers are seen in the October 1992 and October 2009 images. It seems odd that they are not present in the October 2010 image because there was much more rain in the 2010 October quarter than in the October 2009 quarter. In the 2009 image the vegetation seems very dry but there are flowers. The October 2009 image seems to show the vegetation about as dried out as October 2008 which was a poor growth time for most sites. In October 2009 flowers were seen also at sites 65,66, 68, 69 and 74 but they were not as prominent as at site 70. Sites 71-73 showed no flowers for October 2009.





October 1992

October 2009



October 2010



October 2008

In the 2005 manual which I referred to while compiling this account there is reference to a track developing between the camera and marker point. People are asked to avoid walking through the site. This track can be seen in quite a few images before and after 2005. The small images below may not show this well.



April 1994

October 2008

Site 71B: Burnt area, west slope of North Tusk Hill: there is a set of southerly images running from 1988 until 2011, northerly images running from 1989 until 2001 and a set of south-easterly images running from 2006 until 2011. There is a stardropper in the northerly images and this makes for a consistent field of view. In the southerly series the field of view is not as consistent.

There are significant (not lots) flowers in the April 1994 images but not in April 2010 image even though rainfall in the April 2010 quarter was much higher and the vegetation much more lush. In the April 2008 image there is the obvious drying off seen elsewhere at that time.





April 1994, northerly view

April 1994, southerly view



April 2008, southerly view



April 2010, southerly view

Site 72B: Burnt area, west slope of North Tusk Hill lower elevation than site 71: there is a stardropper in the northerly view which makes for consistent field of view. Yellow flowers and thick growth are seen in the northerly view for September 1989. October 2008 there is substantial dry-off and thinning out. The April 2009 image shows recovery and the October 2010 image shows a large display of yellow flowers but vegetation remains thinned out compared to September 1989



September 1989

October 2008



April 2009

October 2010

Site 73B: Unburnt area north tusk hill, east slope. Northwesterly images end at 2001, southeasterly continue to 2011. This site mirrors closely the pattern seen at site 71.

Ray Hickman, March 2013