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Murujuga Rock Art Classification and Taxonomy

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Rock Art Attributes

In many parts of Australia, including here at Murujuga, Aboriginal tradition holds that rock art is a permanent marker left by ancestor beings in the Dreaming, as an acknowledgement of their presence and actions (e.g. Tonkinson 1978), and as a sign of the cultural laws that must be followed. For Murujuga and the wider Pilbara, the ancestor beings are known as the *Marga* (Palmer 1977b). The Dreaming beings and ancestors must be acknowledged and the images respected. Custodians have a responsibility to ensure cultural safety and the wellbeing of visitors, including researchers.

The Murujuga custodians hold cultural knowledge and associated songs both for landscape features and many of the petroglyphs; they view the images through this cultural reference. The petroglyphs are a constant and unchanging reminder of the behavioural pattern set down for all Aboriginal people to follow; importantly the motifs continue to embody spiritual power (Vinnicombe 2002: 13).

An observation about rock art recording is that 'the identifications … of motif content are based on subjective observations limited by a Eurocentric viewpoint' (Vinnicombe 2002: 17). As Western-science-trained researchers accessing and engaging with this rock art, we acknowledge the differences rendered by our separate cultural lens, and we collectively build on research and recording work undertaken by others over the past 50 years (Dix and Virili 1977; Lorblanchet 1992, 2018b; McDonald 2009a; Vinnicombe 1987a, 2002; Veth et al. 1993a; see Mulvaney 2022). Our goal has been to make records that are quantifiable and replicable through these documentation processes. The Western-oriented taxonomic and classificatory system (see Francis 2001) categorises and orders things in a repeatable fashion.

We ascribe labels to images (rock art motifs) that bear similarity to both visual figurative forms as well as hierarchies of geometric shapes and other categories of production, such as graffiti. Our archaeological recording has documented the location and character of all person-made marks on rock surfaces that define this aspect of Murujuga's rock art heritage across this cultural landscape. Our primary recording structure is not intended to reflect an Indigenous knowledge system or cultural understanding of the petroglyphs. Nor do we intend to imply an understanding of the intentions of, or meanings ascribed to, the created images through time.

For appropriate and sustainable research, preservation and management, a full inventory of the petroglyphs and their landscape context was required (McDonald 2009b). It was vital to establish a means to organise and comprehend the available data, both for scientific and management purposes. It is important to understand not only the characteristic style or rendering, but also the physicality of the art and its context. We have consistently recorded a standard set of definable and technical attributes relating to the physical state of all graphic elements within our survey sample areas. These are measurable, and are readily recognised, understood and repeatable.

In the course of the project we replaced the traditional pen and paper record and developed a recording form to collect information on an iPad Mini running FileMaker-Pro©. Regardless of the recording mode, data collected remained focused on the same attributes.

Panel

A rock art panel is the block-face on which a petroglyph is situated. For the management of rock art, and for research-related questions as to spatial placement, visibility and so on, we must know where it is in the landscape, both in relation to land tenure but also relative to a range of natural topographic features. Our documentation includes descriptive and numerical attributes (Figure 3.1), along with a photographic record, both for the petroglyphs and their host rock surface(s). Each individual panel, ascribed with a unique identifier code (including the survey area, year, recording team letter and three-digit number in sequence of recording), has a record of its dimensions, aspect, inclination and condition (surface colour, texture, weathering features). Locations are logged with handheld GPS devices and an individual waypoint is taken for each panel. Where multiple panels occur on a single block, a single waypoint usually sufficed (unless the panel was in a gully, where GPS may not be as accurate).

Based on the local surface geological structure, three types of panels are defined:

- vertical face;
- block;
- horizontal bedrock.

Eight options for contour variation of the panel surface are identified: concave; flat; convex; irregular; undulating; stepped; and where motifs extend over multiple surfaces, this is recorded as two-faced or three-faced panels (Figure 3.1). These categories are the same as those defined by Mulvaney (2010), with the exception of 'uneven'. This naming convention ensures consistency across data sets.

The *panel dip* of the rock surface relates to six options for recording the rock surface inclination: horizontal, incline, oblique, acute, vertical and overhanging (Figure 3.1). Direct database recording rather than entry via Microsoft Excel spreadsheet allowed the incorporation of the identifier overhanging rather than leaning. This also developed as a visual assessment rather than based on a direct measurement of inclination angle originally devised by Mulvaney (2010: 156).

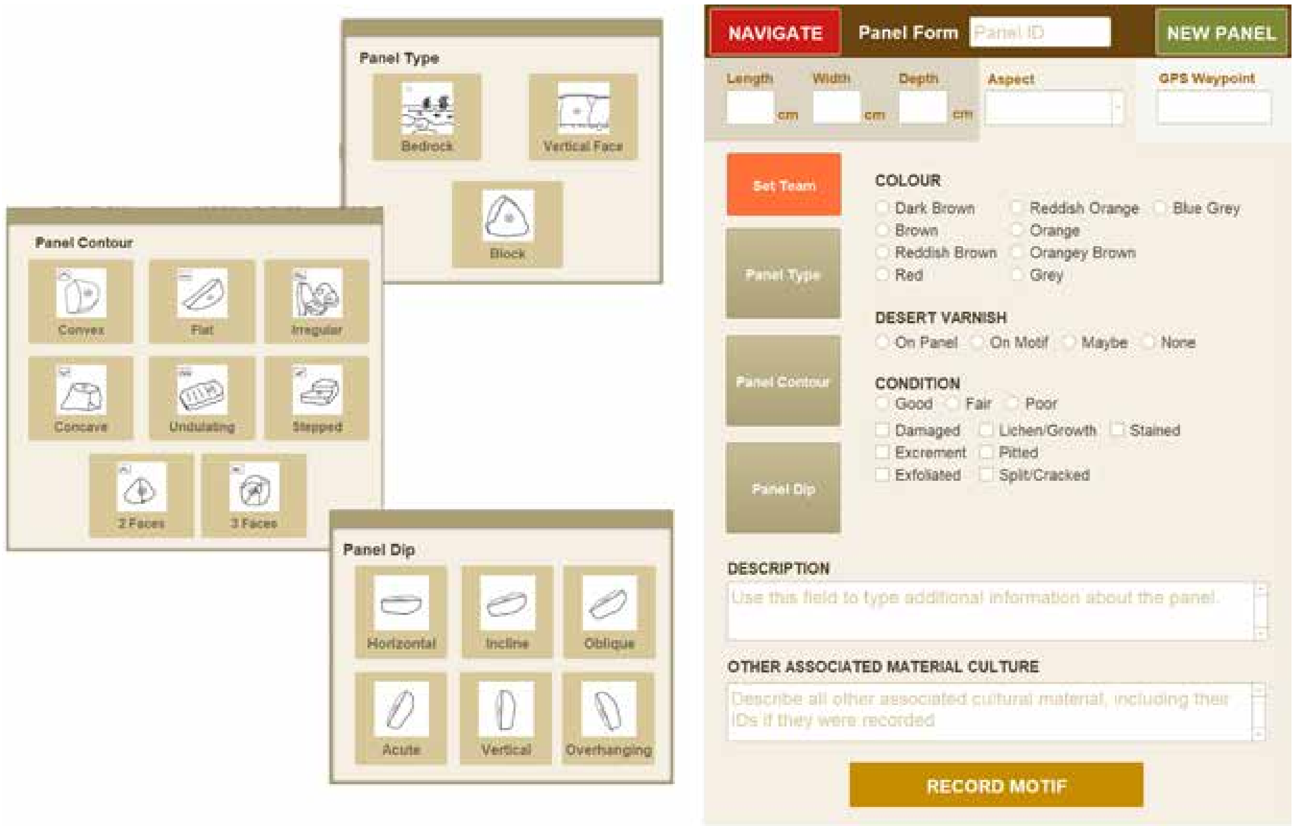

Figure 3.1. Panel form used throughout the Murujuga Linkage Project.

Measurements

Two sets of measurements were taken for each record: panel and motif(s). When recording the dimensions of the panel, the length, width and depth of the block were taken, using the maximum possible measurement as the length, and the width taken at 90 degrees to this. Where depth could not be recorded because the block was embedded in the ground, was obscured by other blocks or was part of the bedrock, a depth measurement was not taken. The length and width were also measured for every motif (in centimetres), with the maximum dimension recorded as length and width being at 90 degrees to the length. All measurements were recorded in centimetres. Bedrock panels where block depth could not be measured were recorded as 666, to alert subsequent researchers that this measurement could not be recorded.

Motifs

Each individual image identified on a panel was recorded as a motif, a recognisable graphic configuration within the developed motif classification hierarchy. Once the panel details are recorded, the digital form leads the recorder to document sequentially all motifs on that panel. For each individual petroglyph (motif) in addition to typology (see Motif Classification section), its size, count, condition, depth, form, technique and contrast state is documented.

Count

The numeric count field accommodates multiple images of the same attributes being present on a panel, where these are evidently not a composition or a category of multiples. This was incorporated into the recording system to increase recording productivity without having to enter each motif separately.

Condition

Three general conditions (good, fair, poor) can be chosen with a hierarchy of one or more other factors able to be selected to provide further detail on the nature and extent of the weathering, including: cracked, damaged, exfoliated, indistinct, marked and stained. This category has been revised (cf. Mulvaney 2010: 160) to include qualifications to categories: for example, instead of simply 'fair', the condition can be qualified as 'fair – exfoliated'.

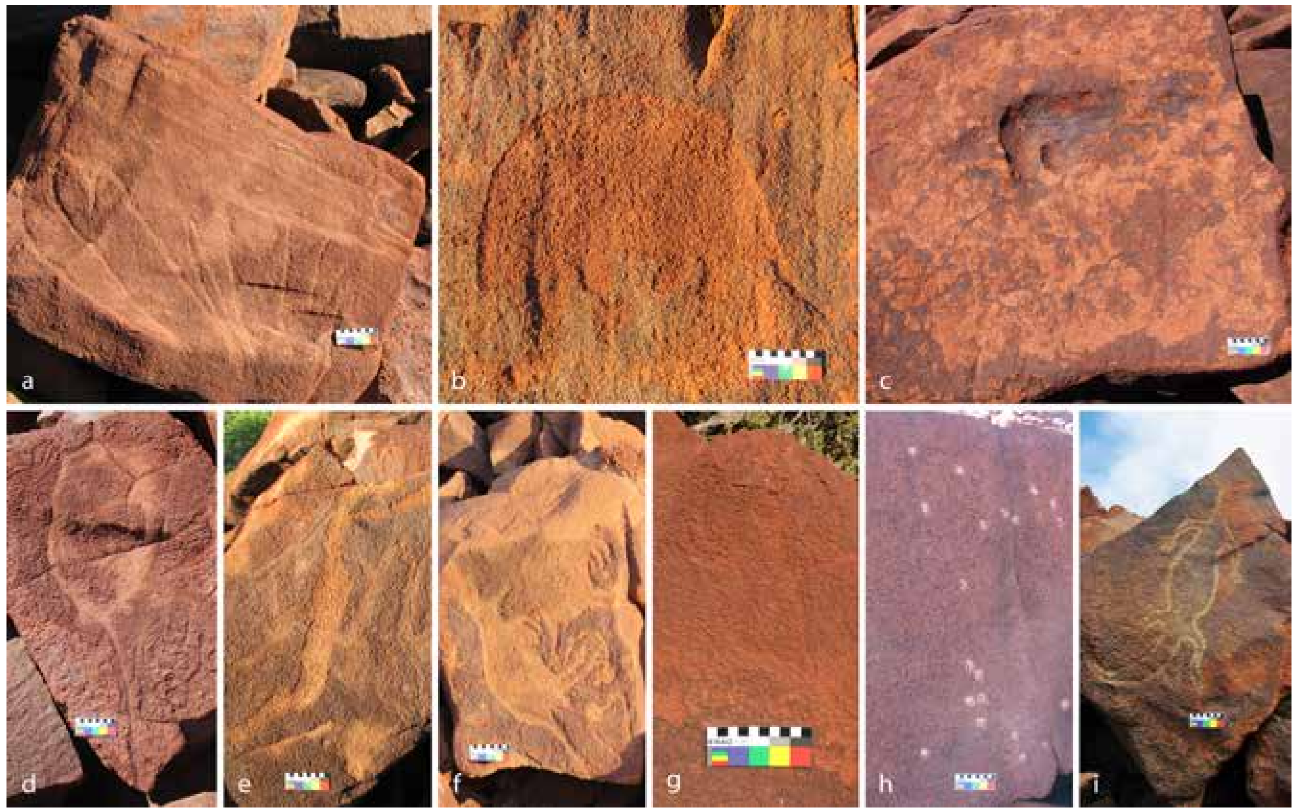

Figure 3.2. Examples of the different condition categories: (a) good, (b) fair and (c) poor; with details of further clarification: (d) cracked; (e) damaged, in this case by rock slide; (f) exfoliated; (g) indistinct; (h) marked, in this case by bullets; and (i) stained.

Depth

Influencing motif visibility is the depth of the groove/mark created during the petroglyph's production. Scratching, for instance, may not penetrate the patina, while gouging or pecking almost always will afford some depth through the patina and weathered crust. Thus, technique can affect current visibility as well as the utility of contrast state as a means of determining relative chronology. Cultural preference, some of which appears linked to the rock type and associated surface texture, also influences petroglyph depth. Lorblanchet (1992: 44) observed the reworking of an image which created relatively smooth, deep grooves. Most higher contrast images are shallow or barely penetrate the rock surface (<3 mm), while low contrast petroglyphs can be up to 10 mm in depth, this taken to relate to a temporal stylistic particularity (Mulvaney 2010). Very few deeper images have been found to have higher contrast, and in these cases recent reworking as part of ritual rejuvenation could be the reason. A combination of colour contrast and depth of petroglyph penetration, along with lighting conditions, contribute to making petroglyphs easily visible.

We record four depth categories: flat; shallow, medium and deep. These are defined on the form (and see Figure 3.3).

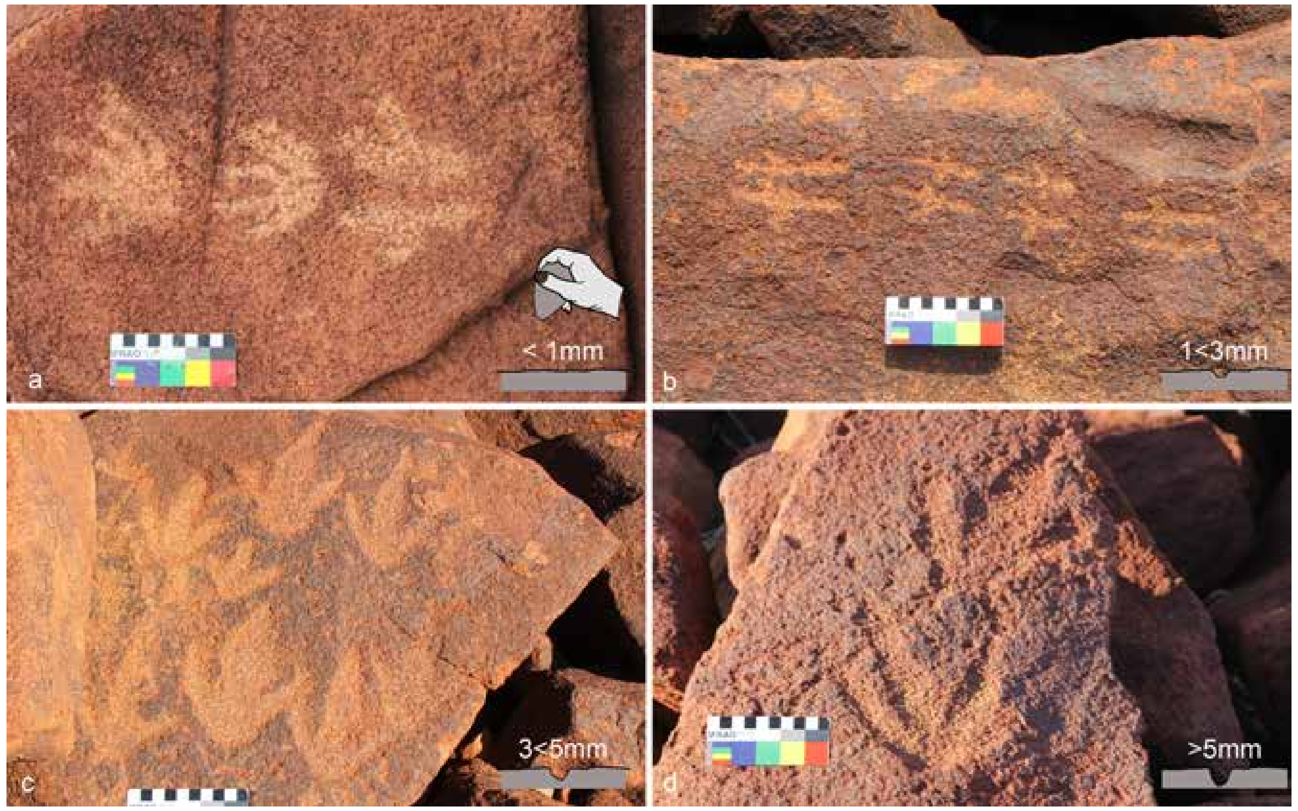

Figure 3.3. The four depth categories recorded during the MLP – all track examples are on gabbro: (a) flat, (b) shallow; (c) medium and (d) deep.

Form

The Murujuga Linkage Project's survey coverage, which included islands of different geologies (see Figure 2.8), resulted in additional techniques and forms being observed. The basic forms of linear, outline, patterned and solid (Mulvaney 2015) and outline and infilled (see McDonald and Veth 2009) has been augmented by additional primary and subsidiary graphic forms, including the addition of scattered marks (Figure 3.4). Mulvaney (2010) previously recorded scattered marks as 'patterned'; however, with the recognition of the often random nature of this type of rock marking as a common assemblage element, we now recognise this as a consistent form.

Technique

A feature of Murujuga rock art, recognised in the National Heritage listing in 2007, is that the techniques used to produce the petroglyphs are diverse and often involve combinations of techniques. The impact point of the tools used to produce the marks are equally varied, from extremely thin points to coarse and angular, or rounded. Percussion and friction are the actions employed, with direct contact by the tool more likely than use of an intermediary (indirect percussion). Chipping out the rock (pecking) is by far the most common technique of those evident, either as single or a combination of action (Figure 3.5). Abrasion, incising and scoring are three friction modes of mark production, more commonly employed on the finer surface texture of the outer island basalts than is recorded for the gabbro or granophyre. Drawing a sharp, pointed tool across the surface in a single action is defined as scratching; when the contact edge is drawn back and forth repeatedly, this produces an incised mark.

Our digital form allows the selection of multiple techniques to represent this variability.

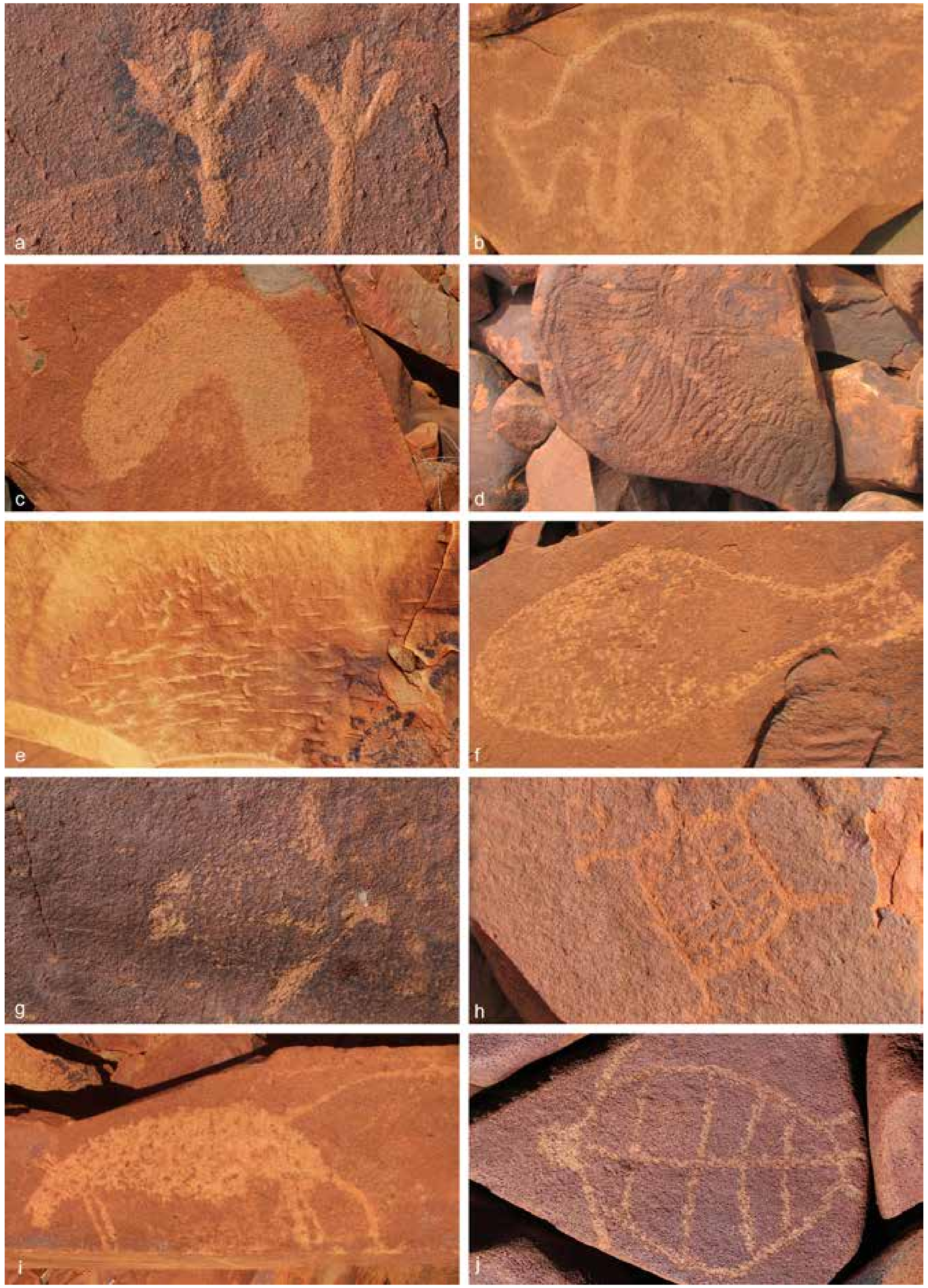

Figure 3.4. The different forms of petroglyphs: (a) linear; (b) outline; (c) solid; (d) patterned; (e) scattered marks; (f) outline + scattered marks; (g) pattern + solid; (h) outline + linear + patterned; (i) solid + linear; (j) outline + linear + patterned + solid.

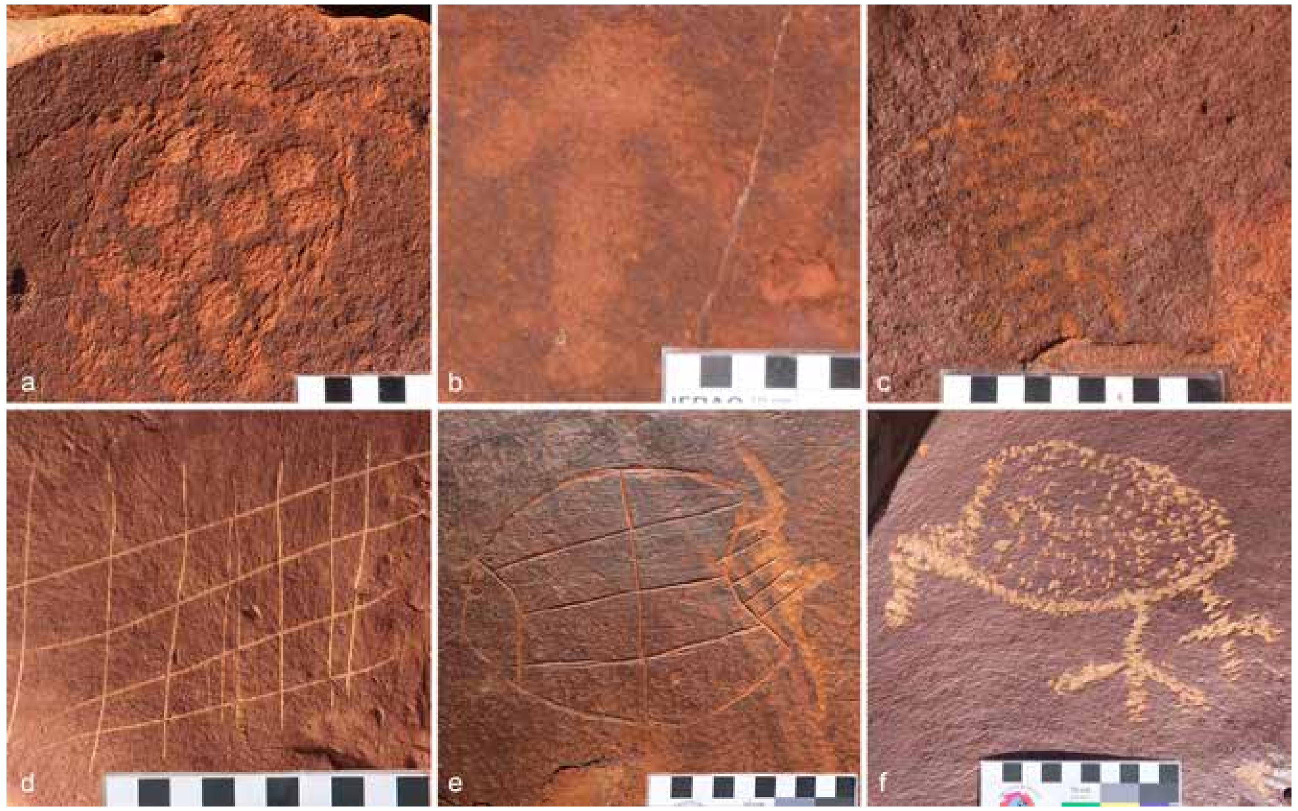

Figure 3.5. Different techniques employed to create an image: (a) pecked turtle showing two differently sized impact shapes; (b) pounded bird track motif, probably produced with a rounded hammerstone; (c) abraded turtle motif; (d) scratched grid; (e) incised and abraded turtle; (f) pecked and gouged bird.

Contrast state

Colour change through weathering exposure provides an indication of the time elapsed since the image was created. The surface colour difference between the petroglyph and surrounding support rock face is expressed as a colour contrast. Recorded here as 'contrast state', this is influenced by many factors including the thickness of the weathered rind and depth of penetration of the petroglyphs into this. Antiquity of surface cortex and extent of other surface coatings (microbiome and geochemical) also influence the rock surface colour appearance. Thus, lithology and physical properties of the weathered crust, along with the depth penetrated through the crust by the original petroglyph's production, can all influence the observed colour contrast and must be taken into consideration when documenting colour contrast and its use as a proxy age indicator (Mulvaney 2010).

In his recording work at Skew and Gum Tree valleys, Lorblanchet (1992) first recognised that varying light conditions affected the visibility of petroglyphs, which in turn affected by the depth of motif penetration. Lorblanchet's patination recording system noted the difference between the colour of the figure and that of the surrounding rock surface. He distinguished these as: very faded, faded and fresh. He augmented his field observations with a Mastersix light meter that measures colour density applied on photographic image projections (see Lorblanchet 1992, 2018c).

Lorblanchet's three-part categorisation was expanded by Mulvaney into five states of contrast to remove what was seen as a potential bias towards taxonomic 'lumping' in the mid-range condition (Mulvaney 2010; for more recent applications and testing of this attribute, see Turner 2008; Clayton 2015; Berry 2018). Within each basal geology, contrast state provides a good proxy for how much weathering the art has been subjected to. Our expanded recording, including the islands with basalts and sedimentary rocks as well as granophyric rock, has demonstrated that where there is minimal weathered rind (e.g. on basalts), contrast state may be unreliable for comparing between basal geologies.

Our contrast state categorisation is from CS1 to CS5, with CS1 as no contrast and CS5 having the greatest difference, fresh-looking in appearance. An additional option was built into the recording form, a category NA which designates that mixed, irregular staining or other surface conditions make judging contrast state problematic. As discussed later, these rankings may be visually different, depending on the basal geology (Figure 3.6).

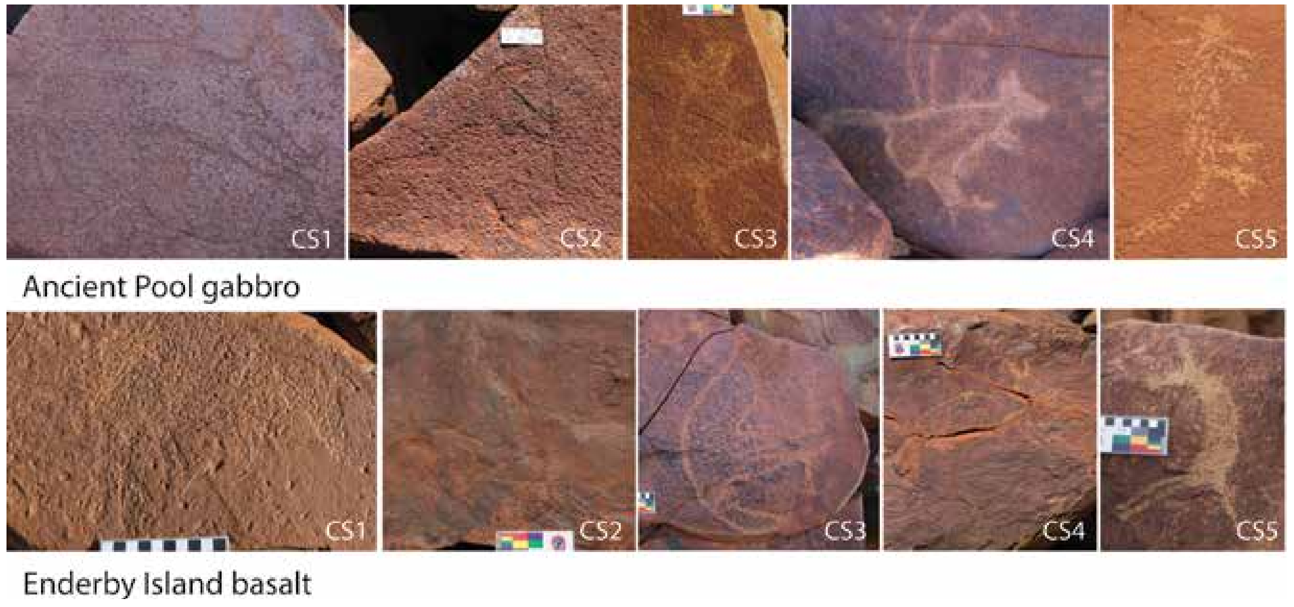

Figure 3.6. Macropod images with contrast states 1–5 recorded on (top) Ancient Pool gabbro; and (bottom) on Enderby Island basalt.

Description

The electronic form allowed for two free text fields; Description, which is useful for explaining more complex attributes than those quantified in the previous fields; and Other Associated Cultural Material, which is useful for identifying associations between the single motif and other cultural material, such as motifs on the same panel, motifs on nearby panels, artefacts, stone structures and other relevant features within the landscape. This field allows complex relationship connections to be made that would not otherwise be identified in a flat table of data.

Motif Classification

The arrangement of shape and configuration of marks allow a definable, repeatable motif to be recognised. A recurring repeatable graphic standard underlies the convention of classificatory typology. Building on the earlier work of Department of Aboriginal Sites staff (DAS 1984; Vinnicombe 1987a, 2002) and others like Lorblanchet (1992, 2018b), McDonald and Veth (2006) and Mulvaney (2010), our hierarchy is based on recognisable classes, primarily figurative and non-figurative, with the addition of 'other' (Figure 3.7).

The classification structure uses a tiered arrangement (see DAS 1984). At this first level we distinguish between the figurative class categories: anthropomorphic (human-like); zoomorphic (animal-like) and tracks (various foot and other spoor marks left by animals and humans) and non-figurative, geometric shapes. To these four classes we have added 'other' to categorise the variety of marks which do not adhere to these recognisable class categories, but which fulfil the criteria of being human-made marks on rock.

'Other' includes amorphous areas, abraded grooves, graffiti, grinding patches, cupules, incised and scratched linear line sets, and random pecking. Grinding patches, the result of economic activity, and graffiti (presumed to be made by outsiders) were included in the 'other' category for convenience in digital recording. Previous recording systems (e.g. Mulvaney 2010, 2015) placed these categories (except for grinding patches or graffiti) within the geometric class. We have had considerable and ongoing debate within the team about the place of grinding patches (and these other marks) within the data set, as previously they have never been systematically recorded amongst the rock art assemblages (cf. Turner 1981) because their purpose is indubitably economic (not symbolic). Many of the 'other' categories are similarly not intended to be symbolic mark-making.

The logic for counting these 'other' human-made marks in the landscape, which are not rock art imagery per se, is that these more random marks may relate to a specific practice in species and elemental increase rituals (see Daniel 1990) or be the result of some other persistent set of human behaviours across the landscape, such as striking the rocks to make audible soundscapes (Díaz-Andreu and Mattioli 2016). These other categories certainly persist across the archipelago in substantial numbers, particularly on some of the softer, smoother lithologies found on the outer islands. Many of these 'other' marks also interact with figurative and non-figurative elements, demonstrating superimposition and other relationships that would otherwise be missed if they were not recorded within the rock art form.

Within each of the five classes are subsequent sets of identifiers based around diagnostic anatomical and/or geometric features. For instance, the zoomorphic class has marine, terrestrial and avian subject divisions. In essence, the ascription of motif label is based on class/subject category, the broad form options and specific recognisable graphic details. Attributes that designate additional divisions between these classes are also described.

Our motif taxonomy provides a structured, repeatable system for recording Murujuga rock art. In recording, especially by many teams of people, often students and park rangers, it is important to establish a standard of recognition whereby the images can be consistently assigned. Equally important is that the classification system accommodates the full range of images encountered.

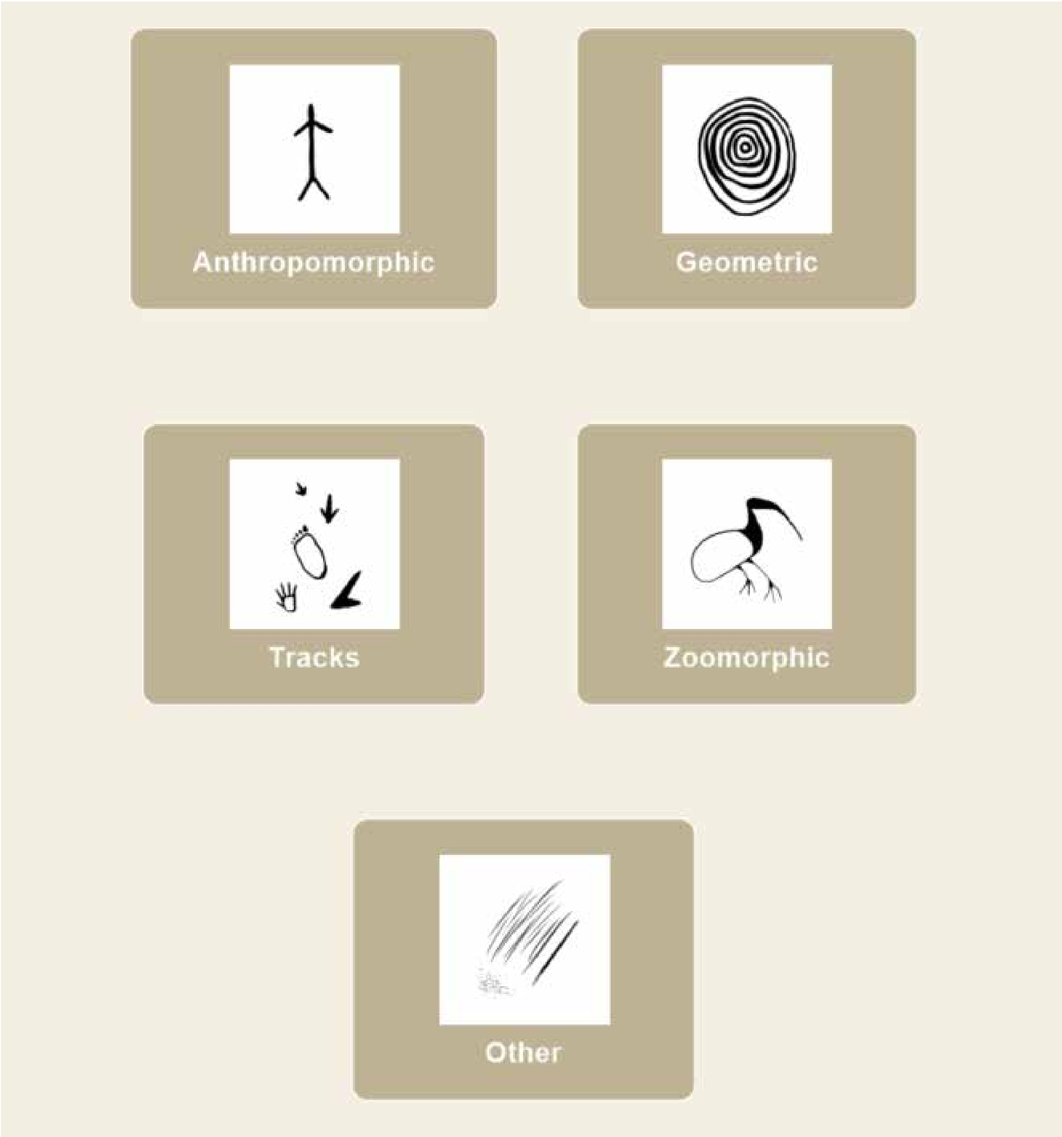

Figure 3.7. The Murujuga five-class taxonomy.

Over the years various classification systems and recording methods have been developed, many dictated to the locations being covered and the nature of the work undertaken. Rock art at the Skew Valley and Gum Tree Valley site complexes was classified into 47 types, with the human form (19 variations) comprising the largest group (Lorblanchet 1992: 49). Motifs were classified under Geometric and Naturalistic during the Dampier Archaeological Project, where Naturalistic included Humans and Animals and their Tracks (DAS 1984; Vinnicombe 1987a, 2002: 17). Within these divisions, there were identified subject categories along with associated variants. Under the Human label are four subject groupings with 122 associated variants or motif types (DAS 1984). For the National Heritage listing analyses, McDonald and Veth (2006) identified variability in the anthropomorphic figures differently, with 10 broad human classes (stick, solid, material culture, lizard-men, profile, outline, groups, therianthropic, complex and decorative), and each human form being identified as having numerous subtypes (529 types; see also McDonald and Veth 2009: 51). Mulvaney identified 31 broad subject groups, with further subgroups providing a total of 495 motif types. As an example, Mulvaney (2010: 150) devised a classification of 11 subjects within the Anthropomorphic class, comprising 96 identifiable types.

Here we have further refined the Murujuga classification process, using the combined taxonomies developed by Mulvaney (2010, 2015) during his doctoral research and those developed for the National Heritage Listing and Outstanding Universal Values reports (McDonald and Veth 2006, 2009, 2011), which build on the earlier approaches. We have continued to modify this during the project and adapted this to the digital recording platform to streamline the field recording processes and post-fieldwork audit and analysis.

The classification system involves four major classes and one minor class comprising seven anthropomorphic, seven track, 16 zoomorphic, 12 geometric and 10 other subjects, a total of 52 initial choices (Figure 3.8). These provide for multiple attributes which further distinguish variability within these broad categories (Figure 3.9 to Figure 3.11). The subject and motif class types can be further defined by selecting attributes / graphic elements (see Figure 3.8 to 3.11).

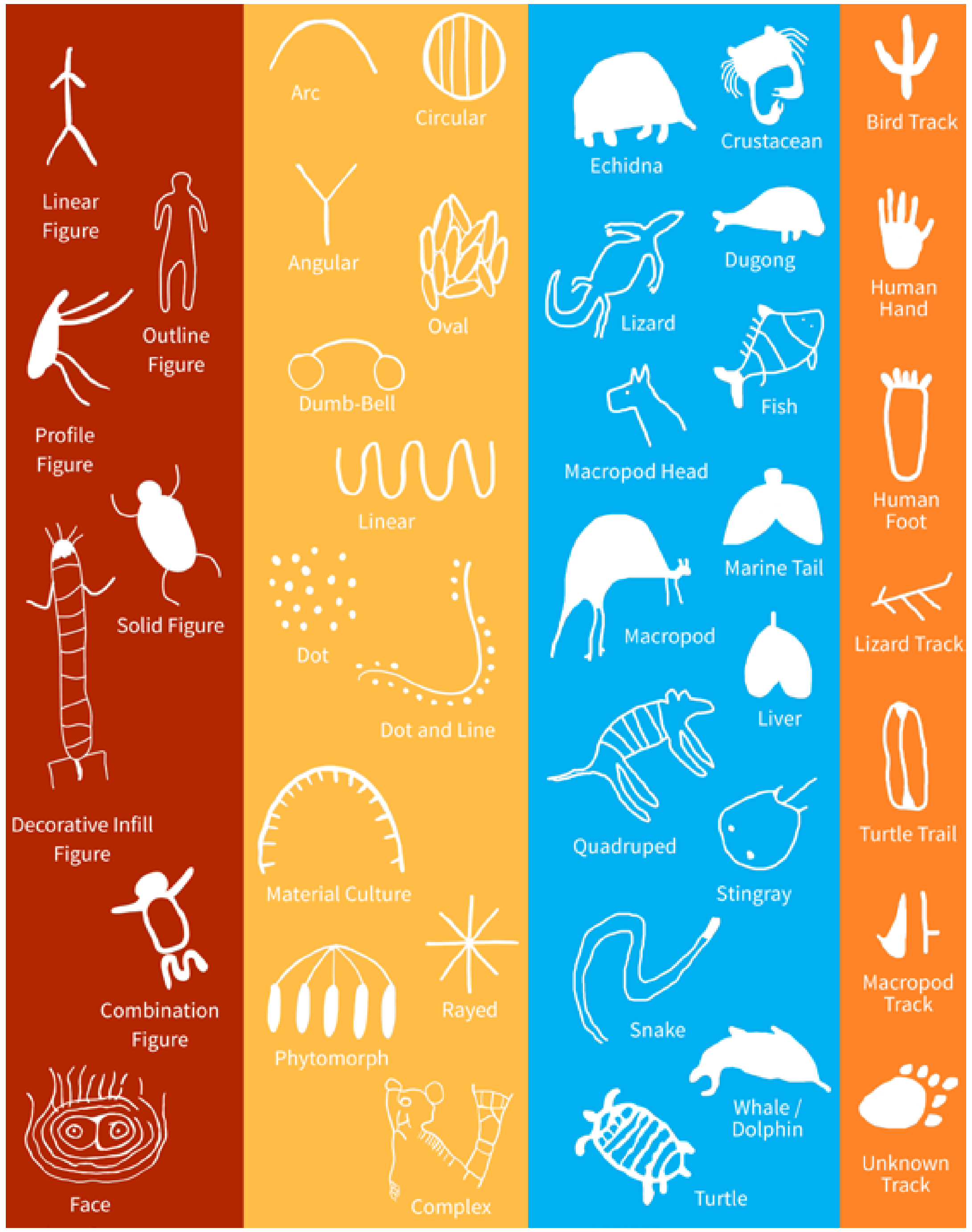

Figure 3.8. Graphic representation of the motif classification that eventuated during the project with seven anthropomorphic, seven track, 14 zoomorphic and 12 geometric subjects.

Figure 3.9. Selected images displaying the range of geometric class subject categories: (a) arc; (b) circle; (c) linear; (d) rayed; (e) dumb-bell; (f) dots; (g) dot and line; (h) complex non-figurative; (i) phytomorphs; (j) material culture.

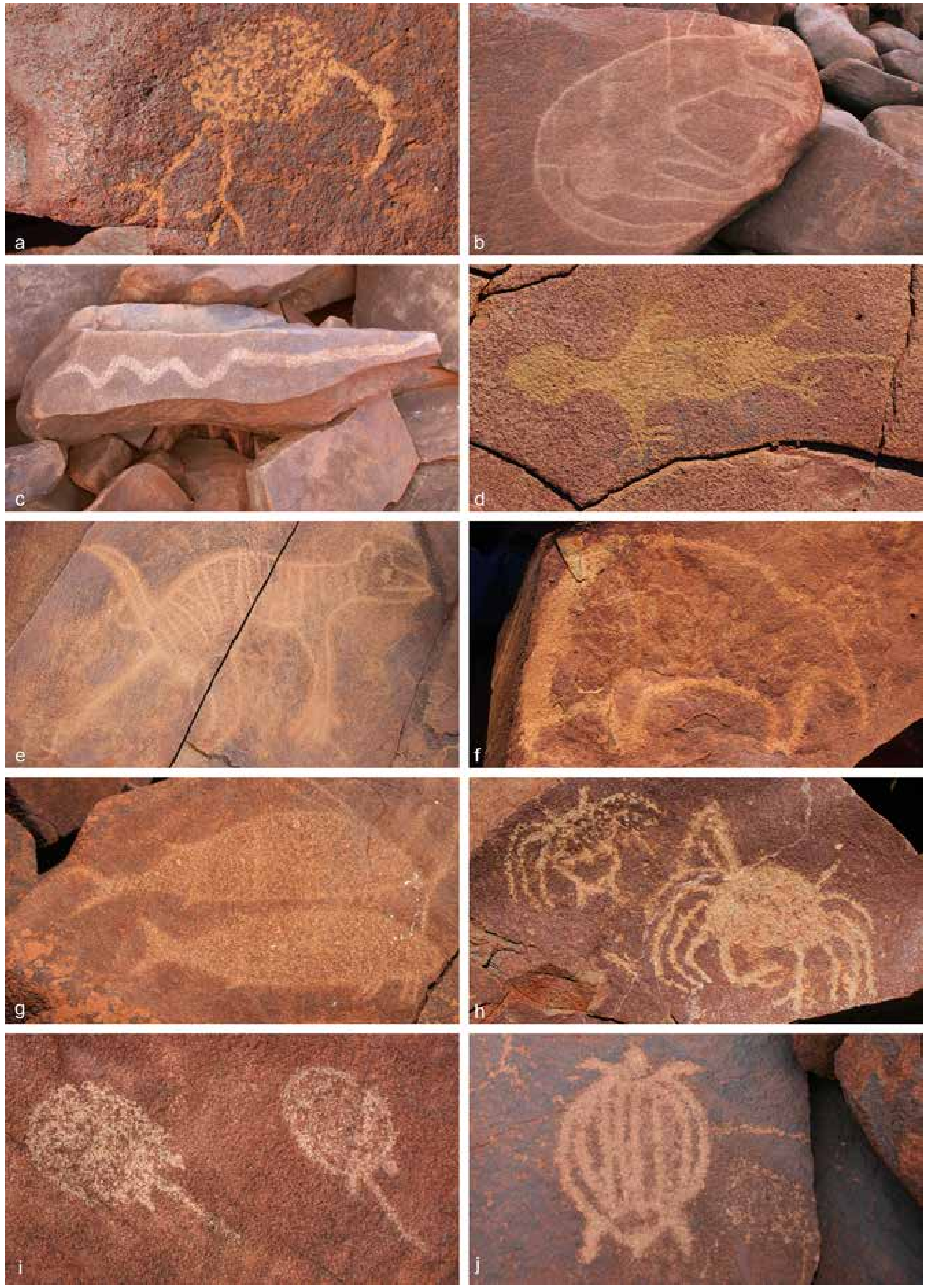

Figure 3.10. Selected images displaying the range of zoomorphic class subject categories: (a) bird; (b) macropod; (c) snake; (d) lizard; (e) quadruped-thylacine; (f) terrestrial other – echidna; (g) fish; (h) crustacean – crab; (i) stingray; (j) turtle.

Figure 3.11. Selected images displaying the range of tracks and other class subject categories: (a) bird; (b) macropod; (c) hand; (d) foot; (e) turtle trail; (f) other track; (g) amorphous area; (h) random pecking; (i) scratched lines; (j) incised lines.

Sketching

The recording workflow for the project included creating an accurate sketch of each motif/panel. Where multiple motifs occur on the same panel, a single sketch was produced showing the spatial relationships between each image, including any superimposition, with each motif labelled with its respective number to link it to its record. Initially, this was drawn on paper and was incorporated into the digital record by taking a photograph of the completed sketch during the fieldwork photography workflow for each panel (see next section). Towards the end of the project, each recording team used an iPad Pro running ProCreate© to make detailed sketches of each image on a photo of the panel in the field, replacing the paper-sketching protocol (Figure 3.12). This innovation has improved the accuracy of the sketching component and made it easier for those less experienced at hand-sketching to quickly produce a good resemblance of the graphic design being recorded. It has also improved the quality of publication-ready field drawings (see McDonald et al. 2021).

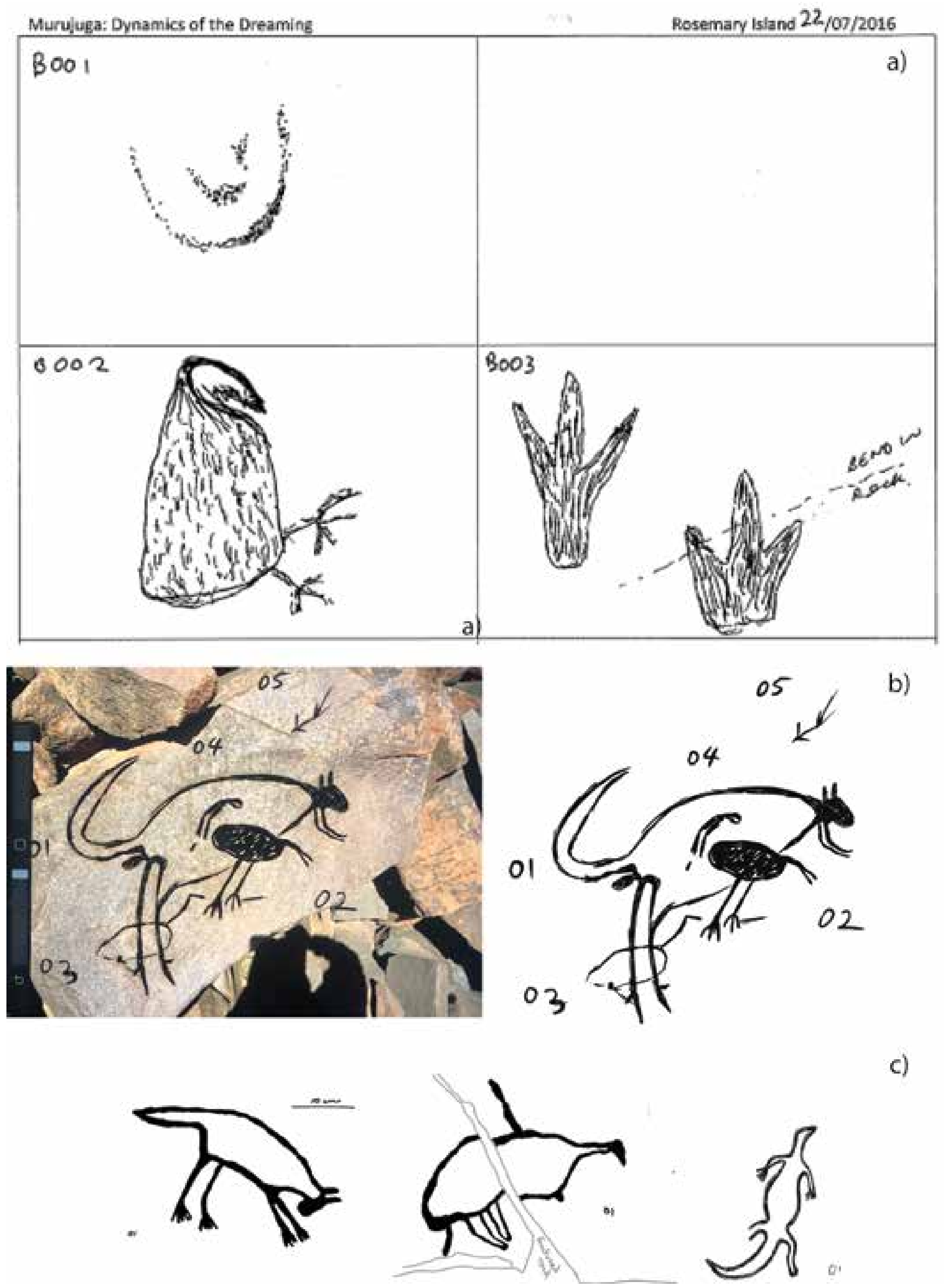

Figure 3.12. The development of the sketch recording system: (a) example of hand sketches created on paper by each team; (b) the iPad ProCreate drawing technique implemented late in the project (with and without background panel image); (c) the illustration-ready result of tracing directly on panel images in the field.

Photography

Each team used a Canon DSLR (5D or 6D) camera to capture every rock art panel and motif in high resolution. The fieldwork photography workflow included taking, in order, a context photo, panel photo, at least one image of each motif identified on the panel, an aspect image (facing away from the panel) and, where paper sketching was still being deployed, a photograph of the sketch. The sequence was closed off by a final photograph of the assigned panel number, displayed via 'the Flappy' (see Chapter 2), which assisted teams in tracking the panel-recording sequence in the field and was a major component of the LightRoom workflow (see Figure 2.4). A 10 cm scale is used throughout this process. The 6D Canons have inbuilt GPS, which is used to cross-check the handheld GPS information or locate features photographed outside the usual workflow. Adobe LightRoom© is used to ensure comprehensive cataloguing of the metadata. Each digital image is linked to recorded panel and motif entries within the electronic database storage system.

Post fieldwork, all images and data collected were audited. All rock art images reproduced in this monograph have been authorised by Murujuga Aboriginal Corporation for publication. This has been facilitated by MAC's heritage team, working with the Circle of Elders and MAC CEO, Peter Jeffries. At this time, a portion of the motifs recorded during this project and the Burrup Field Schools (see Chapter 14) have also been subject to the MAC–CRAR+M Image Clearance Process. This process involves designation of cultural significance of the imagery by a senior male custodian – in the main, Peter Jeffries – although other male members of the MAC Circle of Elders did at times work in conjunction with the CRAR+M Database Manager and editors of this monograph. This process will ensure cultural safety of image repatriation to MAC at the end of all major recording projects. This work has not been completed yet. It is now part of the designated works program for the Desert to the Sea ARC Linkage Project.

Rock Art Recorded during Dynamics of the Dreaming

A total of 272 sites were recorded during the Dynamics of the Dreaming project from the variable landscapes of the six different island targets across the archipelago (Table 3.1). Details of these are documented in the various chapters of this monograph. Most of the new sites comprise only rock art (32%) or included rock art as part of their site cultural material contents (42.4%). Given this project targeted rock art, these resultant site characteristics represent this project focus. Archaeological evidence is ubiquitous across this entire cultural landscape.

Excavations were undertaken at 11 sites: Indigenous open sites, rockshelters and middens. Only three of these did not have rock art immediately associated with the occupation deposit. Archaeological excavations also took place at the historic West Lewis pastoral settlement. Just three of the historic features recorded did not have associated Aboriginal heritage elements (see Chapter 11). These sites are discussed in detail in the different chapters within this monograph.

A total of 14,931 motifs were recorded during the MLP. The largest samples of these were documented from Rosemary and Enderby islands, with the sample transects from the northern Burrup having the next highest number (Table 3.2). We now have sufficient sample sizes from the range of landscapes across the archipelago (McDonald 2015) to begin to better understand the local variability. While the overall assemblage characteristics across the archipelago demonstrate that this is one style province, we continue to document localised variability across Murujuga. Local irregularities are described in detail in the forthcoming chapters, so here we summarise the key findings made during the project.

SITE TYPE	BURRUP PENINSULA	DOLPHIN ISLAND	ENDERBY ISLAND	GIDLEY ISLAND	ROSEMARY ISLAND	WEST LEWIS ISLAND	TOTAL	%F
Art	1	2	18	6	49	12	*88*	*32.4*
Art; grinding	1	2	6		16	7	*32*	*11.8*
Structure		4			22	2	*28*	*10.3*
Art; structure			2	1	17		*20*	*7.4*
Artefacts			1		17	2	*20*	*7.4*
Art; structure; grinding		1			10		*11*	*4.0*
Art; structure; artefacts					8		*8*	*2.9*
Art; structure; artefacts; grinding					6		*6*	*2.2*
Art; artefacts; grinding			3		2		*5*	*1.8*
Art; artefacts					4		*4*	*1.5*
Structure; artefacts					4		*4*	*1.5*
Art; artefacts; grinding; midden			1		2		*3*	*1.1*
Combination site type	3		3		2	6	*14*	*5.1*
Combination site (excavated)	2		4		4	1	*11*	*4.0*
Historical		2		1		4	*7*	*2.6*
Historical; art				1		2	*3*	*1.1*
Historical multiple component sites		2	1	1		4	*8*	*2.9*
Total	*7*	*13*	*39*	*10*	*163*	*40*	*272*	*100.0*

Table 3.1. Sites recorded across the archipelago during the MLP.

ISLAND SAMPLE	MOTIFS		MOTIFS
Burrup	*3,114*	*Gidley Island*	*53*
Ancient Pools Survey Area 01	529	Gidley Island Survey Area 01	53
Ancient Pools Survey Area 02	142	*Rosemary Island*	*4,799*
Ancient Pools Survey Area 03	319	Rosemary Island Isolated	15
Ancient Pools Survey Area 04	368	Rosemary Island Survey Area 01	532
Ancient Pools Survey Area 06	616	Rosemary Island Survey Area 02	1,144
Ancient Pools Survey Area 08	342	Rosemary Island Survey Area 03	1,186
Ancient Pools Survey Area 09	350	Rosemary Island Survey Area 04	1,355
Ancient Pools Survey Area 10	115	Rosemary Island Survey Area 05	226
Old Geos Survey Area	31	Rosemary Island Survey Area 06	341
Watering Cove Survey Area	302	*West Lewis Island*	*1,428*
Dolphin Island	*565*	West Lewis Island Survey Area 01	994
Dolphin Island Survey Area 01	565	West Lewis Island Survey Area 05	345
Enderby Island	*4,972*	West Lewis Isolated	89
Enderby Island Survey Area 01	670	*Total*	*14,931*
Enderby Island Survey Area 02	1,259		
Enderby Island Survey Area 03	146		
Enderby Island Survey Area 04	111		
Enderby Island Survey Area 06	2,076		
Enderby Island Survey Area 07	540		
Enderby Island Survey Area 08	170		

Table 3.2. Motifs recorded in each island survey.

Subject preferences

One of the defining features of this cultural landscape is that it records human transitions from deep time to the recent past, as well as recording the environmental changes that came from sea-level rise and this place transitioning from an interior arid range to coastal sea country. There is a changing style sequence through time, which can be clearly seen in the ways that humans and their accoutrements are depicted (Lorblanchet 1992, 2018b; McDonald 2005b; McDonald and Veth 2009; Mulvaney 2010, 2013; Vinnicombe 2002), and there is a change in focus of animals that have lived in this landscape and transitioned seascape. As identified by Vinnicombe (2002: Table 2), the geometric component of the assemblage is significant. This ARC project can now report in more detail on how these proportions vary across the archipelago (Table 3.3). Subsequent chapters provide details of recordings and offer interpretations for each of the island samples.

For instance, West Lewis Island has an unusually high proportion of 'other' markings, including graffiti, grinding patches and random pecking and scratching. This we consider is a result of the different geological conditions there (smoother, softer basalt) and of the colonial occupancy.

In all sample locations, marine fauna dominates the assemblages within the Zoomorphic class, with turtles being the dominant individual motif class (Table 3.4). In some landscapes (e.g. Dolphin Island), birds are almost as numerous as land animals but, again, marine fauna dominate. On the Burrup and Enderby Island are the largest proportions of macropods. At one site at the western end of Enderby Island, almost half the recorded marine tails (within 'Marine other' in Table 3.4) in the entire sample were recorded.

	ANTHROPOMORPHIC	ZOOMORPHIC	TRACKS	GEOMETRIC	OTHER	TOTAL	%F
Burrup	904	693	268	1,184	65	3,114	20.9
Dolphin Island	134	115	52	207	57	565	3.8
Gidley Island	10	7	15	19	2	53	0.4
West Lewis Island	112	90	129	564	533	1,428	9.6
Enderby Island	707	915	519	1,908	923	4,972	33.3
Rosemary Island	528	638	995	1,946	692	4,799	32.1
Total	*2,395*	*2,458*	*1,978*	*5,828*	*2,272*	*14,931*	
%	*16.0*	*16.5*	*13.3*	*39.0*	*15.2*		

Table 3.3. Proportions of different subjects recorded across the archipelago.

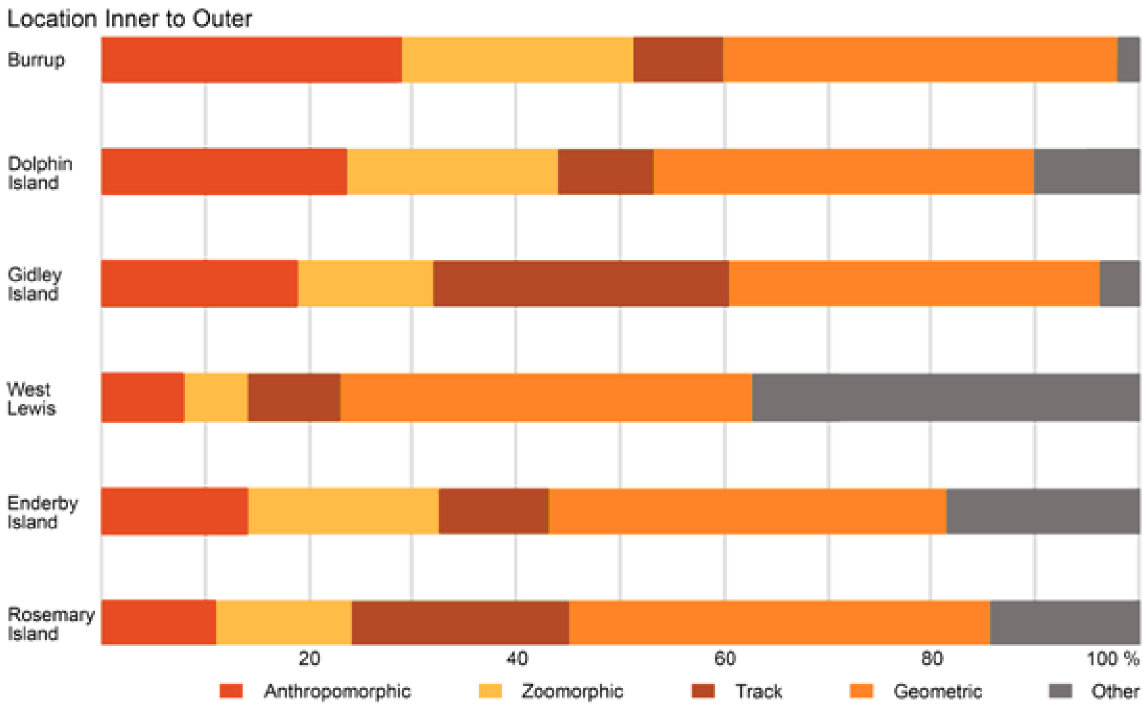

Figure 3.13. Proportions of different subjects recorded across the archipelago, arranged from inner to outer islands.

MOTIF CLASS	BURRUP	DOLPHIN ISLAND	ENDERBY ISLAND	GIDLEY ISLAND	ROSEMARY ISLAND	WEST LEWIS ISLAND	TOTAL
Animal part	39	4	180		50	17	*290*
Bird	90	29	86	1	61	6	*273*
Crustacean			4			1	*5*
Dugong	4		6		18		*28*
Fish	70	29	195	1	158	18	*471*
Lizard	26	7	24		46	4	*107*
Macropod	198	12	118		17	4	*349*
Marine other	9		10		26	1	*46*
Quadruped	47	8	43	2	9	3	*112*
Snake	8		12		6	2	*28*
Stingray	5	4	22		9	4	*44*
Terrestrial other	16		18		15	3	*52*
Turtle	180	22	197	3	223	27	*652*
Total	*693*	*115*	*915*	*7*	*638*	*90*	*2,458*

Table 3.4. Zoomorphic motifs across the archipelago: recorded terrestrial and marine subjects.

This evidence for subject variability, from what is a relativity small sample of the archipelago, is testament to the deep time occupation of this landscape and the transition to a land and seascape at the end of the Pleistocene / Early Holocene (see chapters 6 and 8).

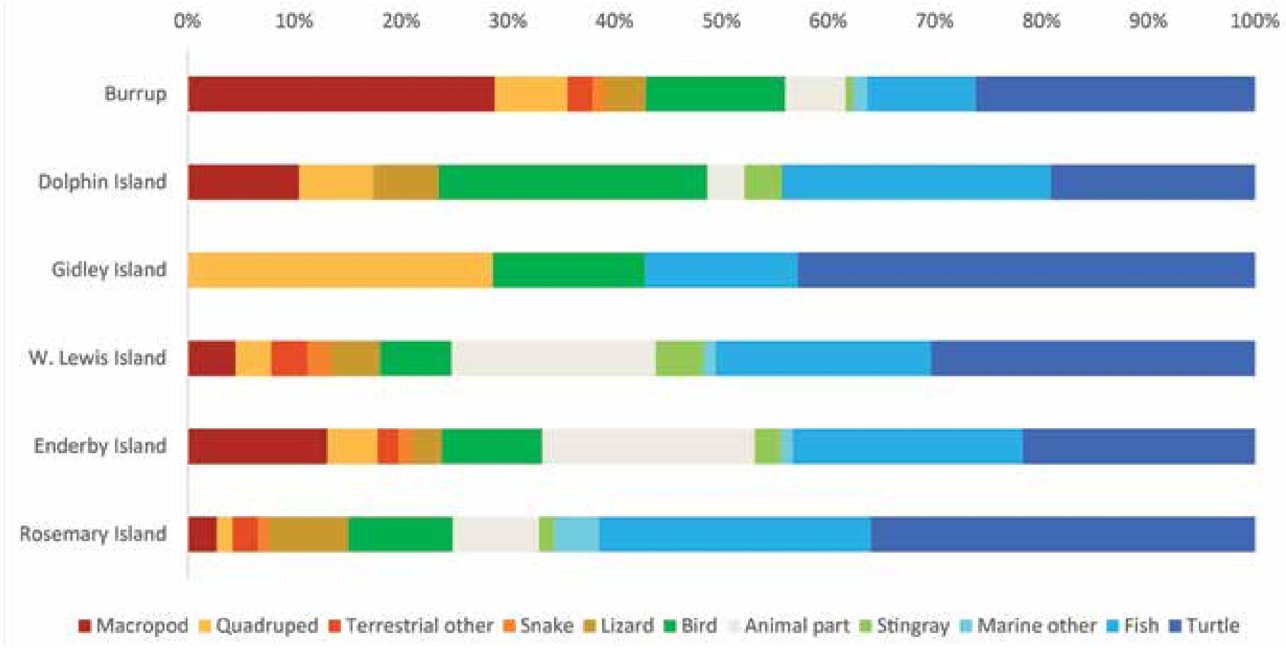

Figure 3.14. Zoomorphic motifs across the archipelago: coded for terrestrial and marine subjects and arranged from inner to outer islands.

Assemblage sizes and motif density

Assemblage size and the density of motifs are two important characteristics that have been developed as part of predictive modelling for the archipelago (Vinnicombe 2002; McDonald 2009a, 2015; McDonald and Veth 2009; Veth et al. 2020). Site boundaries are defined following Vinnicombe (1987a, 2002) as all motifs which occur within 25 m of each other, extended to include other recorded archaeological surface evidence.

Throughout this monograph we have calculated assemblage sizes to characterise the art production in the range of landscapes now systematically recorded. The site-size definitions (see Table 3.5) were originally proposed in Heritage Inventory report (McDonald 2009b) and have been used to develop the predictive model for the archipelago (e.g. McDonald 2015).

ASSEMBLAGE SIZE	NO. MOTIFS
Small	1–5
Medium	6–20
Large	21–150
Complex	>150

Table 3.5. Assemblage size definitions.

Of the 272 sites (with motifs) across the archipelago, most (48%) are small; there are relatively equal numbers of medium-sized and large sites. A total of 38 complex-sized assemblages have now been recorded across the archipelago – in addition to the 13 identified complex-sized assemblages known previously (see McDonald and Veth 2009: Figure 11). Only half of the current sample of complex-sized assemblages are on the Burrup (Table 3.6 and Figure 3.15), but we have now also identified 10 super-sized assemblages (with more than 1,000 motifs), and nine of these are on the Burrup (the other is End 10 on Enderby Island). We also know from our own explorations and more recent survey work (on the Deep History of Sea Country project (Benjamin et al. 2020; Leach et al. 2021), and Murujuga's Rock Art Monitoring project (McDonald and Becket 2022), that there are some major site complexes on Dolphin (and see Donaldson 2009), Middle Gidley, North Gidley and Collier Rocks and West Intercourse islands, the latter four having significant very recent rock art signatures.

This set of assemblage characteristics reveals similarities as well as differences and demonstrates that the entire archipelago contributes to understanding this cultural landscape. Major art complexes reflect intensive foci in the archipelago where people have used sites repeatedly through time. Most of the record, however, is made up of smaller and often isolated art productions (Figure 3.15).

ASSEMBLAGE	SIZE (NO. MOTIFS) SMALL (1–5)	MEDIUM (6–20)	LARGE (21–150)	COMPLEX (>151)
Burrup Peninsula	65	36	23	17
Enderby Island	17	5	7	8
Dolphin Island	2	1	2	1
Gidley Island	6	2	1	–
Rosemary Island	61	19	29	9
West Lewis Island	10	6	6	3
Murujuga (total)	161	68	69	38
%f	*47.9*	*20.5*	*20.2*	*11.3*

Table 3.6. Assemblage size characteristics for the archipelago.

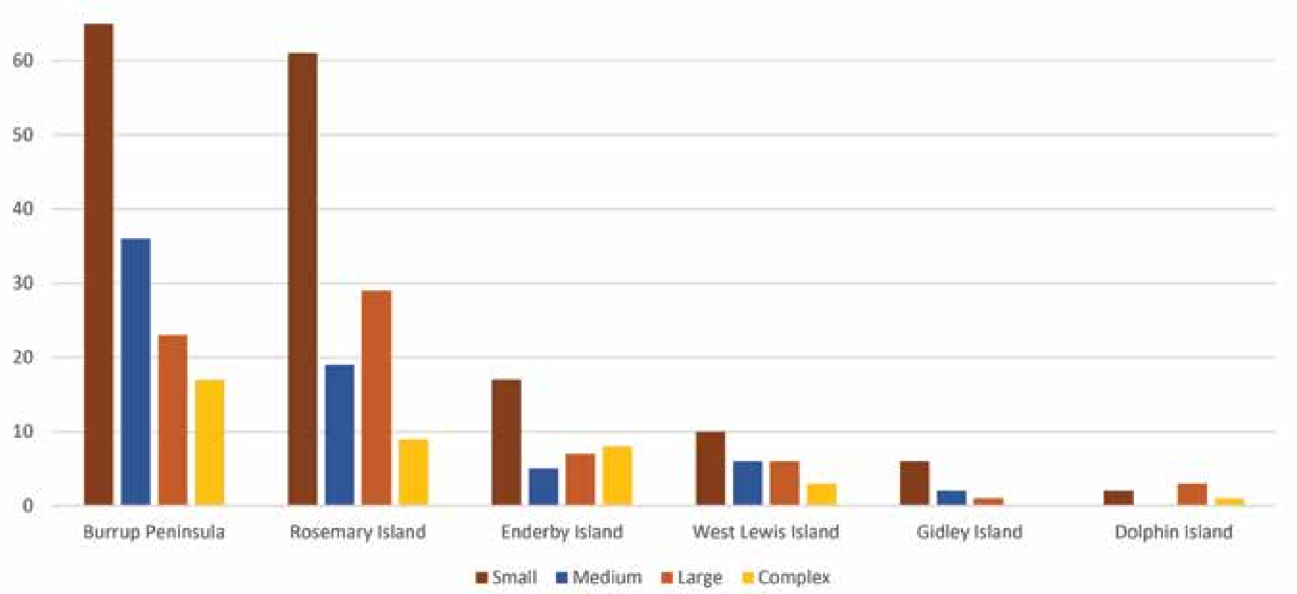

Figure 3.15. Assemblage size characteristics for the archipelago (excluding islands with less than 10 sites).

This project has demonstrated that the islands contain a variety of assemblage sizes, and that there are high-density petroglyph complexes on outer islands as well as on the Burrup (Figure 3.16). A plotting of motif totals and density per hectare (Figure 3.17) reveals that most of the highest density sites are on the Burrup but that very large site complexes (albeit with generally lower densities of motifs per hectare) are also found on Rosemary and Enderby islands. This result will help refine predictive models for the region.

Geology

We now have systematically recorded petroglyphs in a range of representative geologies across the inner, middle and outer islands of the archipelago. We can confirm that rock art is found on a range of different lithologies and that no single rock type appears to have been either preferentially selected to produce art, nor been preferred differentially through time (cf. Donaldson 2011; and see reply by Bednarik 2011). Where suitable rock surfaces occur, they have been targeted for rock art production regardless of the underlying petrology. The art recorded by the project (including the Rio Tinto-funded UWA field schools run since 2010; see Chapter 14) demonstrates that the two well-known Burrup lithologies of granophyre and gabbro dominate the assemblages (however, see Fairweather 2019), but that the varied geologies of the islands result in a much greater diversity (Table 3.7). The gabbro on Rosemary Island (RI gabbro) is of a different lithology to that found on the eastern side of the archipelago, coming from lower in the geological sequence, but these totals are combined here.

Figure 3.16. The density distribution of motifs recorded across the archipelago over the last 10 years.

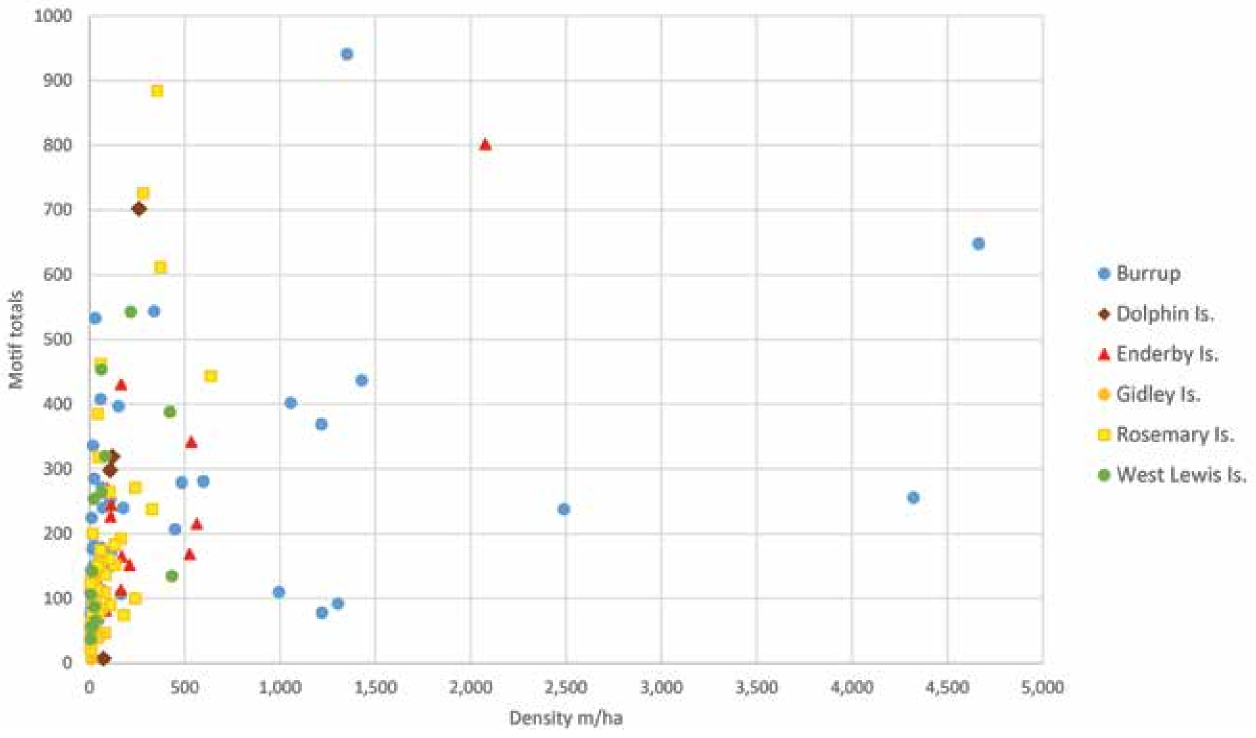

Figure 3.17. Total motifs plotted against motif density (motifs/ha) for all sites medium, large and complex assemblages.

BASAL GEOLOGY	MLP TOTALS	%	BFS TOTALS	%	TOTAL	%F
Basalt and andesite	4,203	*28.1*	–		4,203	*10.90*
Dolerite	302	*2.0*	–		302	*0.80*
Gabbro	6,223	*41.7*	7,585	*32.2*	13,808	*35.90*
Gidley granophyre	2,835	*19.0*	15,932	*67.8*	18,767	*48.90*
Metadolerite	11	*0.1*	–		11	*0.02*
Volcaniclastic siltstone	1,357	*9.1*	–		1,357	*3.50*
Total	14,931	*100.0*	23,517	*100.0*	38,448	*100*

Table 3.7. Geology recorded during the MLP and all Burrup field schools (BFS).

Testing the predictive model

Our predictive model was initially developed during the National Heritage listing assessment (McDonald and Veth 2009; and see McDonald 2009a, b) but has been adapted with more detailed research (McDonald 2015; Mulvaney 2013, 2015; and see Veth et al. 2020). Before this project started, this model predicted (McDonald 2015: 132–133):

1. Throughout all phases of Murujuga's occupation, the focus of archaeological sites and art production will have been on important identifiable resources, particularly (semi)permanent water.
2. The highest densities of archaeological sites (particularly petroglyph sites) as well as the largest petroglyph assemblages will be encountered on the Burrup and proximal islands – particularly in coastal and interior valleys with semi-permanent waterholes, extensive flat coastal hard-rock pavements and rocky outcrops flanking sandy bays in sheltered rock holes and dune soakages.
3. Lower densities of sites (particularly petroglyph sites) and a higher proportion of medium-sized art assemblages will be found on the proximal islands. These will represent rock art production through all defined phases.
4. The lowest density of petroglyph sites, and smallest art assemblages, are expected on the outer islands, particularly where there is less permanent potable water. Most art here will either pre-date islandisation or have been created once people started using watercraft to access these more remote maritime features.
5. Major site complexes with petroglyphs representing multiple phases of art production and other symbolic and occupation behaviours will predominantly be found at resource foci in the landscape. The oldest art (Mulvaney 2010: Phases 1–3b) and associated sites could be found anywhere across the archipelago and, indeed, because of likely larger ranges of less-tethered social groups, would be expected to occur beyond the boundaries of the currently defined art province.
6. Moderate archaeological site densities and small–intermediate sized petroglyph assemblages will be found in areas without identifiable resource foci.
7. Low petroglyph site frequencies and low-density petroglyph assemblages will be found on the tidal mudflats and coastal plain where outcropping rock occurs sporadically. Extensive archaeological sites (particularly midden sites younger than 7,000 years BP) and stone structures designed to harvest maritime resources (e.g. fish traps) would reflect post-transgression collecting and fishing behaviours in these landscape contexts.
8. A higher proportion of early art repertoire(s) (Mulvaney's Phases 1–3b) will be found amongst the art assemblages on the outer islands, while a higher proportion of more recent art repertoire(s) (Phases 4–5b) will be found on the Burrup and proximal islands.
9. The outer islands will encapsulate the earliest symbolic behaviours (petroglyphs and stone arrangements) and associated economic behaviours from the Late Pleistocene and Early Holocene (up to around 7,500 years ago) without major overprinting by subsequent Mid and Late Holocene occupation phases. Art phases on the outer islands might be expected to comprise Pleistocene and Early Holocene art production, and possibly some Late Holocene art production. With island abandonment, no Mid-Holocene (Mulvaney's Phase 4) art production would be expected.
10. On the Burrup and proximal islands, site complexes will be located around reliable water sources and resource foci. All rock art phases would be expected to occur here, with earlier phases being superimposed beneath subsequent art phases. In places where the palaeo-resources are no longer identifiable, and early art (Mulvaney's Phases 1–3b) dominates the assemblages, this art may provide clues to earlier patterns of land use.
11. On the intermediate islands, the distribution and proportions of early and more recent art will depend on the presence of permanent water and other resource foci (e.g. turtle nesting and good-quality lithic resources).

In the subsequent chapters, our work provides the data which allows us to test this model to see how our predictions have been met, overturned or refined, or still present us with avenues for further research. By testing this model, we hoped to refine our understanding of the Pleistocene–Holocene art sequence proposed for the Murujuga engravings (Mulvaney 2010, 2015; McDonald 2015; and see McDonald and Veth 2009, 2013), to develop a better understanding of how people first moved into this landscape, how they survived here during the Last Glacial Maximum, and how they adapted to the coming of the sea.

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