

Draft Burrup Rock Art Strategy Additional Comments in the Light of the Senate Inquiry Report Protection of Aboriginal rock art of the Burrup Peninsula

William Carr 9 April 2018

Introduction

The following comments are provided under the headings of the Draft Burrup Rock Art Strategy. I have not included every comment that could be made but have only provided input on matters I consider constructive. Under each of the headings I refer to the relevant sections from the Senate Inquiry Report (the Senate, 2018).

4.1.1 Methods for monitoring and analysis

Chapter 3 of the Senate (2018) discussed the concerns of a number of submitters regarding the effects of emissions on the rock art.

Between 2004/2005 and 2007/2008, the number of vessel visits to the Dampier Port increased by 50%. There has only been a further 5% increase in vessel visits since 2007/2008.

Financial Year	Vessel Visits	Export Tonnage	Source
2015/16	4209	173mt	Pilbara Ports Authority Annual Report 2016
2007/08	4029	134mt	Dampier Port Annual Report 2008
2004/05	2669	96mt	Dampier Port Annual Report 2005

Table 1 vessel visits and export tonnage through Dampier Port

Gillett (2008) in reporting on the CSIRO air pollution study on the Burrup showed changes in air quality between 2004/2005 and 2007/2008. The results for gasses are summarized in Table 2.

Site	NH ₃ 04/05	NH ₃ 07/08	NO ₂ 04/05	NO ₂ 07/08	SO ₂ 04/05	SO ₂ 07/08	HNO ₃ 04/05	HNO ₃ 07/08
1	0.3	0.3	0.6	0.6	101	112	144	158
3	0.3	0.3	0.7	0.8	139	152	162	157
4	0.4	0.5	1.8	2.0	178	191	198	217
5	0.4	0.7	2.4	2.8	215	223	240	272
6	0.5	0.9	1.8	1.7	176	167	241	203
7	0.4	0.6	1.4	1.3	141	145	210	176
8	0.4	0.6	2.1	2.1	164	177	250	243
9	2.6	2.4	2.2	2.4	89	105	276	280
10	0.8	0.6	0.5	0.8	83	115	160	173

Table 2 Summary of annual average gas concentrations measured at the Burrup Peninsula sites. Concentrations of NH₃ and NO₂ are in ppb while SO₂ and HNO₃ are in ppt (from Gillett 2008).

Sites 1 at the northern end of Dolphin Island, Site 3 at the northern end of the Burrup Peninsula and Site 10 on Mardie Station 81 km south west of Dampier were selected as control sites. Sites 4 to 8 were in the industrial area of the Burrup Peninsula.

Gillett (2008) considered that concentrations of ammonia, nitrogen dioxide, sulfur dioxide and nitric acid are very low compared with measurements made at other remote locations. However in his discussion of the background concentrations of gasses he observed that much lower sulphur dioxide measurements have been made at the South Pole (20 ppt) and a remote part of New Zealand (15ppt).

A number of submissions refer to potential increases in the effects of acidity on petroglyphs. The ammonia releases from the Yara Pilbara plant are however of some concern as ammonia is a weak base but also a nutrient source for microorganisms. In addition ammonium nitrate releases from the TAN plant may result deposition that is slightly acidic when dissolved in water.

It is clear that there is a need for ongoing monitoring of the petroglyph surfaces both close to and distant from industry to see if industrial emissions are accelerating natural weathering. As alluded to in the Senate (2018), this should include areas close to and distant from industry:

- Colour change of engraved and adjacent non engraved surfaces
- Rock surface mineralogy changes
- Microtopography changes
- Microbiology changes

4.12 of the Senate (2018) recognises that petroglyphs are made by a range of techniques: “some are hammered or pecked into the rock, some are abraded and others are just lightly scratched. Some are just, literally, bruising the rock surface”. The current rock art monitoring panels do exhibit this range.

In addition, there is a comment that petroglyphs occur on a wider range of rock types than gabbro and granophyre. This is recognized but the majority are on these rock types. Others include relatively restricted outcrops of granite on the Burrup Peninsula and, distant from industry, basalt on the Dampier Archipelago Islands.

As discussed in 4.69 of the Senate (2018) it will be important to continue to use ASD estimates of L^* , a^* , b^* as well as the results from the Konica Minolta instrument. The ASD has a larger sample head area so its results are less likely to be affected by small placement variations of the head on the rock surfaces.

The principles on p10 of the Draft Strategy are not affected by the outcomes of the Senate (2018). 4.71 of the Senate (2018) concludes that a “complete statistical analyses is done on the full spectrum of each individual ASD spectrum (not just the visible part i.e. L^* , a^* and b^*)”.

4.72 of the Senate (2018) refers to the CSIRO recommendations concerning increasing the number of monitoring sites, ie that:

“A study be conducted to assess how many new sites and how many new engravings and backgrounds should be added to the current locations to increase the quality of the monitoring in the Burrup Peninsula. In particular, new control sites with similar rock types should be added to the current ones (for instance Depuch Island). It should also be noted that by increasing the number of independent measurement on each spot (in doing so improving statistical analysis) could also have an adverse effect on the petroglyphs. There were signs in 2015 and 2016 that instruments measurements might be affecting the measured spots. A balance should be found between statistical endeavour and petroglyph protection”

Petroglyph monitoring conducted in November 2017 adjacent to the Yara facilities demonstrated that the sample head surrounds picked up dust from the rock surfaces. There had not been any rain for many months and the rock surfaces were coated with dust.

Australian Greens’ (Recommendation 13) and Labor Senators (Recommendation 9) additional comments

These refer to identifying all rock art sites within 2km of the Yara Pilbara site This does not provide any help in deciding whether the petroglyphs are being affected by emissions and is not required by the Commonwealth conditions. There have been a number of heritage surveys in the area. The monitoring of six sites as has been set up provides the opportunity to see if any changes occur that are not due to natural weathering.

4.92 of the Senate (2018) refers to a comment that the use of two sites located “in the north of the Burrup

Peninsula as control sites for monitoring colour change is inappropriate given the close proximity of ships entering and leaving the Dampier Port”. This is not accepted as air quality monitoring on Dolphin Island adjacent to Site 1 showed low gas concentrations similar to Mardie Station some 81km from the Burrup Peninsula. The rock types in Dolphin Island and Gidley Island are the same gabbro and granophyre that occur close to industry.

What is evident is that there should be an increase in the number of monitoring sites on these two islands.

In addition, there should be a repeat of air quality monitoring on Dolphin Island to determine any changes associated with the increase in industrial activity.

The Senate (2018) 5.34 refers to an article published in *Rock Art Research* concerning the value of the study. The conclusions are not relevant as the concerns raised are particularly associated with the use of the BYK data which did not form part of the analysis in the final CSIRO report.

4.2 Other studies

The discussion at 4.22 and 4.98 of the Senate (2018) referred to the mention of ecosystem sensitivity to acidic deposition in Gillett (2008). This is not relevant to the air quality results recorded and was used to give the public an idea of the ecological significance of the air quality measurements. Those opposed to industry in the region used the example as a way of disputing all the air quality results.

4.2.2 pH

The Senate (2018) at 4.100 notes that the Draft Strategy provides for regular rock surface pH measurements. It is considered that such field monitoring would be difficult to standardise and would be of little value. Issues include:

- Varying volumes of liquid retained on surface
- Different times liquid is in contact with surface
- Range of temperatures of rock surface
- Amount of liquid absorbed by surface

All these factors would affect the hydrogen ion concentration of the liquid on the rock surface. Advice should be sought from the ChemCentre if this approach is to be progressed.

The same issues apply to “washing” of rock surfaces to gain an idea of the surface chemistry and particulates. Such work was carried out by CSIRO early in the study and it was decided that the technique could not provide reproducible results on the rough sloping rock surfaces.

It is agreed that monitoring stations should be reestablished on the Burrup Peninsula, Dolphin Island and possibly another distant location to measure rainfall, pH, cations and anions as well as deposition flux of nitrogen and sulfur. The Mardie Station site may now be affected by the CITIC Pacific iron ore project less than 20 km distant. Due to remote nature of the area with no power supplies the monitoring stations would need to be self supporting.

5.1 Joint management – Murujuga National Park

The Senate (2018) at 6.41 discusses access to the northern Burrup. It is of concern to read that machinery has been used to ease access to the Jump Up and that subsequently there has been considerable damage to the rock art. Graffiti is an ongoing issue. Councillor Long at 6.47 comments that it is vitally important that the Murujuga National Park is better managed. He suggested that gates, a

visitor centre and rangers with authority would assist in improving protection. The impact of damage by visitors would appear to be a major concern on the protection of the rock art.

8.0 Stakeholders and consultation

The **Coalition Senators** 1.16 note the majority of claims and statements made by Professor Black and others as to the risk and/or actual degradation of rock art are not supported by scientifically valid evidence. Overall, the majority of claims and/or statements made by Professor Black and others about risks of/or actual damage are not supported by evidence from well-designed technical studies and investigations.

[REDACTED]

In addition to the Stakeholder Reference Group the WA Government should consider establishing a small technically competent group to provide input on development of the future monitoring program and reviewing the outcomes.

Conclusions

- [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED] The major issue of the early use of the BYK spectrophotometer was recognized by CSIRO [REDACTED] and when a suitable instrument, the Konica Minolta, was available it was introduced. There were always the ASD instrument results as a reliable backstop that demonstrated no statistical difference between the sites close to and distant from industry. [REDACTED] confirmation that there should be an increase in the number of monitoring sites on Dolphin and Gidley Islands and possibly elsewhere and conduct further air quality monitoring close to and distant from industry, both of which were being discussed [REDACTED].
- This was the first time in the world that a long term regional petroglyph monitoring program was established. As with all such programs, techniques evolve and this is demonstrated here with the decision to replace the BYK spectrophotometer with the Konica Minolta instrument. In addition, the initial accelerated weathering tests were repeated on a much more extensive range of samples more recently.
- It is clear that there is a need for ongoing monitoring of the petroglyph surfaces both close to and distant from industry to see if industrial emissions are accelerating natural weathering. As alluded to in the Senate (2018), this should include areas close to and distant from industry:
 - Colour change of engraved and adjacent non engraved surfaces
 - Rock surface mineralogy changes
 - Microtopography changes
 - Microbiology changes

- As discussed in 4.69 of the Senate (2018) it will be important to continue to use ASD estimates of L^* , a^* , b^* as well as the results from the Konica Minolta instrument. The ASD has a larger sample head area so its results are less likely to be affected by small placement variations of the head on the rock surfaces.
- the Senate (2018) 4.72 refers to the CSIRO recommendations concerning increasing the number of monitoring sites in particular that a balance should be found between statistical endeavour and petroglyph protection when taking measurements.
- the Senate (2018) at 4.100 notes that the Draft Strategy provides for regular rock surface pH measurements. It is considered that such field monitoring would be difficult to standardise and would be of little value. The same issues apply to “washing” of rock surfaces to gain an idea of the surface chemistry and particulates. Advice should be sought from the ChemCentre if rock surface pH measurement is to be progressed
- It is agreed that monitoring stations should be reestablished on the Burrup Peninsula, Dolphin Island and possibly another distant location to measure rainfall, pH, cations and anions as well as deposition flux of nitrogen and sulfur. The Mardie Station site may now be affected by the CITIC Pacific iron ore project. Due to remote nature of the area with no power supplies the air quality monitoring stations would need to be self supporting.
- Although not specifically mentioned the monitoring should also include dust sampling as well due to the observations of heavy dust covering during recent rock art surface monitoring.
- An immediate concern to the maintenance of the rock art is the impact of damage from visitors. the Senate (2018) at 6.41 discusses the observed effects of improved access to the northern Burrup.
- In addition to the Stakeholder Reference Group the WA Government should consider establishing a small technically competent group to provide input on development of the future monitoring program and reviewing the outcomes.

References

Gillett R 2008: Burrup Peninsula Air Pollution Study. Report for 2004/2005 and 2007/2008
CSIRO Marine and Atmospheric Research
[http://www.dsd.wa.gov.au/documents/2008_Burrup_Peninsula_Air_Pollution_Study\(1\).pdf](http://www.dsd.wa.gov.au/documents/2008_Burrup_Peninsula_Air_Pollution_Study(1).pdf)

The Senate Environment and Communications References Committee, March 2018: Protection of Aboriginal rock art of the Burrup Peninsula