

14

**Burruup Peninsula
Rock Art and
Stone Structures**

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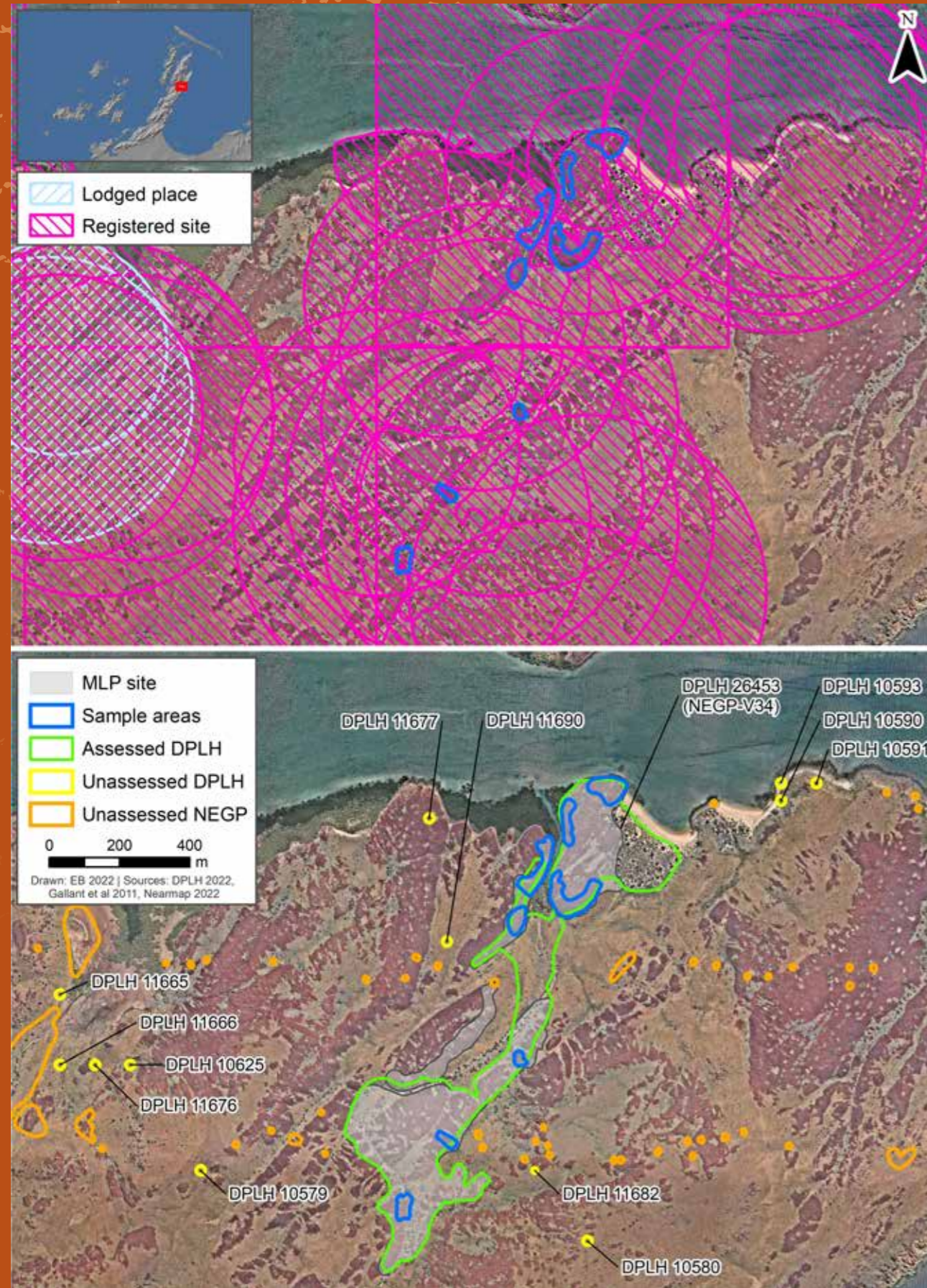


Figure 14.1. Ancient Pool Valley showing (top) the location of previously recorded sites, with (bottom) the audited DPLH sites and the currently recorded samples in blue.

This chapter describes rock art and stone structures recorded by the linkage project team across the northern Burrup. It includes samples from the place known as Ancient Pool and a smaller sample from a portion of the dolerite dyke at Watering Cove, where the excavation programme overcame our capacity to complete recording. It also contains summary information about the rock art and stone structures recorded by 10 years of the rock art field school. This includes samples from Murujuga National Park, the Rio Tinto leases and other Burrup and Maitland Industrial Estates Agreement (BMIEA) landscapes which were identified as being of management interest by Murujuga Aboriginal Corporation.

Ancient Pool

A single field season in 2016 was spent in this far north-eastern portion of the Burrup, south of Searipple Passage. This site complex has numerous overlapping sites lodged and/or registered with the Department of Planning, Lands and Heritage (DPLH) (Figure 14.1). It was visited by archaeologists from the Western Australian Museum in the 1970s and during the National Estate Grants Program (NEGP; Veth et al. 1993b), with several survey transects oriented east-west crossed this site complex. We were interested in investigating the landscape around the site recorded as NEGP-V34, visited during the National Heritage listing fieldwork (McDonald and Veth 2006, 2009), as this includes several well-known motifs and assemblages (see Bednarik 2002b; Dix 1977; Donaldson 2009; and see the ABC series, *First Footprints*). Many of the registered/lodged sites are duplicate recordings and site files for DPLH 10582, DPLH 10583, DPLH 10596, DPLH 10597, DPLH 10597, DPLH 11678, DPLH 11679, DPLH 11680, DPLH 11681 and DPLH 11689 indicate that these refer to all or part of NEGP-V34 (DPLH 26453). The area was named Ancient

Pool by Mulvaney (2010), for the early-phase rock art and semi-permanent pool with a large water-holding capacity one kilometre south of Searipple Passage (Figure 14.2 a–b).

A total of 70 person days were spent here by the project team and Rio Tinto staff volunteers. An additional two person days here in 2017, involved collecting a tufa core from the main pool and undertaking a ground penetrating radar (GPR) survey across the quaternary alluvium proposed for excavation at the rear of the Holocene beach. No excavation was eventually undertaken in this site complex because of the shallow GPR results.

The tufa formation associated with this pool is the subject of ongoing investigation by the Dating Murujuga's Dreaming Project (CRAR+M 2021). We suspect there was an additional palaeo-waterhole feature, now drowned and infilled with marine sediments and mangrove thicket in the northern part of this large site complex (Figure 14.2c).



Figure 14.2. Ancient Pool landscapes: (a) showing the pool with tufa full in May 2016; (b) empty in May 2016; (c) the view up the mangrove-lined tidal creek towards Areas 2, 9 and 10; and (d) the interior valley downstream of the main pool, Area 6.



Figure 14.3. Ancient Pool fieldwork tracklog, showing areas traversed and those focused on in detail (note only four of seven team members were wearing GPS devices).

The geology here is predominantly gabbro, with several (unmapped) dolerite dykes criss-crossing the area and defining the ridgelines/watershed (Figure 14.3

and Figure 14.4). Eight sample areas were recorded in detailed: five proximal to Searipple Passage and three in the interior valley (Figure 14.4). This was not intended

to be a total record of this extraordinary site complex, but to represent an example of the art from different landscape contexts between the current coastline and the interior permanent pool. Time precluded more extensive recording. This site complex has high cultural,

scientific and aesthetic values: it is within the WA-listed Aboriginal Protected Area (number 43: Burrup Peninsula North Area; gazettal date 2 November 1984), as well as being within the National Heritage Listed Area (7 July 2007) and Murujuga National Park (17 January 2013).

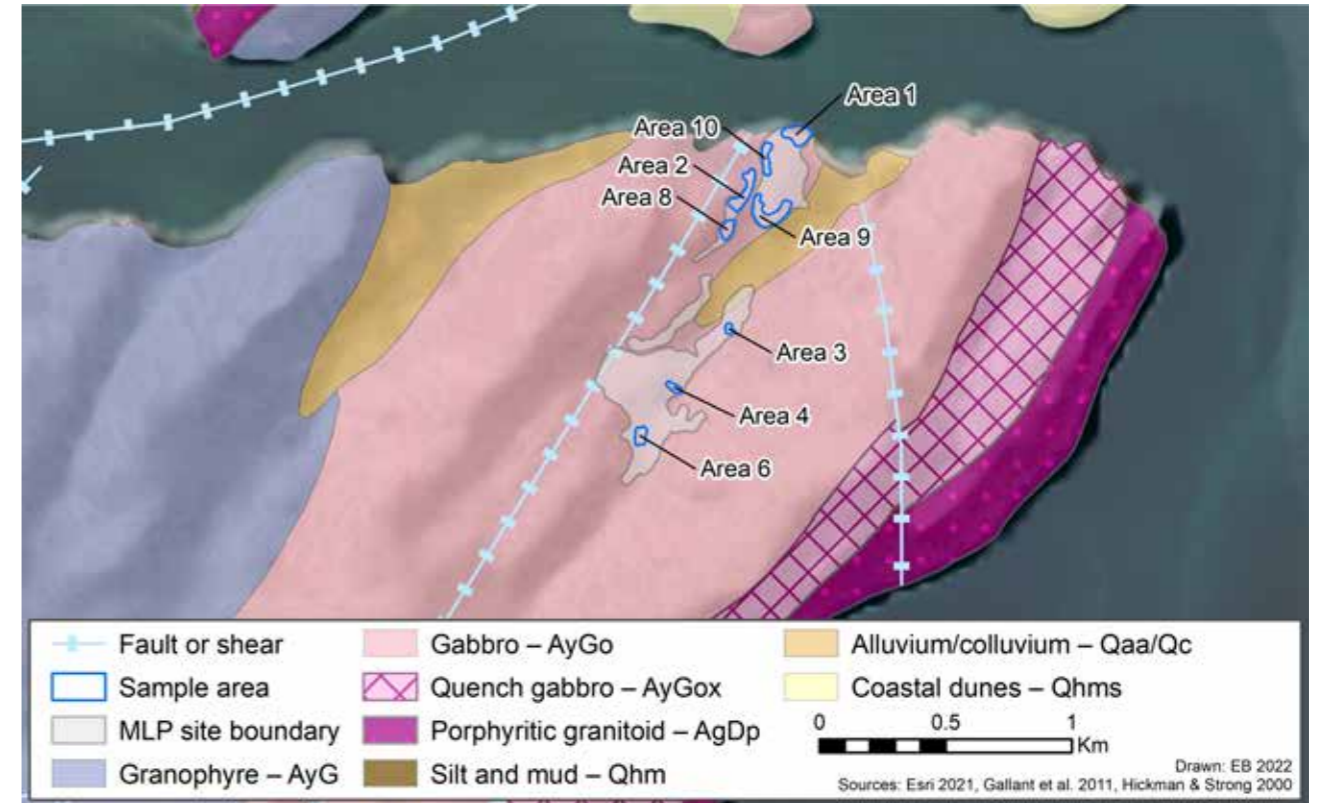


Figure 14.4. Basal mapped geology showing the eight survey areas. Recent fieldwork has indicated that there are unmapped dolerite dykes within the valley also.

Four rock art concentrations were designated as MLP sites: MLP-AP001, MLP-AP002, MLP-AP003 and MLP-AP004. Three of these were defined by broadly confirming the NEGP site boundaries, while the fourth site, MLP-AP004, extends beyond the NEGP-V34 boundary and incorporates NEGP-W24. Artefacts and midden material were also noted in the valley, between the MLP sites, but were not systematically recorded. Defining the extent of this material is likely to result in the merging of the boundaries into a large site complex

incorporating all four MLP sites. The Ancient Pool rock art sites are not defined the same way as other survey area transects given that many more petroglyphs occur adjacent. We have thus not calculated site size characteristics, but the distribution pattern is assessed (Table 14.1 and Table 14.2; Figure 14.5). Most of the Ancient Pool area, approximately 38 hectares, remains unrecorded and likely contains some 10,000–20,000 rock art motifs (Figure 14.5).

SITE TYPE	NO.	%
Art; grinding	1	25
Art; grinding; scatter; structure	1	25
Art; grinding; midden; scatter; structure	2	50
Total	4	100

Table 14.1. Ancient Pool site types.

NORTHERN SAMPLE		SOUTHERN SAMPLE	
MLP-AP001 (NEGP-V34)	MLP-AP002 (NEGP-V34)	MLP-AP003 (NEGP-V34)	MLP-AP004 (NEGP-W24)
Area 1	Area 2	Area 3	Isolated
Area 9	Area 8	Area 4	
Area 10		Area 6	
995 motifs	485 motifs	1,296 motifs	1 motif
592 panels	275 panels	747 panels	1 panel
6 structures	0 structures	21 structures	0 structures

Table 14.2. Ancient Pool rock art sites.

Our Ancient Pool analysis is divided into Northern and Southern sample areas. The Northern sample areas include MLP-AP001 (Areas 1, 9 and 10) and MLP-AP002 (Areas 2 and 8). The southern MLP-AP003 contains

Areas 3, 4 and 6. MLP-AP004 was surveyed in the rain. Because it was too wet for the electronics, the only motif recorded in detail was an archaic face.

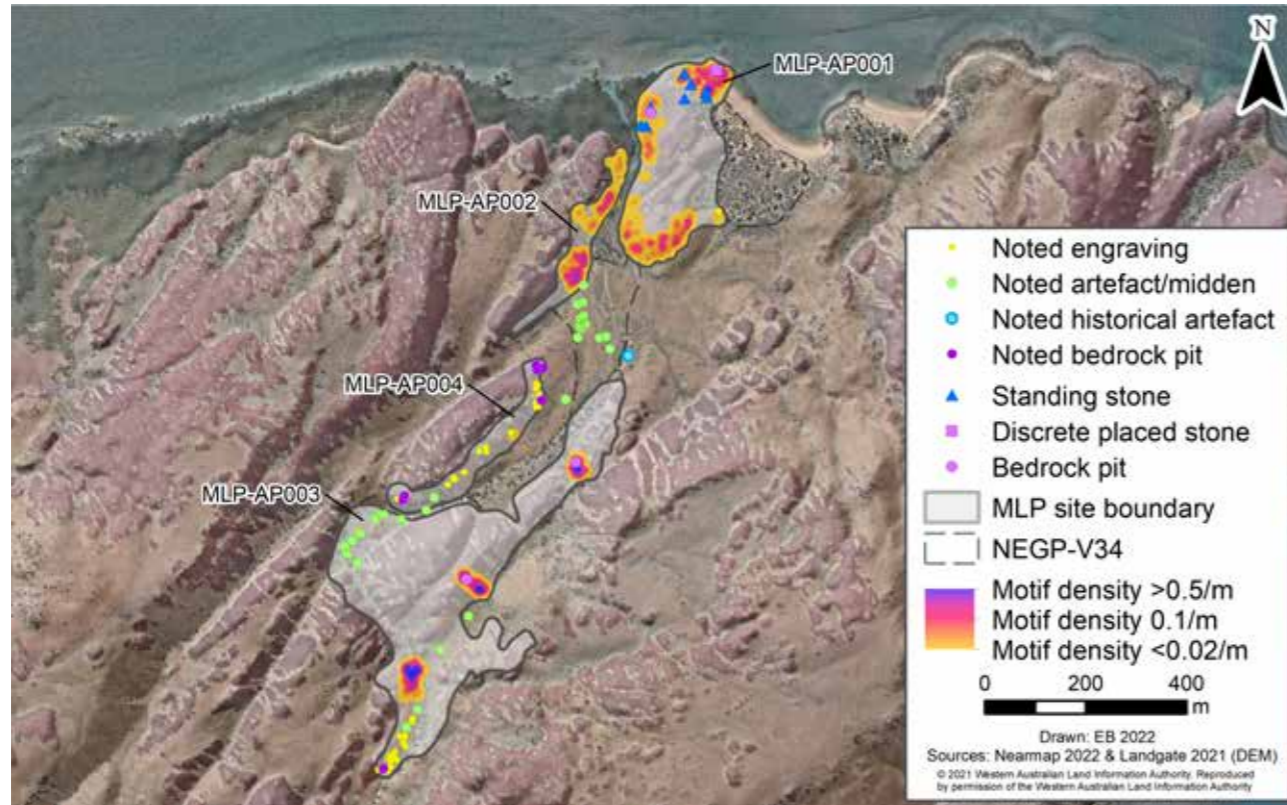


Figure 14.5. Ancient Pool sites showing recorded motif density and location of recorded stone structures. 'Noted' archaeological material was not fully recorded.

Ancient Pool Northern sample (Areas 1, 2, 8, 9 and 10)

Survey and recording initially focused on the eastern side of the mangrove-lined creek and the rock slopes bordering the northern beach (Areas 1, 9 and 10). Saturation recording here included 876 panels and 1,480 motifs from the five sample areas (Figure 14.6). The large sand body behind the beach was included in the original V34 site recording, as is some of the western side of the creek. Survey on the western side of the mangrove creek extended further north of the original NEGP-V34 northern boundary (Areas 2 and 08; see Figure 14.6) as significant motif assemblages were encountered. Two sites are now recorded in this location (MLP-AP001 and MLP-AP002, separated by the 25m rule at the creek line).

MLP-AP001 covers the large gabbro outcrop on the eastern side of the mangroves and creek line. The V34 site boundary includes the large sand body adjacent to the northern beach, and while this was observed to have evidence for scattered midden, the boundary we have

defined is based on the distribution of engraved art and/or stone structures. All the northern stone structures are within this site. There are four standing stones, one discrete placed stone (interpreted as a fallen standing stone) and a bedrock pit. As this area was sample recorded, there is high research potential for future detailed recording to locate more stone structures and many hundreds more petroglyphs awaiting detailed documentation.

MLP-AP002 is on the western side of the mangrove-lined creek, extending southwards along a slope that was targeted initially during rapid recording (after our rainy-day survey). The upper slope along this side of the creek was not surveyed due to time constraints and it is likely that additional art is located there.



Figure 14.6. Ancient Pool Northern sites: (a) MLP-AP001 looking west and (b) looking north-east, with Dolphin Island in the background; (c) MLP-AP002 looking west; and (d) looking south along the mangrove-lined tidal creek running between MLP-AP001 and MLP-AP002.

NORTHERN SAMPLE AREA	MLP SITE	MOTIFS	AREA (HA)	MOTIFS/HA
Area 1	AP001	525	0.59	888.7
Area 2	AP002	143	0.60	237.6
Area 8	AP002	342	0.28	1,182.8
Area 9	AP001	350	0.88	398.9
Area 10	AP001	115	0.33	349.9

Table 14.3. Northern sample areas surveyed and motif densities.

Northern sample rock art characteristics

Subject and class

The combined data from the five sample areas within the two Northern MLP defined sites is analysed here as one assemblage. While geometrics are, as usual, the dominant class of motifs here (33.7%), there is a higher percentage of anthropomorphic (31.6%) and zoomorphic (27.8%) motifs in the Northern sample areas (Table 14.4; Figure 14.7) compared to other rock art assemblages across Murujuga. Only 15 'other' motifs were recorded within this area, including eight grinding patches and two graffiti elements. The two graffiti elements are located on the eastern side of the gabbro outcrop, above the mangrove-lined tidal creek. They appear to have been created contemporaneously, perhaps with a metal implement: one is a boat, the other a phallus. They are both located well back from the water's edge,

and within a few metres of each other. It is assumed that these do not have historic significance, despite the boat having a central funnel that looks like an early steamship (Mulvaney 2018: 260).

CLASS	TOTAL	%F	DEPICTIVE	%F
Anthropomorphic	468	31.6	468	31.9
Geometric	499	33.7	499	34.1
Other	15	1.0		
Tracks	87	5.9	87	5.9
Zoomorphic	411	27.8	411	28.1
Total	1,480	100.0	1,465	100.0

Table 14.4. Ancient Pool Northern sample areas: class proportions.

Ovals, arcs and linear motifs are the most common geometrics here (Table 14.5; Figure 14.9). There is a lot of variability in the oval motifs. Only 14 are regular in shape compared to 21 irregular examples; most are tapered (25) or with a tang (20) and several (5) are barred. Many of the arcs (23) are enclosing, and there are multiple (11) concentric arc motifs (Figure 14.9). Similarly, the linear

category is quite diverse, with single lines (30) being the most numerous. There are also a lot of dot clusters (many recent, indicated by contrast state) as well as many (23) old complex geometric motifs (Figure 14.10). Many of the more elaborate design elements are in the area associated with the tidal creek.

SUBJECT	COUNT	%	SUBJECT	COUNT	%
<i>Anthropomorphic</i>			Tracks		
Combination figure	5	0.3	Bird track	39	2.7
Decorative infill figure	42	2.9	Combo track	1	0.1
Archaic face	5	0.3	Human foot	10	0.7
Linear figure	217	14.8	Human hand	6	0.4
Outline figure	55	3.8	Macropod track	28	1.9
Profile figure	40	2.7	Turtle trail	3	0.2
Solid figure	104	7.1	<i>Zoomorphic</i>		
<i>Geometric</i>			Animal part		
Angular	36	2.5	Bird	49	3.3
Arc	97	6.6	Dugong	3	0.2
Circular	13	0.9	Fish	40	2.7
Complex	27	1.8	Lizard	11	0.8
Curvilinear	16	1.1	Macropod	125	8.5
Dot	53	3.6	Marine other	1	0.1
Dot and line	2	0.1	Material culture	1	0.1
Dumb-bell	2	0.1	Quadruped	27	1.8
Linear	96	6.7	Snake	4	0.3
Material culture	15	1.0	Stingray	4	0.3
Oval	117	7.9	Terrestrial other	9	0.6
Phytomorph	6	0.4	Turtle	108	7.5
Rayed	19	1.3	<i>Total</i>	<i>1,465</i>	<i>100</i>

Table 14.5. Ancient Pool Northern sample areas: subject proportions for identifiable motifs.



Figure 14.8. Ancient Pool Northern sites graffiti: (a) looking south towards location of the graffiti (location marked by x in image); (b) steamship image; and (c) phallus motif.

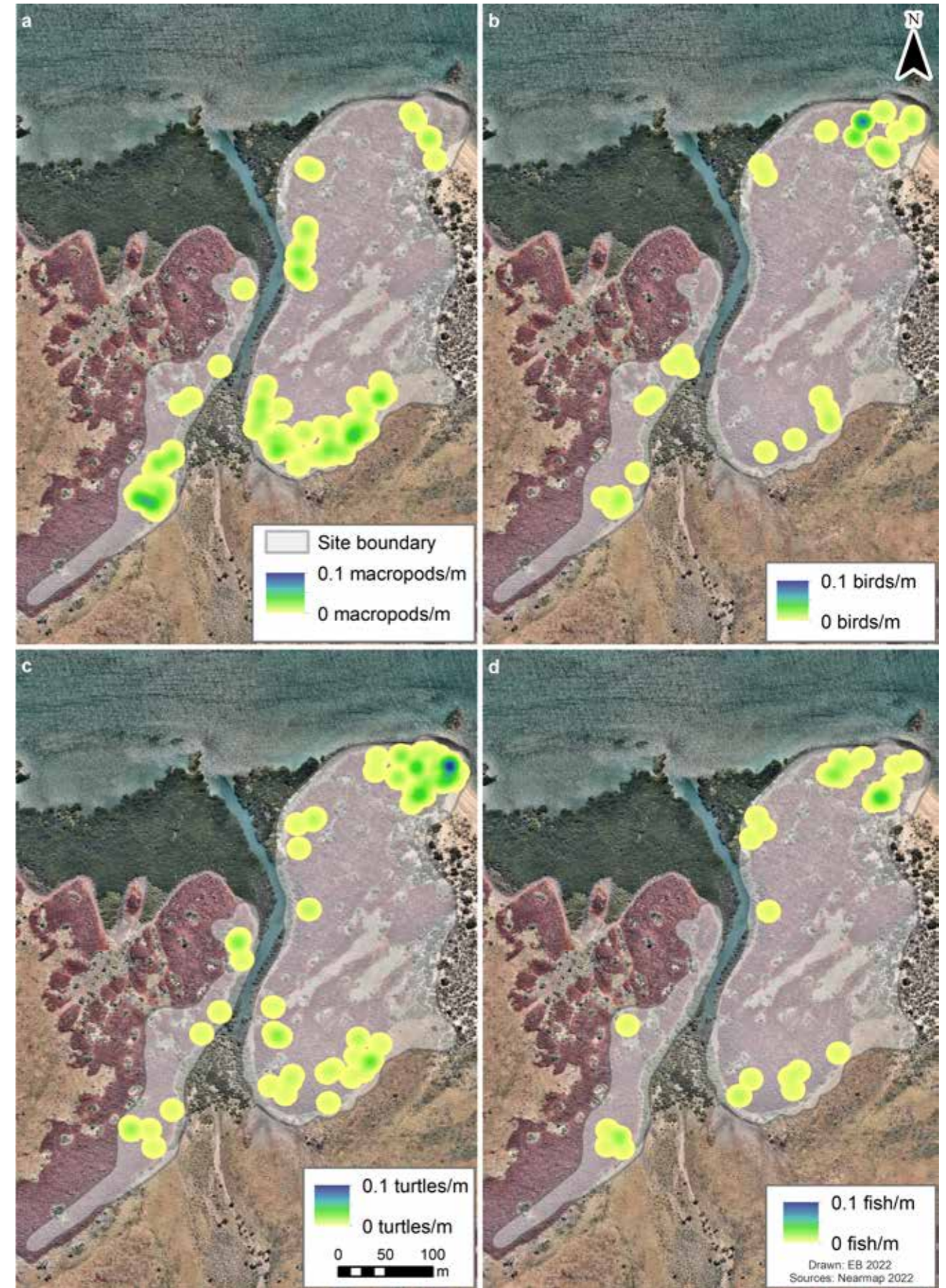


Figure 14.7. Ancient Pool Northern sample showing density distribution of zoomorphic motifs: (a) macropods, (b) birds, (c) turtles and (d) fish.

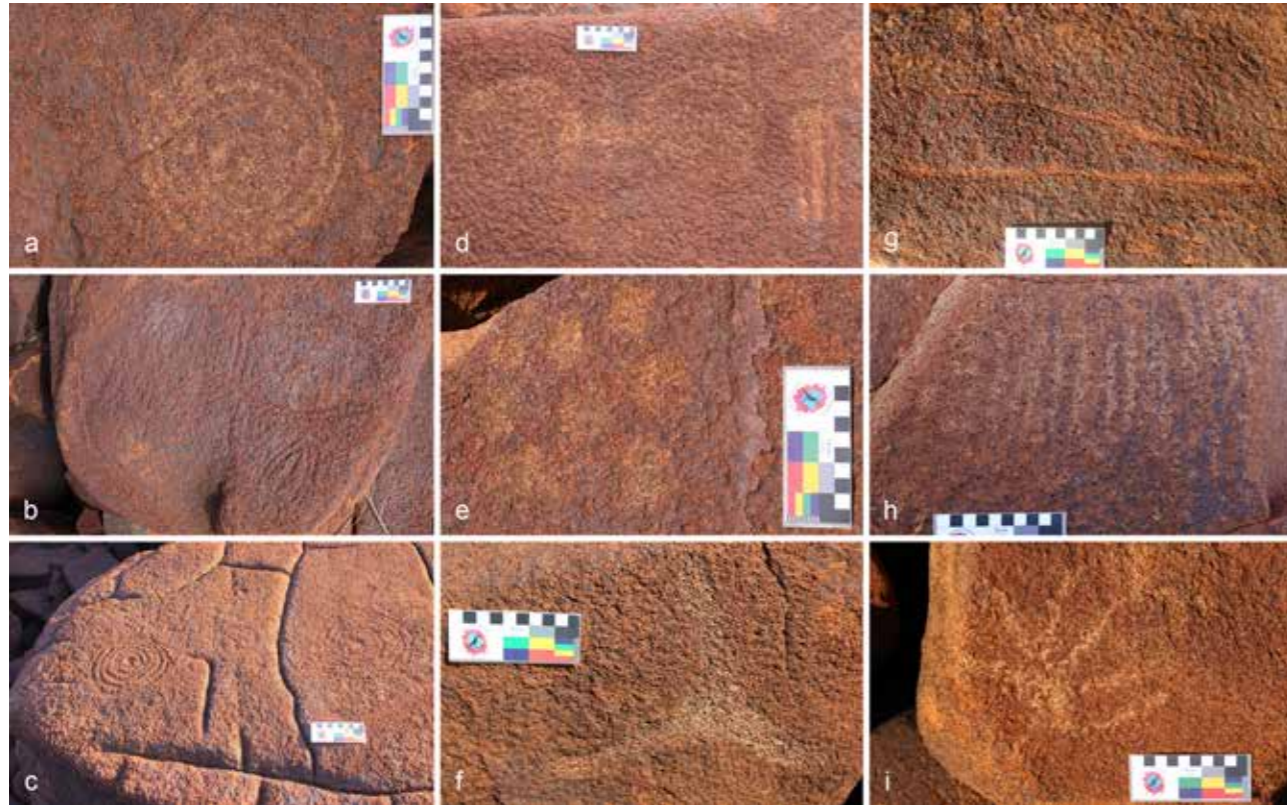


Figure 14.9. Ancient Pool Northern sites geometric images: (a-c) concentric circles and oval designs; (d) dumb-bell motif; (e) dot cluster motif; (f-g) angular linear designs; (h) line set; and (i) rayed motif.

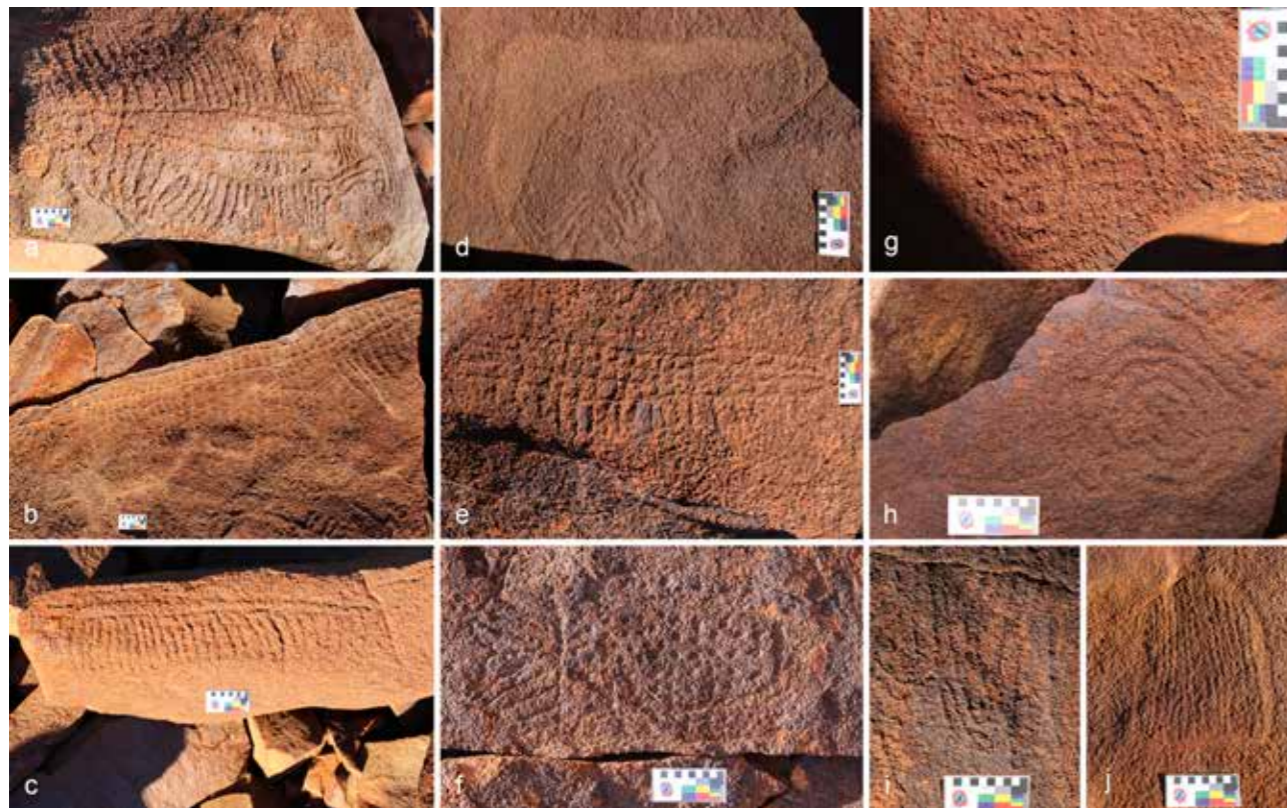


Figure 14.10. Ancient Pool Northern sites older geometric images in the area adjacent to the tidal creek: (a-c) complex designs of lines; (d) possible No. 7 boomerang with concentric curvilinear pattern motif; (e) grid design; (f) complex geometric of the dot and line form; (g-i) concentric curvilinear designs; and (l) enclosed parallel line set.

Macropods and turtles dominate the zoomorphic class, followed by birds and fish (see Table 14.5). There are 125 macropods in this Northern sample, 14 of which have the early fat-tailed trait and another 10 with stylised with anatomically detailed feet (Figure 14.11 and Figure 14.12).

There are two with joeys, one of these a fat-tailed variety. Quadrupeds here include seven echidna and a thylacine. There are 108 turtles in this assemblage, three of which are freshwater species, 54 of which have carapace designs (Figure 14.1 3). Three of these are shown as mating; and

there are several hunting scenes (with spear, track and line). A range of marine motifs are present, predominantly within the Northern part of MLP-AP001. Within the sample area most are generic in form (Figure 14.14), yet diagnostic species such as catfish, dugong, dolphin and whale are depicted in other areas of the site. Animal parts include marine tails (13) and livers (15).

Birds are an important component (n = 49) and these include water birds such as wading birds, one of which is shown with fish in its mouth (Figure 14.15b); older forms (emu); and an anatomical form resembling the bush turkey (Australian Bustard) with eggs within its body cavity (Figure 14.15a). Two birds are shown with extended wings and one with a spear (Figure 14.15d, Figure 14.16e).

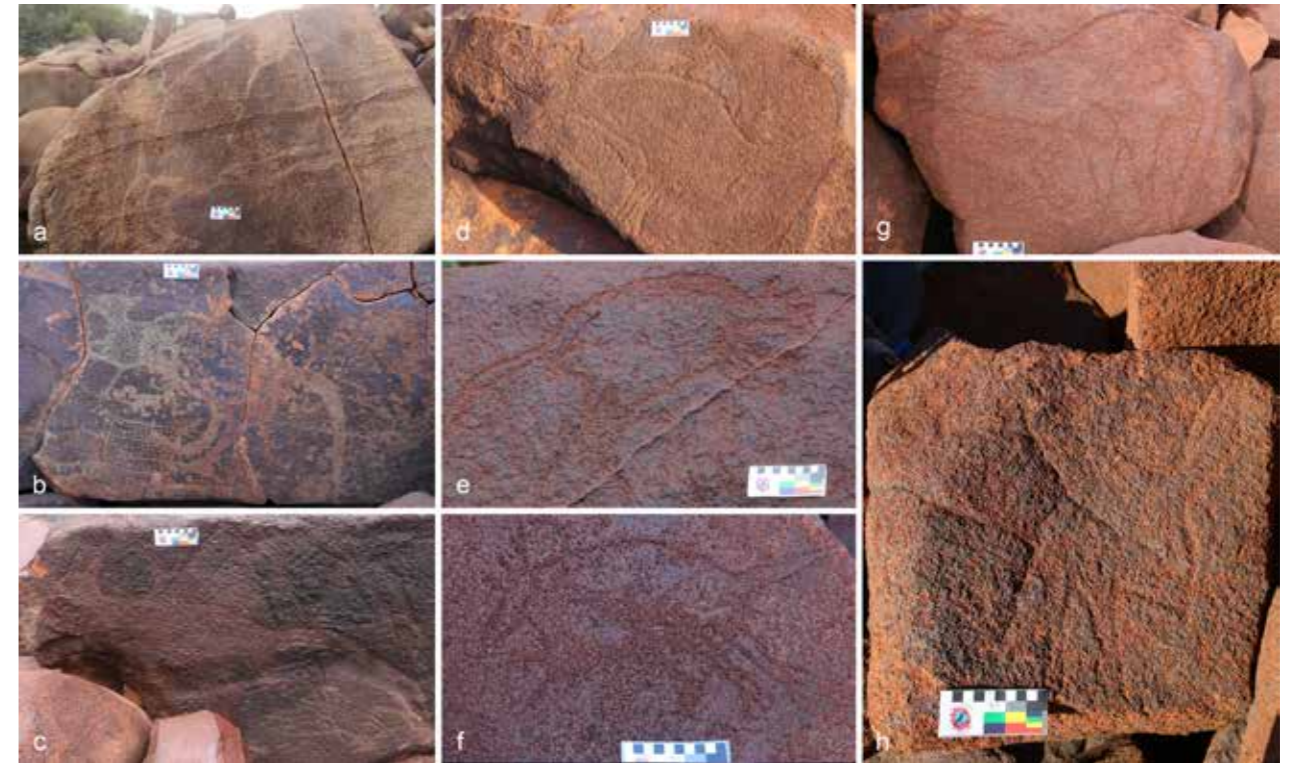


Figure 14.11. Macropod motifs showing the range in style and size.



Figure 14.12. Examples of the 'fat-tail' macropod motif in a variety of contrast states; all these examples are from the MLP-AP002 site.

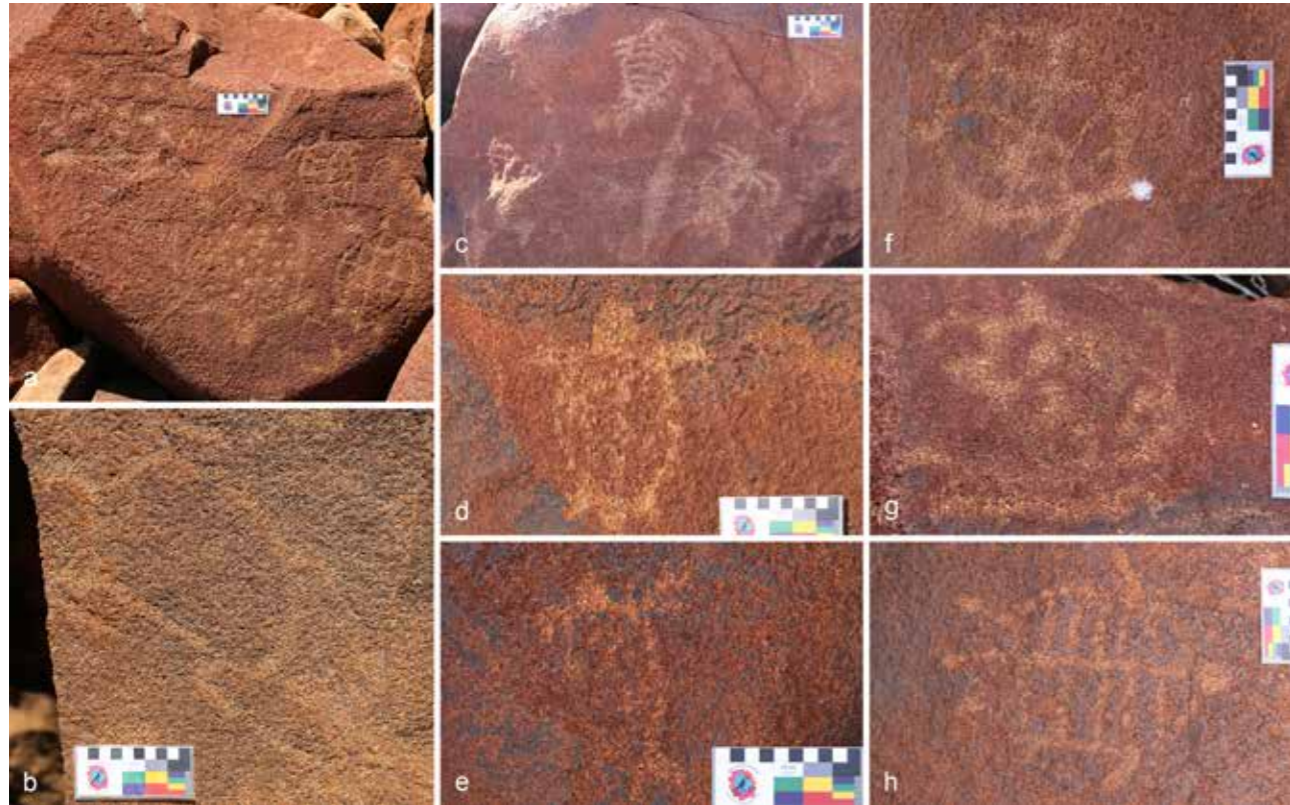


Figure 14.13. Examples of the turtle motifs with different carapace designs, including (b) a long-neck freshwater variety, and (c) two mating pair compositions.

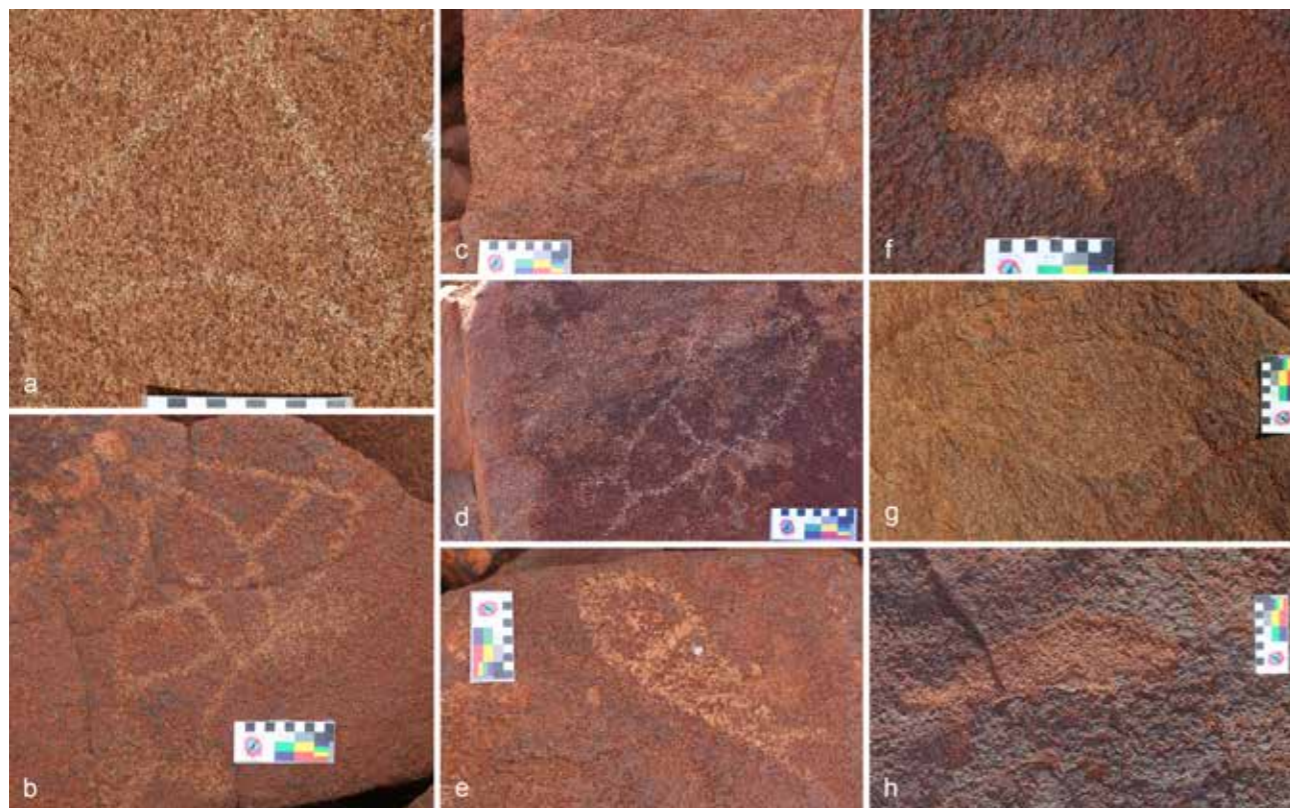


Figure 14.14. Examples of the fish motifs, including (a) marine tail and (b-c) part (back half) fish motifs. Note the variety of contrast states, forms and techniques.

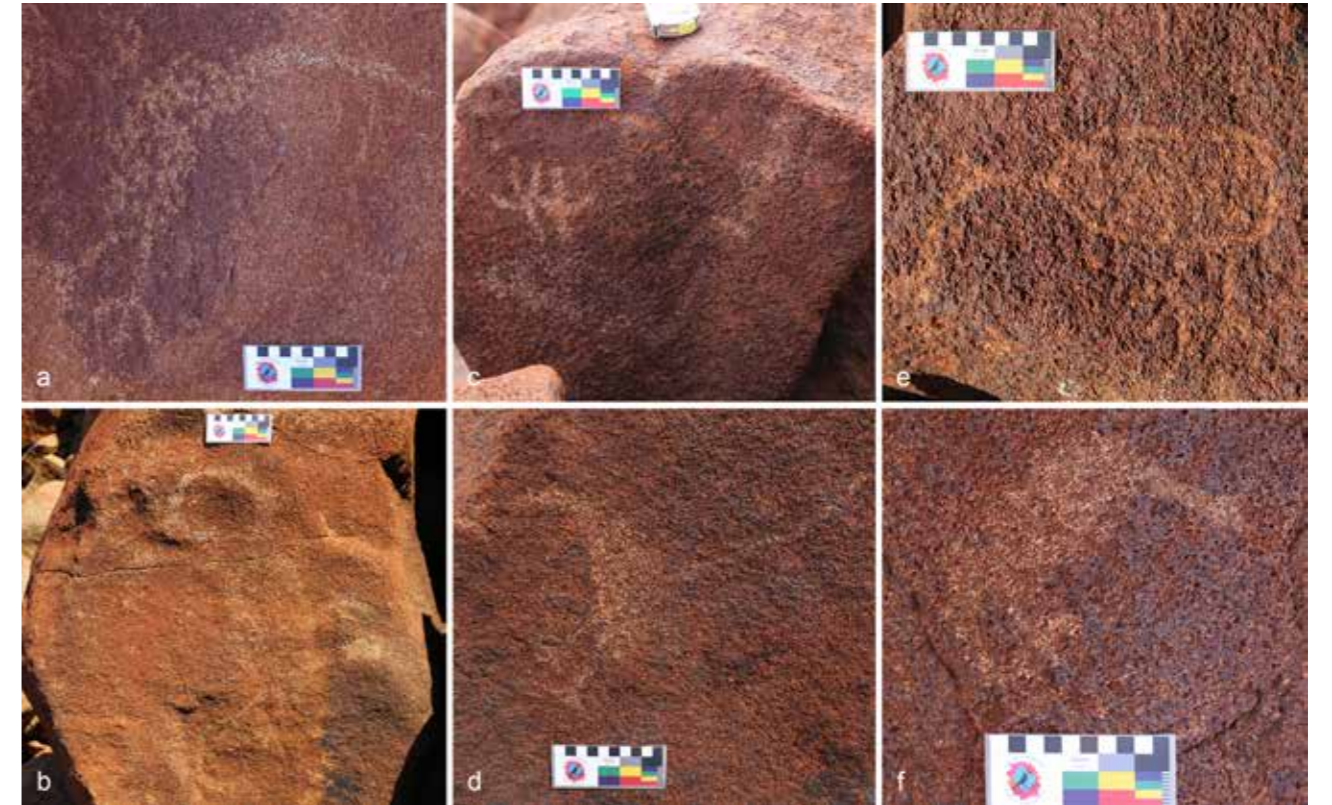


Figure 14.15. Examples of the bird motifs from MLP-AP001, including (d) speared bird.

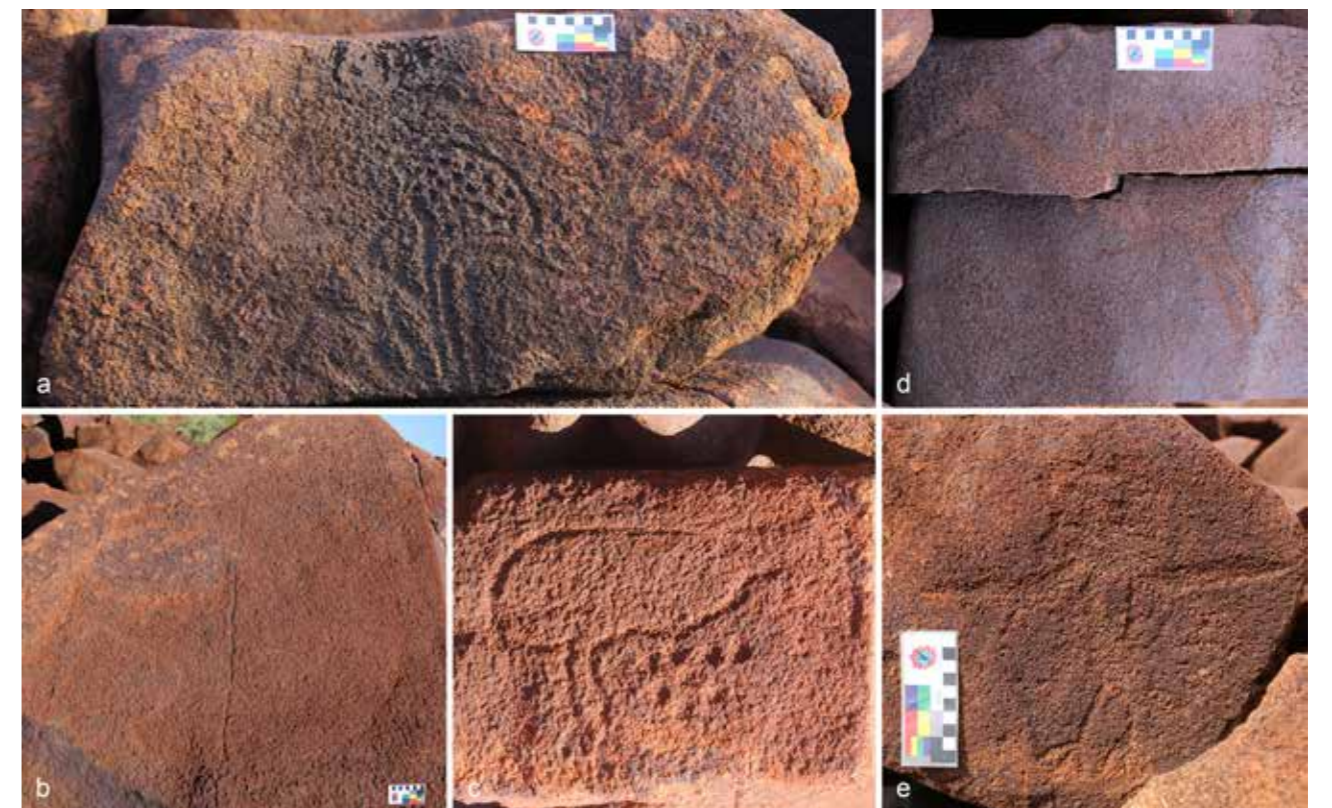


Figure 14.16. Examples of the bird motif from MLP-AP002, including (a) possible bush turkey; (b) large solid emu; and (e) the spread wing design.

There are only 87 track motifs in this Northern sample, and these are dominated by bird and macropod tracks. There is a relatively high number of human hands, although some of these are less anatomically correct so may well be better catalogued as 'track other'. Bird tracks

(n = 39) are equally divided between three-toed (n = 19) and four-toed varieties (n = 20) and these are mostly depicted as singles or in pairs (Figure 14.17 a–b, e). Only 28 macropod tracks were found in this assemblage, and these are found in a variety of styles and contrast states,

including five pairs and nine in trails (Figure 14.17 c–d, f). Only a few turtle trails were recorded here ($n = 3$), with only two of these associated with a turtle. Ten human

foot motifs were recorded, one which displays the toes as separate marks (Figure 14.17g).

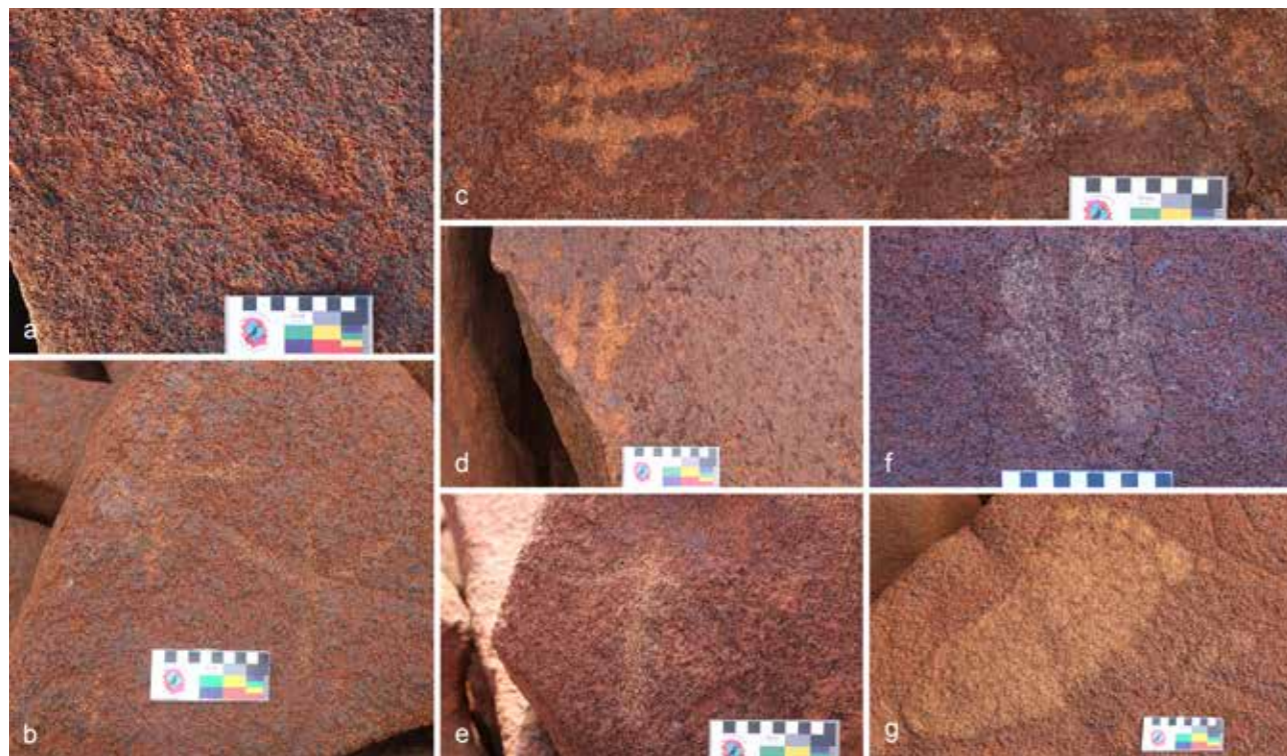


Figure 14.17. Examples of track motifs: (a) three-toed bird track in-line; (b) four-toed bird track pair; (c) trail of macropod tracks; (d) macropod track; (e) single three-toed bird track; (f) macropod track; and (g) human foot motif.

The anthropomorphic class is dominated by linear forms, i.e. stick figures ($n = 217$). There are also many solid figures ($n = 104$) and profile figures ($n = 40$), of which three display the distinctive dot head form (McDonald and Veth 2009; Mulvaney 2010). Outline figures are common in this Northern sample ($n = 55$), most of which are non-gendered (92.5%; there is one female and three males). Three of these non-gendered outline anthropomorphs have proportionately exaggerated heads. Linear figures, as well as being most numerous, demonstrate the most variability in size range and style characteristics. Many are the small schematic non-gendered 'stick figures' ($n = 50$); there is also a huge variety in attributes here, including groups (many forms of coitus), figures associated with material culture, headdress variability, elongated torso, and others with exaggerated heads and/or genitalia.

There is a dense concentration of decorative infill figures ($n = 42$), a specific identifiable anthropomorphic graphic with proportionately elongated cigar-shaped torso (which sometimes includes the head) and with patterned internal design (combination of dots, bars and lozenges) and stylised small limbs and head. These are concentrated each side of the mangrove-lined creek (Figure 14.18). This is the largest known concentration of this style across Murujuga (see Berry 2018). The variability shown in this category is no doubt due to the large sample size. Several have headdresses, many have feet,

and there are several examples which incorporate elements of other Murujuga styles (elongated bodies, exaggerated hands/genitalia, therianthropes; dot-heads; groupings). We have distinguished here between the standard schema and a non-standard schema which includes patterned body but variations on the body shape and limb designs: 17 are standard forms; 19 are non-standard, and there are six which are morphologically more like lizards than human forms (l). Several are associated with items of material culture. While many of these (24) are non-gendered (which is the norm), there are multiple examples here that are gendered, including seven that are male and three that are recorded as female. One of these 'female' figures has a circular design in the belly suggesting pregnancy or some other significant anatomical feature or may simply be a decorative element on a male representation (due to contemporary cultural sensitivities we have not illustrated these motifs here). A similar design in an archaic face with body has been observed in the Calvert Ranges, although this one incorporates natural quartz inclusions within the bedrock (McDonald and Veth 2010). This assemblage of early anthropomorphic forms is of high scientific and cultural significance and is deserving of further analysis.

Five archaic faces were recorded in the Northern sample areas. This represents a subset of 130 recorded examples known in the general location (Mulvaney 2010)

which reveal extreme variability in this very old and characteristic art form (again, not shown here because of contemporary cultural sensitivities). Only one of the known cases in this Northern sample has a head without body (the norm is 68%). The archaic face without a body has an appendage (ear or raised hand to ear?) on one side of a circular face with intaglio/bas relief decoration, eyes, mouth and nostril, with possible hair or simple headdress. One of these bodies may be a long-neck turtle, while the other bodies are in a variety of styles and animal forms.

The third earlier andromorphic phases are those with the head, represented by a tiny circle, separated from the body. These dot-headed figures are relatively numerous ($n = 14$), and these display a range of styles and compo-

sitions, including side profile and several composed in groups. Other examples of this early style here include several hanging groups, paired compositions and one male and one female gendered example (gender is rarely portrayed). This characteristic separation of the head is found mostly on solid ($n = 6$) and profile figures ($n = 5$) but also linear figures ($n = 3$).

There are also numerous outlined human figures with diminutive/elongated bodies and exaggerated heads, as well as several of the recent style linear human figures with exaggerated hands, feet and genitalia. There are also many headdress figures ($n = 33$) in a variety of styles; and five therianthropes (with combined animal and human characteristics).

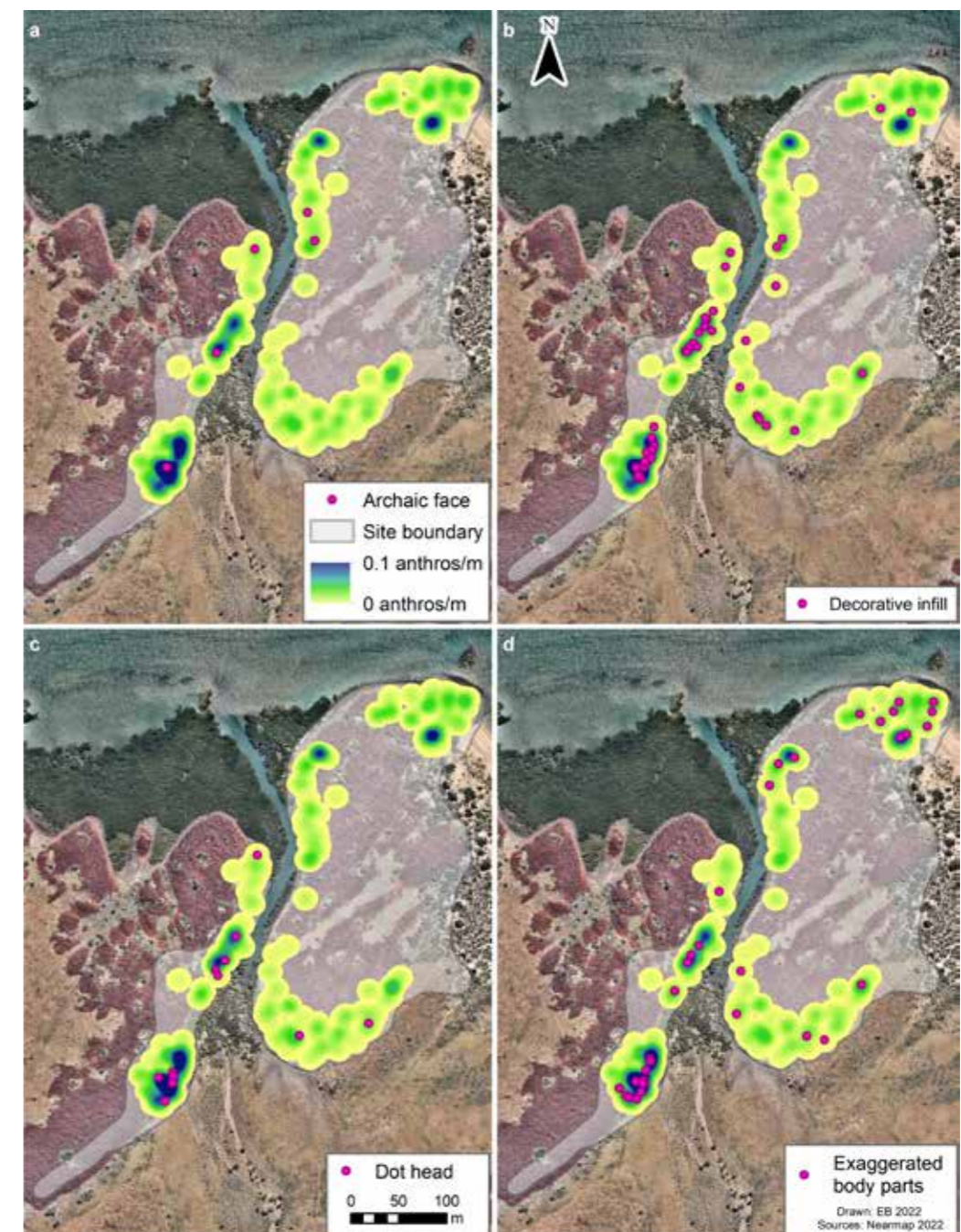


Figure 14.18. Ancient Pool Northern sample distribution of all human figures around the recorded areas showing different locations of characteristic types: (a) archaic faces; (b) decorative infill; (c) dot heads; and (d) exaggerated body parts.

Form

The most common motif form for northern Ancient Pool petroglyphs is linear (30.5%) with solid, outline, and linear + solid combinations making up another 48% of the recorded motifs (Table 14.6). Across this assemblage,

133 motifs (9%) have patterned infill, these mostly being different carapace patterns found in the dominant turtle motifs (see Figure 14.13), but also the large number of complex geometric motifs (see Figure 14.10).

FORM	COUNT	%
Linear	448	30.8
Solid	244	16.5
Linear; solid	237	16.4
Outline	234	15.8
Linear; outline	106	7.3
Linear; outline; pattern	46	3.1
Outline; pattern	40	2.7
Outline; solid	39	2.6
Linear; outline; solid	29	2.0
Pattern	15	1.0
Linear; pattern	13	0.9
Linear; outline; pattern; solid	10	0.7
Outline; pattern; solid	9	0.6
Other combinations	9	0.6
Total	1,480	100

Table 14.6. Ancient Pool Northern sample areas: motif forms.

Technique

The dominant technique in this sample area is pecking (81.6%) which is consistent with sites across the Burrup and Dolphin Island. Abraded and pecked + abraded combinations are relatively common (18%). All other

recorded techniques have very low occurrence (Table 14.7). The low number of grinding patches across this sample area is notable and is likely attributable to the rough-textured gabbro geology here.

TECHNIQUE	COUNT	%
Pecked	1,202	81.6
Abraded	141	9.5
Pecked and abraded	131	8.9
Gouged	2	0.1
Gouged; pecked	2	0.1
Incised	1	0.1
Scratched; pecked	1	0.1
Total	1,480	100.0

Table 14.7. Ancient Pool Northern sample areas: techniques used in all motifs and other marks.

Size

Over half the assemblage (53%) is smaller than 30 cm in size, with another 33% between 30 cm and 60 cm long (Table 14.8). Sixty motifs (4%) are larger than 100 cm and four are larger than 200 cm; these include two snake motifs (the longest having an internal linear design, the other with decorative dot infill). Many of the large and decorative images are positioned on a large block of gabbro on either side of the mangrove creek. There is also one large block on the western side of the creek which has multiple very large kangaroos positioned around its edges (see Figure 14.11).

SIZE RANGE (CM)	COUNT	%	SIZE RANGE (CM)	COUNT	%
1-10	104	7.1	121-130	2	0.1
11-20	362	24.5	131-140	5	0.3
21-30	314	21.2	141-150	2	0.1
31-40	248	16.8	151-160	4	0.3
41-50	155	10.5	161-170	8	0.5
51-60	91	6.2	171-180	1	0.1
61-70	52	3.5	191-200	5	0.3
71-80	41	2.8	221-230	3	0.2
81-90	27	1.8	231-240	1	0.1
91-100	22	1.5	NA	3	0.2
101-110	15	1.0	Total	1,480	100
111-120	14	1.0			

Table 14.8. Ancient Pool Northern sample areas: size of the motif assemblage (including 'other' features).

Weathering state

The majority (c. 80%) of this Northern area motif assemblage is spread through the middle ranges of the contrast state values (CS2, CS3 and CS4). Given the relatively large proportion of early-style motifs in this sample (Table 14.9), it is not surprisingly there is a higher proportion of low contrast motifs (CS1 = 17%). This coupled with the very low occurrence of high contrast

state (CS5) is unusual compared to other sample areas across Murujuga. The focused distribution of the low and high contrast states and associated subjects supports the notion that there once was a potable water source where now the mangrove-lined tidal creek has established.

CONTRAST STATE	COUNT	%
CS1	251	17.1
CS2	386	26.3
CS3	402	27.4
CS4	388	26.5
CS5	38	2.6
Total	1,465	100

[Table 14-9.jpg to sit next to table]

Table 14.9. Ancient Pool Northern sample areas: contrast state of the motif assemblage (excluding 'other' marks).

Northern sample stone structures

Ten stone structures were recorded within the Northern sample areas (Figure 14.20). Stone structures were not specifically targeted by the recording program here and systematic survey targeting this site type is likely to

uncover many more structures in this area. Numerous stone pits were observed but not recorded in detail, as with midden and stone artefact material.

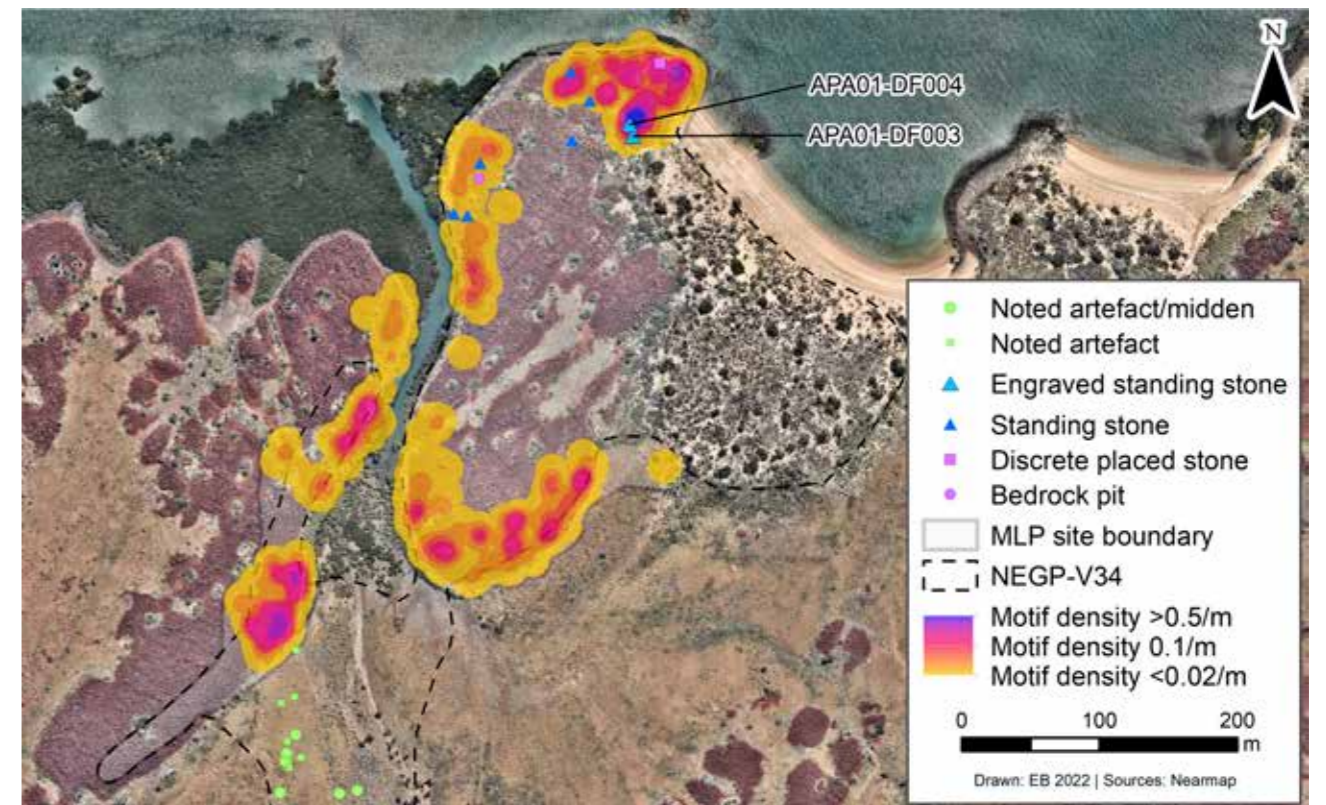


Figure 14.19. Northern sample showing distribution of stone structures.

The majority (80%) of recorded structures are standing stones, with a discrete placed stone interpreted as a fallen standing stone. Upright placed stones are

thought to be created for a range of social and symbolic functions, from personal memorialisation and transmitting messages constrained to a group, to socially

encoded ritualistic behaviour. Two engraved standing stones were identified in the assemblage (APA01-DF003 and APA01-DF004; see Figure 14.19). Engraved standing stones are relatively rare, and it has been hypothesised they likely mark places of symbolic or ritual function, such as Thalu sites (Beckett 2021: 229). These structures are clearly visible from various vantage points, silhouetted against the sky, and their pecked high-contrast engravings are clearly visible to anyone passing.

This suggests that these structures are constructed to draw the eye, transmitting additional information than is possible by engravings and/or standing stones alone.

A single bedrock pit was recorded: a 2 m deep natural crevice associated with anthropogenically moved stones. This structure is deep and narrow and is a comfortable place to sit. It may have been the by-product of resource extraction (Beckett 2021: 306) or perhaps was some form of hunting hide or other concealment.

STRUCTURE TYPE	COUNT	%
Standing stone	8	80.0
Discrete placed – horizontal	1	10.0
Bedrock pit	1	10.0
<i>Total</i>	<i>10</i>	<i>100.0</i>

Table 14.10. Northern sample stone structures.



Figure 14.20. Standing stones recorded in the Ancient Pool Northern sample area: (a) looking south to APA01-DF003 with enclosing arc motifs in foreground; (b) looking north-west to APA01-DF003 with petroglyphs on rock surface below; and (c) view looking westwards showing APA01-DF004 with geometric motif on the standing stone face.

Ancient Pool Southern sample (Areas 3, 4 and 6)

Survey of the southern end of the original NEGP-V34 site targeted three specific sample transects to provide an understanding of the overwhelming density of rock art in this area (see Figure 14.5, Figure 14.21 and Figure 14.23). Area 3 was a narrow transect 35 m wide on the lower-mid slopes of the eastern side of the interior valley, south of

the open plain behind the modern beach where the main creek line deviates around along the western side to the main pool. Area 4 was 250 m south of Area 3; a 25 m-wide transect on the western side of this same interior valley, still north of the main Ancient Pool. Area 6 was located in the interior eastern slope directly south of the main

rock hole, again on the western side of the interior valley. Transects 4 and 6 were positioned to include all topographic landforms between the creek's vegetated base and the watershed at the top of the ridgeline. From the main pool and upstream of this, the main drainage

line is in the interior valley: a dolerite dyke creating the break in slope that forms both the pool and the deviation of the main creek line out of this valley and to the west (Prof. Janet Hergt, pers. comm. to Jo McDonald 2022).



Figure 14.21. Landscape views of the Southern sample area zones: (a) looking south-west up the valley from above Area 3 towards Area 4, with Area 6 in the distance; (b) looking north-west at rock slope of Area 4; (c) view north-west to main rock hole and Area 6; and (d) view looking east at rock slope of Area 3.

SAMPLE AREA	MOTIF CQUNT.	SIZE (HA)	MOTIFS/HA
Area 3	313	0.1	2,854.2
Area 4	367	0.1	2,463.6
Area 6	616	0.3	2,332.3

Table 14.11. Size of Southern areas surveyed, and density of motifs recorded.

Within this wider base of the interior valley there is a large midden and occupation site on the higher ground to the south-east of the waterhole (Figure 14.24). We had initially intended to undertake test excavations in this landscape, but time precluded this investigation. As a result of our recording exercise there are two engravings sites recorded in this location (see Table 14.2). The larger of the two (MLP-AP003) uses a reduced version of the original boundaries of site NEGP-V34 and incorpo-

rates sample Areas 3, 4 and 6. A total of 1,132 panels and 1,272 motifs were recorded in this Southern assemblage. Within this landscape, our sample covered roughly 8% of the available engraved surfaces in this interior valley. The engraving assemblage in this interior valley is projected to be more than 20,000 motifs associated with the main waterhole.



Figure 14.22. Midden adjacent to Ancient Pool: (a) helicopter view looking west over midden; (b) looking south over midden; (c) ground-level view south-west; and (d) view looking north-east towards midden from the waterhole.

Site MLP-AP004 was defined based on the extent of engravings that were noted but not systematically recorded (Figure 14.5). A single archaic face motif was recorded in detail here. This is located outside the area of previously documented /well known motifs (Bednarik 2002b; Donaldson 2009; Mulvaney 2010), within the valley running north-east of the Ancient Pool waterhole. The Site MLP-AP004 area was surveyed on a rainy day

when the electronic equipment could not be deployed, and so the slopes around this motif have not been systematically documented. This site is outside the original NEGP-V34 boundaries but covers NEGP-W24, a small site on the northern end of the outcrop containing engravings, grinding and multiple stone pits (NEGP-W24 Site Recording Form, 1992). This area has high potential for future research.

Southern sample rock art characteristics

Subject and class

Different proportions of overall motif classes were encountered in this Southern sample, compared to the Northern assemblage (cf. Table 14.4 with Table 4.12). Over 40% of this assemblage is geometric, a much higher proportion than found in the Northern sample. Anthropomorphic motifs contribute the next largest proportion (c. 25%) to this assemblage; a slighter lower proportion than found in the Northern assemblage. There are fewer zoomorphic motifs in this assemblage (c. 20%) but double the proportion of tracks (11.6%) here. The 'Other' class comprises 24 grinding patches and one graffiti element. Situated above the rock pool is the scratched initials MAI (Figure 14.23). The 24 grinding patches in this sample are in Area 6, proximal to the rock hole. Further evidence for the more intensive domestic focus around the waterhole is a widespread

midden with flaked stone amongst which several grindstones were observed.

CLASS	TOTAL	%F	DEPICTIVE	%F
Anthropomorphic	328	25.3	328	25.8
Geometric	538	41.5	538	42.3
Other	25	1.9		
Tracks	150	11.6	150	11.8
Zoomorphic	256	19.7	256	20.1
Total	1,297	100.0	1,272	100

Table 14.12. Ancient Pool Southern sample areas: class proportions.



Figure 14.23. On the south side and above the Ancient Pool, Jo McDonald is near the graffitied initials MAI.

Ovals, linear and arc motifs are the most common geometrics in this sample (Figure 14.24). Again, there is a lot of variability in the 123 oval motifs, but this is different to that seen in the Northern sample. Here, more are regular (n = 29) compared to irregular (n = 14); several are tapered (n = 15) or with a tang (n = 13). Barred ovals are also present (n = 7), one of which is also tapered. Many of the arcs (n = 20) are enclosing, and there are even more (n = 17) concentric arc motifs than found in the Northern sample (Figure 14.26h-i). Again, the linear category is quite diverse, with single lines (n = 25) being the most numerous, followed closely by meandering lines (n = 22). There is one example in Area 4 where these single lines have been created across numerous adjacent blocks creating a continuous linear pattern across the slope (Figure 14.25). There are again, as in the Northern sample, many (n = 16) older complex geometric motifs amongst this assemblage (Figure 14.26 and Table 14.13).

SUBJECT	COUNT	%	SUBJECT	COUNT	%
<i>Anthropomorphic</i>			<i>Tracks</i>		
Combination figure	10	0.8	Bird track	71	5.6
Decorative infill figure	6	0.5	Human foot	6	0.5
Face (archaic)	6	0.5	Human hand	5	0.4
Linear figure	200	15.7	Macropod track	55	4.3
Outline figure	9	0.7	Other track	8	0.6
Profile figure	24	1.9	Turtle trail	5	0.4
Solid figure	73	5.7	Zoomorphic		
<i>Geometric</i>			<i>Animal part</i>		
Angular	32	2.5	Bird	32	2.5
Arc	94	7.4	Dugong	1	0.1
Circular	45	3.5	Fish	29	2.3
Complex	16	1.3	Lizard	14	1.1
Curvilinear	13	1.0	Macropod	60	4.7
Dot	76	6.0	Marine other	8	0.6
Dot and line	4	0.3	Quadruped	17	1.3
Dumb-bell	1	0.1	Snake	4	0.3
Linear	82	6.4	Stingray	1	0.1
Material culture	27	2.1	Terrestrial other	7	0.6
Oval	123	9.7	Turtle	73	5.7
Phytomorph	6	0.5			
Rayed	19	1.5			
				<i>Total</i>	<i>1,272 100.0</i>

Table 14.13. Ancient Pool Southern sample areas: subject proportions for identifiable motifs.

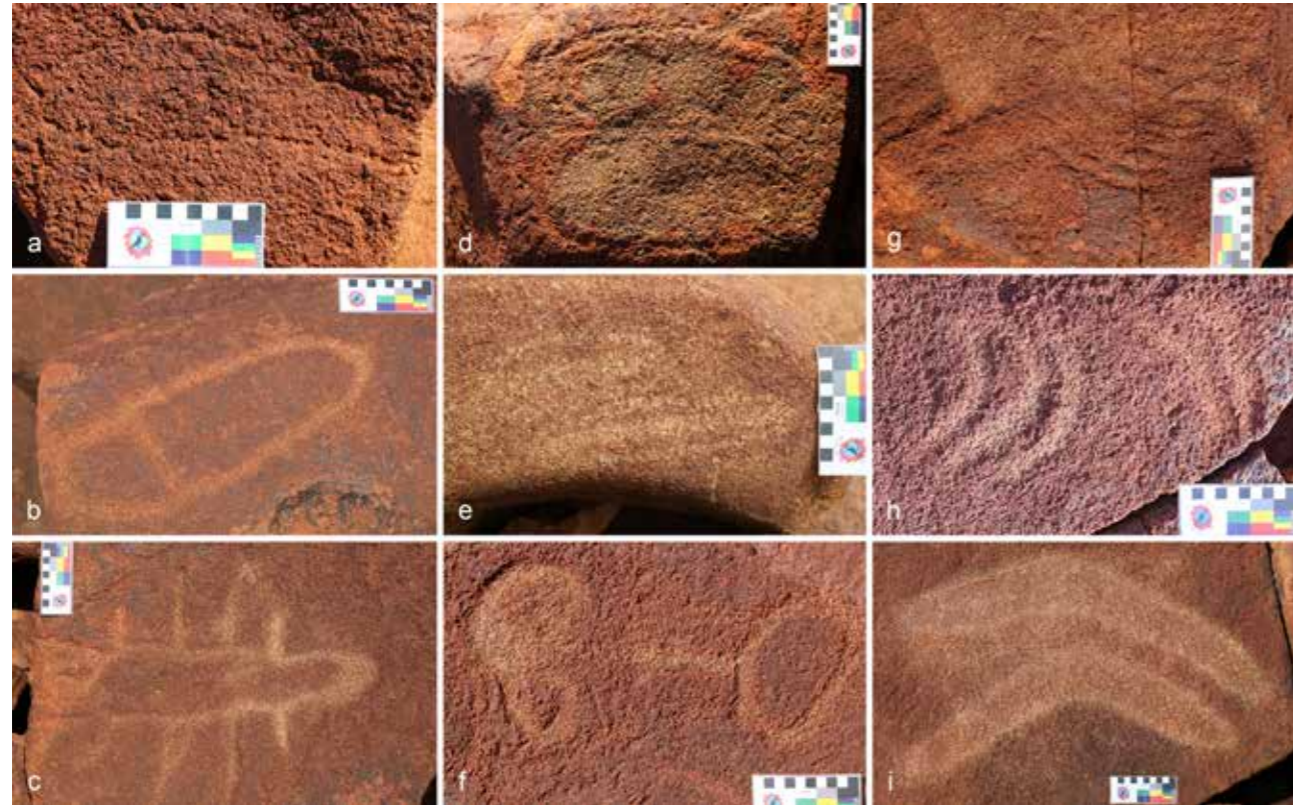


Figure 14.24. Ancient Pool Southern sample geometric motifs: (a) tapered oval; (b) bisected (bar) oval; (c) oval with tangs; (d) oval pair; bisected ovals (possible turtle track); (e)€ oval pair; (f) dumb-bell; (g-h) arc sets; and (i) material item, boomerang pair.



Figure 14.26. Ancient Pool Southern sample complex geometric motifs which mostly fill the entire panel: (a-c) dot cluster; (d-f) dot-line complex geometric; (g-h) complex linear geometric; and (i) complex linear geometric with dot cluster superimposed.

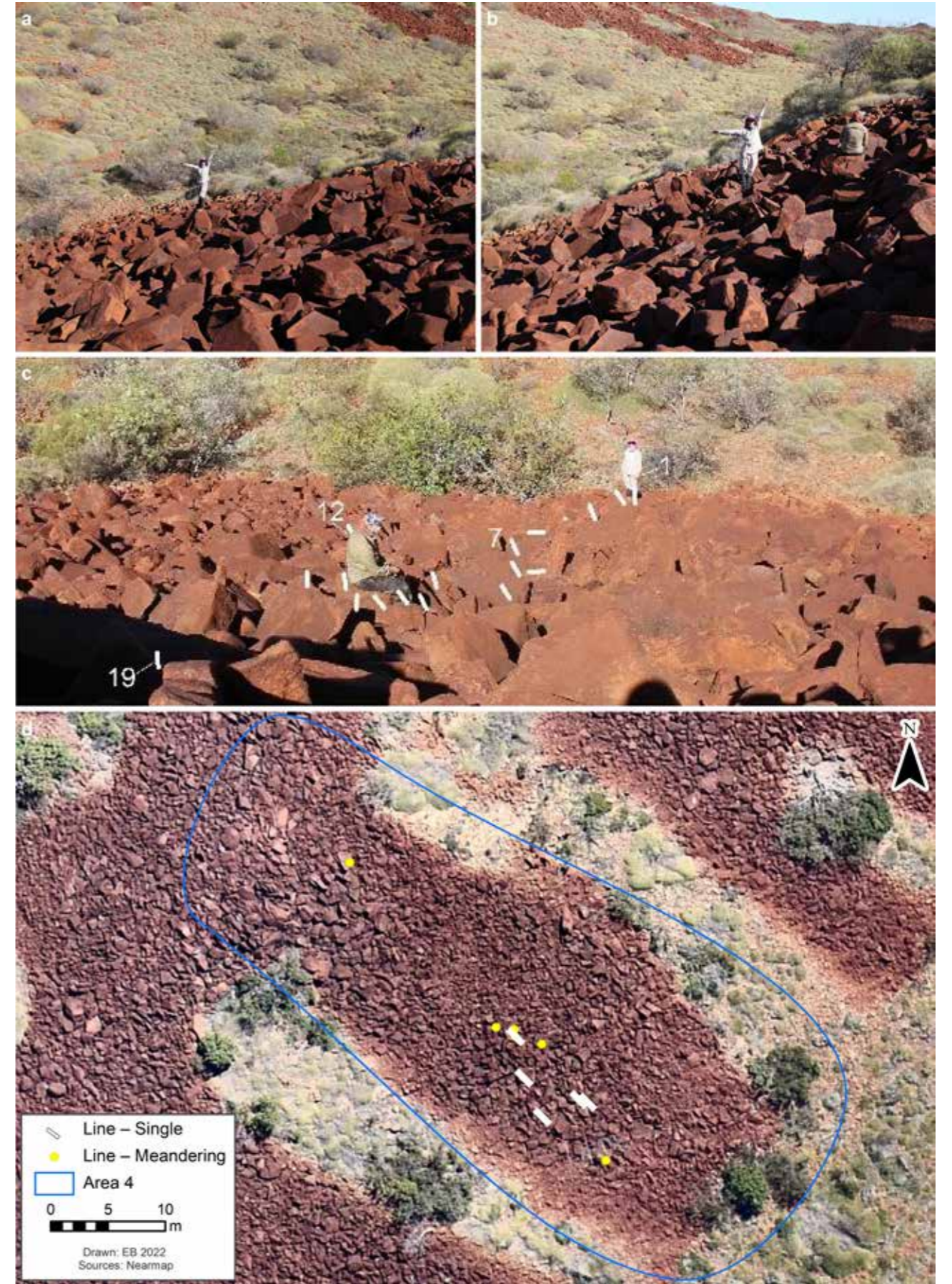


Figure 14.25. Ancient Pool Southern sample Area 4 with multiple line motif arrangement showing a and b) Victoria Wade showing the location and direction of the c and d) lines and meandering lines which transcends multiple panels at different elevations.

Human figures again dominate the figurative motifs in this sample (Table 14.13 and Figure 14.27). While the vast majority of these (n = 200) are linear figures, there are also many other characteristic Murujuga varieties which have been created in this landscape. There are many profile figures (n = 24), including four with dotheads; one of which is a group hanging below a line.

Linear figures, as well as being most numerous (n = 200), reveal the most variability, in size range and style characteristics. Many are the small schematic non-gendered 'stick figures' (n = 25), or those where the body line continues and indicates male gender (n = 49), but there is also a huge array of attributes here – with groups, associated material culture, headdress variability, elongated and grouped varieties (many forms

of coitus), and exaggerated heads and/or genitalia. Outline figures are less common than in the Northern sample, and these are mostly relatively small and non-gendered (one male).

There are only six decorative infill figures in this sample, three of which are male and one of which is a non-gendered group: all within Area 3. In contrast to the Northern sample, only one of the archaic faces in this assemblage has a body – and this is more like that of a fish than a human figure. Extreme stylistic variability in this motif type also occurs here.

There are only three disarticulated dot-headed figures in the Southern assemblage. These early-style figures are all non-gendered: two are in hanging groups, the other a single figure in profile.



Figure 14.29. Ancient Pool Southern sample macropod motifs: (a-c) hunting depictions; and (d-i) less anatomically-correct macropod images in a range of postures.

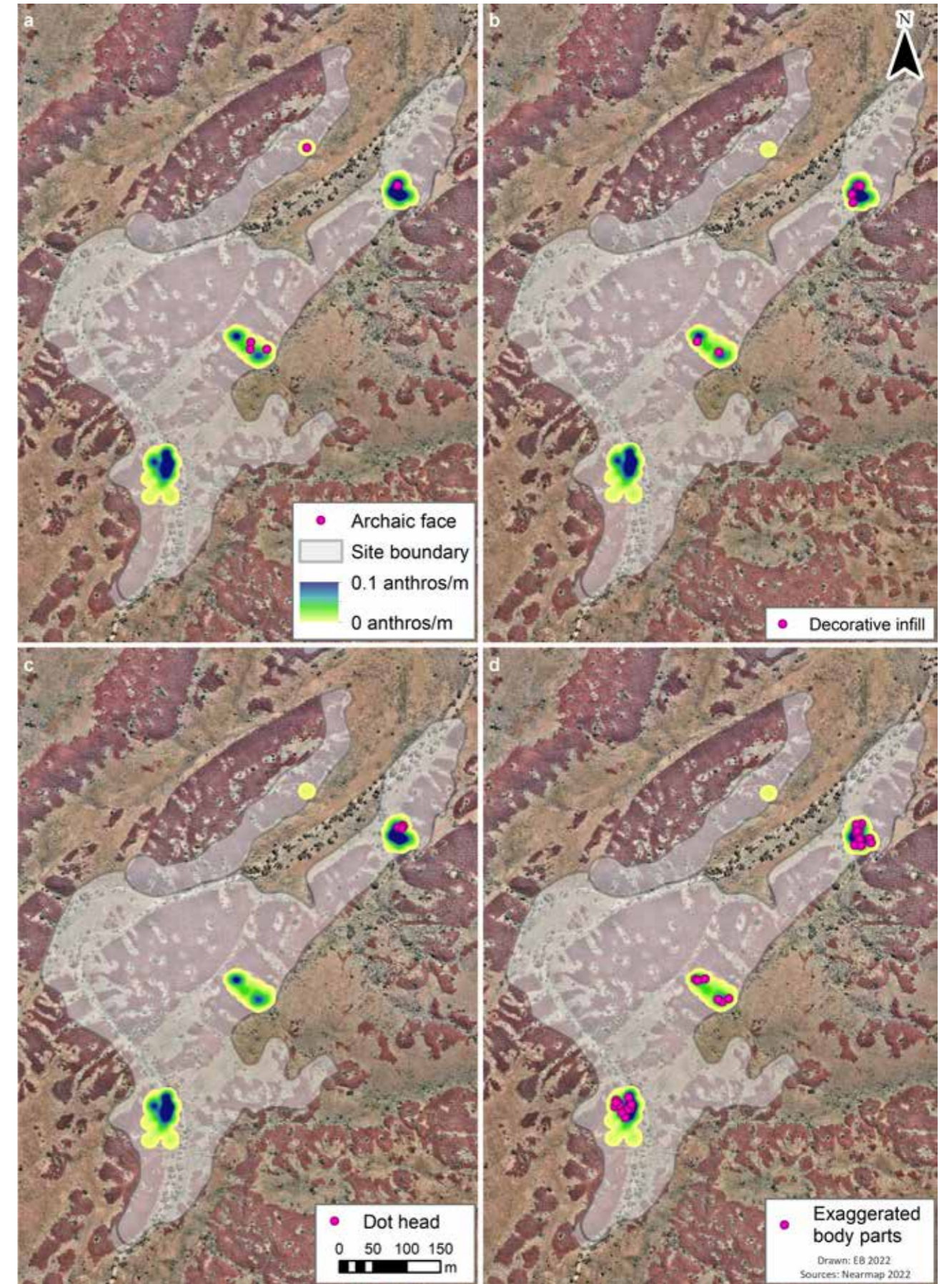


Figure 14.27 Ancient Pool Southern sample distribution of all human figures in the recorded areas showing location of (a) archaic faces; (b) decorative infill; (c) dot heads; and (d) exaggerated body parts.

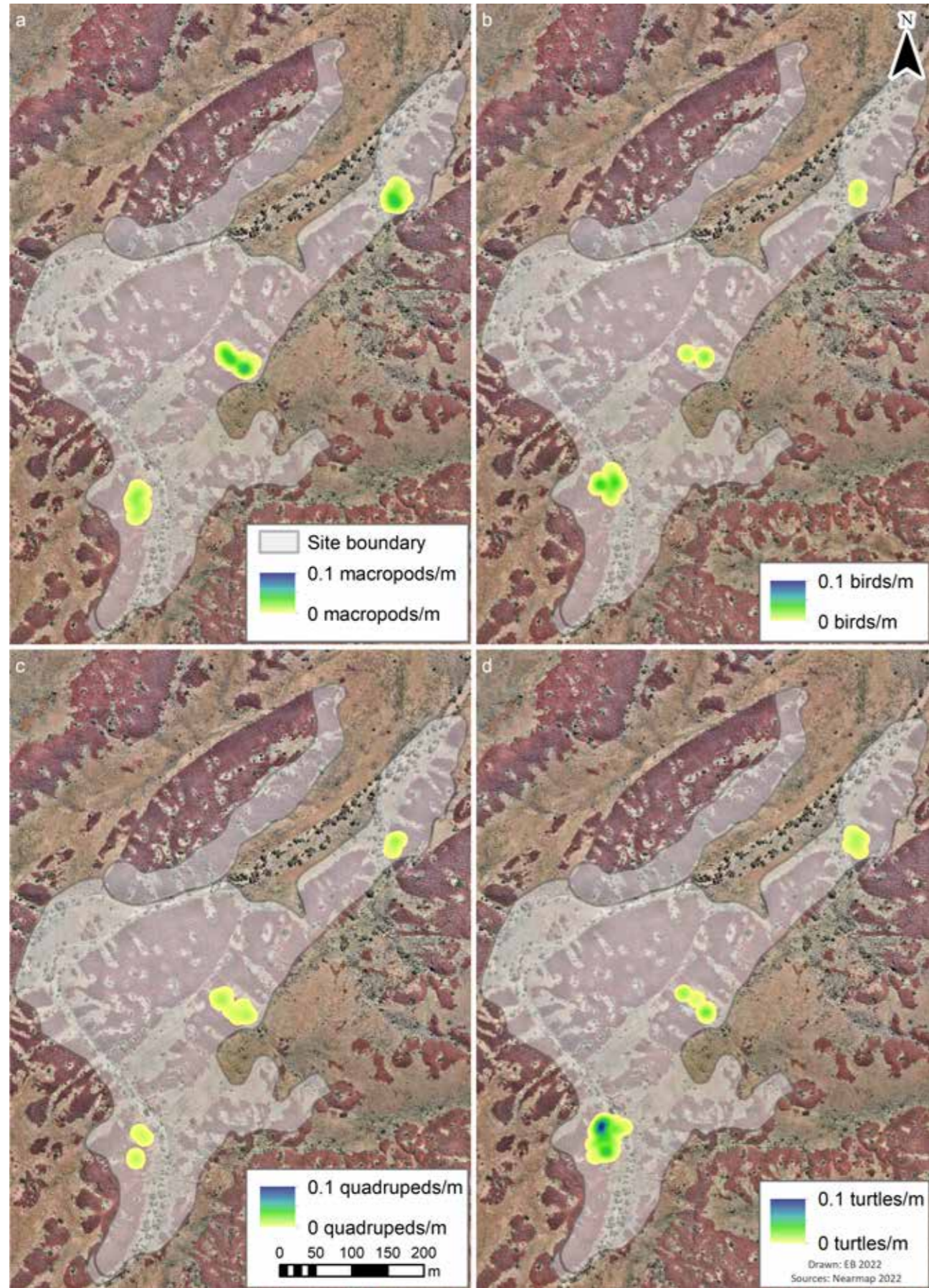


Figure 14.28. Ancient Pool Southern sample showing density distribution of zoomorphic motifs: (a) macropods; (b) birds; (c) quadrupeds; and (d) turtles.

While turtles and macropods dominate the zoomorphs, there is a lot of variability in terrestrial and marine themes (Table 14.13 and Figure 14.28). Of the 60 macropods in this Southern sample, four are shown as in hunting scenes, with spears or a line (Figure 14.29 a, b) and one possible boomerang depiction (Figure 14.29c). Fourteen macropod images are stylised, some with anatomically detailed features such as feet and macropodal

bulges (Figure 14.29 b, h, i). Quadrupeds here include five echidnas, these in a variety of characteristic schemas. There are 73 turtles in this assemblage, one of which is a freshwater species and 35 of which have carapace designs (Figure 14.30a–c). Five of these are shown mating and there are six hunting scenes (with spear, track and/or line).

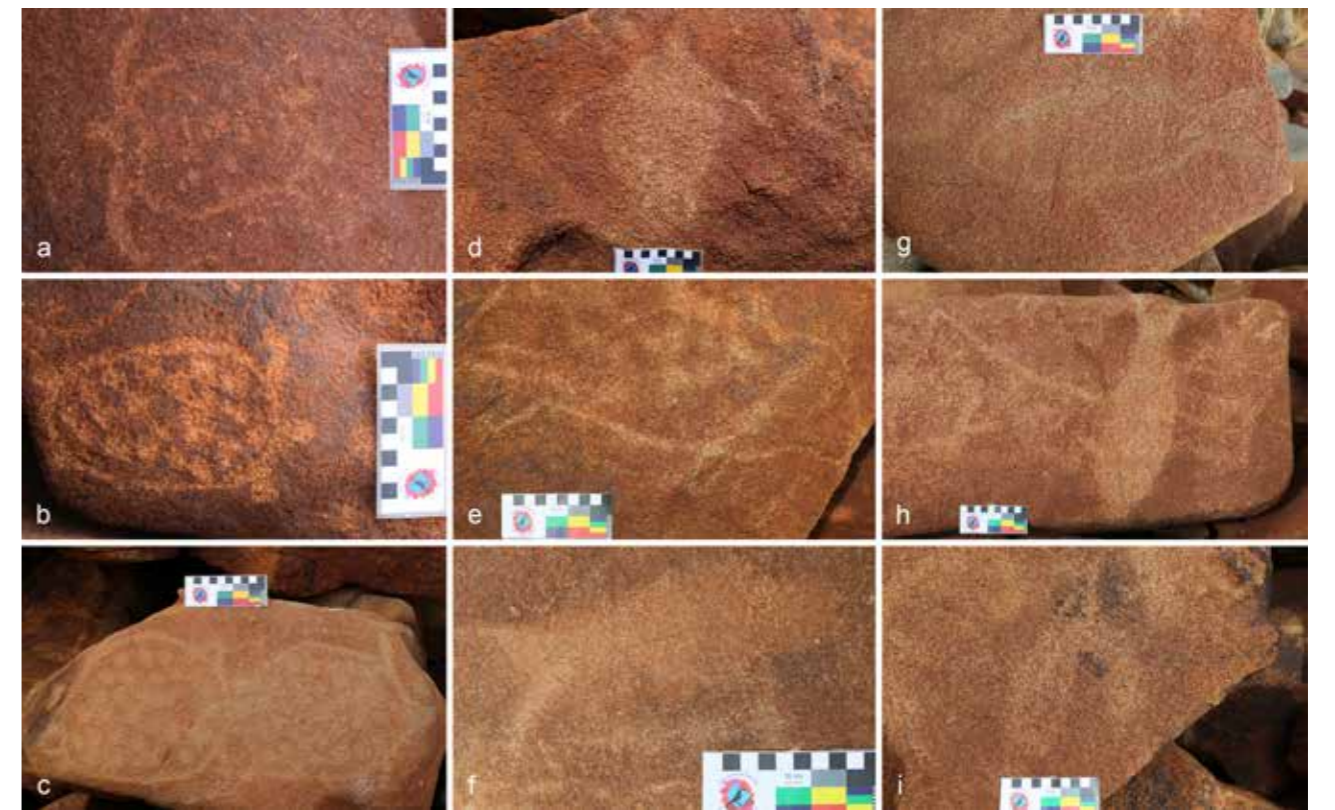


Figure 14.30. Ancient Pool Southern sample marine fauna motifs: (a–c) dot design carapace; (d) turtle with solid/infill carapace; (e) outline fish; (f) infill pecked fish; (g–h) fish with 'spear'; and (i) stingray liver motif.

Birds are an important component (n = 32) and these include two pelicans, wading birds (Figure 14.31a–d), and four which are shown with outspread wings. Animal parts include marine tails (n = 6) and livers (n = 3).

Tracks are dominated by bird and macropod tracks with significantly few human tracks. Bird tracks (n = 71) are mostly three-toed varieties (n = 53) including those found in pairs and trails (Figure 14.31). Fifty-five

macropod tracks were found in this assemblage, in a variety of styles and contrast states and configurations: including in pairs (n = 6) and in trails (n = 9). There are a number (n = 5) of tripedal (two feet + tail) and one pentapedal tracks (both feet, hands and tail) here. Only a small number of turtle trails were recorded here (n = 5), only two of these associated with a turtle.

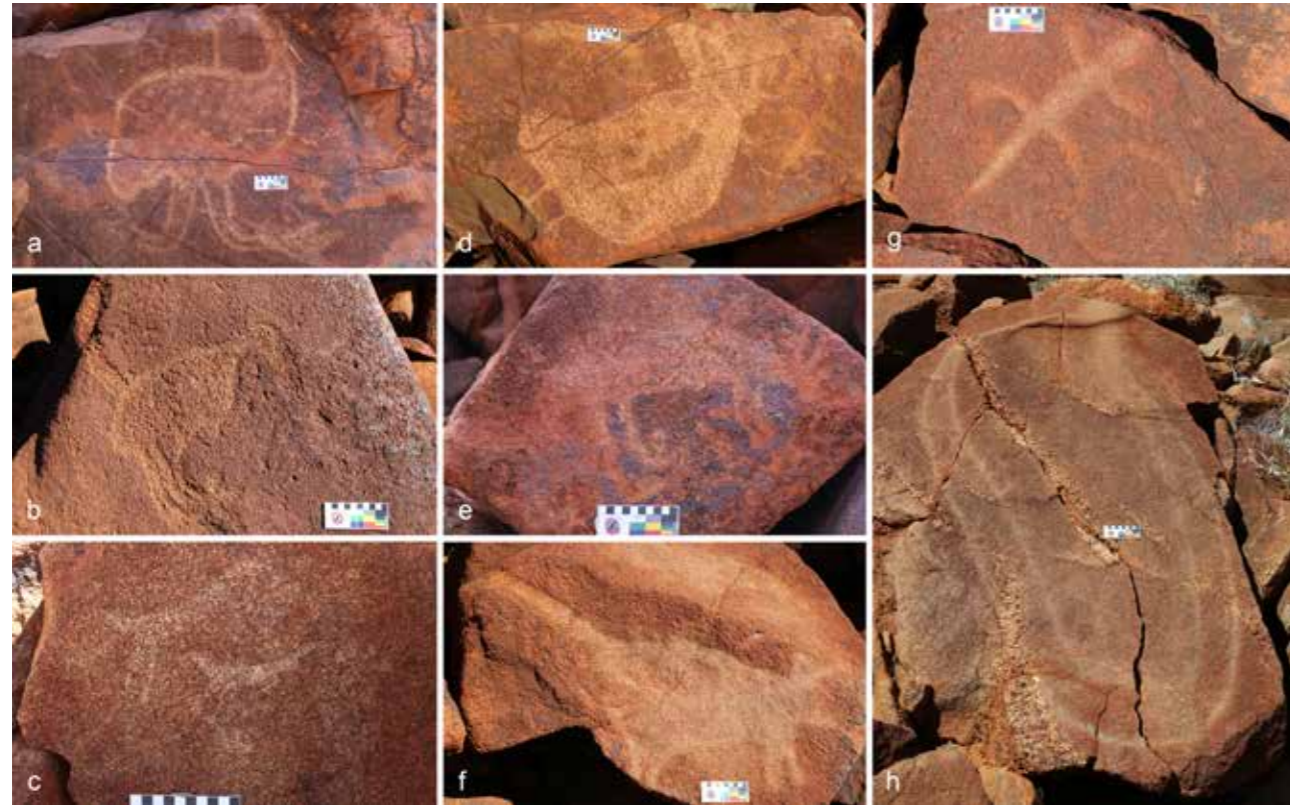


Figure 14.31. Ancient Pool Southern sample bird motifs: (a) 'emu'; (b) bird with possible boomerangs; (c) wading bird pair; (d) pelican; (e-f) quadrupeds; (g) lizard motif; and (h) large snake (olive python) depicted on rock above waterhole.

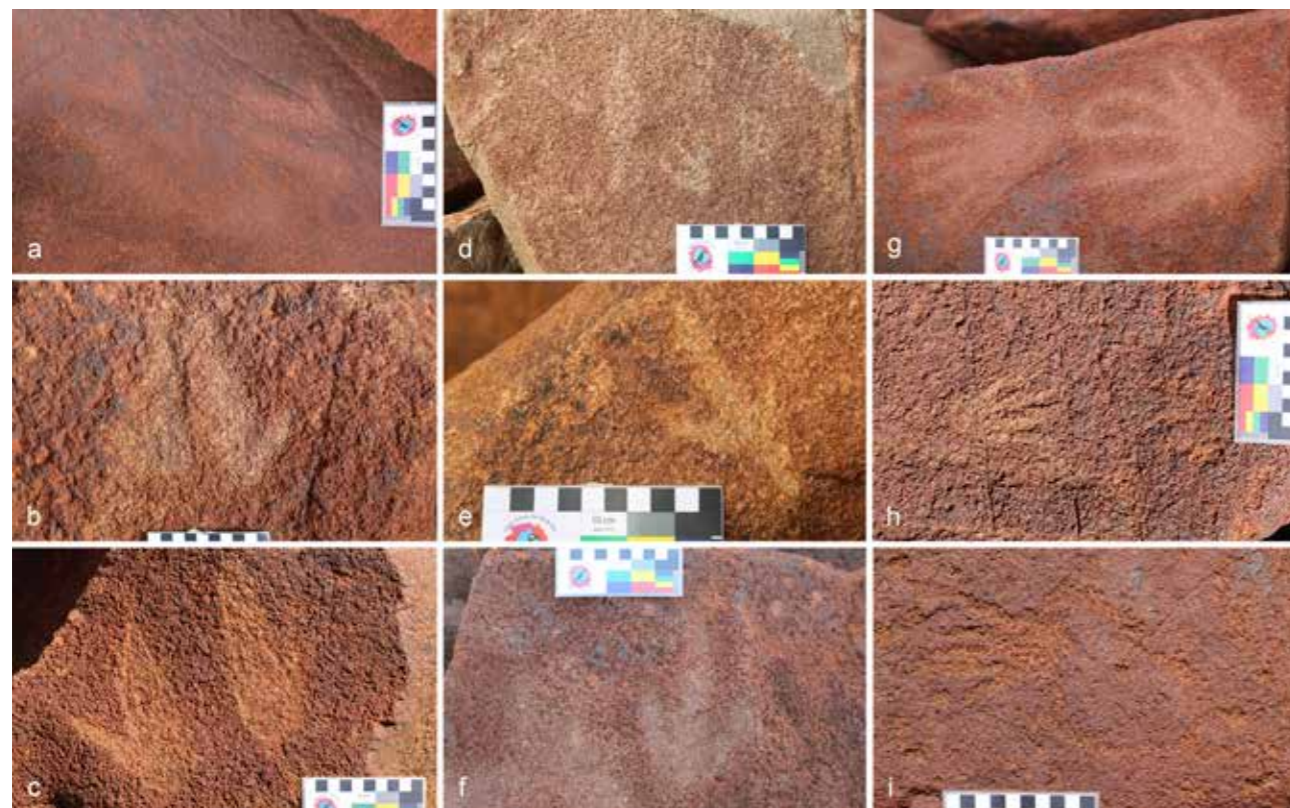


Figure 14.32. Ancient Pool Southern sample track motifs: (a-c) macropod; (d-f) bird; and (g-i) category other, possibly lizard.

Form

The most common motif form for Ancient Pool Southern petroglyphs is linear (c. 34%) followed by solid forms (23%). Outline, linear and solid combinations make up the remainder of the recorded motifs (Table 14.14). Across this assemblage, 75 motifs (6%) have patterned

infill, this mostly the result of different carapace patterns found in the dominant turtle motifs, but also the large number of complex geometric motifs (see Figure 14.26 and Figure 14.29).

FORM	COUNT	%
Linear	444	34.2
Solid	294	22.7
Linear; solid	179	13.8
Outline	170	13.1
Linear; outline	71	5.5
Outline; solid	32	2.5
Linear; outline; pattern	23	1.8
Outline; pattern	22	1.7
Linear; outline; solid	15	1.2
Pattern	15	1.2
Outline; pattern; solid	6	0.5
Linear; pattern	5	0.4
Scattered marks	5	0.4
Linear; outline; pattern; solid	4	0.3
Linear; scattered marks	4	0.3
Outline; scattered marks	3	0.2
Other combinations (i.e. with <3 examples)	5	0.4
Total	1,297	100

Table 14.14. Ancient Pool Southern assemblage sample areas: motif form.

Technique

The dominant technique in these sample areas is pecking (75.7%) followed by motifs with a combination of abraded and pecked (14.5%), then abraded motifs (8.9%). All other techniques are relatively minor contributions to

the graphic variability here. The rough-textured gabbro geology here means that incised or scratched images are rare.

TECHNIQUE	COUNT	%
Pecked	982	75.7
Pecked + abraded	188	14.5
Abraded	115	8.9
Pounded	5	0.4
Incised	3	0.2
Pecked; pounded	2	0.2
Scratched	2	0.2
Total	1297	100

Table 14.15. Ancient Pool Southern sample areas: techniques used.

Size

Over half (59%) of this assemblage is smaller than 30 cm in size, with another 31% between 30 cm and 60 cm in maximum length (Table 14.16). Only 24 motifs in this sample are larger than 100 cm in size; and only a single motif is larger than 200 cm. This largest petroglyph is of a probable macropod superimposed by several other images, including a large freshwater turtle. The generally smaller motif size range compared to that found in the

Northern sample in part is likely due to the much smaller canvas sizes available in the interior valley slopes: although the geology is of the same basal geochemistry, it has been subject to greater fracturing, resulting in much smaller block sizes. Where larger individual blocks are found in these upper reaches of the creek line, larger motifs are produced.

SIZE RANGE	COUNT	%	SIZE RANGE	COUNT	%
1-10	110	8.6	91-100	19	1.5
11-20	372	29.3	101-110	8	0.6
21-30	265	20.8	111-120	6	0.5
31-40	220	17.3	131-140	4	0.3
41-50	111	8.7	141-150	2	0.2
51-60	64	5.0	151-160	1	0.1
61-70	39	3.1	161-170	1	0.1
71-80	30	2.4	181-190	1	0.1
81-90	18	1.4	211-220	1	0.1
<i>Total</i>			<i>1,272</i>		<i>100</i>

Table 14.16. Ancient Pool Southern sample areas: size ranges (cm) of the motif assemblage (excluding 'other' marks).

Age indicators

In a marked divergence to the Northern sample area, the Southern sample has a higher percentage of petroglyphs in the higher contrast ranges. Most (c. 43%) of the motif assemblage is in contrast state 4 (CS4) and the second-highest colouration state is CS3 (c. 29%). There are very few motifs (c. 5%) in the most recent

patination phase CS5; less than is found in the earliest (CS1) weathering condition (Table 14.17). Many of these are near the main rock hole and associated with the ridge running north-east from this water source. Those petroglyphs in the lower contrast range include the elaborate geometric designs and the archaic faces.

CONTRAST STATE	COUNT	%
CS1	75	5.9
CS2	229	18.0
CS3	364	28.6
CS4	545	42.8
CS5	59	4.6
<i>Total</i>	<i>1,272</i>	<i>100</i>

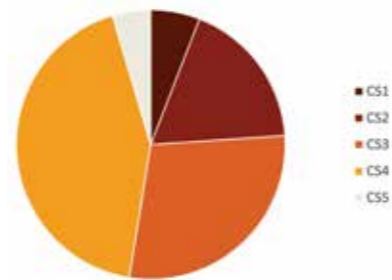


Table 14.17. Ancient Pool Southern sample areas: contrast state of the motif assemblage (excluding 'other' marks).

Southern sample stone structures

While stone structures were not a target of this recording program, two structures were recorded (Table 14.18 and Figure 14.33). These structures are bedrock pits found within the survey area MLP-AP004. A third bedrock pit was also noted on the southern end of this site but was not recorded. Unusually, surfaces within one of the bedrock pits (APA04-EF001) were engraved with three motifs: a macropod and macropod tracks (Figure 14.34a). This may indicate that this bedrock pit was at

least partially created as a by-product of the engravings. Another six bedrock pits were noted within the boundaries of MLP-AP004: two of these were recorded as part of NEGP-W24 as having "classic circular form ... [and with] evidence of stacking and displacement" (NEGP-W24 Site Recording Form, 1992). Further examination and recording is needed to better understand these structures.

STRUCTURE TYPE	COUNT	%
Bedrock pit	2	100.0
<i>Total</i>	<i>2</i>	<i>100.0</i>

Table 14.18. Ancient Pool Southern sample stone structures.

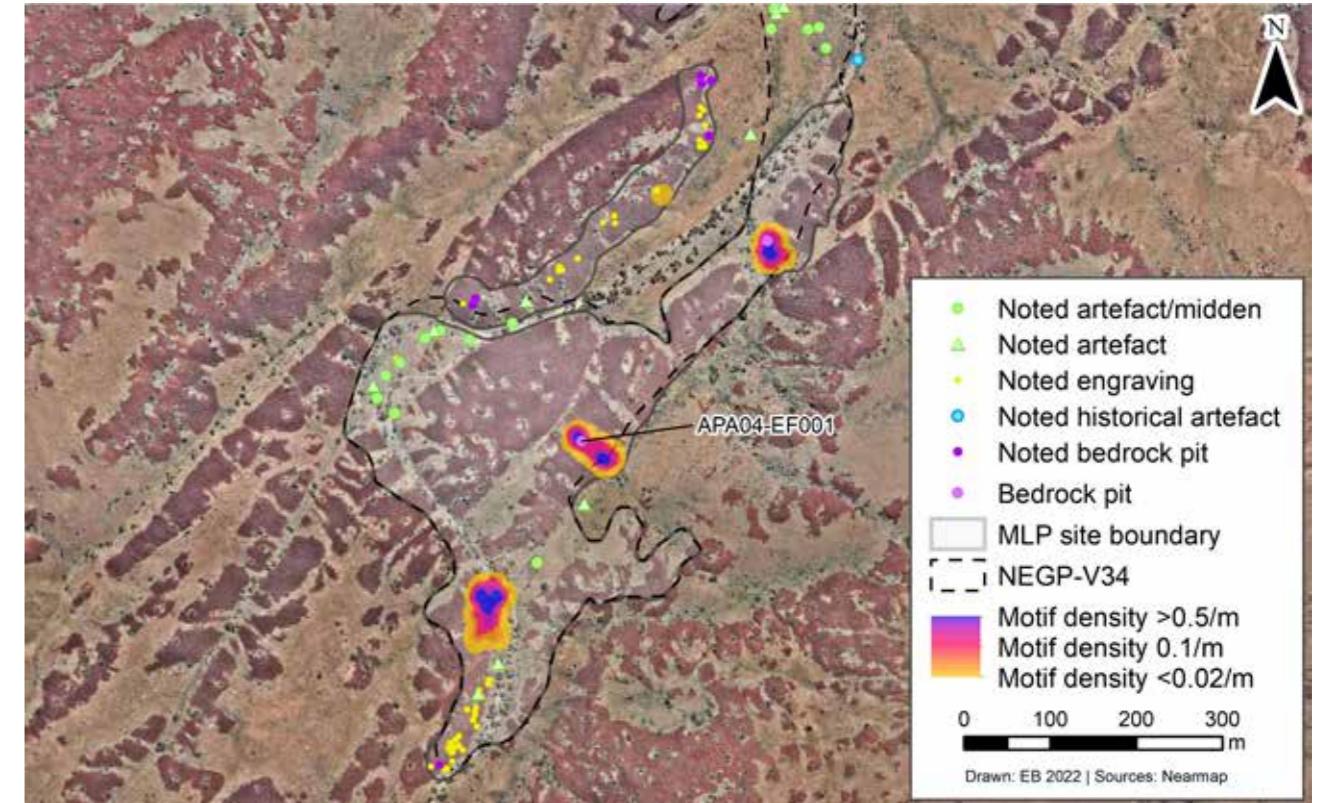


Figure 14.33. Ancient Pool Southern sample showing distribution of stone structures.



Figure 14.34 Ancient Pool Southern sample bedrock pits: (a) APA04-2016-EF001 with macropod image on wall block; and (b) APA03-2016-DF001.

Discussion of significant values in the Ancient Pool cultural landscape

The recording work in this northern Burrup site complex confirms previous evidence of the outstanding cultural and scientific values of this location. Many tens of thousands of petroglyphs occur near this north-eastern end of Burrup Peninsula covering c. 45 hectares.

Technique and form

Pecking is the dominant technique used to produce rock art on the exposed and fractured gabbro geology here, and there is a high proportion of combination use of

Site and motif density

Almost 2,800 motifs were recorded across eight sample areas in a transect between Searipple Passage (in the north) to just south of the large rock hole now known as Ancient Pool. Northern assemblage data was collected from an area of 2.68 ha, while the Southern sample

These five Northern sample areas include 1,471 systematically recorded petroglyphs along with four isolated, but significant, other petroglyphs. The three sample areas within the Southern zone added a further 1,271 and an isolated archaic face motif to the database.

pecking and abrasion. The combination of techniques resulting in many intaglio / bas relief forms across this sampled landscape.

was recorded within an area of 0.52 ha. These rock art assemblages are of a comparative similar sample size, but motif density is almost five times higher in the interior valley adjacent to and within 200 m of the semi-permanent water feature (Table 14.19).

SAMPLE	SIZE (HA)	MOTIF COUNT	MOTIFS/HA
North	2.68	1,480	550.6
South	0.52	1,272	2,446.2

Table 14.19. Density of motifs recorded in the two Ancient Pool landscapes.

Rock art was found in a range of densities across the eight sample areas, with the motif density being highest in the interior valley (Figure 14.35). Densities over 2,000 motifs/ha are amongst the highest recorded across the archipelago but are comparable to other Burrup site

complexes associated with semi-permanent waterholes (see, for comparison, the Deep Gorge site complex (McDonald 2009a); Gumtree Valley and Skew Valley (Lorblanchet 2018b); and Happy Valley (Clayton 2015)).

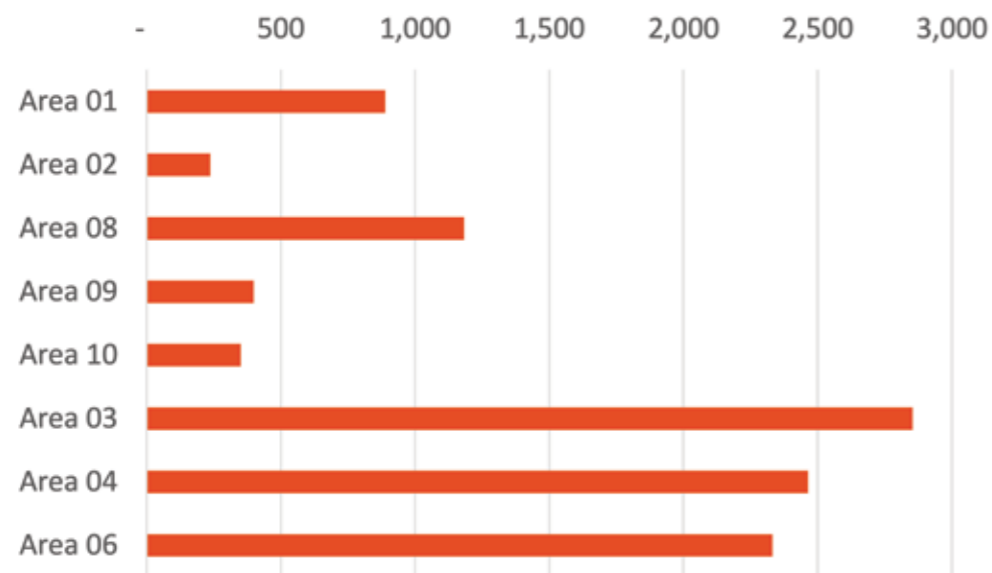


Figure 14.35. Densities of art production (motifs per hectare) in sample areas ordered from the Searipple coastline to interior water source.

Motif class choice

Most of the engraved rock art across this northern Burrup landscape is geometric (38%) and is on par with the general pattern across the archipelago (McDonald and Veth 2009; Mulvaney 2010). Across this northern zone there is more variability with proportions of tracks, human figures and different animal forms in each of the different sampled areas (Figure 14.14.36). Grinding patches are

only found immediately adjacent to the waterhole or close to the beach. This more functional use of rock surface is associated with and in proximity to other forms of occupation evidence, the waterhole and middens. Human figures are more prevalent than geometric motifs in Areas 2, 8 and 10. Area 10 also has a dominance of zoomorphic subjects over geometric motifs.

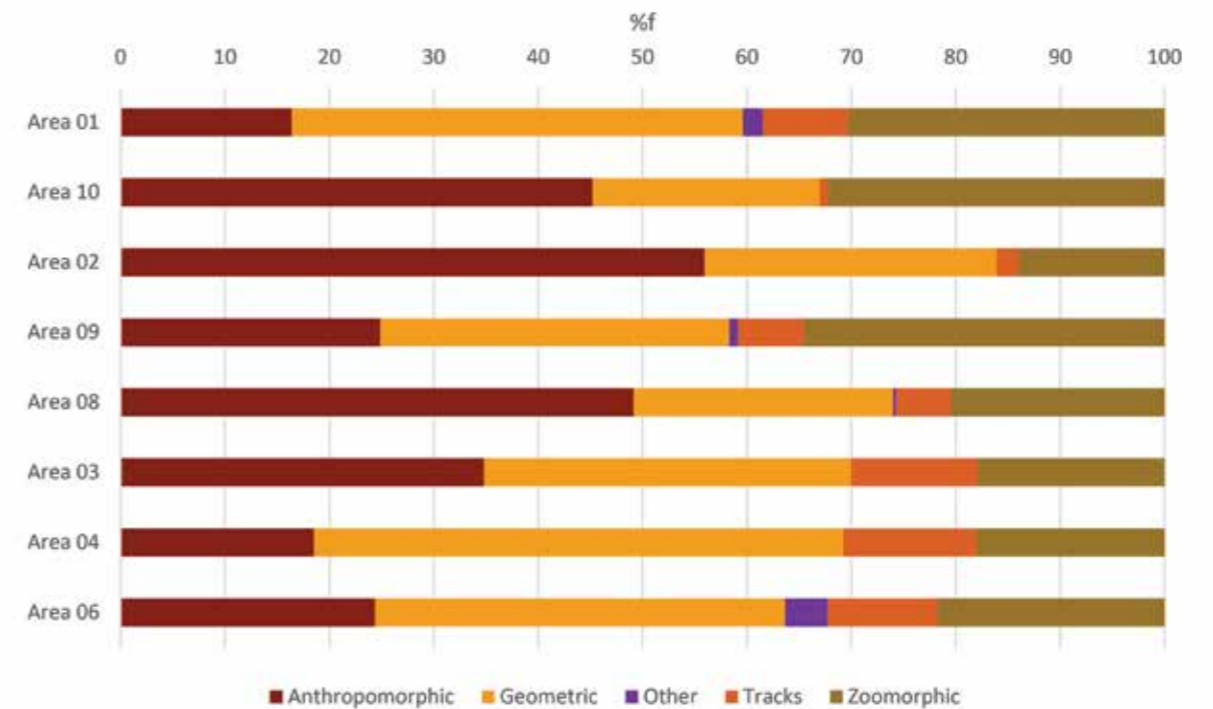


Figure 14.36. Ancient Pool sample areas comparing subject foci in all assemblages, arranged from coast (top) to inland pool (bottom).

Turtle images dominate the zoomorphic class in Areas 1, 2 and 6, while macropods are dominant in Areas 3, 4, 8, 9 and 10 (Figure 14.14.37). Marine themes are more numerous than terrestrial ones on the coastal margins (Areas 1 and 2) and immediately south of the permanent pool (Area 6),

while macropods and other terrestrial subjects are more prevalent in most interior samples and adjacent to the mangrove-lined creek. This spatial patterning demonstrates shifting foci through time and is further demonstration of the deep time art production in this landscape.

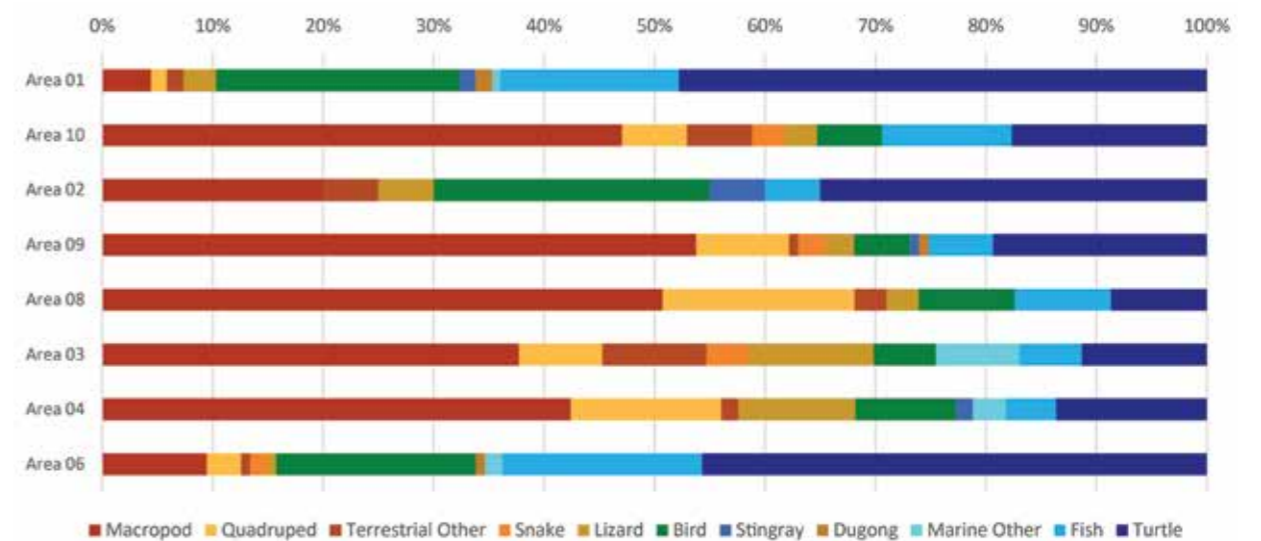


Figure 14.37. Zoomorphic proportions in the eight sample areas (ordered north-south) showing preferences for terrestrial vs maritime themes.

Early human forms

Archaic faces, decorative infill humans and disarticulated dot-head human figures are associated with the earlier artistic phase of Murujuga (see Mulvaney 2010). These stylistic forms are numerous here, validating the notion that there was an early epicentre of art production here at the northern Burrup (Figure 14.14.38). We propose that there is a palaeo-drainage and potable water feature here which was a focus drawing people to the location for this early rock art production.

Mulvaney's definition of decorative infilled anthropomorphs emphasised the cigar-shaped body and diminutive limbs and the association found with many of an axe-like or hooked boomerang shape (Mulvaney 2010: 277). This is a more restricted graphic definition than was used in the National Heritage listing analysis (McDonald and Veth 2006: 89). Berry's analysis of decorative infill figures (DIF), including 97 motifs from 26 sites around Murujuga, and this was even more expansive in characterisation. Her analysis revealed the highest known focus of DIF in Emu Face Valley (n = 13), 17 km to the south-east of Ancient Pool, with multiple other known locations across the Burrup Peninsula, the Northern and the Inner islands (Berry 2018: 193; Figure 8.22). The 48 DIF motifs in Ancient Pool makes this an extraordinary focus of this early style, albeit spread along a kilometre, noting that the Emu Face concentration is within a 200 m length of creekline.

Berry's analysis of another of the early graphic forms, the dot-head figures (DHF), involved 102 scenes (from 21 sites on the Burrup) involving 575 individual figures (Berry 2018: Figure 8.37). Berry found that these DHF compositions included between two and 18 individual human figures (Berry 2018: 213–217) and that they included a wide range of different body and head shapes. No climbing figure compositions (i.e. anthropomorphic forms arranged against a vertical line) were encountered in the Ancient Pool assemblages, but there were many compositions arranged beneath a line (hanging). Other graphic examples of DHF include paired compositions and one male and one female gendered example. A similar range of body shapes to those identified by Berry (2018: Table 8:10) was encountered with solid (n = 6) and profile figures (n = 5) but also linear figures (n = 3). We also found a unique variety, which included a decorative infilled body. This cross-schema suggests that either these style productions were contemporaneous or that there was copying of distinctive traits between artists of these two types of human form. While all previously recorded motifs have been non-gendered or male; here we have two with female anatomical features. The characteristic dot-head composition of a larger dot-headed

figure arranged with two smaller similar examples, was not found at Ancient Pool. This composition form seems to be restricted to the south of Watering Cove (Berry 2018: Figure 8.51).

Eleven archaic faces (many with bodies and unique forms) have been recorded from this assemblage (in all except Area 6). These demonstrate the typically wide range of Murujuga stylistic characteristics. Half a dozen, well-known examples are found in the interior valley outside our three Southern sample areas (see Donaldson 2009), including two newly recorded examples found during fieldwork for the Dating Murujuga's Dreaming Project (LP 190100724) in 2022.

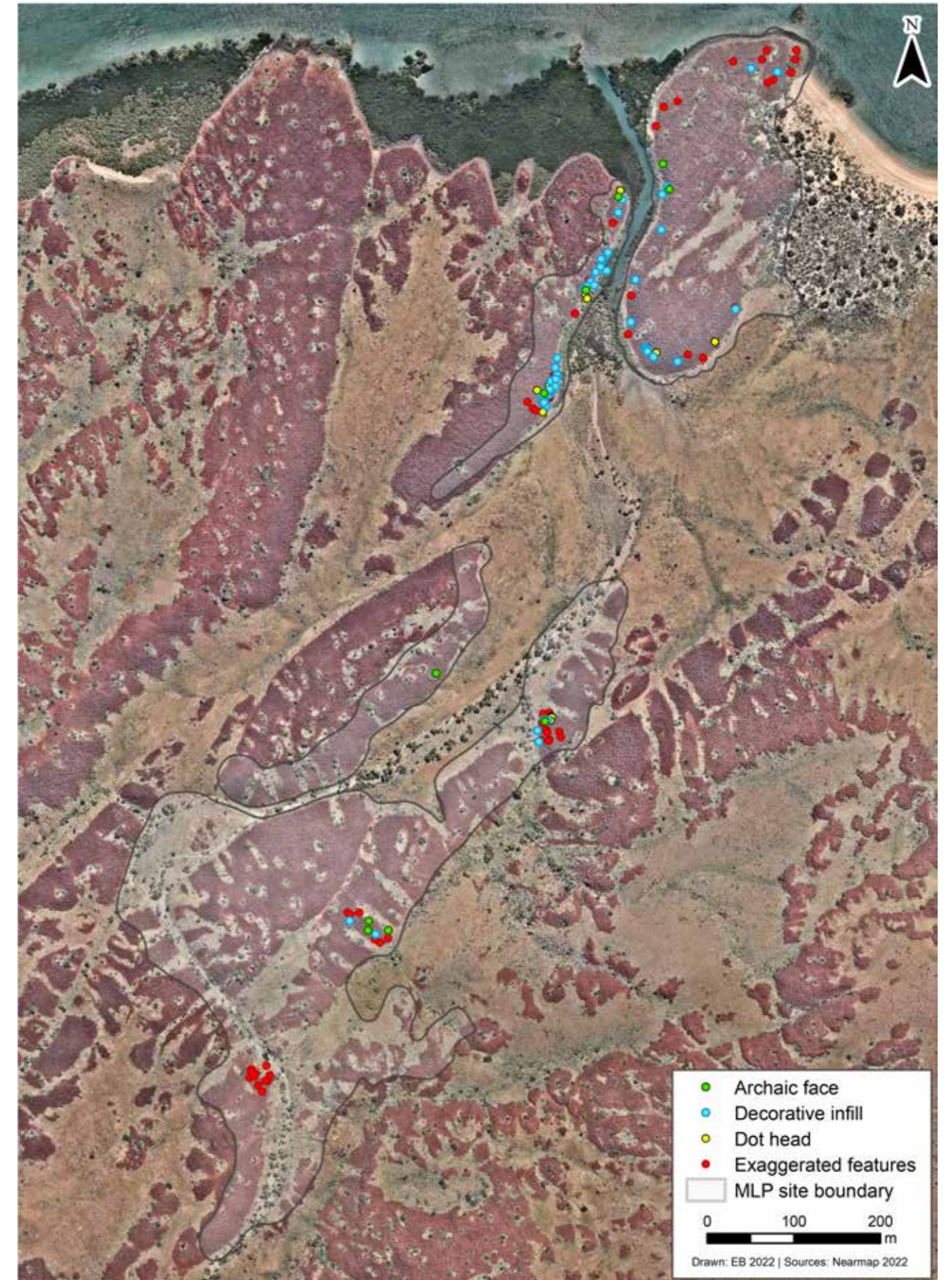


Figure 14.38. Distribution map of the eight sample areas showing location of archaic faces, decorative infill figures, dot heads and linear figures (exaggerated features).

The temporal indicators as measured through contrast state demonstrates that rock art here was produced through all the artistic phases (see Mulvaney 2010; McDonald 2015; McDonald and Veth 2013), but that

the focus for this production appears to have shifted through time. The earliest phases (CS1 and CS2) were produced across all landscapes, but the focus for these phases was in Area 10 and in Areas 2, 9 and 8 (Figure 14.41); most rock art was produced during the middle phases (CS3 and/or CS4). Rock art was also produced, albeit in smaller quantities, in the most recent period (CS5), with this later production focused on the coastal

margins and at the waterhole.

The area with the largest proportion of art in the earliest phase of production (CS1) is Area 10, followed by Areas 9 and 2. The most recent art production (CS5) is found in Areas 1 and 6; and these areas also have the highest proportion of art produced in CS4. In many of these sample areas, most of the art was produced in contrast states 2 and 3.

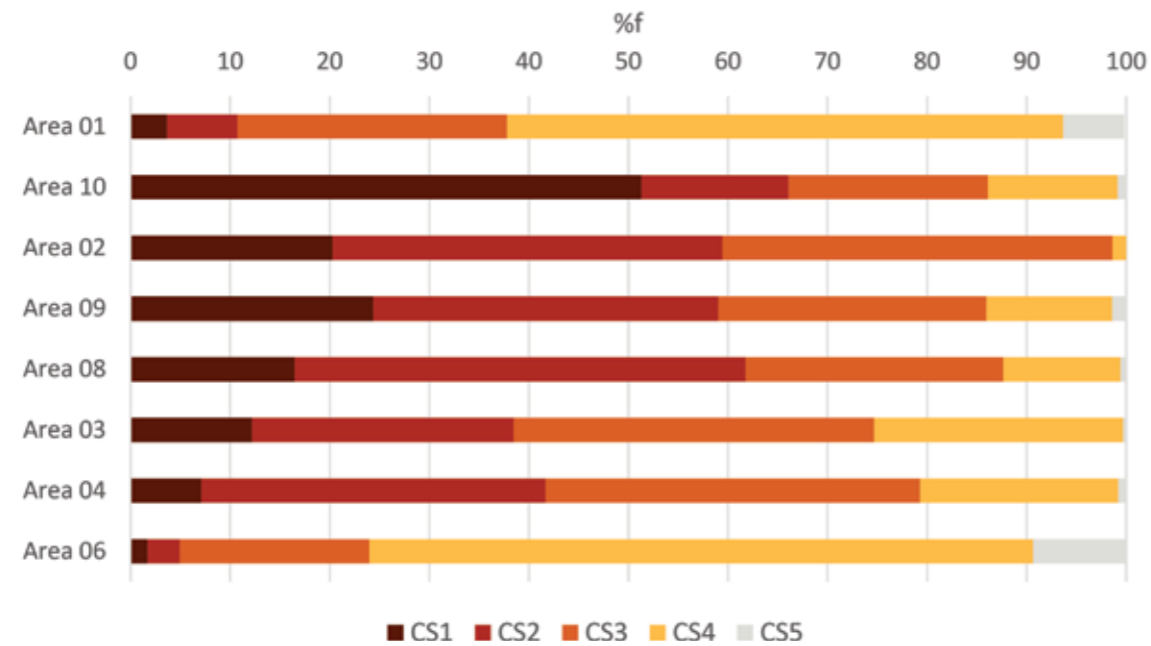


Figure 14.39. Comparison of contrast state in the eight Ancient Pool sample areas, arranged from coast (top) to inland pool (bottom).

The early focus on archaic faces and other early human forms, complex geometrics and large terrestrial species (macropods and emu) located around what is assumed to be a palaeo water source at the (now) head of

the mangrove creek line transforms into a maritime focus facing Searipple Passage, and a shift to the permanent water resources of Ancient Pool with sea-level rise in the Mid to Late Holocene.

Stone structures

Stone structures include eight standing stones, one horizontal discrete placed stone and three bedrock pits. The standing stones, two of which are engraved, are located predominantly in the raised rocky area immediately south of Searipple Passage. Several of

these are visible from the water. As stone structures were not targeted systematically for recording, our sample areas will have not encountered the full range of feature variability.

Watering Cove

Located at the northern end of Watering Cove, an exposed dolerite dyke cuts through the granite bedrock, trending north-west/south-east. This is 140 m in length and approximately 16 m wide and 3–5 m high. The project team undertook a very short recording exercise on a small knoll and a 40 m length from the southern side of the western end of the dyke (Figure 14.40). This recording program was truncated when it became clear that more person-power was required to assist with the excavations on the nearby sand dune (see Chapter 15). This small sample represents six person-days of recording in July 2017.

The dolerite dyke has been identified previously (Figure 14.41) as a high-density and significant rock art feature on the Burrup (DPLH 11736; Virili 1977). Two other sites, DPLH 11737 and DPLH 11738, were found on granite outcrops further up the creek to the south and north (respectively) of the creek line. Based on the site descriptions these have been mapped by CRAR+M as falling on the edge of DPLH 11736 and we have extended the boundary to better incorporate the outcrops described. These areas were not surveyed in detail and the archaeological evidence extends beyond the current boundaries of this site.

Geologically this is an interesting landscape with the junction of granite, gabbro and quench gabbro in the vicinity (Figure 14.42). Rock art has been documented

on the gabbro and granite geologies nearby (McDonald and Beckett 2022).



Figure 14.40. Watering Cove dolerite dyke: (a) photograph looking eastwards showing topographic setting of dyke within the granite boulder field and gabbro slopes; (b) view northwards from creek line looking up towards dyke; and (c) view along northern flank of dyke from the recorded knoll.

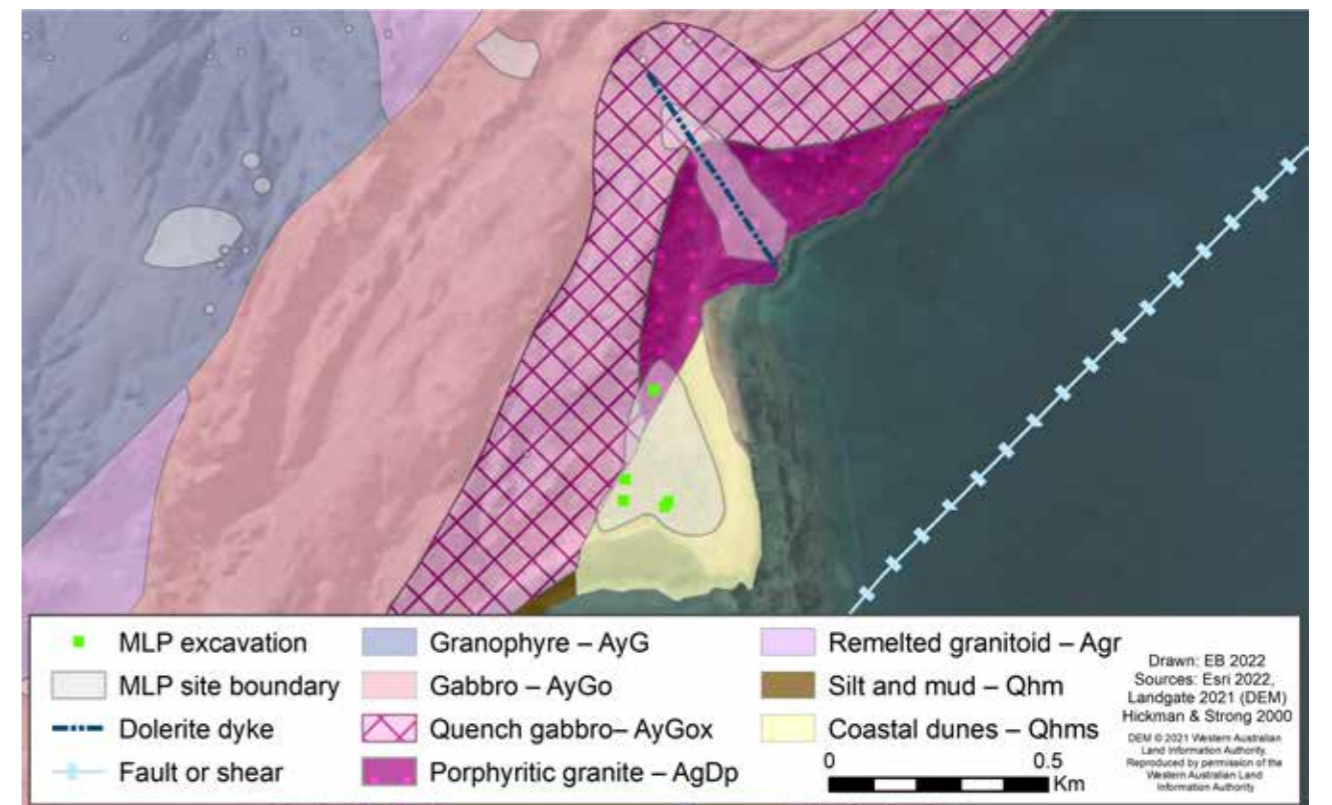


Figure 14.42. Mapped surface geology at Watering Cove.

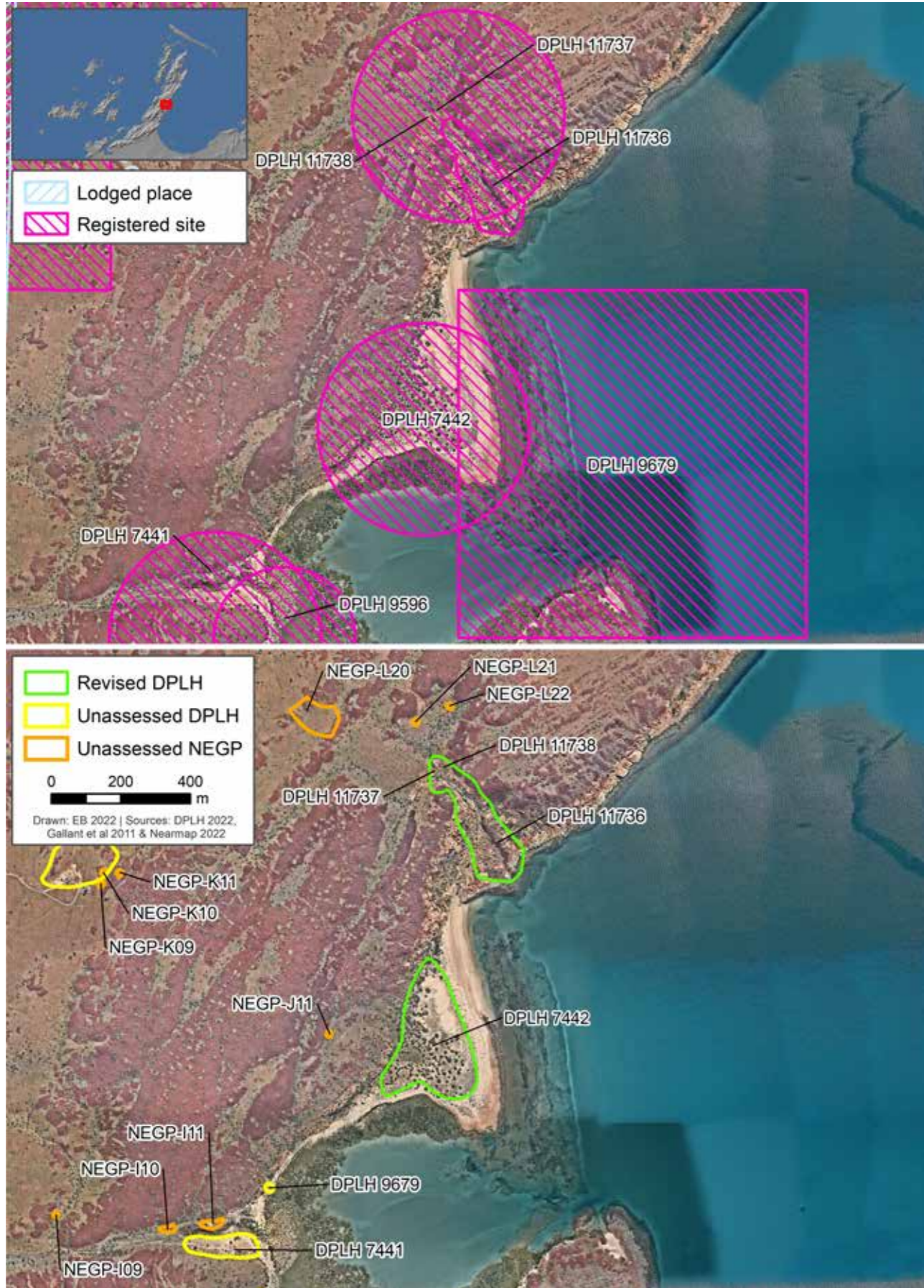


Figure 14.41. Watering Cove showing (top) the location of previously recorded sites with (bottom) audited DPLH and unassessed DPLH and NEGP sites.

The rock art

While geometrics are, as usual, the dominant class of motifs here (42.4%), there is a higher percentage of anthropomorphic (32.1%) and lower percentages of tracks and zoomorphic motifs within this small sample (Table 14.20) compared to other rock art assemblages across Murujuga. Twenty-two 'other' motifs were recorded from this sample, these including eight grinding patches, an

incised line set (n = 1), amorphous area (n = 8) and one random pecking. The eight grinding patches recorded here were situated within the creek-line corridor or on the adjacent granite boulders located below the dyke formation. Engraved art is found along the entire dolerite dyke feature and also on an isolated dolerite boulder pile several hundred metres further west (see Figure 14.43).



Figure 14.43. The landscape around the dolerite dyke showing (a) the central portion of the dyke and (b) the isolated boulder pile of this same geology.

	NO.	%F	DEPICTIVE	%F
Anthropomorphic	97	32.1	97	34.6
Geometric	128	42.4	128	45.7
Other	22	7.3		
Tracks	28	9.3	28	10.0
Zoomorphic	27	8.9	27	9.6
<i>Total</i>	<i>302</i>	<i>100</i>	<i>280</i>	<i>100</i>

Table 14.20. Watering Cove dolerite dyke: class proportions.

Linear motifs, ovals and arcs are the most common geometric images within this Watering Cove sample (Table 14.21 and Figure 14.44). There is a lot of variability in the linear motifs: six are sinuous and another six are meandering lines. There are equal numbers (n = 5) of regular and tapered ovals and eight of these have a tang. Most of the arcs (n = 8) are open, and another seven have a regular, even curve, with only one concentric arc

motif recorded. Similarly, the linear category is quite diverse, with single lines (30) being the most numerous. There are multiple (n = 13) old complex geometric motifs (Figure 14.45e), this being indicative of the older age for much of this assemblage. Three complex geometrics have elaborate design elements and five include curvilinear elements.

SUBJECT	COUNT	%	SUBJECT	COUNT	%
<i>Anthropomorphic</i>			<i>Geometric</i>		
Decorative infill figure	3	1.1	Angular	16	5.7
Linear figure	36	12.9	Arc	25	8.9
Profile figure	11	3.9	Circular	2	0.7
Solid figure	47	16.8	Complex	13	4.6
<i>Tracks</i>			<i>Dot</i>		
Bird track	18	6.4	Linear	29	10.4
Macropod track	10	3.6	Material culture	3	1.1
<i>Zoomorphic</i>			<i>Oval</i>		
Bird	9	3.2	Rayed	6	2.1
Fish	1	0.4	<i>Total</i>	<i>372</i>	<i>100.0</i>
Lizard	1	0.4			
Macropod	13	4.6			
Quadruped	3	1.1			

Table 14.21. Watering Cove dolerite dyke: subject proportions.

The anthropomorphic class is dominated by linear forms (n = 36), commonly known as stick figures. There are also many solid figures (n = 47) and profile figures (n = 11), of which three display the distinctive dot-head form described as a numerous sample in Ancient Pool (see previous section; and see McDonald and Veth 2009; Mulvaney 2010). Three non-gendered outline anthropomorphs are a distinct graphic form with exaggerated circular heads. Linear figures, as well as being the most numerous, demonstrate the most variability in size range and style characteristics. These include small schematic non-gendered 'stick figures' (9) as well as a similar number that are simple male figures (n = 10) and three female figures. Design attributes here include several groups (in line coitus, pairs), figures associated with material culture and/or headdress, and several with exaggerated genitalia. No archaic faces were recorded in this small sample, although there are four well-known depictions located on three separate panels within this

dolerite dyke formation. There was also one group of hanging profile figures with dot heads recorded. There are many human forms in profile (n = 11), and considerable variability shown in the 47 solid figures. Three decorative infill motifs were recorded here. One is a therianthrope, with a turtle body shape, head in profile; another is male gendered; while the third is a classic non-gendered form with a three-pronged headdress.

This use of the dyke surfaces for petroglyph production continues through this early phase of rock art as exemplified by the decorated infill, dot-head and archaic face forms, into the recent period of the last thousand years. There are two anthropomorphic figures, based on design elements and physical condition, that are likely to be even more recent. One has a rarely depicted headdress (Piercy 2011) created by a parallel set of three lines. The other, superimposed over a much more ancient macropod motif, is depicted with one oversized foot.

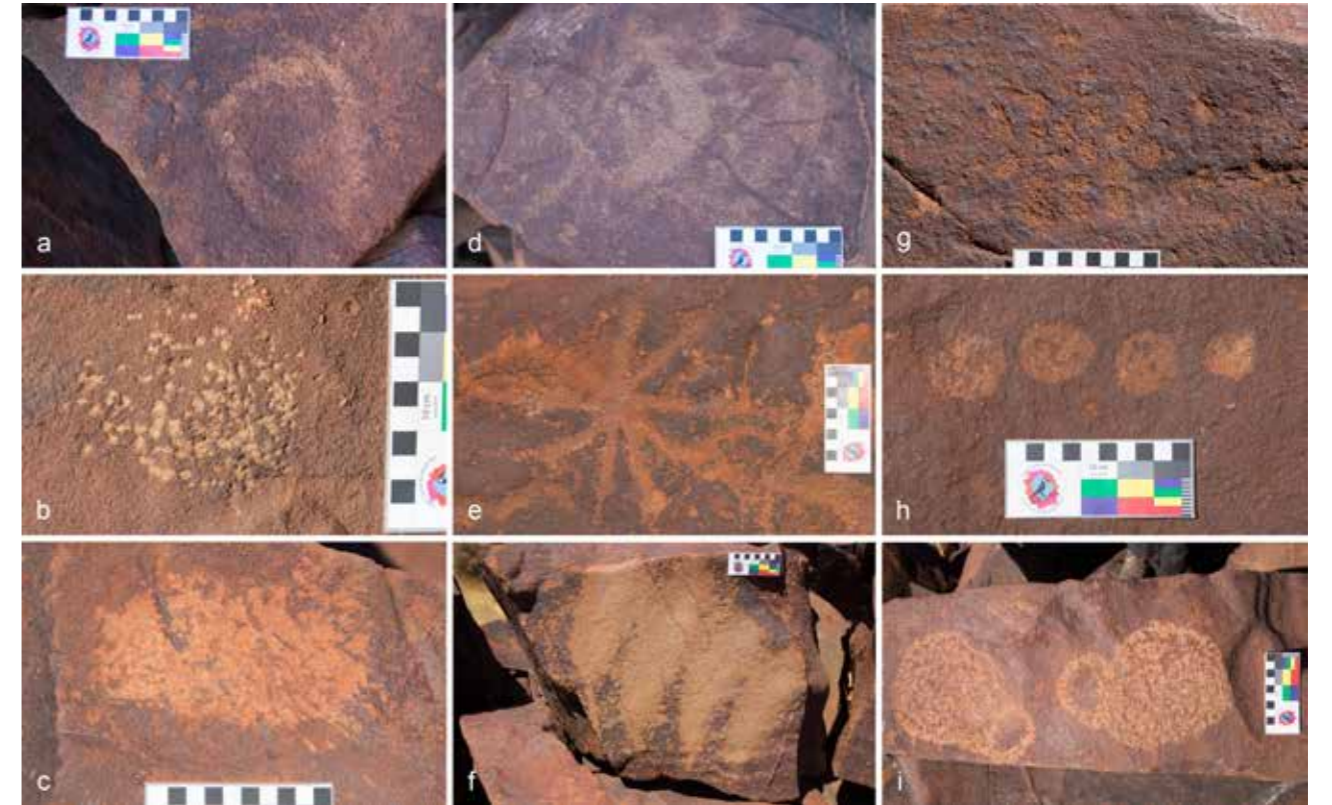


Figure 14.44. Watering Cove dolerite dyke other and geometric class petroglyphs: (a-b) random pecking; (c) circular; (d) arc set; (e) rayed geometric; (f) tapered oval set; (g) dot cluster; (h) dot line; and (i) material objects.

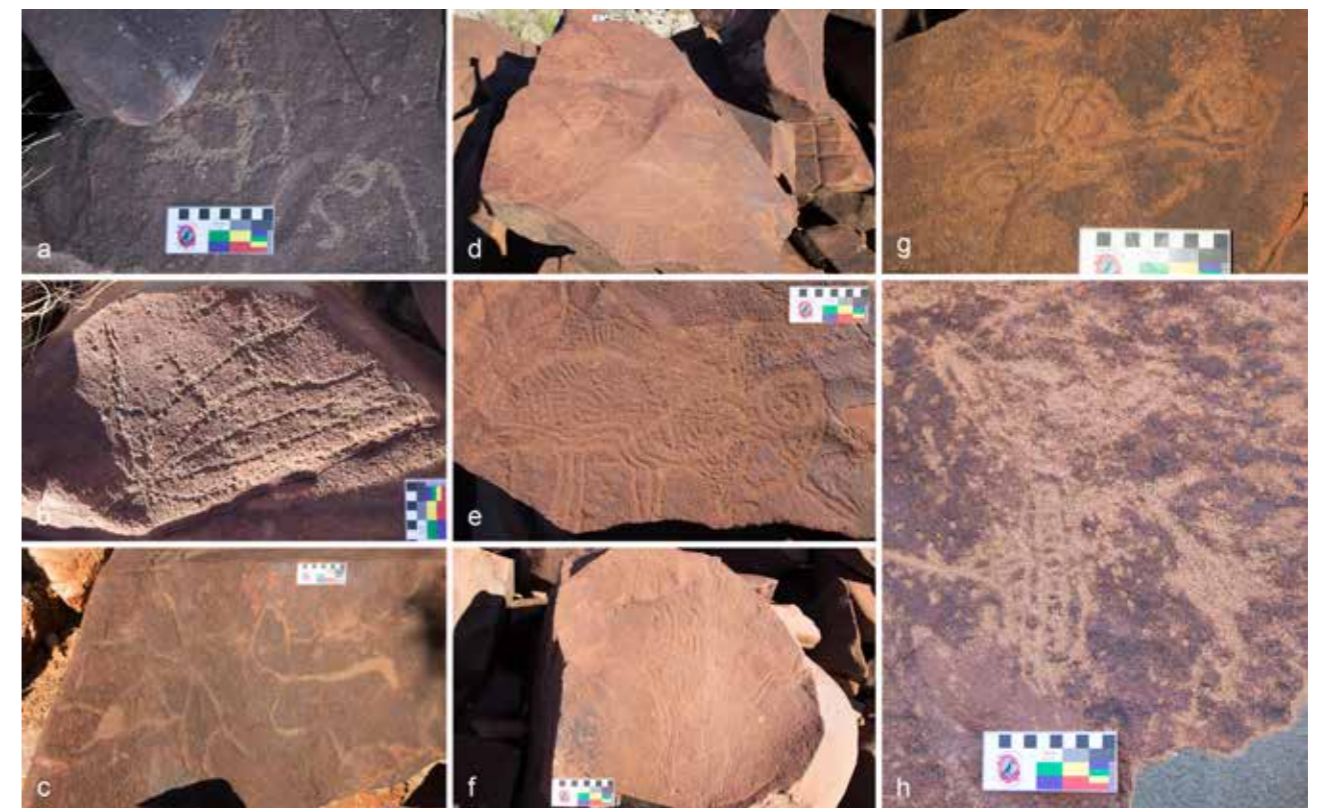


Figure 14.45. Watering Cove dolerite dyke geometric class petroglyphs: (a-c) variations on the curvilinear motif; (d) view of panel with multiple petroglyphs including a complex design; (e, f-g) complex geometrics; (h) complex dot-line arrangement.

Macropods dominate the zoomorphic class, followed by birds and quadrupeds (see Table 14.21). There are 13 macropods in this sample, none of which are the early fat-tailed variety. There is one associated with a boomerang, and there are several stylised varieties, with diagnostic foot and body shapes (Figure 14.46a-d).

Quadrupeds here include several solid and linear-bodied animals with short legs. There are no turtles or other marine motifs recorded in this small assemblage, and only one freshly pecked fish. The single older lizard is heavily patinated and the panel has exfoliated, damaging the tail.

Birds are an important component of the animal depictions (n = 9) and these include waterbirds (e.g. wading) and a variety of one and two-legged varieties,

one of which is shown with a snake in its mouth while another has been speared (Figure 14.46f–i). There are no older bird forms, e.g. emu.

The small track assemblage is restricted to bird (n = 18) and macropod tracks (n = 10). The macropod tracks include a variety of species (Figure 14.47a–b), with include several trails, one crossing several panels. The bird tracks include three and four-toed varieties (Figure 14.47c–h).

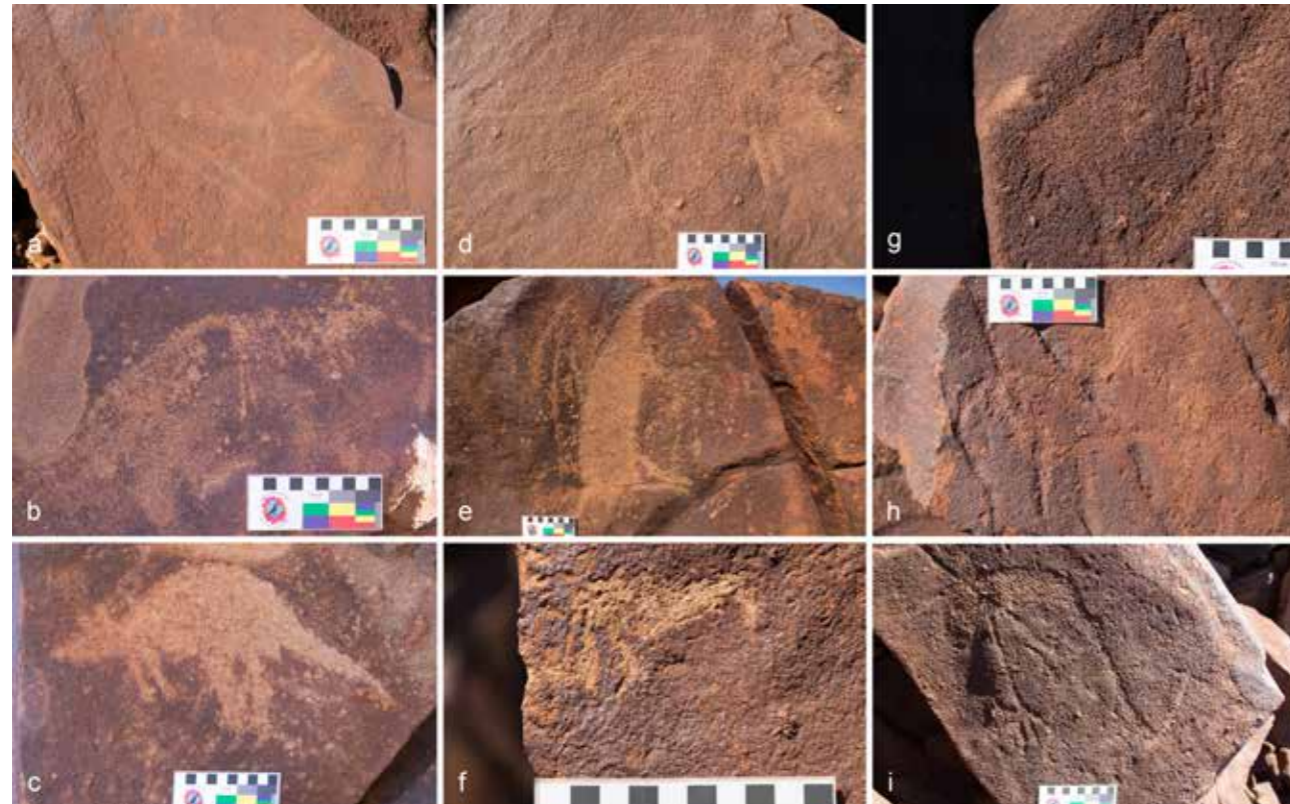


Figure 14.46. Watering Cove dolerite dyke zoomorphic class petroglyphs: (a–d) variations on the macropod form; (e) unusual graphic that has multiple animal subject features; (f–g) recent and older bird motifs; and (h–i) possible speared bird images.

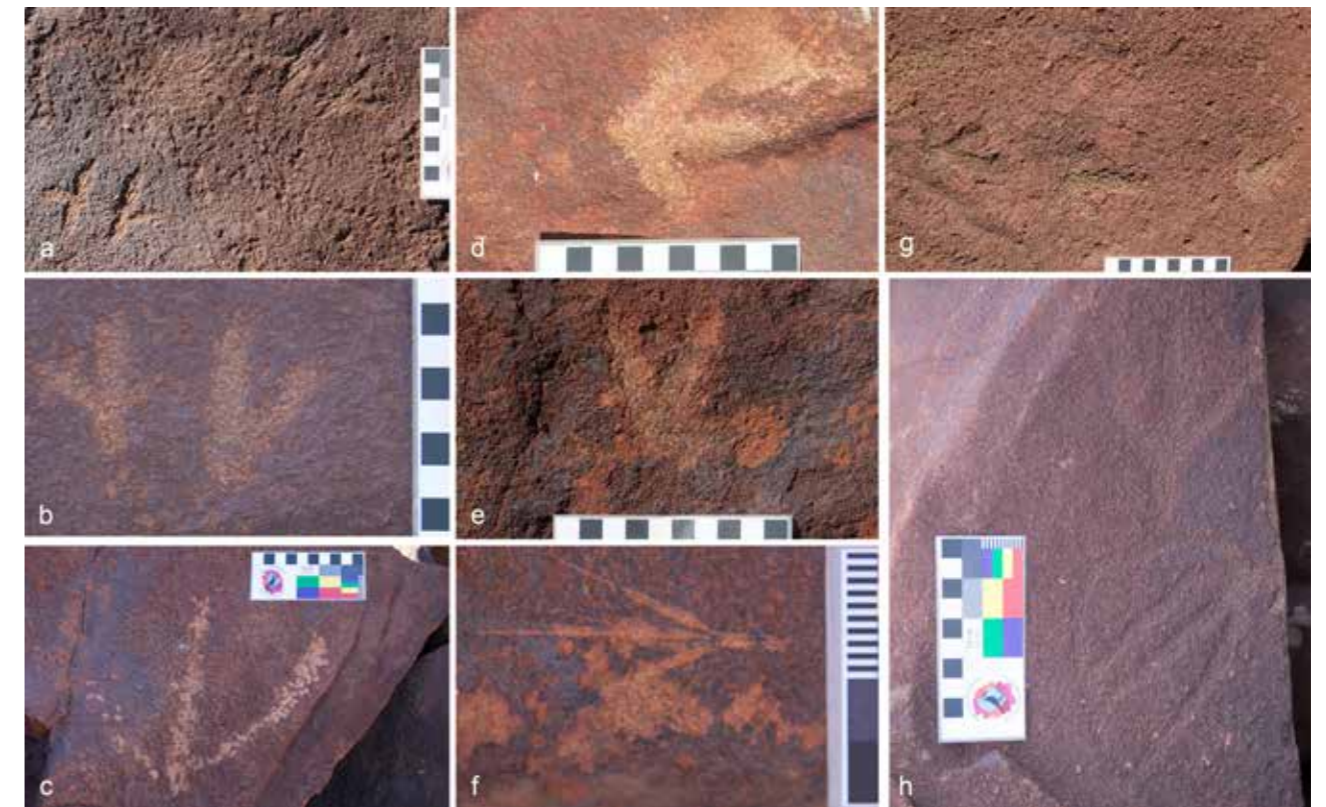


Figure 14.47. Watering Cove dolerite dyke track class petroglyphs: (a–b) macropod track; and (c–h) variations with the bird track graphic.

Technique and form

The most common motif form for this small Watering Cove sample is linear (44%) with linear + solid combinations and solid forms making up another 40% of the recorded motifs (Table 14.22). Only six motifs (2%) have patterned infill, these largely accounted for by the complex geometric motifs and decorative infill figures

(see Figure 14.44 and Figure 14.45).

The dominant technique of this sample set is pecking (86.1%): which is within the normal range for sites on gabbro and granophyre geology. Pecked and abraded combinations are relatively common (8%), with all other recorded techniques relatively few (Table 14.23).

FORM	COUNT	%F
Linear	134	44.4
Linear; solid	71	23.5
Solid	54	17.9
Linear; outline	14	4.6
Outline	8	2.6
Linear; outline; pattern	4	1.3
Outline; solid	3	1.0
Scattered marks; solid	3	1.0
Other combinations (<3 graphic elements)	11	3.6
Total	302	100

Table 14.22. Watering Cove dolerite dyke: motif forms.

TECHNIQUE	COUNT	%F
Pecked	241	86.1
Pecked + abraded	23	8.2
Abraded	5	1.8
Scratched	4	1.4
Gouged; pecked	2	0.7
Incised	2	0.7
Pecked; scratched	2	0.7
Gouged	1	0.4
Total	280	100

Table 14.23. Watering Cove dolerite dyke: motif technique (excluding 'other').

Most of the assemblage (75%) is smaller than 30 cm in size, with another 21% between 30 cm and 60 cm in length (Table 14.24). Three motifs (1%) are larger than 100 cm but none are larger than 200 cm. The largest recorded motif is a heavily weathered complex geometric measuring 121 cm; the second largest is a meandering line which covers most of a panel. One large roughly pecked outline

kangaroo is 116 cm long, while another is 97 cm long. This latter macropod is superimposed beneath the unusual, more recent human figure with exaggerated foot and a bisected circle head described above (see Figure 14.45d). Several other motifs are co-located with dispersed areas of peck marks, the latter known to be a diagnostic feature associated with Thalu sites (Daniel 1990).

SIZE (CM)	COUNT	%F	SIZE (CM)	COUNT	%F
1-10	51	18.2	71-80	1	0.4
11-20	95	33.9	81-90	1	0.4
21-30	63	22.5	91-100	1	0.4
31-40	38	13.6	111-120	2	0.7
41-50	14	5.0	121-130	1	0.4
51-60	7	2.5	NA	1	0.4
61-70	5	1.8	Total	280	100

Table 14.24. Watering Cove dolerite dyke: motif size (excluding other).

Weathering state

The majority (c. 72%) of this small assemblage is spread evenly through the middle ranges of the contrast state values (CS2 and CS3). Almost equal numbers of heavily weathered (CS1 – 11%) and relatively unweathered contrast (CS4 – 13%) are found here. Only three motifs look very recent (CS5 – 1%). Various researchers have suggested that this Watering Cove site is a focus for

earlier art production in Murujuga (Bednarik 2006; Mulvaney 2010; Virili 1977). Our very small sample supports that there is earlier, rather than later, art production here. More systematic recording is required to collect a larger and representative sample from this less common geological context.

CONTRAST STATE	COUNT	%F
CS1	32	11.4
CS2	71	25.4
CS3	133	47.5
CS4	38	13.6
CS5	3	1.1
NA	3	1.1
Total	280	100

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Table 14.25. Watering Cove dolerite dyke: contrast state (excluding 'other').

Site and motif density

The density of art here has been noted as being phenomenal (Donaldson 2009: 224). Only 302 motifs were recorded but from within a very small area (0.04 ha) including a small knoll and western end of the

Watering Cove dolerite dyke. The total area of this dyke is calculated at 0.27 ha. This small assemblage was collected from a length of c.40 m along the southern side only of one end of the dyke feature (c. 14.8%).

SAMPLE	SIZE (HA)	MOTIF COUNT	MOTIFS/HA
Watering Cove	0.04	302	7,550

Table 14.26. Density of motifs recorded on the Watering Cove dyke.

Given the observed continuous production of art along both sides of this feature, it is estimated that there could be 2,040 motifs on the dyke (which covers an area of 0.271 ha) as well as more found on other geologies in the adjacent valley (Figure 14.48). The calculated

projected density here (Table 14.26) is the highest recorded across the archipelago. Ancient Pool Areas 4 and 6 are the next highest at c. 2,300 motifs/ha (see Table 14.19). While lower densities of art were found on the surrounding granite bedrock, another small outcrop

of dolerite occurs several hundred metres to the west, and motifs have also been observed on the surrounding

gabbro bedrock (McDonald and Beckett 2022).

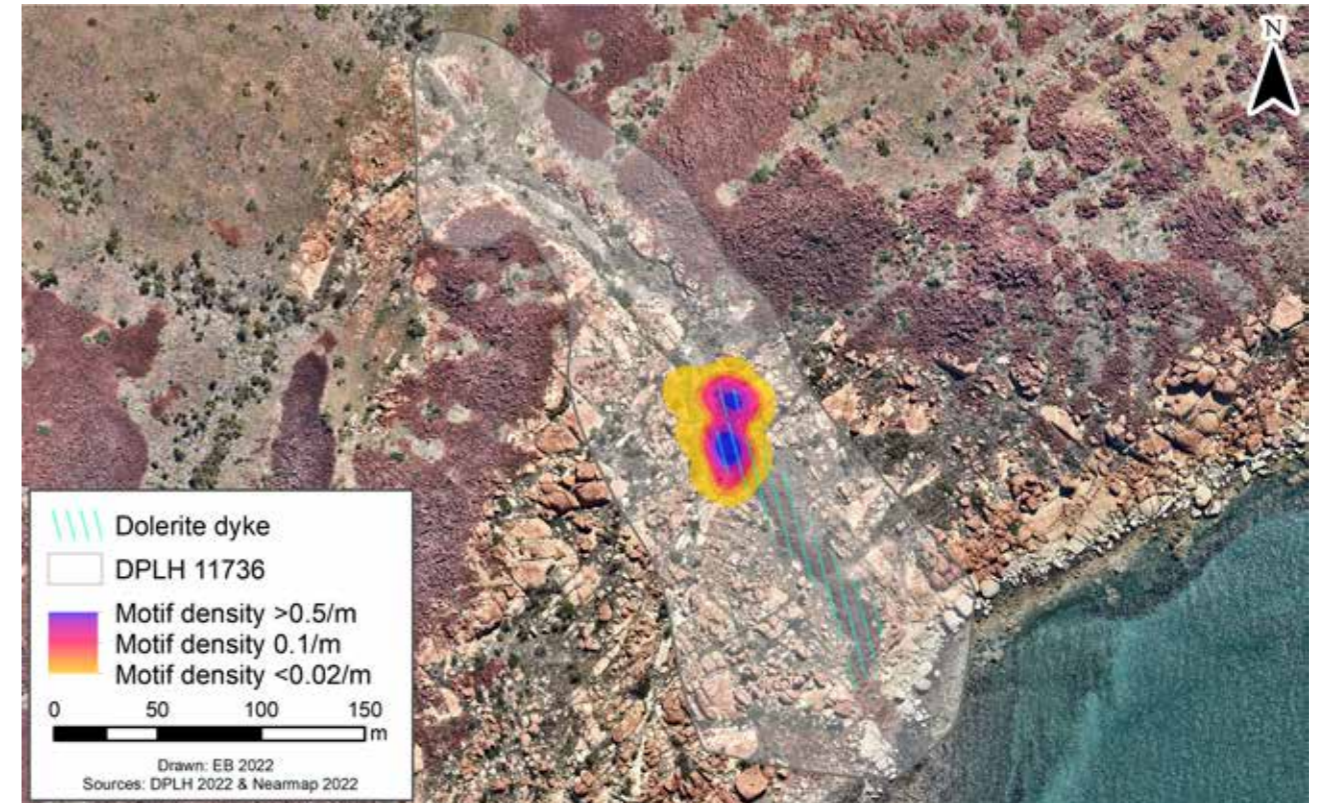


Figure 14.48. Extended MLP boundary for DPLH 11736, showing the density distribution of motifs in the small sample recorded and extent of unrecorded dolerite dyke.

Burrup rock art field schools (BFS) 2012–2022

The annual Murujuga rock art field school is funded by the 2007 Rio Tinto Conservation Agreement with the Commonwealth. This Conservation Agreement was formulated because of the Dampier Archipelago (including Burrup Peninsula) National Heritage Place listing and provisions of the Environment Protection and Biodiversity Conservation Act 1999. The first few years of the field school (2010, 2011) involved Rio Tinto heritage staff and the Archaeology department of UWA, focused on one of the major site complexes within the Rio Tinto Dampier leases, known as Happy Valley (Virili 1977; Gunn and Mulvaney 2009; Mulvaney 2011a).

The original goal envisaged for the field school, in addition to providing training for students, was in fulfilling RioTinto's obligations under clause 5 of the Conservation Agreement, to:

- (i) identify all sites with National Heritage Values on company-held leases.
- (ii) present, and transmit information about, the National Heritage values.

- (iii) manage National Heritage Values to ensure the Values are conserved for future generations; and
- (iv) research and monitor the National Heritage Values.

This also provided an opportunity for engagement of Traditional Owners with Rio Tinto staff and university students while working within the usually restricted-access areas of Rio Tinto leases.

During the 2011 field school, excavation of a test pit uncovered a grindstone within the midden deposit. Richard Fullagar and Judith Field undertook residue and usewear analysis (Fullagar and Field 2011). The surface polish was found to be like usewear on experimental rocks used by Fullagar to grind acacia and spinifex seeds. Microscopic analysis identified numerous starch grains consistent with *Dioscorea* tubers. These, along with acacia and grass pollen and phytoliths confirm the processing of plants. Additional experimental work has identified that spinifex was processed for the grass fibre as well as the seed as a food source (Hayes et al. 2018).



Figure 14.49. Happy Valley field school 2011: (a) Richard Fullagar obtaining residue sample on the rock surface uncovered during excavation, with students observing the process; (b) two sample locations on grinding patch; and (c) use of polyvinyl siloxane (PVS) to take a high-resolution impression of the grinding surface.

Since the formation of CRAR+M, and Jo McDonald's arrival at UWA in 2012, the annual rock art field school has trained over 100 UWA undergraduates in what is now a designated second-year undergraduate unit (ARCY2005). In 2012 the Murujuga Aboriginal Corporation formed the Murujuga Land and Sea Unit and since that time its Rangers have also participated in these field school. Undergraduates have also studied the UWA Archaeology of Rock Art unit (ARCY2004, a prerequisite), and the field school has also trained occasional visiting scholars from other parts of the world, students from other universities on placements, postgraduate candidates undertaking training at CRAR+M and, more recently, the Murujuga Aboriginal Corporation's Rangers on an annual basis. Ken Mulvaney and Jo McDonald have led this training since 2012, and the field school for many years employed Ben Gunn (also retained by Rio Tinto for training in 2010 and 2011). UWA Archaeology and then CRAR+M staff have included Liam Brady and Annie Carson (2010, 2011), Al Paterson (2012), Jamie Hampson (2014, 2015, 2017), Leslie Zubieta (2015), Ben Smith (2016), Peter Veth (2021, 2022) and postgraduates (Lucia Clayton, Meg Berry, Sam Harper, Emma Beckett, Laura Meyer, Ana Motta, Suzanne Shroup). During the MLP, project staff Joe Dortch and Sarah de Koning participated in the field school (2016–2019), as did Victoria Wade as a PhD candidate. Rio Tinto staff (Victoria

Wade, Rachael Bell, Alex Walter, Gabrielle Turner, Henry Thomason, Bob Tait, Camille Greenfield and Woody Sangakkara) have participated in the field school in a variety of roles.

In 2012 McDonald brought Glen McLaren, Environmental Systems Solutions Director, to the field school to assist in the development of a digital recording platform using Samsung recording devices (ESS was also involved in a separately funded Pilbara Development Corporation grant received by UWA) to set up what was initially known as the Pilbara Rock Art Database. This has now transitioned into the CRAR+M database. In 2015 Michael Ashley from CoDA (Center for Digital Archaeology at University of California, Berkeley) also participated in the field school, introducing Lightroom© into our workflow, and starting the transition to Filemaker forms on Apple iPads. When the Murujuga: Dynamics of the Dreaming project (MLP) started in 2014, Sarah de Koning was employed as database officer, from which time she, too, has participated in the field schools. Since the MLP concluded, Sarah has been employed as CRAR+M Database Manager through the Rio Tinto MoU with UWA. The field school has transitioned from a paper recording system to one that is fully digital (see chapters 2 and 3). Since 2010 the field school has run in all years except for 2020 (the first COVID19 pandemic year when WA was in shutdown for intraregional movement).

This training collaboration expanded once the co-management of Murujuga National Park was declared in 2013. Murujuga National Park represents approximately 42% of the Burrup and included c. 50% of the National Heritage Listed Place on the Burrup Peninsula. A similar proportion of the National Heritage Place falls within lands which are zoned for industry under the Burrup and Maitland Industrial Estates Agreement (2002). We decided to refocus this training exercise to include the Murujuga Land and Sea Unit Rangers and to include locations which were under tourist and other potential development pressures. There are numerous

significant valleys within the still-designated BMIEA lands that are within the National Heritage Listed Place but outside the conservation estate of the National Park (Figure 14.50 and Table 14.27). Recent negotiations between the Western Australian Government and MAC have resulted in the transfer of many industrial leases to MAC ownership, increasing the size of the conservation estate (Peter Jeffries and Amy Stevens, plenary presentation, AAA conference, Darwin, 2022). A major outcome of the Murujuga field school has been the important demonstration of the significant heritage values of the rock art in many of these areas.

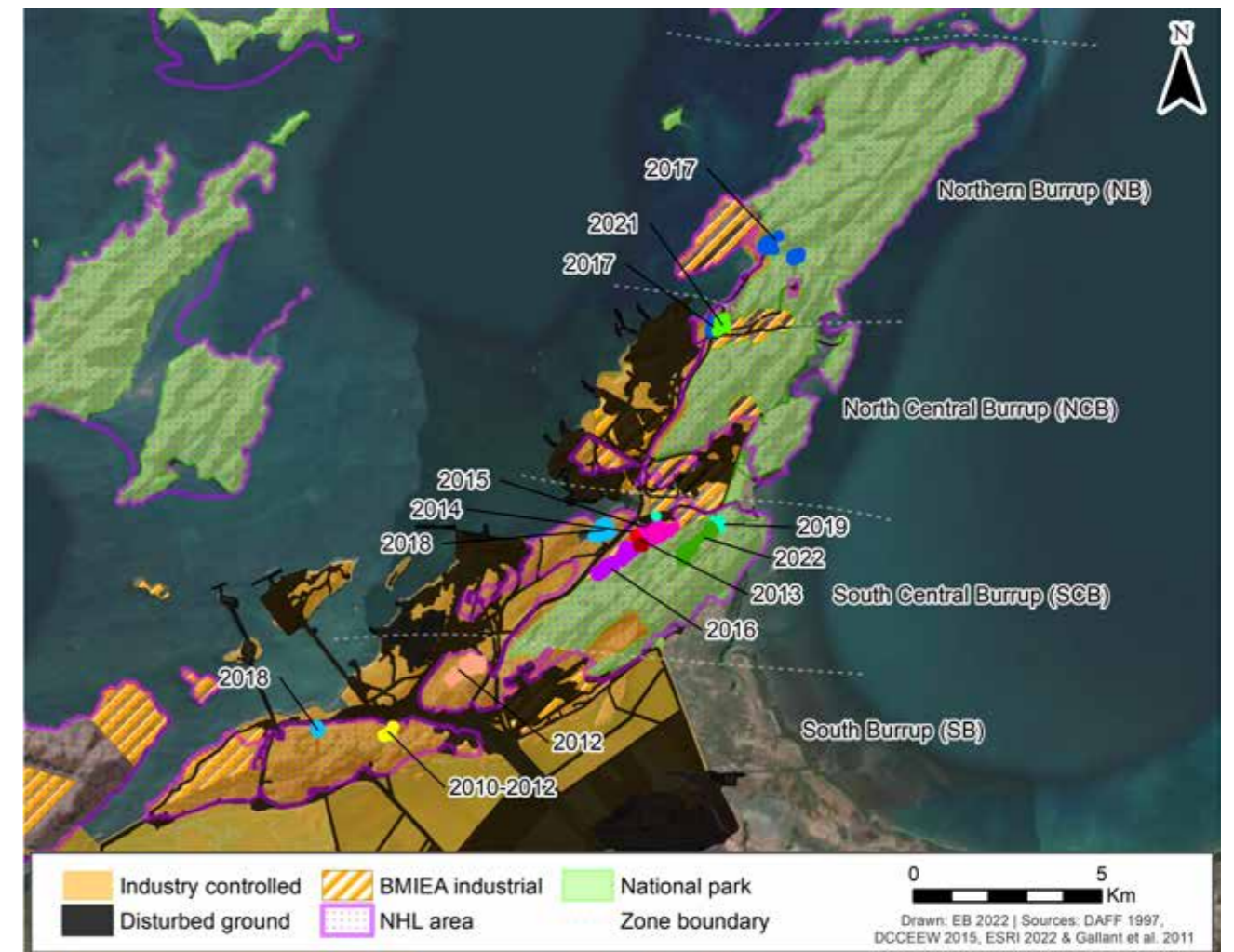


Figure 14.50. Burrup Peninsula showing the location of each year's field school with underlying relevant land title.

BFS YEAR	LOCATION	ZONE	GOVERNANCE	NO. DAYS	STUDENT NO.	TOTAL PERSON-DAYS	NO. OF MOTIFS*	NO. OF PANELS	STRUCTURES
2010	Happy Valley	SB	Industry/NHP	18	11	360	2,543	1,935	18
2011	Happy Valley	SB	Industry/NHP	18	12	288	2,311	1,790	32
2012	Happy Valley / Dampier Rd West	SB	Industry/NHP	11	12	159	1,647	744	
2013	Queen Vic Valley North	SCB	BMIEA/NHP	12	12	231	1,504	919	
2014	Queen Vic Valley South	SCB	BMIEA/NHP	11	14	228	3,151	1,657	
2015	Prince Albert Valley and slopes east	SCB	BMIEA/NHP	10	10	208	2,059	1,115	
2016	Emu Face and slopes east	SCB	BMIEA/NHP	13	10	182	2,097	1,055	110
2017	Casper's Pool / Jump-up / Picnic Creek	NB/NCB	BMIEA/MNP/NHP	14	8	238	2,410	1,398	95
2018	FFMMS / Hunters Valley	SCB/SB	BMIEA/Industry/NHP	14	8	168	2,361	1,149	209
2019	Nganjarli	SCB	MNP/NHP	8	6	80	1,090	559	23
2021	Picnic Creek	NCB	BMIEA/NHP	9	6 (+5 rangers)	133	1,362	999	18
2022	Walking track south of Nganjarli	SCB	MNP/NHP	14	15	271	994	548	23
Total				152	124	2,546	23,529	13,868	528

Table 14.27. Locations, zoning and statistics for the 11 UWA-MAC-Rio Tinto field schools documented in this chapter. *Motif totals include grinding patches from 2012; stone structures were only systematically included after Emma Beckett's PhD candidature commenced.

Given the diverse areas covered and the number of sites involved, here we provide a broad summary of the panels and motifs recorded during these field schools. In recent years, each field school's findings have been reported annually to the MAC Circle of Elders and these have occasionally been published (e.g. McDonald et al. 2021). Each year the undergraduate students have

been designated assignments to assess the National Heritage values in the location in which they assisted in generating the data. Some of these assessments are summarised here. The field schools' results are presented here according to their geographic locations across the Burrup (see Chapter 2).

Northern Burrup – Murujuga National Park

The 2017 field school focused on two areas, some 770 m apart, selected by MAC as requiring documentation so that they could make appropriate management decisions about visitation and the proposed alignment of a formed road. One area was around Casper's Pool (colloquially named for a prominent petroglyph – an outlined human figure – overlooking the approach to the place) which is registered as DPLH 7056/Calcrete Falls – a misnomer! This site is subject to analysis of the freshwater carbonate tufa drape (not calcrete, as the

site name would imply) by the current Dating Murujuga's Dreaming project. The other area, colloquially known as the Jump-up, is a vehicle access point to the northern Burrup – so named because the track crosses a spur of fractured block formation and has been a decadal challenge for local four-wheel-drive enthusiasts (see Figure 14.51). Both areas are on granophyre geology, the former near a quench gabbro/granite intrusion.

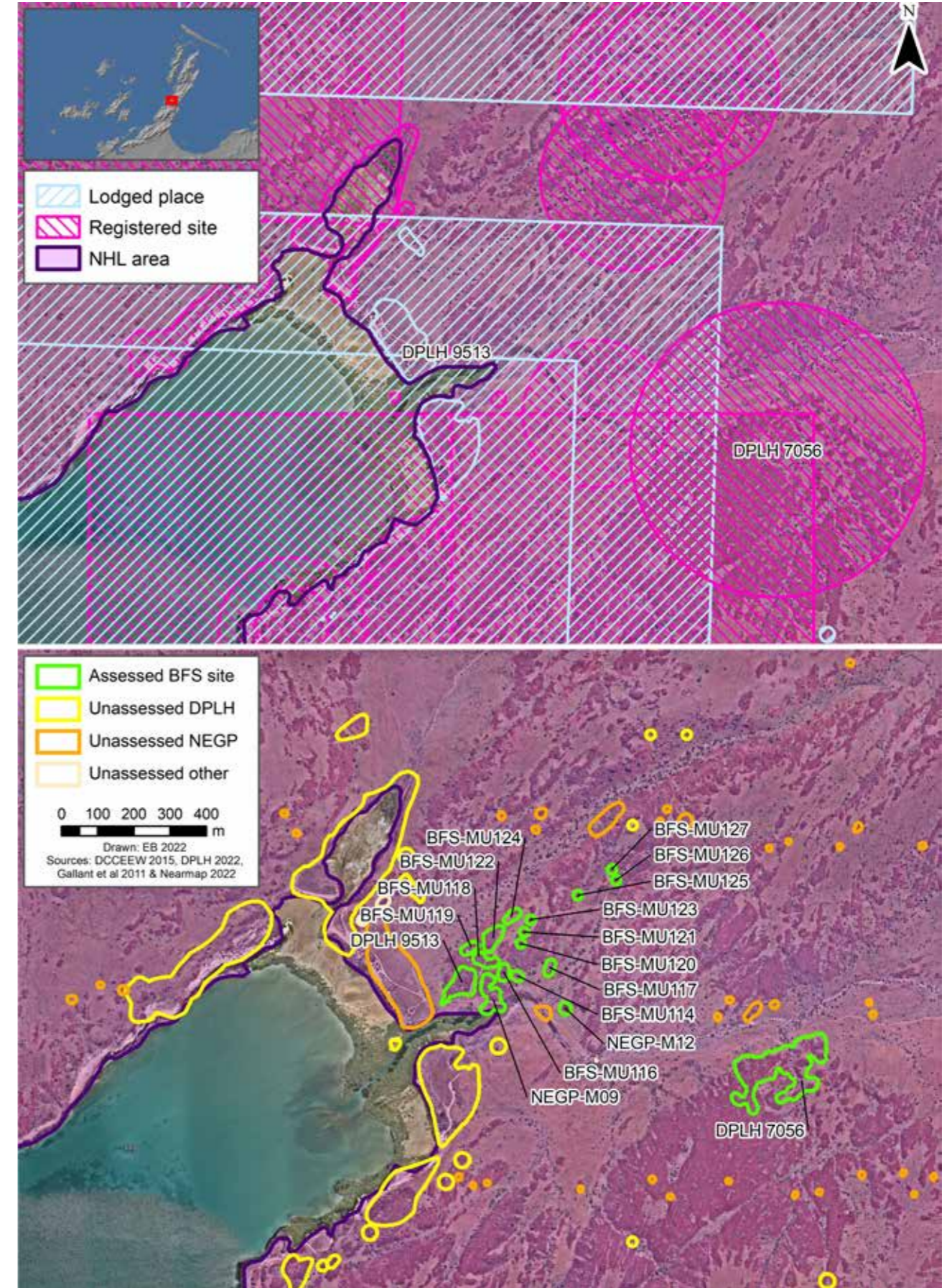


Figure 14.51. (Top) the 2017 Burrup field school (BFS) location at Casper's Pool (DPLH 7056) and the Jump-up showing in relation to the National Heritage listing and DPLH registered sites in this area; and (bottom) the current audited boundaries of recorded features identified during previous archaeological surveys.

Almost 590 panels and 1,056 motifs were recorded around Casper's Pool while 115 panels with 220 motifs were recorded around the Jump-up and its adjacent landforms. The rock art present on the slopes overlooking the pool and extending over the western ridge comprise a site-complex-sized assemblage. These motifs are dominantly geometric with zoomorphic categories the most common figurative motifs (Figure 14.52).

On the slopes above Casper's Pool, facing onto the broad valley leading eastwards from the top of Withnell Bay just over a kilometre away, within an alcove formed by large granophyre blocks are one of just two unequivocal examples of the distinctive, ancient cupules (Mulvaney

2013: 107; Taçon et al. 1997). The second cupule example is located just 30 m away along the slope and in a similar context (Figure 14.52).

There are several medium-sized assemblages, but mostly small assemblages recorded around the Jump-up (Table 14.28). This part of the national park is visited regularly by unmanaged tourists/4WD enthusiasts, as demonstrated by more than 50 instances of graffiti recorded during this field school. Most of this illegal marking behaviour (n = 42) is around the Jump-up, where people have been concentrated (sometimes stranded) while trying to get their vehicles up the difficult incline. The other 12 of these markings are near the pool.

SITE	ANTHROPOMORPHIC	GEOMETRIC	OTHER	TRACKS	ZOOMORPHIC	TOTAL
BFS-MU114		2	1		3	6
BFS-MU116	7	1	1			9
BFS-MU117	2	1				3
BFS-MU118	1	3	5			9
BFS-MU119	1	2		2	1	6
BFS-MU120		2	1			3
BFS-MU121			1			1
BFS-MU122	1	10	11	3	3	28
BFS-MU123		1				1
BFS-MU124		2	1			3
BFS-MU125			1			1
BFS-MU126			2			2
BFS-MU127		1				1
DPLH 7056	187	454	119	100	196	1056
DPLH 9513	2	18	27	11	1	59
NEGP-M09	1	9	19		3	32
NEGP-M12	5	10		3	6	24
<i>Total</i>	<i>207</i>	<i>516</i>	<i>189</i>	<i>119</i>	<i>213</i>	<i>1,244</i>

Table 14.28. Northern Burrup sites recorded during the 2017 field school, showing class choices and total assemblage sizes.



Figure 14.52. Casper's Pool site complex: (a) looking westwards over alcove with cupules to Withnell Bay; (b) looking southwards along channel above rockpool, with macropod motif in foreground; (c) fish motif superimposed over large snake image; (d) two relatively fresh fish motifs; (e) two superimposed macropods and other designs; (f) macropod motif; (g) macropod motif; (h) macropod penta-pedal track motif with hind feet, hands and curved tail; (i) bird motif (migratory whimbrel?); and (j) bird motif (egret?).

The assemblage size, subjects and associated archaeological features around the pool demonstrably meet all the Murujuga National Heritage values as identified against the published National Heritage criteria (Table 14.29). These identified characteristics are shorthand for an identified criterion (as defined by the Commonwealth), and this mapping exercise demonstrates the presence of National Heritage values (noting

that for a site to contain NHL values it only must meet a single criterion: see McDonald and Veth 2009). A mapping of these values is presented as a quantification based on the presence of an anthropomorph and/or standing stone amongst the assemblage, and/or whether the assemblage has more than 50 motifs (Figure 14.53). The more dispersed assemblages around the Jump-up meet NHL criteria a), b), c) and d).

NHL CRITERIA	IDENTIFIED MURUJUGA NHL VALUES	CASPER'S POOL	JUMP-UP
b	Diversity of engraved human forms (site contains an engraving of a human figure)	X	
f	2. Diversity and creativity in human forms	X	
d	3. Human forms representative of other Pilbara-style provinces	X	
b	4. Complex scenes with human forms demonstrating antiquity	X	
f	5. Complex scenes of human activity of unusual creativity	X	
a	6. Different degrees of weathering on faunal motifs showing changing response to sea-level change	X	X
c	7. Different weathering of motifs showing relative chronology	X	
c	8. Large number of superimpositions showing relative chronology	X	
a	9. and 10. Archaic face present	X (4)	
b	11. Site contains more than 50 motifs	X	
c	12. Site contains more than 50 motifs associated with other archaeological evidence	X	X
b & d	13. and 14. The site contains a standing stone, including those with known functions / rare characteristics	X	X
b & d	15. and 16. The site contains a definite cultural stone pit and/or circular stone arrangement	X	X

Table 14.29. Identified National Heritage values criteria for the recorded cultural heritage features from the 2017 field school in the northern Burrup.

A total of 11 standing stones were recorded during this fieldwork (Figure 14.54). None of these are located within areas of high motif density, indicating some spatial separation between these symbolic behaviours. Three standing stones were recorded at the south-western end of site DPLH 7056, away from the pool and the densest rock art production. Another eight standing stones were recorded at the Jump-up within NEGP M9 (n = 3),

BFS-MU116 (n = 1), BFS-MU118 (n = 3) and DPLH 9513 (n = 1). Emma Beckett's PhD project recorded another three structures (a bedrock pit, a clearing/enclosure and a cluster/pile) within DPLH 9513. These structures may have been used as hunting hides or possibly as wind protection given their locations at higher elevation with good views and access to the mudflats and surrounding landscape.



Figure 14.54. Northern Burrup examples of stone structures: (a) standing stones; and (b) cleared stacked enclosures, recorded during this field school.

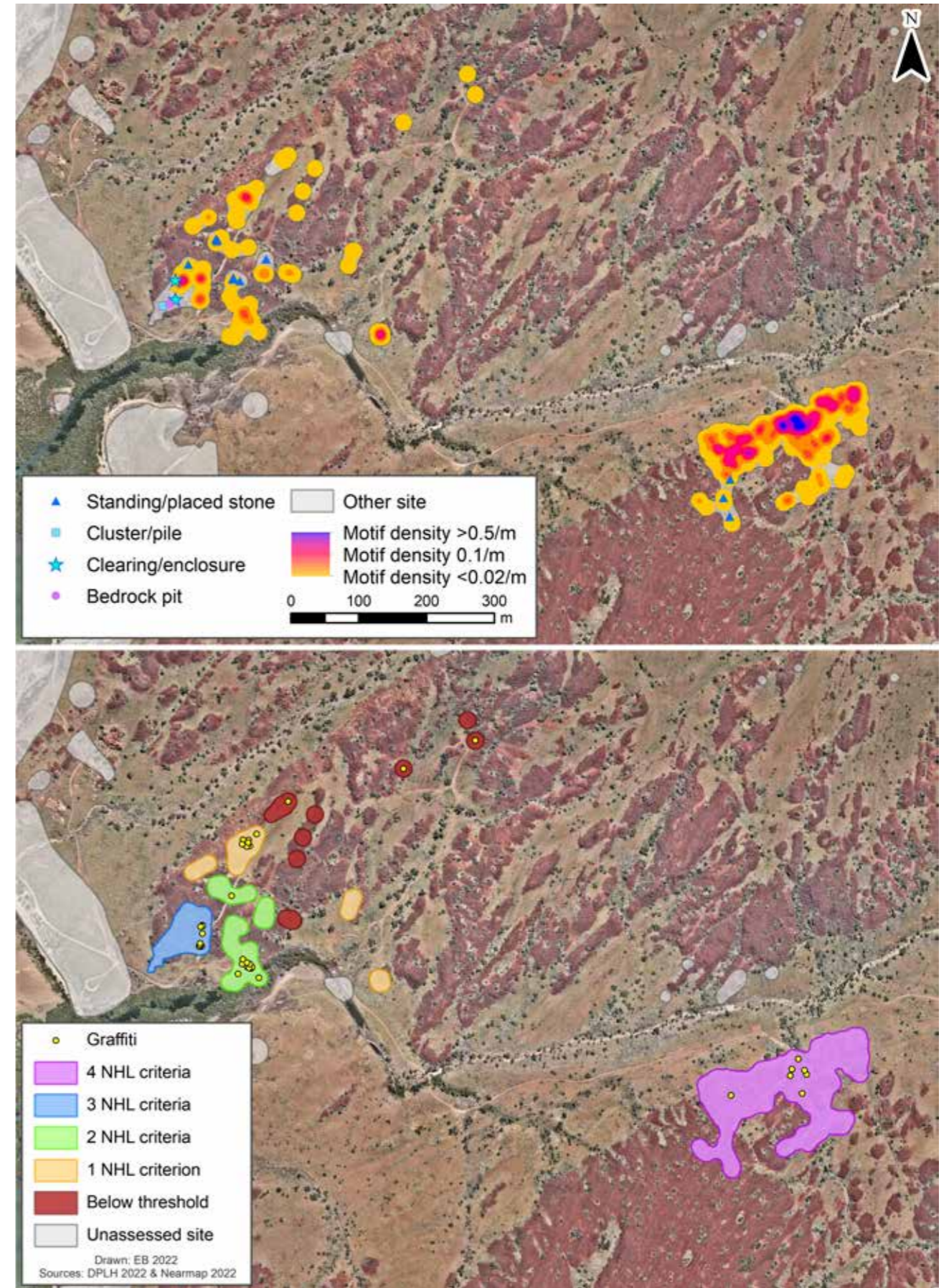


Figure 14.53. Northern Burrup landscapes covered by the 2017 field school showing: (top) distribution of recorded cultural features and density of petroglyphs; and (bottom) occurrences of National Heritage value criteria and locations of graffiti.

After the field school, park management closed the original parking area, located on top of a large *Anadara* (*Tegillarca*) midden near the Pool. A new parking area has been constructed further away from this site focus.

North Central Burrup – BMIEA leases

Part of the 2017 and all the 2021 field school seasons were spent recording rock art along a 340 m section of Picnic Creek and southwards towards Woodside's Mount Wongama access road (Fig 14.55). This seasonally flowing creek runs through a series of low and taller granophyre outcrops at the southern end of Withnell Bay. The area was chosen by MAC as requiring detailed recording to assist in decision-making about the proposed route for road construction to the northern recreation area. The sealed road currently finishes west of the site, 360 m south of the creek, and from there a well-used dirt track continues to the public boat ramp at Withnell Bay. Custodians want to stop this access track being used because of its proximity to several significant motifs and a Dreaming track known to pass through this area. A less-used track runs through the centre of the site, running off the Woodside locked access track to Mount Wongama. By the time the second field school was run here (after the 2020 COVID no field-school year) the decision had already been made to place the northern access route through the centre of this site complex.

An audit of the DPLH site records indicates multiple overlapping recordings for this area, with extensive and continuous archaeological evidence. The BFS fieldwork indicates that archaeological material is continuous across two large site complexes, DPLH 9858 – Picnic Creek and DPLH 11720 – Withnell Bay 05, which also incorporate a number of smaller registered sites (e.g. DPLH 20100, DPLH 38719, DPLH 38720). The western extent of DPLH 9858 was not verified by the BFS fieldwork. The original site boundary is not reliable given it bisects the main outcrop now known to be covered in rock art and stone structures. The original site record stated that the site extends "well inland up Picnic Creek and throughout coastal plain of central Withnell Bay [but the] northern and eastern margins of site complex was not surveyed in detail" (DPLH 9858 Site File). DPLH 11720 extends through this north-eastern area following the creek inland. This site was originally recorded as I2

Public access through the Jump-up has also been closed during construction of an alternate route to provide access to the northern recreation area.

and I5 by the NEGP project that explicitly focused on systematic recording of 50 m-wide east–west transects. Further survey to the mouth of the creek and along the coast is likely to reveal this is one large site complex.

The BFS fieldwork recorded 1,694 panels with 2,528 motifs within the Picnic Creek site complex. These include a large number of geometric motifs as well as high numbers of land and sea animals (Figure 14.56). A total of 74 stone structures have been recorded here as well as an extensive open artefact scatter with grinding material on the open areas between the rock art on both sides of the creek and along the proposed road corridor heading north from the creek. There are several discrete *Tegillarca* midden deposits as well as dispersed shell scatters and redeposited shell along the creek channel and banks.

There is less graffiti recorded here ($n = 5$). The large number of 'other' motifs here represents mostly grinding patches ($n = 179$), which are extensive along both sides of the creek and found distributed amongst knapped lithic material and midden (mostly blood cockle *Tegillarca* and baler *Melo*).

There has been extensive landscape modification in this area with 85 stone structures within four sites (DPLH 11720, DPLH 9824, DPLH 10307 and BFS-MU040). It should be noted that rock art is likely present beyond all current Picnic Creek site boundaries, with the field school being constrained timewise by COVID restrictions in 2021 (Figure 14.57).

The eastern outcrop of Picnic Creek is covered in stacked stone structures scattered in amongst the natural outcrops. Landscape walls comprise 44.7% of structures recorded within this area and 44.6% within Picnic Creek. These structures loop and conjoin in amongst bedrock, making it difficult at times to determine where they begin and end. Despite this, the human intervention is clear: individual stones are stacked and display negative flaking, mixed patination and calcrete crusts, confirming anthropogenic involvement (Beckett 2021).

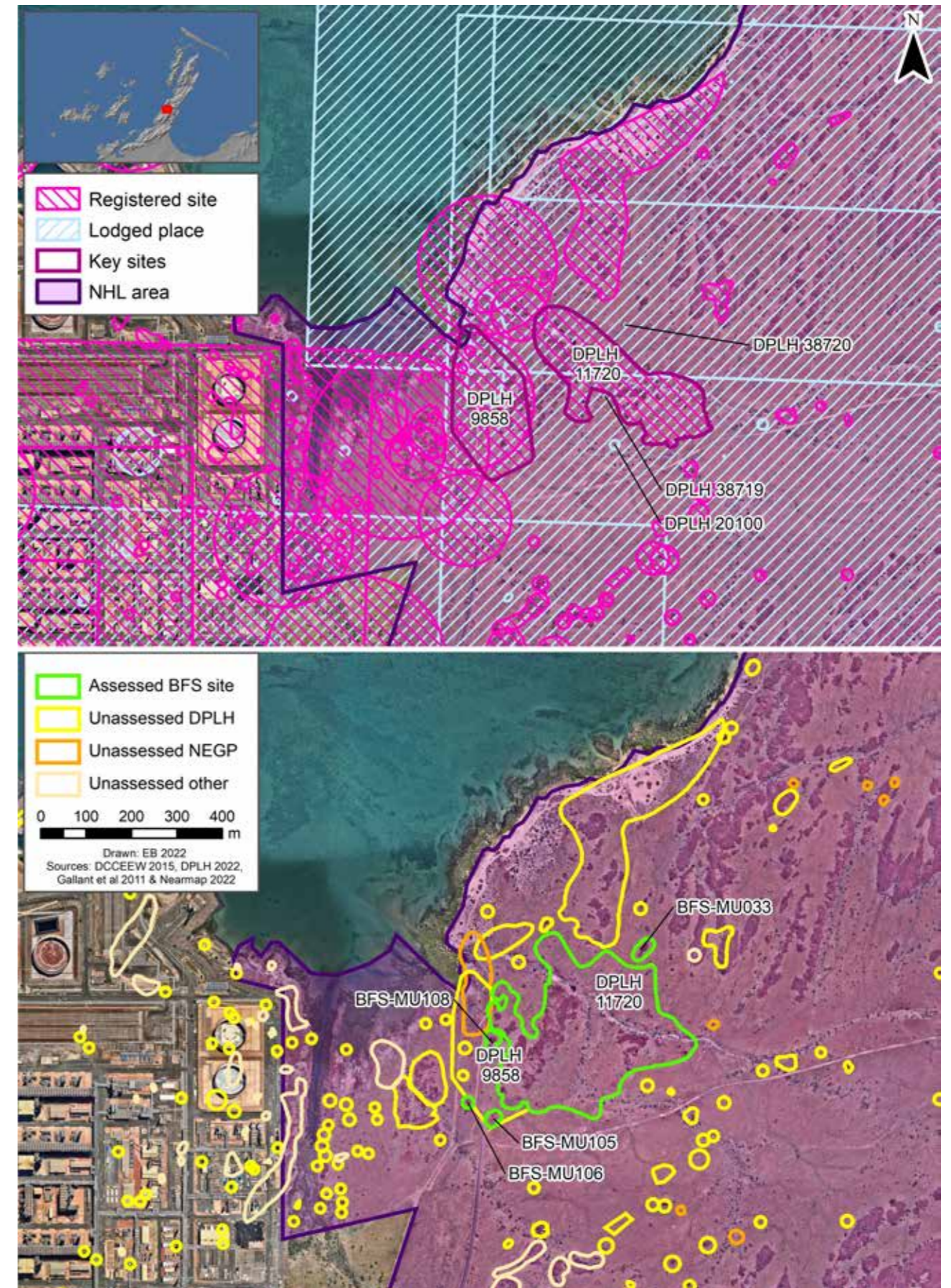


Figure 14.55. The Picnic Creek area showing the NHP boundaries with: (top) DPLH registered sites in this area; and (bottom) the extent of the 2017 and 2021 field school recording and current audited boundaries of recorded features.

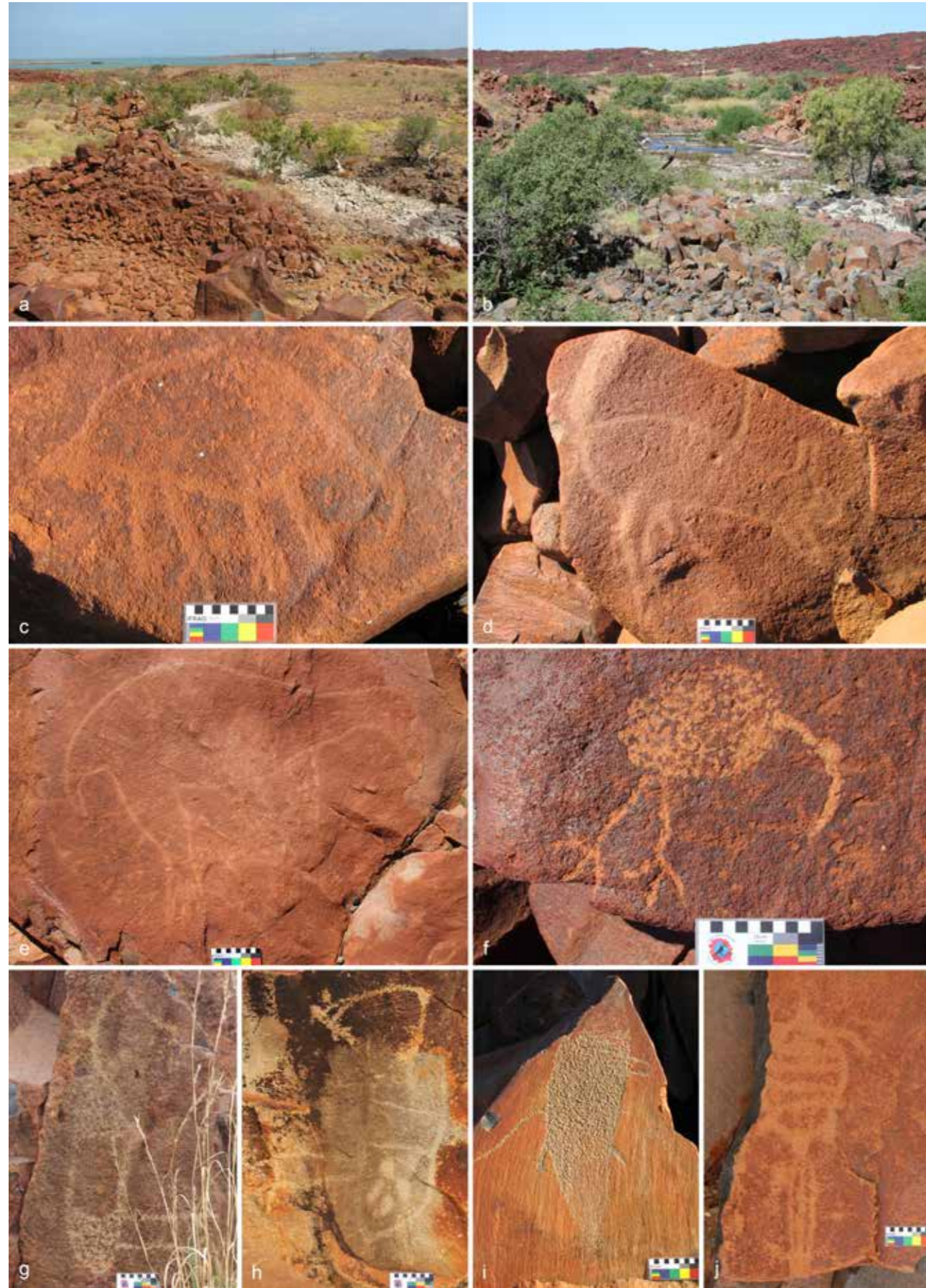


Figure 14.56. Picnic Creek site complex: (a) looking westwards over channel to Withnell Bay; (b) looking eastwards with Woodside transmission line to Mount Wongama in background; (c) unusual echidna motif with extended legs and snout; (d) macropod with arc intersecting back line; (e) unusual robust bird; (f) more recent bird with distinct anatomical form; (g) late period style of bird motif; (h) late period style of bird motif with fish in beak and 'eggs'; (i) fish with spear to back; and (j) turtle with track.

SITES	ANTHROPOMORPHS	GEOMETRIC	OTHER	TRACKS	ZOOMORPHS	TOTAL
BFS-MU105	1	5	2	1		9
BFS-MU106		1				1
BFS-MU108		4		3		7
Picnic Creek (DPLH 9858 and 11720)	521	978	325	376	289	2,489
BFS-MU033 (Picnic Creek North)	3	16	1		2	22
<i>Total</i>	<i>525</i>	<i>1,004</i>	<i>328</i>	<i>380</i>	<i>291</i>	<i>2,528</i>

Table 14.30. Picnic Creek site numbers and class records.

Bedrock pits comprise 29.4% of structures in the area and 32.4% of the structures found within the Picnic Creek site. Most of these are in two distinct clusters to the west and eastern ends of the site. Those on the west are found in a similar landform to the landscape walls, while those on the east side were in amongst rock art. Standing stones

comprise 18.8% of structures across the area, with 75% of these found within the Picnic Creek site complex. Only 5% of structures in this area were clearings or enclosures and 80% of these were found within the site complex. A single cluster or pile was found close to the road.



Figure 14.57. Picnic Creek: (a and b) three low standing stones recorded during the field school; (c) stacked and cleared enclosure being recorded with MLSU Ranger.

SITE	LANDSCAPE WALL	BEDROCK PIT	STANDING STONE	CLEARING OR ENCLOSURE	CLUSTER OR PILE	TOTAL
Picnic Creek (DPLH 9858 + DPLH 11720)	33	24	12	4	1	74
DPLH 10307	5	1	3			9
MSF-MU040			1			1
DPLH 10307				1		1
<i>Total</i>	<i>38</i>	<i>25</i>	<i>16</i>	<i>5</i>	<i>1</i>	<i>85</i>

Table 14.31. Northern Central Burrup stone structures.

All five listed National Heritage criteria are met by the Picnic Creek assemblages (Table 14.32, Figure 14.58). There are archaic faces; early, middle and later-period characteristic Murujuga human forms; and an overprint- ing of more recent marine-themed subjects, especially turtles (n = 122), fish and stingrays. There is a mixture of contrast states, with CS3 and CS4 being the dominant weathering condition here (see following discussion).

NHL CRITERIA	IDENTIFIED MURUJUGA NHL VALUES	PICNIC CREEK SC
b	1. Diversity of engraved human forms (site contains an engraving of a human figure)	X
f	2. Diversity and creativity in human forms	X
d	3. Human forms representative of other Pilbara-style provinces	X
b	4. Complex scenes with human forms demonstrating antiquity	X
f	5. Complex scenes of human activity of unusual creativity	X
a	6. Different degrees of weathering on faunal motifs showing changing response to sea-level change	X
c	7. Different weathering of motifs showing relative chronology	X
c	8. Large number of superimpositions showing relative chronology	X
a	9. and 10. Archaic face present	X (4)
b	11. Site contains more than 50 motifs	X
c	12. Site contains more than 50 motifs associated with other archaeological evidence	X
b & d	13. and 14. The site contains a standing stone, including those with known functions / rare characteristics	X
b & d	15. and 16. The site contains a definite cultural stone pit and/or circular stone arrangement	X

Table 14.32. Identified National Heritage values criteria for the recorded cultural heritage features from the 2017 and 2021 field schools at Picnic Creek.

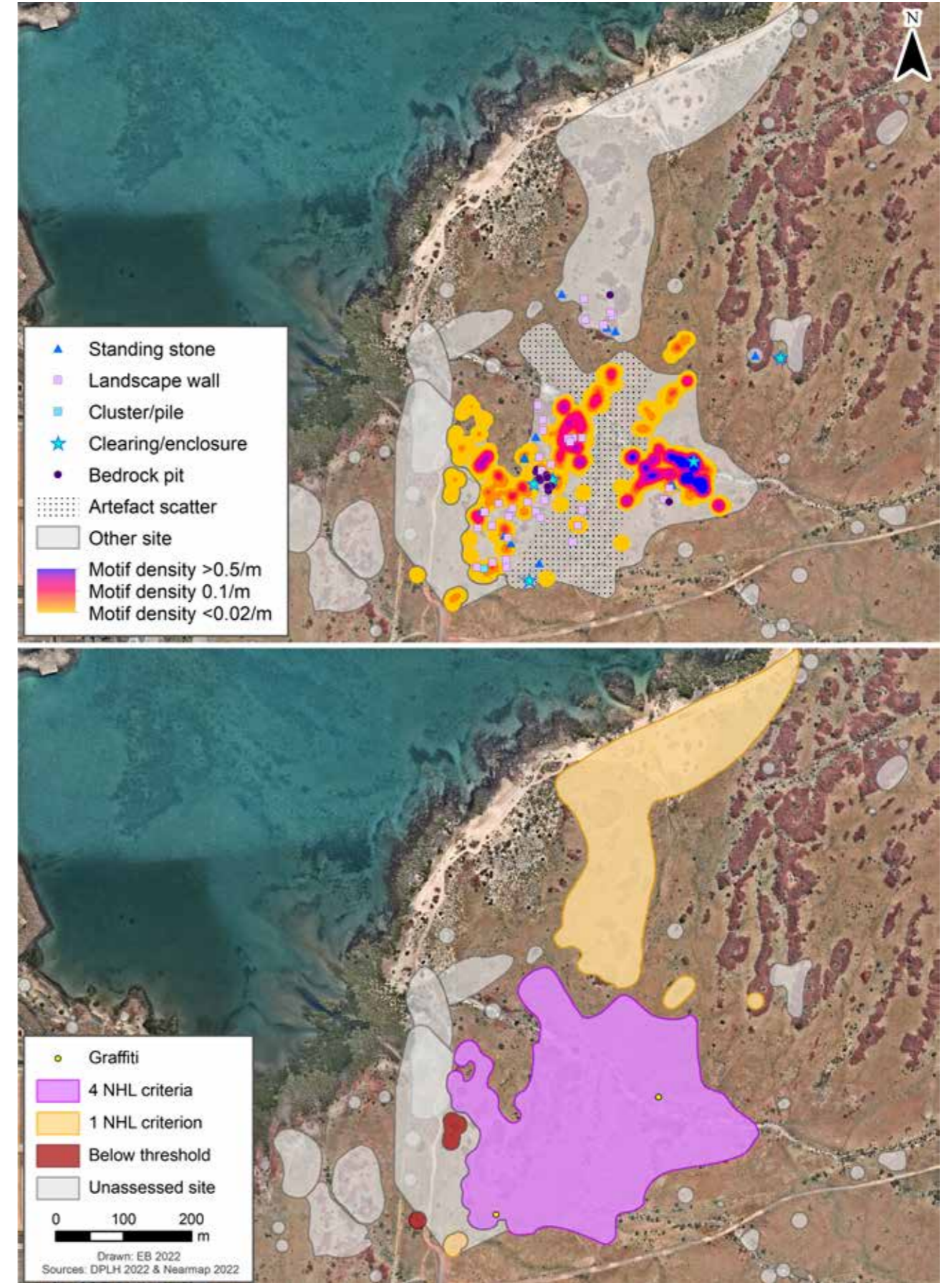


Figure 14.58. Southern Withnell Bay showing area covered by the 2017 and 2021 field schools: (top) distribution of recorded cultural features with density of petroglyphs; and (bottom) assessed National Heritage values and isolated graffiti.

The proposed alignment for the road to the northern Burrup will dissect the Picnic Creek site complex. Further work should be undertaken to salvage a representative sample of the cultural material recorded along the road

Southern Central Burrup – BMIEA leases

The 2013, 2014, 2015, 2016 and 2018 field schools focused on the BMIEA lands on either side of the Burrup Road south of Hearson Cove Road. Based on granophyre bedrock, these landscapes include several major creek lines with semi-permanent pools that rise in the centre of the Burrup and drain into King Bay. Some areas include previously identified, named and registered site complexes (e.g. Queen Victoria Valley and Emu Face Valley; Table 14.33 and Figure 14.59). The spatial distribution of cultural features here results in 67 Aboriginal

corridor prior to construction, with a condition being that all recorded rock art and stone structures must be avoided by the development.

sites, including almost 9,000 petroglyphs, hundreds of grinding patches and over 300 stone structures, including heaped stone arrangements and placed standing stones.

Petroglyph occurrences recorded during these field schools range from isolated images to a variety of different site sizes and include seven site complex-sized assemblages (Table 14.33 and Figure 14.59). The full range of contrast states is also recorded here – with potentially a slightly older focus (CS1 and CS2) in several of the valley site complexes.

SITE NAME	ANTHROPOMORPH	GEOMETRIC	OTHER	TRACK	ZOOMORPHIC	TOTAL
BFS-MU031	3	4			3	10
BFS-MU032	1	7		2	5	15
BFS-MU037	1	2				3
BFS-MU038		3				3
BFS-MU040	1	1	1			3
BFS-MU044	3	2			1	6
BFS-MU045		1				1
BFS-MU046	12	116	2	25	9	164
BFS-MU047		2				2
BFS-MU048		1				1
BFS-MU049	11	56	9	6	17	99
BFS-MU050	45	16			5	66
BFS-MU051		4				4
BFS-MU052	2	3				5
BFS-MU054	1	6	7		3	17
BFS-MU055	1	3	2		1	7
BFS-MU056	2	10			2	14
BFS-MU058	8	26	4	3	5	46
BFS-MU059		1				1
BFS-MU060	5	6	5	2	5	23
BFS-MU061		9		3	1	13
BFS-MU062	6					6
BFS-MU063	2	6				8
BFS-MU064	1	3		1	1	6
BFS-MU066	1	11	2	3		17
BFS-MU067		2				2
BFS-MU068	4	49		4	1	58
BFS-MU069		29				29
BFS-MU070	91	154	12	52	29	338
BFS-MU071		1				1
BFS-MU072	3			2	2	7
BFS-MU073	1	4		1	1	7
BFS-MU075		1				1
BFS-MU076	21	46	16	14	13	110
BFS-MU077	1	1		4		6
BFS-MU078		3				3
BFS-MU079	4	2				6
BFS-MU080	253	479	136	133	160	1,161
BFS-MU081	4	7	1		4	16
BFS-MU082	1	1				2
BFS-MU083	19	20	3	13	9	64

SITE NAME	ANTHROPOMORPH	GEOMETRIC	OTHER	TRACK	ZOOMORPHIC	TOTAL
BFS-MU084	1	10	3	3		17
BFS-MU085	3	25	2	5	9	44
BFS-MU087	1	2		5	5	13
BFS-MU088	1					1
BFS-MU089	1					1
BFS-MU090		2				2
BFS-MU091	2	7		2	5	16
BFS-MU092		2				2
BFS-MU093	1					1
BFS-MU095	8	1			1	10
BFS-MU096	1					1
BFS-MU097	1	1			4	6
BFS-MU099	1					1
BFS-MU102	8	10	1		4	23
BFS-MU103					1	1
BFS-MU129	1	3	2	2		8
DPLH 9397 (Emu Face Valley)	303	662	58	170	120	1,313
DPLH 9209 (Flying Foam Kangaroos)	17	39	25	10	22	113
DPLH 9214 (Flying Foam Massacre Memorial Site)	3	30	31	2	5	71
DPLH 9210 (Flying Foam Massacre Memorial Site 2)		3			1	4
DPLH 9212 (Flying Foam Rockshelter)	36	63	44	18	17	178
DPLH 26008 (Hearson Engravings)		1		1		2
DPLH 9439 (King Bay South-East)		1				1
DPLH 9253 (Midden Road 3)	90	273	117	46	71	597
BFS-MU130 (Queen Vic Valley 1)		1				1
BFS-MU065 (Queen Vic Valley 2)	3	9	6	7	2	27
DPLH 10564 (Queen Vic Valley Complex)	1,071	1,564	414	564	649	4,262
Total	2,061	3,808	903	1,103	1,193	9,067

Table 14.33. Southern Central Burrup BMIEA leases: field school sites and motif classes from 2013, 2014, 2015, 2016 and 2018.

An isolated site north of Hearson's Cove Road was recorded during the 2019 Nganjarli field school. It was not documented in the publication from this year (McDonald et al. 2021) and so is included here.

SITE NAME	STANDING STONE	DISCRETE PLACED STONE	CLEARING OR ENCLOSURE	LANDSCAPE WALL	MODIFIED GNAMMA	BEDROCK PIT	UNKNOWN	TOTAL
BFS-MU034						1		1
BFS-MU039				1				1
BFS-MU040						1		1
BFS-MU043				1		2	1	4
BFS-MU044						8		8
BFS-MU046	1		6	9		3		19
BFS-MU049	1							1
BFS-MU052	1					1		2
BFS-MU054						3		3
BFS-MU055				1		6		7
BFS-MU056						6		6
BFS-MU058						5		5
BFS-MU059						2		2
BFS-MU061				2		3		5
BFS-MU063				2		1		3
BFS-MU093	7							7
DPLH 9397 (Emu Face Valley)	1			15		7		23
DPLH 9209 (Flying Foam Kangaroos)	5		1			20		26
DPLH 9214 (Flying Foam Massacre Memorial Site)	152	6	2		1	10		171
DPLH 9210 (Flying Foam Massacre Memorial Site 2)	2					3		5
DPLH 9439* (King Bay South-East)	1		3					4
MSF-MU008				1		2		3
MSF-MU009				3				3
MSF-MU011				1				1
MSF-MU012				1				1
MSF-MU013				1		3		4
MSF-MU014						1		1
MSF-MU015						1		1
DPLH 10564 (Queen Vic Valley Complex)				22				22
Total	171	6	12	60	1	89	1	340

Table 14.34. Southern Central Burrup BMIEA leases: stone structures.

These areas have many of the earlier terrestrial forms with heavy patination including many macropods (n = 168, including fat-tailed varieties) as well as an overprinting of more recent marine-themed subjects, especially turtles (n = 236) and fish (n = 235). Bird motifs (n = 177) include species that can be identified as waders and other coastal feeders. Bird tracks are the most depicted tracks (Figure 14.60 and Figure 14.61).

There is a mixture of contrast states, with CS3 and

CS4 being the dominant weathering condition here (see following discussion), but many assemblages here have evidence for earlier production (CS1 and CS2). In almost all areas, grinding patches are a common site component, although these appear less often than in some areas of the archipelago. Lithic artefacts and marine shell middens are present throughout the area, although these have not been recorded systematically by the annual field school program.

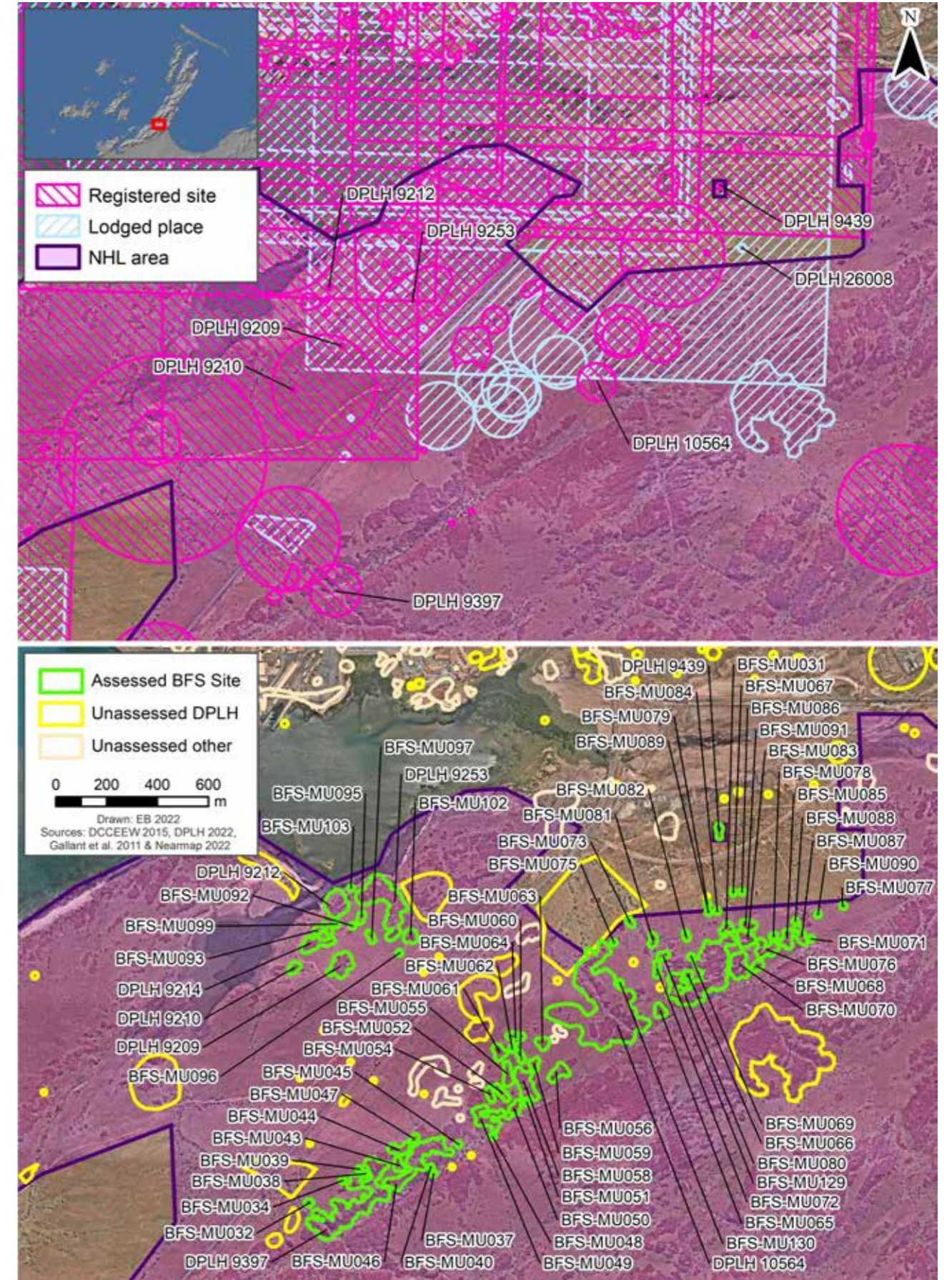


Figure 14.59. Map of the 2013, 2014, 2015, 2016 and 2018 field school locations showing the NHP boundaries and (top) DPLH registered sites in this area; and (bottom) the current audited boundaries of recorded features in this area.

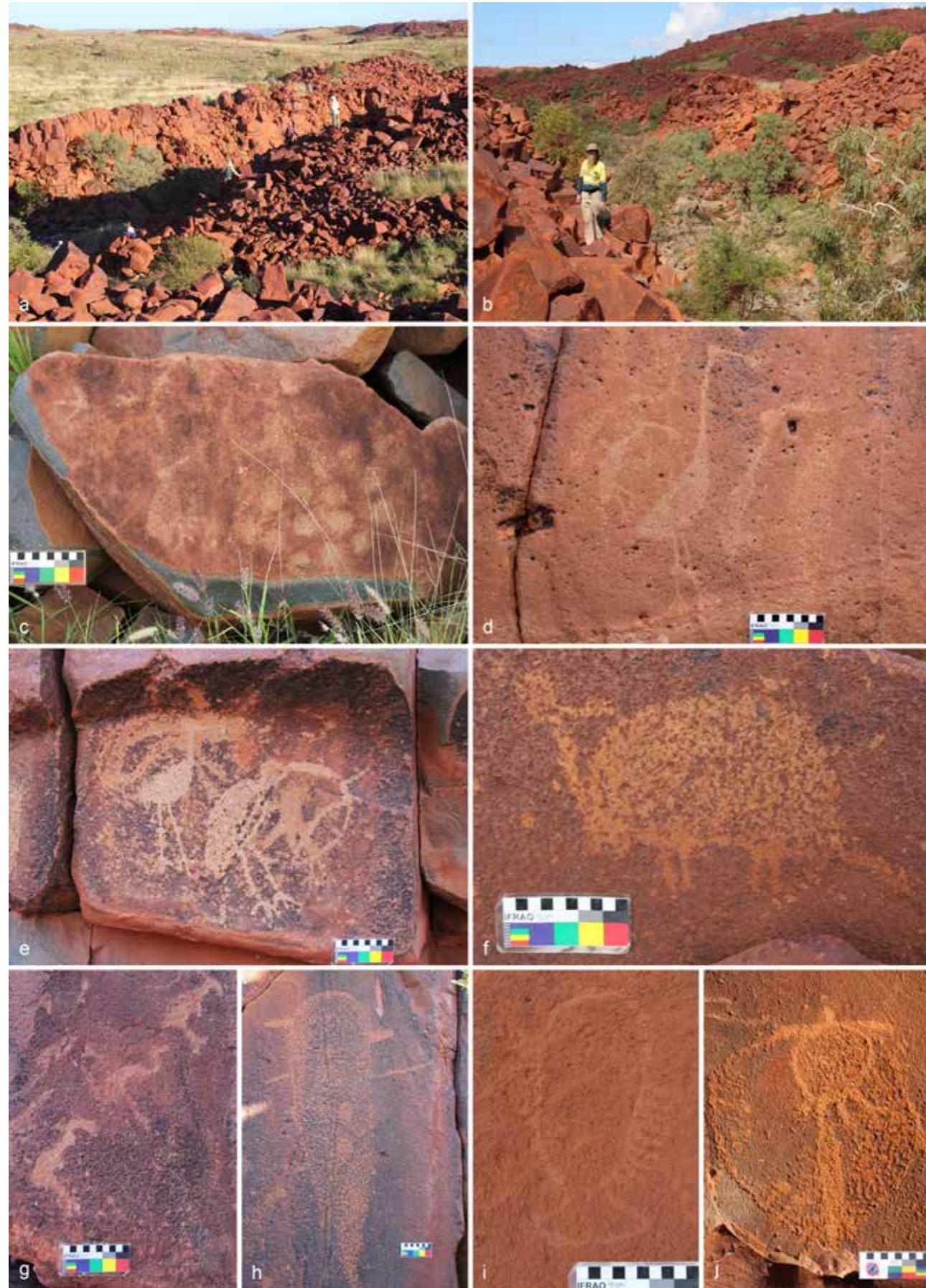


Figure 14.60. Some representative and outstanding faunal motifs from Queen Victoria Valley site complex: (a) looking westwards across the valley; (b) looking south-east up the valley with Ben Gunn standing on the slope; (c) panel with bird track, bird and 'bird egg' motifs; (d) vertical panel with three bird images; (e) vertical panel with three bird images superimposed over earlier motifs; (f) echidna; (g) vertical panel with three older style birds; (h) fish with lines into body; (i) fish with distinct fin feature; and (j) turtle with track superimposed over geometric.



Figure 14.61. Some representative and outstanding faunal motifs from site DPLH 9209: (a) looking north-west across the site to King Bay; (b) panel of scratched/abraded fish; (c) pair of pecked/abraded fat-tail macropods; (d) pecked fat-tail macropod. Examples from Midden Creek Road site complex DPLH 10564: (e) looking northwards along valley slope with King Bay in background; (f) macropod and bird pair with eggs; (g) turtle with track; and (h) turtle and fish with turtle tracks.

A total of 4,755 panels were recorded during these successive field schools, along the slopes and valleys to the east of the Burrup Road, and near King Bay, with a total of 9,063 motifs. Three hundred and forty (340) stone structures were recorded in these areas, including

(in 2018) the 171 structures (include 152 standing stones) that are part of the Flying Foam Massacre memorial site (Figure 14.62), where the Yaburara hold their annual commemoration of this event.

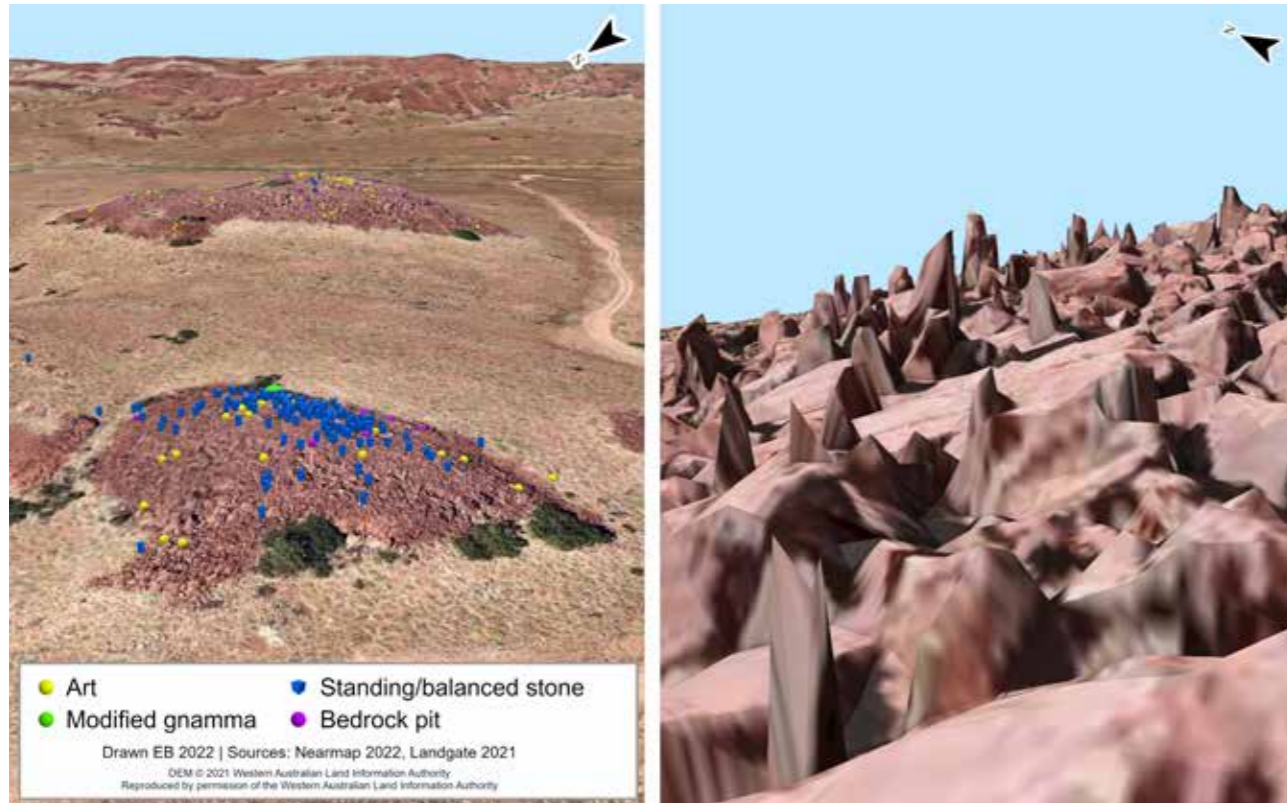


Figure 14.62. 3D model of the Flying Foam Massacre memorial site.

All five listed National Heritage criteria are met by the recorded assemblages of these field schools (Table 14.35 and Figure 14.14.63). There are archaic faces, and

early, middle and later-period characteristic Murujuga human forms.

NHL CRITERIA	IDENTIFIED MURUJUGA NHL VALUES R	2013	2014	2015	2016	2018	2019*
b	1. Diversity of engraved human forms (site contains an engraving of a human figure)	X	X	X	X	X	
f	2. Diversity and creativity in human forms	X	X	X	X	X	
d	3. Human forms representative of other Pilbara-style provinces	X	X	X	X	X	
b	4. Complex scenes with human forms demonstrating antiquity	X	X	X	X	X	
f	5. Complex scenes of human activity of unusual creativity	X	X	X	X	X	
a	6. Different degrees of weathering on faunal motifs showing changing response to sea-level change	X	X	X	X	X	
c	7. Different weathering of motifs showing relative chronology	X	X	X	X	X	
c	8. Large number of superimpositions showing relative chronology	X	X	X	X	X	
a	9. and 10. Archaic face present	X (6)		X (7)	X (3)	X (#)	
b	11. Site contains more than 50 motifs	X	X	X	X	X	
c	12. Site contains more than 50 motifs associated with other archaeological evidence	X	X	X	X	X	
b & d	13. and 14. The site contains a standing stone, including those with known functions / rare characteristics	X	X	X	X	X	X
b & d	15. and 16. The site contains a definite cultural stone pit and/or circular stone arrangement	X	X	X	X	X	X

Table 14.35. Identified National Heritage values criteria for the recorded cultural heritage features from the 2013–2016, 2018 and 2019 field schools in the southern Burrup. *Only the sites recorded in the BMIEA lands in 2019 included here.

Several locations are heavily visited by tourists and 83 instances of graffiti were recorded by these six field schools.

Interestingly, none of these are in the Queen Victoria Valley and most (n = 65) were recorded in 2018 around the popular

picnic spot near King Bay and the Flying Foam Massacre site. Many of this inappropriate marking behaviour may relate to the construction period for the Pilbara Port/LNG Hub from

the late 1970s and early 1980s, as this was a popular spot at this time (Ken Mulvaney, personal observation), although the area continues to be a popular fishing spot today.

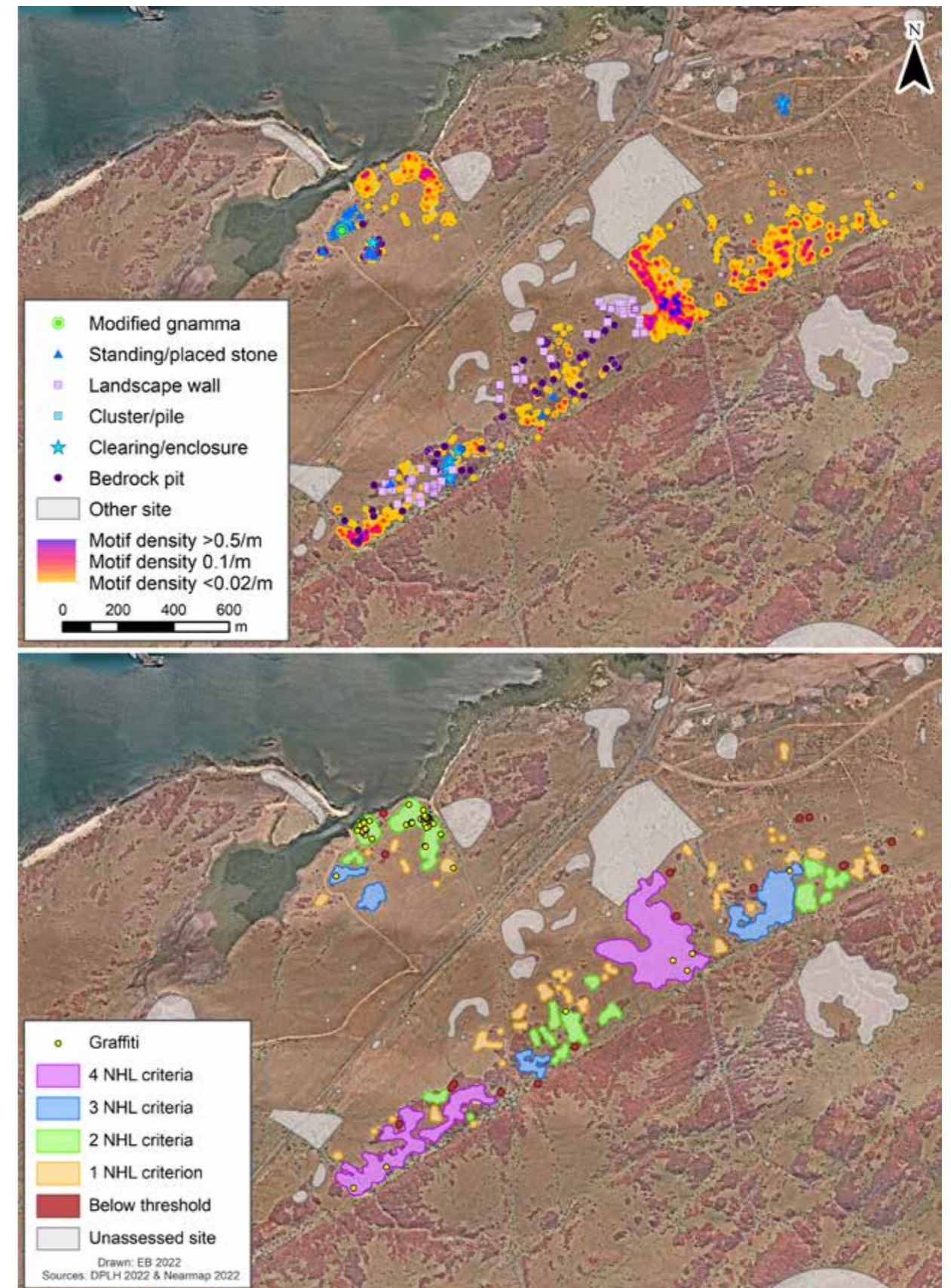


Figure 14.63. Southern Burrup landscapes covered by the 2013–2016, 2018 and 2019 field schools showing (top) distribution of recorded cultural features with density of petroglyphs; and (bottom) areas assessed with National Heritage values (>50 motifs, anthropomorph, archaic face and stone structures present) and occurrences of graffiti.

Southern Central Burrup – Murujuga National Park

Two field schools have been located within the national park and were chosen by MAC specifically for management purposes (Figure 14.64). The 2019 field school was based at Nganjarli (previously known as Deep Gorge) and was undertaken ahead of the installation of the boardwalk and paths. The 2022 field school focused on a proposed DBCA walking trail from the Nganjarli car park. The results of the 2019 data, based on gabbro geology, have been published (McDonald et al. 2021) and so is not detailed here. The 2022 field school covered the hillslopes above and adjacent to a kilometre-long section of a proposed walking trail running south from the Nganjarli car park. This overlies two different geologies (gabbro and granophyre) and included two separate drainage lines and a semi-permanent pool at the southern (upper limit) of the survey transect (c. 150 m wide). The audit of the DPLH records revealed that this pool and its site complex was originally documented in 1983 as Casper’s Pool (DPLH 9607).

A total of 548 panels were recorded during this 2022 field school, these with 994 motifs. Twenty-three stone structures were recorded as well, and one team also recorded stone artefact and midden evidence in the northern and southern parts of the survey transect, along with a quarry on an unmapped dolerite dyke midway along the transect (Figure 14.64). A total of 15 sites resulted from this recording exercise, several of which were previously recorded/registered with DPLH (Table 14.36).

At the northern end of the transect the panel distribution forms a continuation of the Deep Gorge site complex recorded earlier (McDonald 2009a), now DPLH 9407 (Nganjarli Deep Gorge), while at the southern end the site complex is a continuation of the site originally recorded as Casper’s Pool (DPLH 9607). While this transect is bookended by two site complex-sized assemblages, the majority of documented sites here comprise small and medium-sized petroglyph assemblages.

SITE	ANTHROPOMORPHIC	GEOMETRIC	OTHER	TRACKS	ZOOMORPHIC	TOTAL
BFS-MU130		1	1		1	3
BFS-MU131				1	1	2
BFS-MU133			1			1
BFS-MU138			1			1
BFS-MU139	1	3		1		5
BFS-MU140	1					1
BFS-MU141	1	1		1		3
BFS-MU142	3	5		3		11
BFS-MU143					2	2
BFS-MU144		1				1
BFS-MU145		1			2	3
BFS-MU146	8	11	2	6	3	30
BFS-MU147	3	1			3	7
DPLH 9607 (Casper’s Pool)	104	170	37	77	61	449
DPLH 9407 (Nganjarli Deep Gorge)	83	221	10	76	85	475
Total	204	415	52	165	158	994

Table 14.36. Field school sites and motif classes from the 2022 Nganjarli walking trail.

The recorded stone structures are also concentrated within the two larger site complexes. Although only seven were documented here, a total of 32 structures have so far been identified within the Nganjarli (DPLH 9607) complex. Eighteen of these were documented

during the 2019 fieldwork (McDonald et al. 2021: 281), six (one bedrock pit and five clearings/enclosures) during fieldwork by Emma Beckett (Beckett 2021: 202) and one standing stone during the 2009 fieldwork (McDonald 2009a; McDonald et al. 2021: 281).

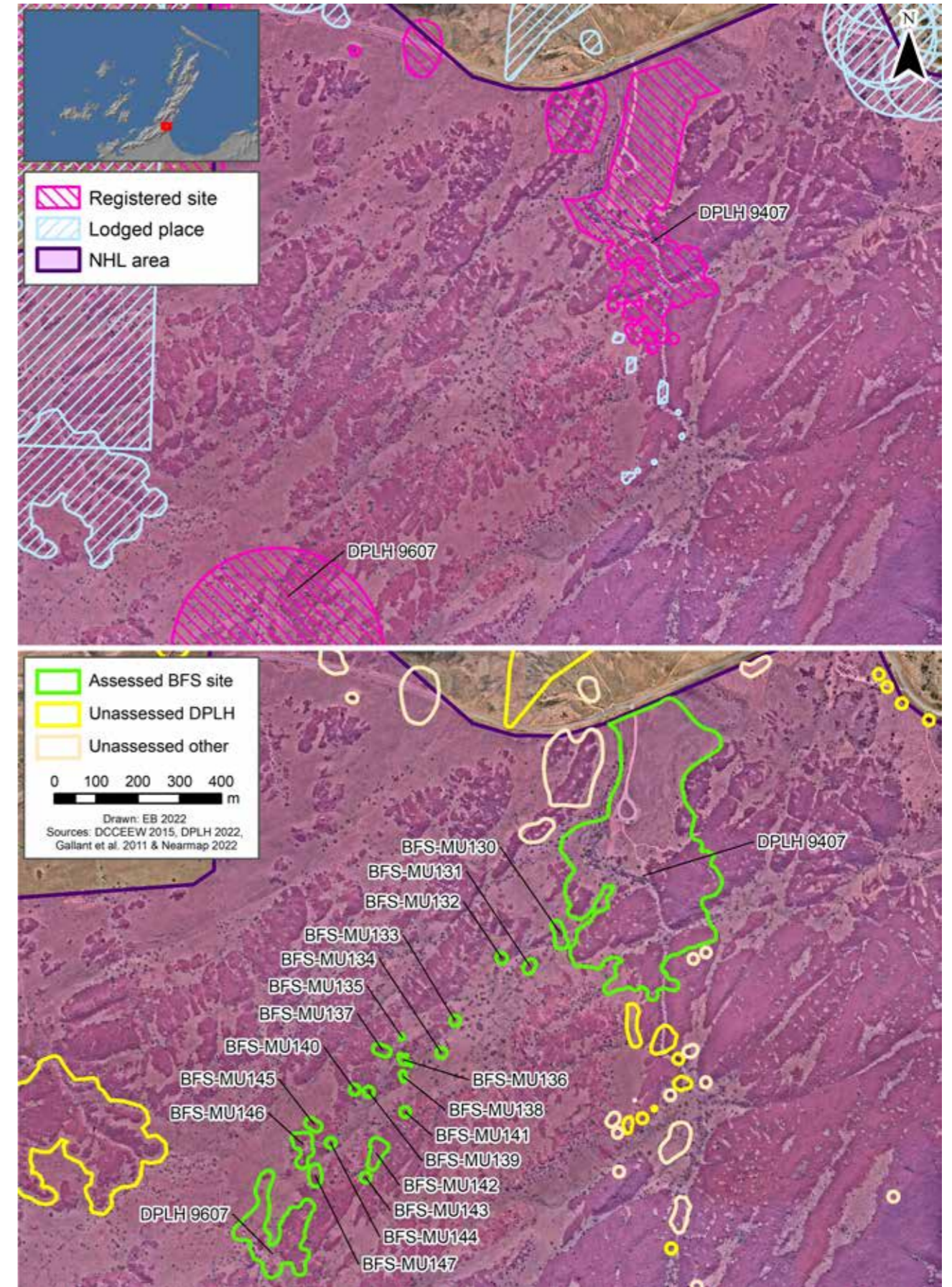


Figure 14.64. Map of the 2019 and 2022 field school locations showing (top) the DPLH registered sites in this area; and (bottom) the current audited boundaries of recorded features in this area.

SITE	STANDING STONE	CLUSTER/ PILE	CLEARING/ ENCLOSURE	LANDSCAPE WALL	BEDROCK PIT	TOTAL
Nganjarli (Deep Gorge)			1		6	7
BFS-MU132	2					2
BFS-MU131					1	1
BFS-MU134		1				1
BFS-MU139					2	2
BFS-MU137	1				2	3
BFS-MU136					1	1
BFS-MU135					1	1
Casper's Pool		1		2	2	5
<i>Total</i>	<i>5</i>	<i>2</i>	<i>14</i>	<i>2</i>	<i>15</i>	<i>23</i>

Table 14.37. Southern Central Burrup – Murujuga National Park: stone structures.

All five listed National Heritage criteria are met by this field school's relatively small assemblages (Table 14.38 and Figure 14.68). There is one archaic face as well as early, middle and later-period characteristic Murujuga human forms, albeit in small numbers. This area has more early terrestrial animal forms, all with heavy patination. Macropods (n = 49, including some fat-tailed varieties) were recorded in a variety of locations. Some were in

difficult positions (Figure 14.65a), suggesting some of these blocks have shifted since the art was produced. Macropods and terrestrial others (n = 21) are the most common animal motifs, with relatively little overprinting by more recent marine-themed subjects; turtles (n = 7) and fish (n = 12) are relatively rare compared to birds (n = 24). Bird tracks (n = 78) and macropod track (n = 69) are co-dominant.

NHL CRITERIA	NHL IDENTIFIED MURUJUGA VALUES	NGANJARLI WALK
b	1. Diversity of engraved human forms (site contains an engraving of a human figure)	X
f	2. Diversity and creativity in human forms	X
d	3. Human forms representative of other Pilbara-style provinces	X
b	4. Complex scenes with human forms demonstrating antiquity	X
f	5. Complex scenes of human activity of unusual creativity	X
a	6. Different degrees of weathering on faunal motifs showing changing response to sea-level change	X
c	7. Different weathering of motifs showing relative chronology	X
c	8. Large number of superimpositions showing relative chronology	X
a	9. and 10. Archaic face present	X (1)
b	11. Site contains more than 50 motifs	X
c	12. Site contains more than 50 motifs associated with other archaeological evidence	X
b & d	13. and 14. The site contains a standing stone, including those with known functions / rare characteristics	X
b & d	15. and 16. The site contains a definite cultural stone pit and/or circular stone arrangement	X

Table 14.38. Identified National Heritage values criteria for the recorded cultural heritage features in the 2022 field school south of Nganjarli.

There is a mixture of contrast states, with CS2 and CS3 being the dominant weathering condition here (see following discussion), but many assemblages here have earlier forms (CS1), and very few in the more recent phases. Grinding patches are only common around

Casper's Pool where there is also midden (mostly *Tegillarca*) and stone artefact deposits. Lithic artefacts and middens are persistent occupation evidence and were recorded systematically.

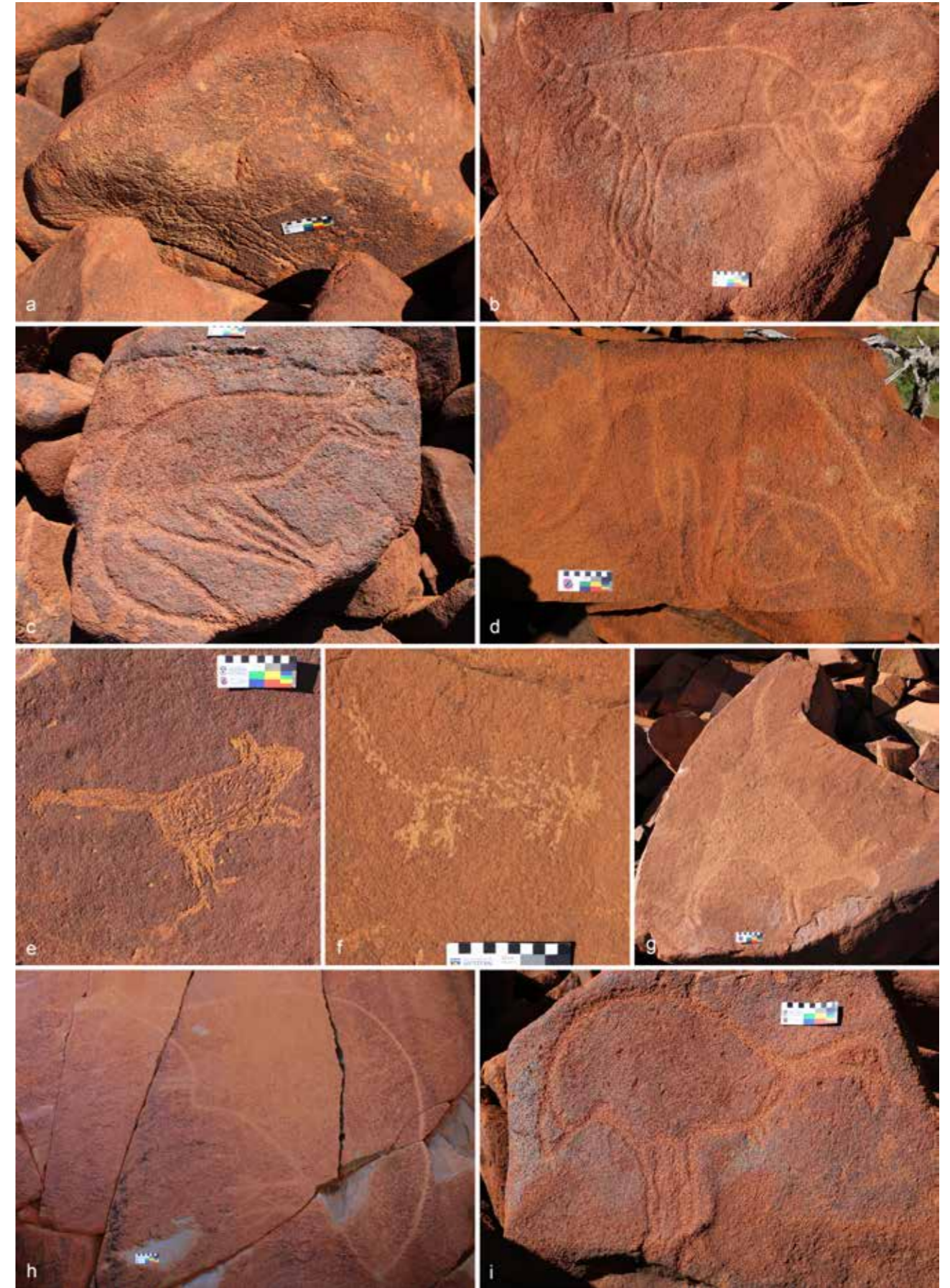


Figure 14.65. Examples of some representative and outstanding faunal motifs from this part of the Murujuga National Park: (a) petroglyphs of macropod in difficult to produce and low view shed; (b-d) variations on the fat-tail macropod design; (e-g) unusual graphic depictions of macropod image; and (h-i) variations on the emu motif.

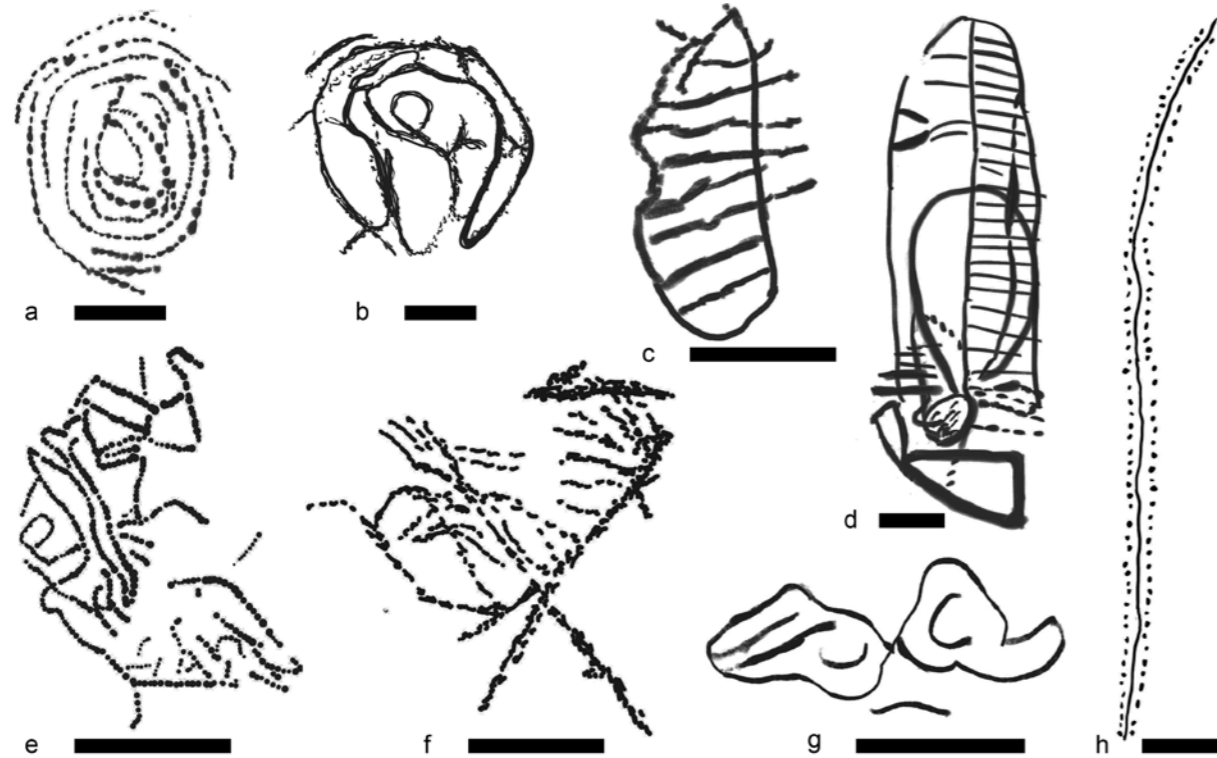


Figure 14.66. Line drawings of some unusual geometric motifs in this part of Murujuga National Park including a-d) concentric circle and parallel line designs, and (h) a lizard track along a natural crack (scale bar = 10 cm).

Southern Burrup – Rio Tinto leases

Field schools were run within Rio Tinto leases between 2010 and 2012 (Happy Valley and west of Dampier Road). Hunters Valley was recorded during the 2018 season, with time being split between this well-known site adjacent to the East Intercourse railway line (Virili 1977) and BMIEA land in the King Bay area (discussed earlier). The Happy Valley site complex is located 2.5 km south of Dampier and focused on a short gully through the gabbro massif (Figure 14.14.68). The area covered by these field schools is approximately 6.25 ha, with the additional area of 6.8 ha recorded in 2009 by Mulvaney and Gunn, which has been analysed previously (Clayton 2015; Gunn and Mulvaney 2009; Mulvaney 2011a, 2015).

The 2012 field school exercise also took the opportunity to investigate an area of about 52 ha that was subject to a scrub fire caused through upgrade work at the intersection of Dampier Road and Burrup Road.

A total of 6,157 panels were recorded during these field schools, these with 7,863 motifs. The vast majority of these (77%) are in the Happy Valley site, where 56 stone structures were also recorded (Figure 14.70). These recordings combine to form 31 sites, several of which were previously partially recorded/registered with DPLH (Table 14.39 and Table 14.40). Happy Valley and Hunters Valley are both site complex-sized assemblages, and all the sites recorded in these various field school

areas contribute to the full range of assemblage characteristics, these being mostly small and medium sized with several large sites.

These areas have many of the earlier terrestrial forms with heavy patination including many macropods ($n = 172$ at Happy Valley; $n = 38$ at Hunters Valley, including many fat-tailed varieties) as well as an overprinting of more recent marine-themed subjects, including turtles ($n = 199$ at Ha V and $n = 15$ at Hu V) and fish ($n = 104$ at Ha V and $n = 21$ at Hu V) and birds ($n = 238$ at Ha V and $n = 21$ at Hu V). Bird tracks dominate in both site complexes.

There is a mixture of contrast states, with CS1 and CS2 being the dominant weathering condition here (see following discussion), with few assemblages having more recent forms (CS4 and CS5). In all areas, grinding patches are a common site component. Lithic artefacts and middens are persistent occupation evidence, although these have not been recorded systematically throughout these field schools. In addition to the normal graffiti of initials, names and dates, there are examples within Happy Valley, especially along the main drainage line of petroglyphs, that have been re-marked, presumably done in the late 1960s and early 1970s to improve visibility for photographs. There are 15 instances of graffiti in Hunters Valley, this deriving mainly from the construction period of the adjacent rail line in the early 1970s.

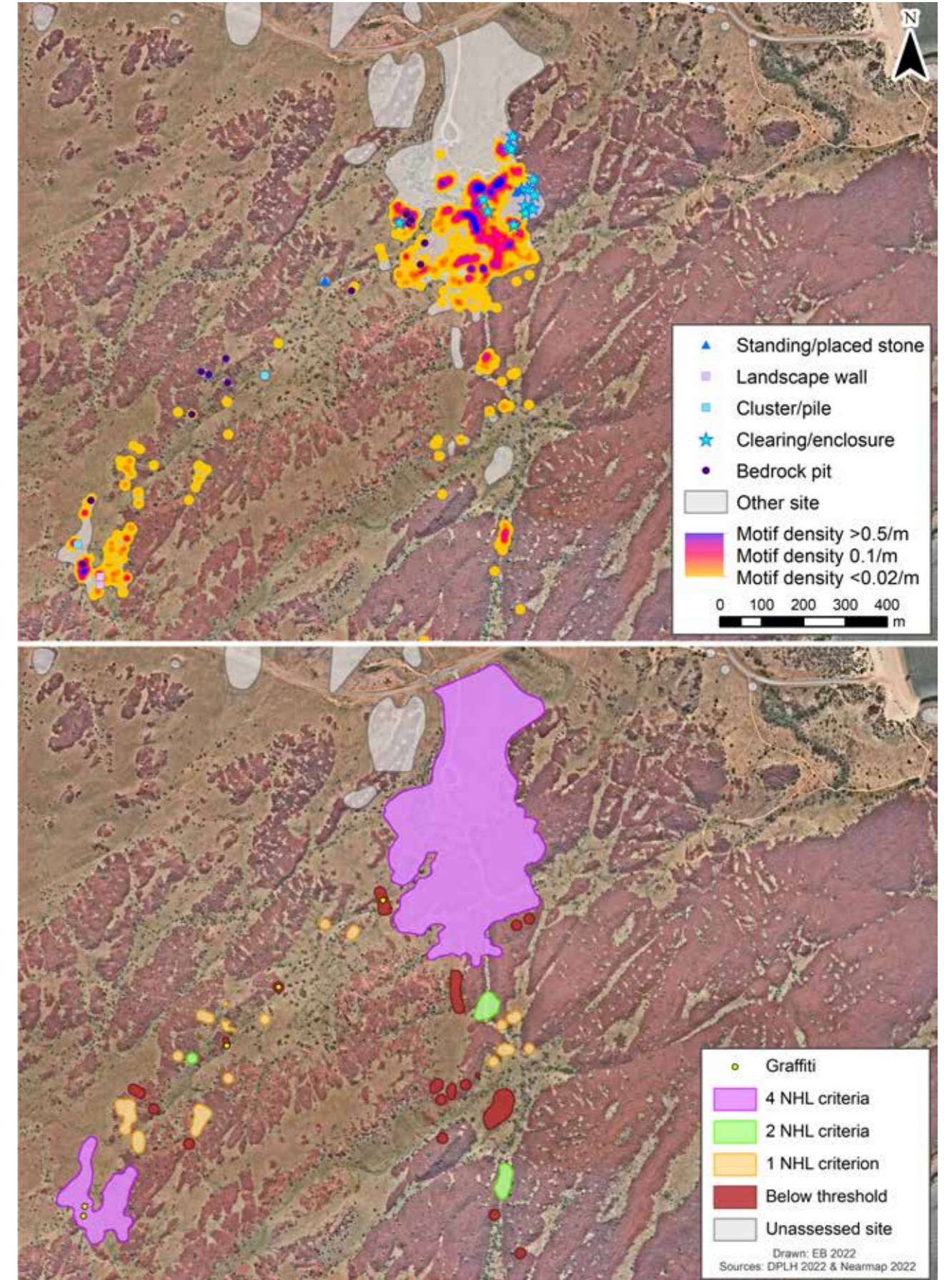


Figure 14.67. Southern Central Burrup landscapes covered by the 2019 and 2022 field school and McDonald 2009 Deep Gorge survey: (top) with distribution of recorded cultural features and density of petroglyphs; and (bottom) assessed areas with National Heritage values and occurrences of graffiti.

SITE NAMES	ANTHROPOMORPHS	GEOMETRIC	OTHER	TRACKS	ZOOMORPHS	TOTAL
BFS-MU003	1	31		10	1	43
BFS-MU004			1			1
BFS-MU005	10	24	25	31	1	91
BFS-MU006		1				1
BFS-MU007				1		1
BFS-MU008	21	99	13	10	9	152
BFS-MU009	2					2
BFS-MU010		3				3
BFS-MU011	3	3	1	2	1	10
BFS-MU012			1			1
BFS-MU013		5		4		9
BFS-MU014			2			2
BFS-MU015		4	4			8
BFS-MU016	1					1
BFS-MU017		1		2		3
BFS-MU018	1	2				3
BFS-MU019		2				2
BFS-MU020		4				4
BFS-MU022	1					1
BFS-MU023		3				3
BFS-MU024		7				7
BFS-MU025		1	1			2
BFS-MU026		1				1
BFS-MU027			1			1
BFS-MU028				2		2
BFS-MU029		1				1
BFS-MU030	1	3	1	2		7
BFS-MU021	12	43	3	6	6	70
(Dampier South)						
DPLH 11758						
(Happy Valley)	1,983	2,246	112	526	1,205	6,072
BFS-MU128		2	8			11
(Hunters Valley 1)						
DPLH 11757						
(Hunters Valley Site Complex)	420	547	197	44	143	1,351
Total	2,457	3,033	370	640	1,366	7,866

Table 14.39. Sites recorded from the 2010–2012 and 2018 field schools held on Rio Tinto leases.

SITE	STANDING STONE	DISCRETE PLACED STONE	BEDROCK PIT	TOTAL
Happy Valley	47	1	8	56

Table 14.40. Southern Burrup – Rio Tinto leases: stone structures.

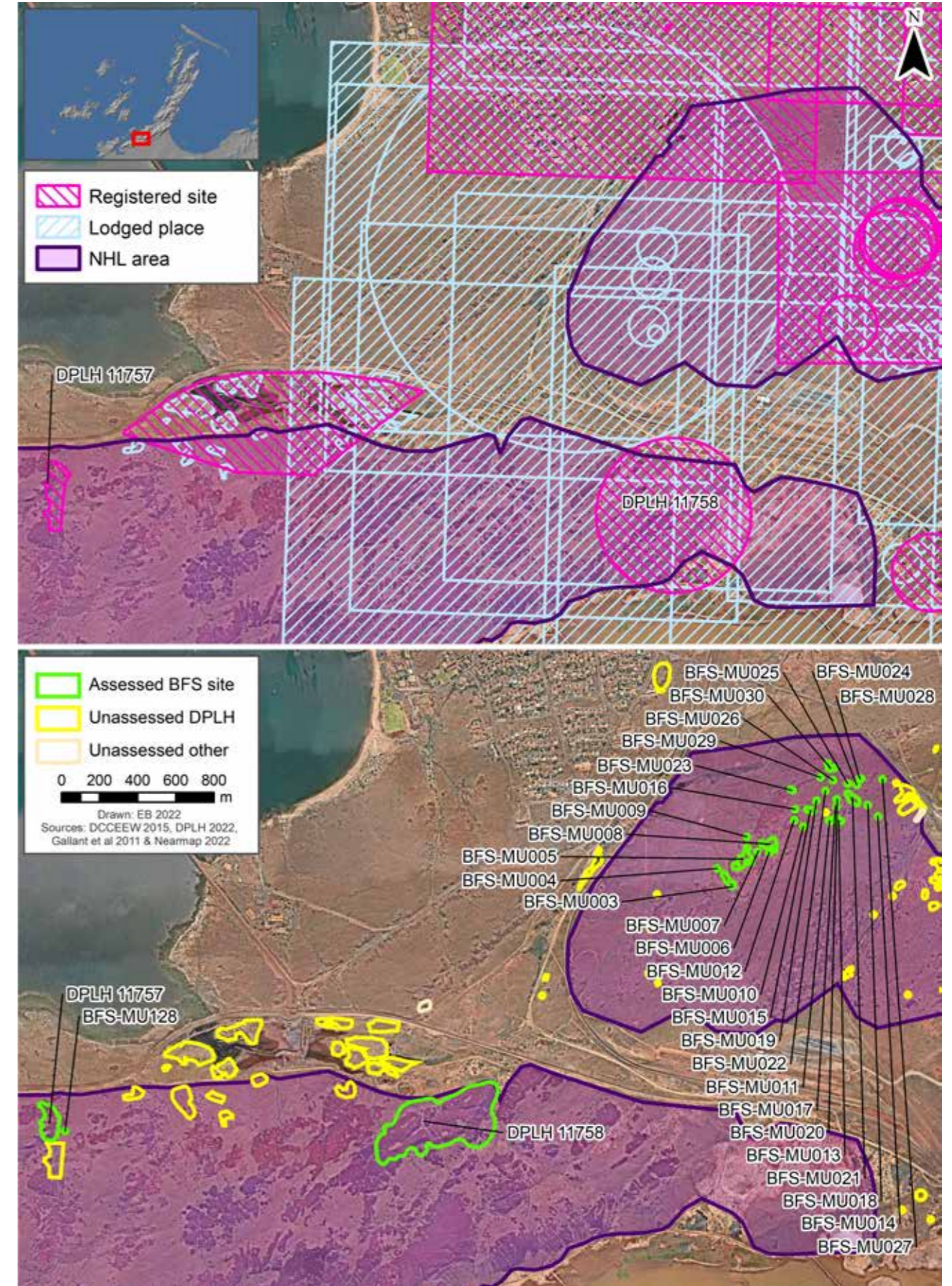


Figure 14.68. Locations recorded by the 2012 and 2018 field schools and National Heritage boundaries with (top) DPLH registered sites in this area (note: no BFS grid reference locations for 2010, 2011; DPLH 11758 is registered in wrong location); and (bottom) the current audited boundaries of recorded features in this area.

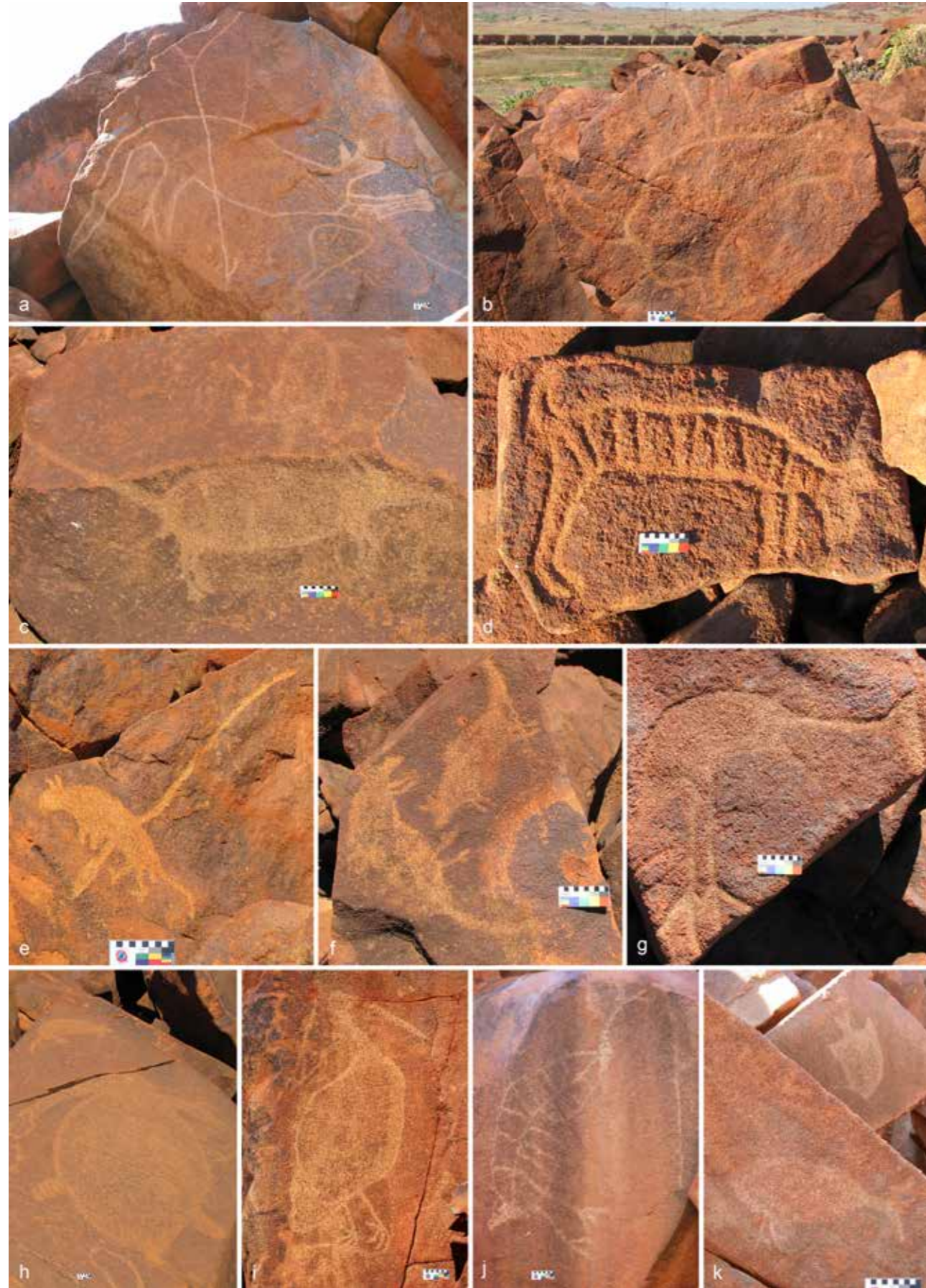


Figure 14.69. Some representative and outstanding faunal motifs from the Happy Valley site in Rio Tinto's leases: (a) one of the petroglyphs reworked in recent times; (b) macropod with two lines to back and the artistic convention of eyes depicted; (c) uncommon species with long snout and ears; (d) the (well-publicised) thylacine; (e) speared small animal; (f) macropod; (g) possible jabiru stork image; (h) long-neck turtle and small mammal; (i) pelican; (j) late-period bird; and (k) bird and fish on adjacent panels.

All five listed National Heritage criteria are met by these field school assemblages (Table 14.41 and Figure 14.70). There are archaic faces as well as other early motifs including the so-called "climbing men", along with middle and later period diagnostic Murujuga human forms.

NHL CRITERIA	IDENTIFIED MURUJUGA NHL VALUES	HAPPY VALLEY	DAMPIER SOUTH	HUNTERS VALLEY
b	1. Diversity of engraved human forms (site contains an engraving of a human figure)	X	X	X
f	2. Diversity and creativity in human forms	X	X	X
d	3. Human forms representative of other Pilbara-style provinces	X		X
b	4. Complex scenes with human forms demonstrating antiquity	X		X
f	5. Complex scenes of human activity of unusual creativity	X		X
a	6. Different degrees of weathering on faunal motifs showing changing response to sea-level change	X	X	X
c	7. Different weathering of motifs showing relative chronology	X	X	X
c	8. Large number of superimpositions showing relative chronology	X		X
a	9. and 10. Archaic face present	X (3)		X (1)
b	11. Site contains more than 50 motifs		X	
c	12. Site contains more than 50 motifs associated with other archaeological evidence	X		X
b & d	13. and 14. The site contains a standing stone, including those with known functions / rare characteristics	X	X	X
b & d	15. and 16. The site contains a definite cultural stone pit and/or circular stone arrangement	X		X

Table 14.41. Identified National Heritage values criteria for the recorded cultural heritage features in the 2012 and 2018 field schools on the southern Burrup.

Geology

There has been some debate in the literature about whether the dominant geologies on the Burrup Peninsula (Dampier Island / Murujuga) were used preferentially to produce petroglyphs (see Chapter 2; Bednarik 2011; Bird and Hallam 2006; Donaldson 2011a, 2011b). Most of the field schools have taken place on landscapes which are on Gidley granophyre, with only the Happy Valley (2010–2012) and the Nganjarli recordings (2019, 2022) being located on the rougher gabbro with thicker weathering rind surfaces (Hickman 2001; Hickman et al. 2006). By combining the Rio Tinto records (n = 969) from the Happy Valley East survey (Gunn and Mulvaney 2009) and the Deep Gorge transect recording completed for

management purposes (n = 3,471; McDonald 2009a), we have recorded over 28,000 motifs for the Burrup Peninsula from these two geologies (Table 14.42. Geology for motifs recorded between 2009 and 2022 by the authors not directly linked to the ARC research.). Within these broader geological landscapes, there are numerous dolerite dykes, as well as granite and quench gabbro surface exposures. None of the rock art recorded during the field schools was observed to occur on these other geologies, although rock art is known on dolerite and less frequently on granite and the very coarse-textured quench gabbro (see McDonald and Beckett 2022).

GEOLOGY	MOTIFS	%F
Gabbro	12,144	42.58
Gidley granophyre	16,370	57.42
Total	28,517	100.00

Table 14.42. Geology for motifs recorded between 2009 and 2022 by the authors not directly linked to the ARC research.

We compared geology with contrast state and there appears to be a correlation between gabbro geology and more advanced states of weathering (Table 14.43). This matches the pattern observed previously regarding the rates of surface weathering and patination (Mulvaney 2010). Using the contrast state data collected from the 12 field school seasons (noting the larger sample size for granophyre), there is a dominance of CS1 and CS2 weathering for gabbro. It is interesting that the proportions of CS5, however, are similar for both geologies (Figure 14.71).

GEOLOGY	CS1	CS2	CS3	CS4	CS5	TOTAL
Gabbro	1,341	2,607	1,778	530	93	6,349
%	21.12	41.06	28	8.34	1.46	
Granophyre	1,221	3,769	6,730	3,336	400	15,456
%	7.9	24.38	43.54	21.58	2.58	
Total	2,562	6,376	8,508	3,866	493	21,805
%f	11.49	28.61	38.18	17.35	2.21	

Table 14.43. Correlation of dominant Murujuga geologies and contrast state recorded by the 12 BFS.

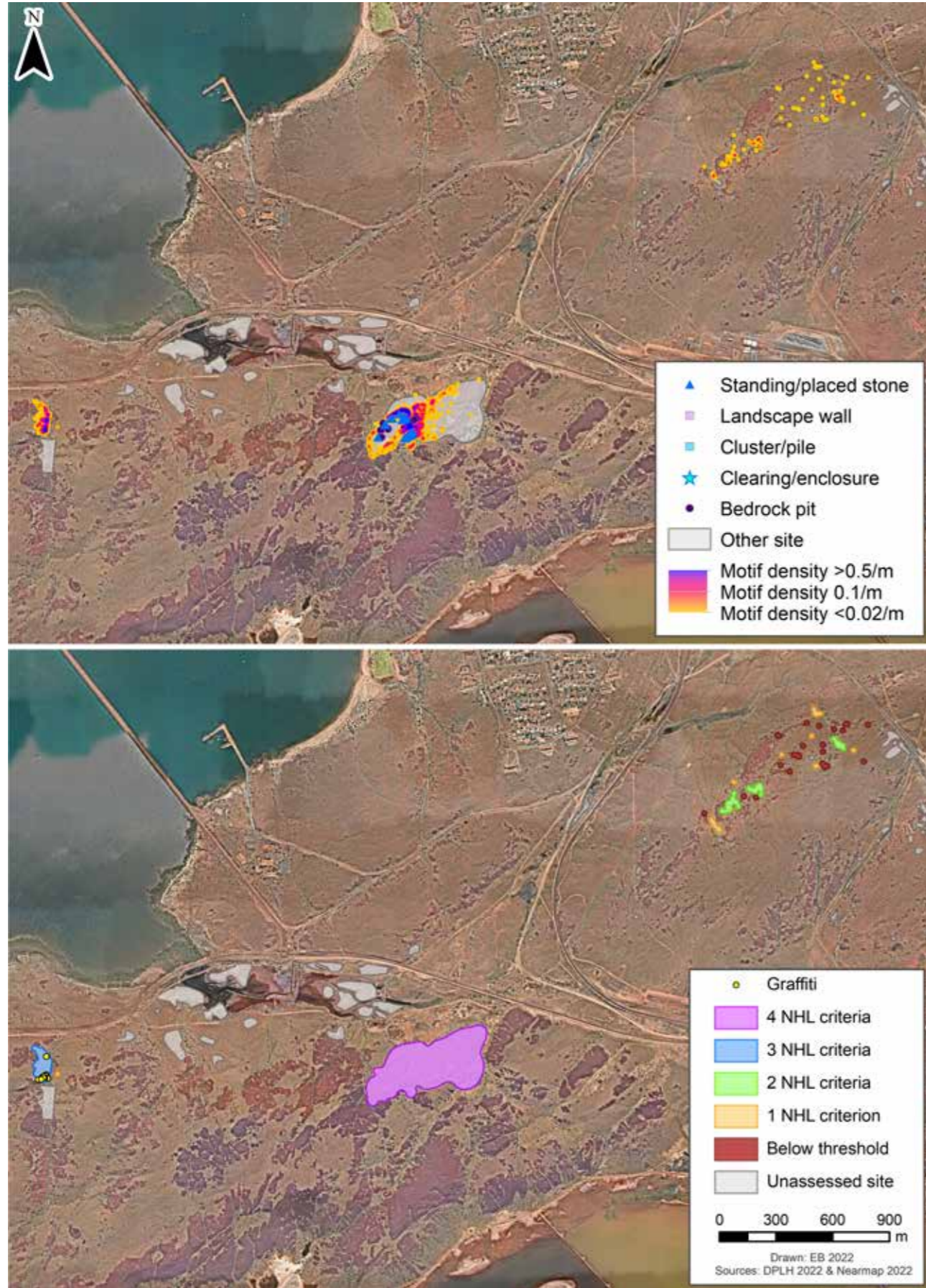


Figure 14.70. Southern Burrup landscapes covered by the 2012 and 2018 field schools showing (top) distribution of recorded cultural features with density of petroglyphs; and (bottom) assessed areas with National Heritage values and occurrences of graffiti.

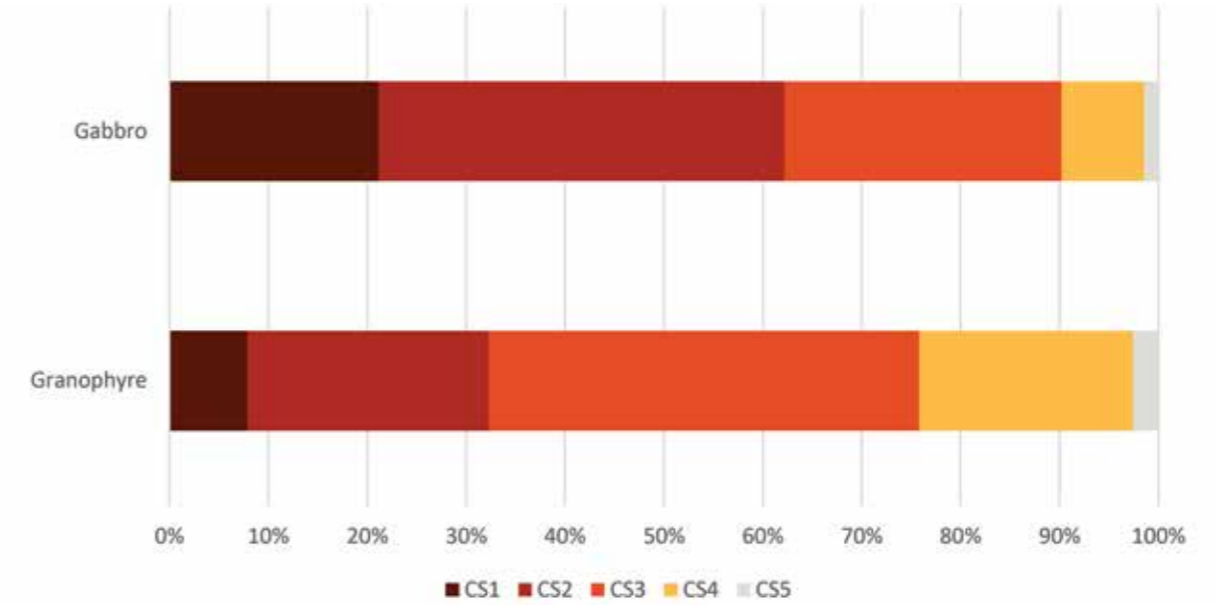


Figure 14.71. Proportions of main Murujuga geologies and contrast states from the 12 BFS.

Comparisons

Almost 22,000 motifs have been documented during the 12 years of field schools conducted across the Burrup. Nearly half the motifs are geometric, and approximately a quarter are human-like figures, tracks and various animals. Additional rock marking was recorded under the category 'Other', including grinding patches, graffiti, and random and linear markings, although the categorisation of these has evolved over the 12 years. These categories are excluded from this discussion (Table 14.44 and Figure 14.72). The distribution across

the four subject categories conforms broadly with those presented by Vinnicombe (2002: Table 2) based on data amalgamated from previous surveys at Woodside LNG, NEGP, Maitland, Hearson's–King Bay. Geometrics ranged between 35% and 49%; human figures between 15% and 26.6%; and zoomorphs from 25% to 37% (noting that Vinnicombe included tracks with their associated makers i.e. human < > feet / animal < > bird/kangaroo etc. tracks).

BFS YEAR	ANTHROPOMORPHS	GEOMETRIC	TRACKS	ZOOMORPHS	TOTAL
2010	779	1,033	238	493	2,543
2011	738	932	211	430	2,311
2012	519	532	147	297	1,495
2013	319	581	272	199	1,371
2014	849	1,273	345	496	2,963
2015	453	1,045	254	256	2,008
2016	459	1,137	253	209	2,058
2017	516	1,109	295	321	2,241
2018	587	1,252	119	268	2,226
2019	228	452	139	220	1,039
2021 I	216	607	204	183	1,210
2022	204	438	165	158	965
Total	5,867	10,391	2,642	3,530	22,430
%f	26.16	46.33	11.78	15.74	

Table 14.44. Class proportions across the 12 field schools held on the Burrup 2012–2022.

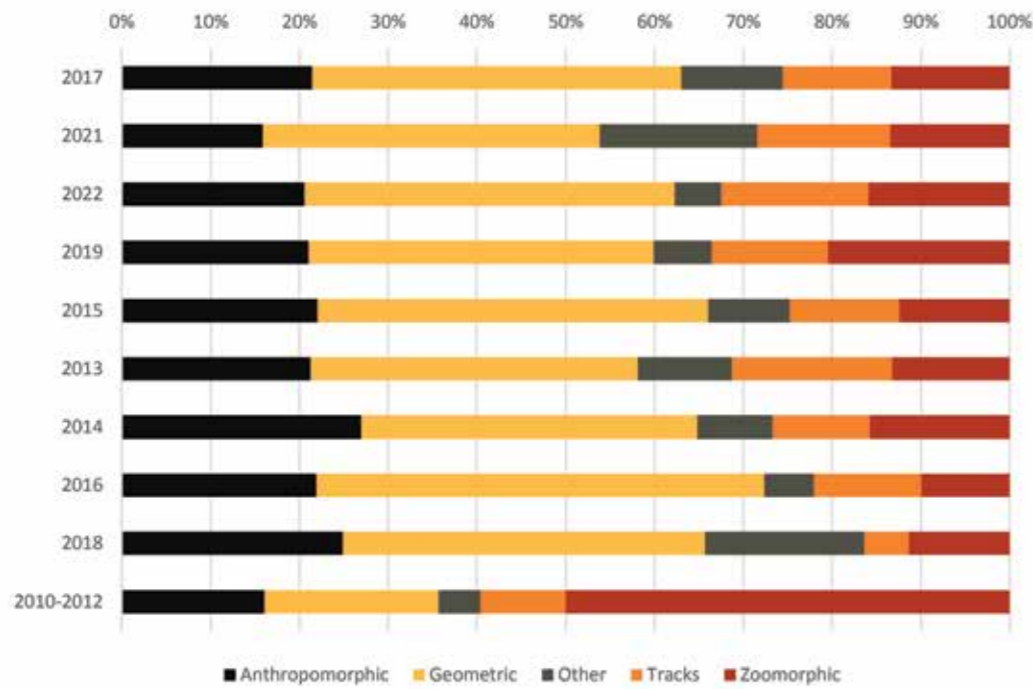


Figure 14.72. Motif class preference across the Burrup in relation to the location across the landscape combining several years of data.

While geometric motifs are consistently dominant across the archipelago, some assemblages have significantly higher proportions of these (e.g. the slopes above Emu Face; north of Queen Victoria Valley), while other areas have significantly lower proportions (e.g. Happy Valley and Queen Victoria Valley). Human figures are significantly lower in proportions at Picnic Creek (while grinding patches and tracks are present in higher than usual numbers). The significant differences are shown

(Figure 14.73). On the massive gabbro slopes and creek line of Happy Valley and the Nganjarli site complex, human figures are in relatively higher proportions compared to geometric motifs documented in granophyre-dominated locations. Zoomorphs are present in higher numbers in Happy Valley and Emu Face Valley. Zoomorphs appear in significantly higher numbers at Nganjarli, but in lower numbers at Hunters Valley and Emu Face Valley.

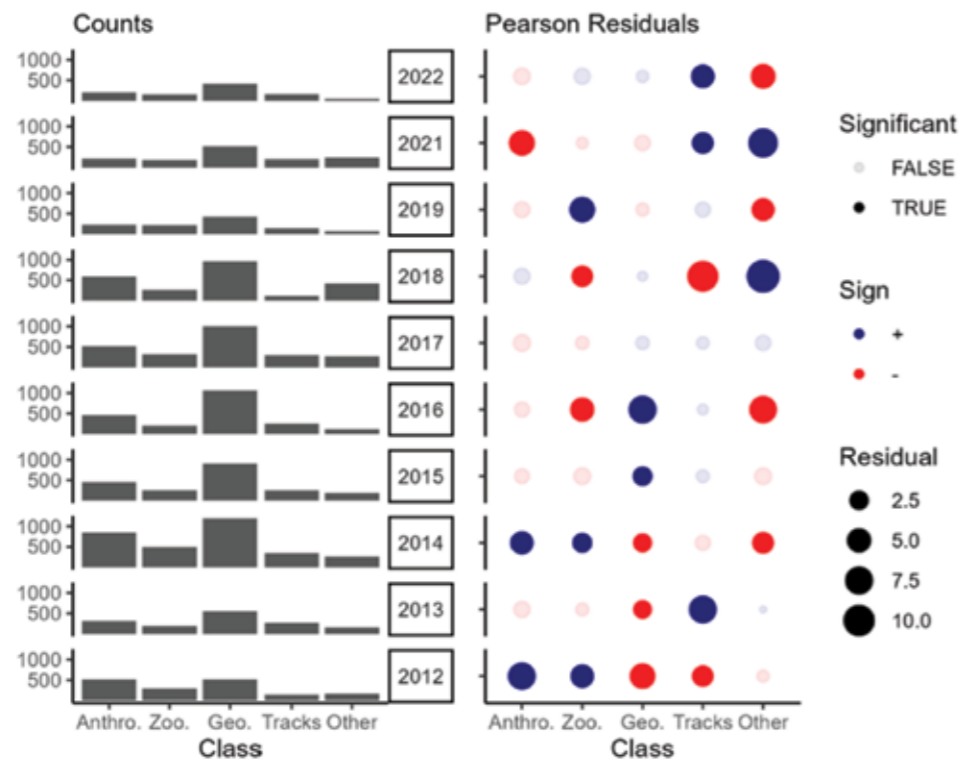


Figure 14.73. Pearson's R statistical significance values for the different motif classes recorded during 10 years of field schools.

The extent of weathering, measured as contrast state (CS) between the engraved and adjacent unaltered surface, provides a proxy for relative age. Data derived from the field schools confirms many of the previously identified patterns of contrast state found more broadly across the archipelago (Table 14.45 and Figure 14.74). Most art production occurs within the middle range of

weathering condition (CS3), with more petroglyphs produced in the earlier phases (CS1 and CS2) compared to the more recent, higher contrast images (CS4 and CS5). There is variation across the locations targeted during the field schools, this likely reflecting the past pattern of resources and focus of people's presence and art production.

BFS YEAR	CS1	CS2	CS3	CS4	CS5
2017	253	606	1029	365	121
2021	64	284	491	363	39
2022	136	330	299	149	20
2019	395	256	202	119	38
2015	128	480	1,012	391	30
2013	138	317	662	364	13
2014	167	459	1,142	1,032	38
2016	248	609	973	215	19
2018	88	671	1073	393	74
2012	423	520	468	184	52
2011	263	1,172	688	175	32
2010	243	650	420	80	9
Total	2,546	6,354	8,459	3,830	485
%f	11.7	29.3	39.0	17.7	2.3

Table 14.45. Contrast state variations (motif totals 21,674) through the different field school assemblages across the Burrup (sorted north-south).

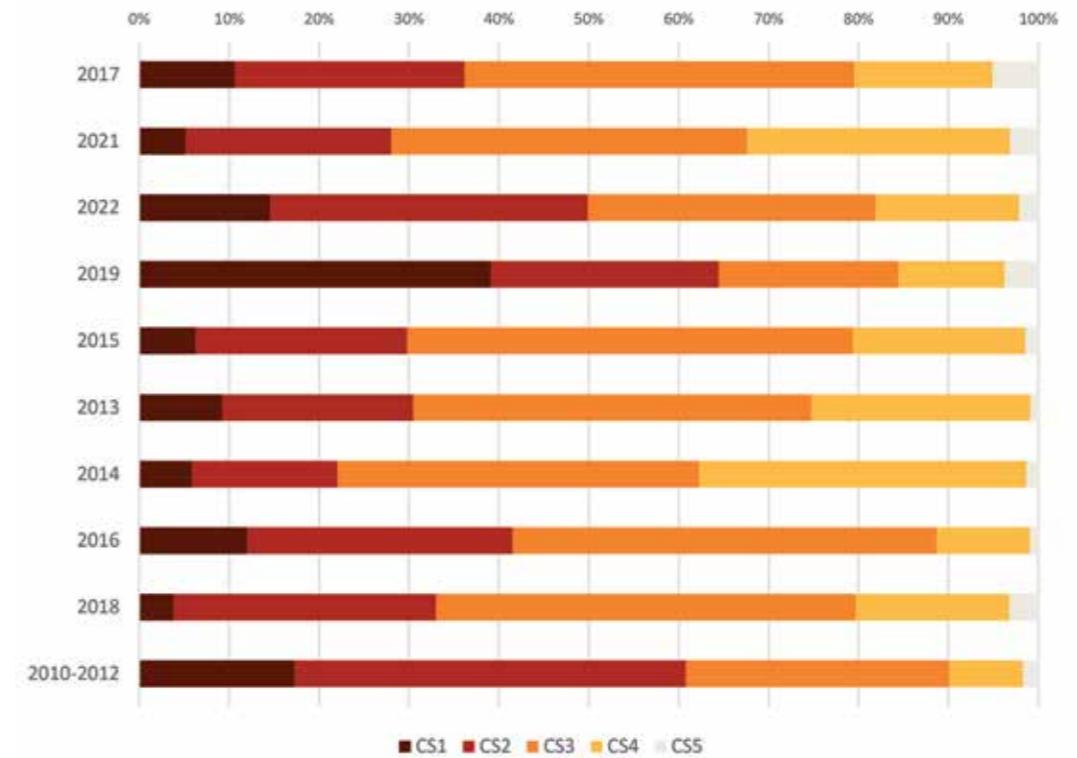


Figure 14.74. Contrast state variations through the different field school assemblages across the Burrup (sorted north-south).

Several of these assemblages show significant difference in the contrast state proportions (Figure 14.75). The Nganjarli and Happy Valley assemblages have significantly higher proportions of motifs in CS1 (and Happy Valley in CS2). Locations associated with drainage channels containing rock pools (e.g. Casper's Pool, Picnic Creek, Hunters Valley) show a relatively

higher proportion of CS4 and CS5 as well as a general spread across all weathering conditions, demonstrating the importance of these persistent potable water sources for human presence.

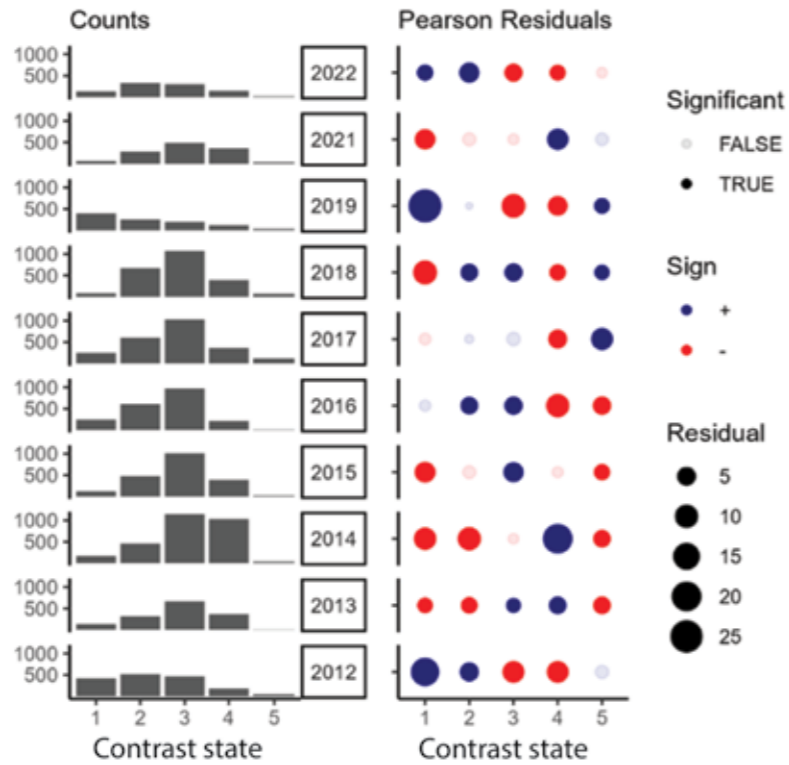


Figure 14.75. Statistical significance values for the different contrast states recorded in the BFS assemblages.

The change from terrestrial to marine themes is one of the characteristics of the changing style phases at Murujuga (Mulvaney 2011b; McDonald and Veth 2009). The proportions of different subjects across the field school assemblages, again, reveal the variability of people's choices across this part of the archipelago (Table 14.46 and Figure 14.76). Terrestrial themes are dominant in several locations associated with drainage systems (e.g. Nganjarli, Happy Valley and Hunters Valley),

while maritime themes are dominant at Picnic Creek (particularly turtles) at the southern end of Withnell Bay, and the areas associated with King Bay (particularly fish). The slopes in and around Emu Face and Queen Victoria valleys and on the granophyre knolls of Dampier South exhibit similar numbers of terrestrial and marine themes, demonstrating persistent connections to these places through time.

BFS YEAR	MACROPOD	QUADRUPED	LIZARD	SNAKE	TERRESTRIAL OTHER	BIRD	FISH	TURTLE	MARINE OTHER	DUGONG	STINGRAY	ANIMAL PART	CRAB
2017	98	24	7	9	13	42	33	74	1		1	19	
2021	4	7	10	4		14	23	88	3	1	8	21	
2022	49	14	6	2	21	24	12	7	8		4	11	
2019	72	35	20	3	17	40	8	16	6	2	1	3	
2015	61	28	6	5	10	25	47	54	2	1		15	2
2013	15	25	32	6	5	49	23	33	3	1		7	
2014	54	48	21	3	18	85	102	103	4	7	5	45	1
2016	38	18	17	7	8	19	37	36	4	4	5	16	
2018	57	29	11	4	14	34	65	33	3	2		16	
2012	75	33	13	3	3	55	53	56	3	1	2		
2011	32	16	8	4	27	30	46	70	16	4	1	17	1
2010	55	90	19	1	6	105	44	71	7	5	4	21	2
Total	610	367	170	51	142	522	493	641	60	28	31	191	6
%	18.4	11.1	5.1	1.5	4.3	15.7	14.9	19.3	1.8	0.8	0.9	5.7	0.2

Table 14.46. 2010–2022 field school zoomorphic proportions (n = 3,312) arranged from north to south.

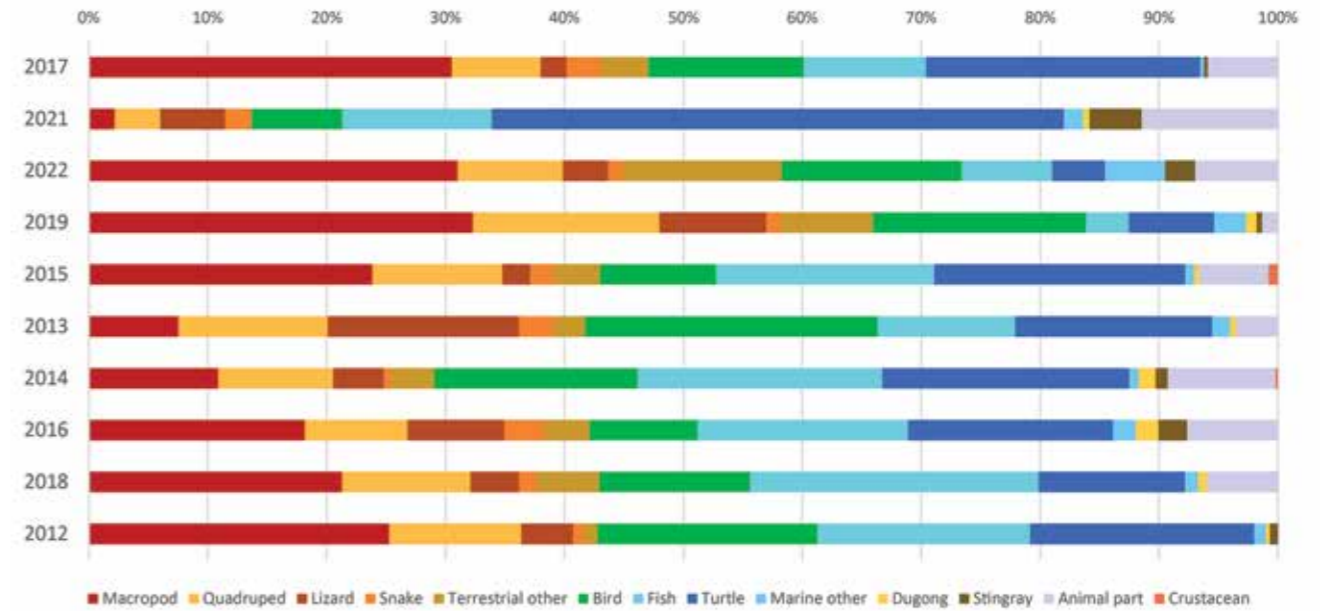


Figure 14.76. Subject choices across the Burrup showing varying marine and terrestrial themes (annual field schools sorted north to south).

The quantification of data collected by the 12 field schools demonstrates that localised stylistic variability (e.g. McDonald 2009b; McDonald and Veth 2009;

Mulvaney 2010) continues to be identified across the Burrup – as well as the islands – as seen in the rock art chapters in this monograph.

References

ABC TV. 2011. First Footprints. <https://iview.abc.net.au/show/first-footprints>

Beckett, E. 2021. Contextualising Murujuga Stone Structures: Dampier Archipelago. Unpublished PhD thesis, CRAR+M and Archaeology, University of Western Australia.

Bednarik, R. G. 2002b. The survival of the Murujuga (Burrup) petroglyphs. *Rock Art Research* 19(1): 29–40.

Bednarik, R. G. 2006. *Australian Apocalypse: The Story of Australia's Greatest Cultural Monument*. Occasional AURA Publication, no. 14. Melbourne: Australian Rock Art Research Association.

Bednarik, R. G. 2011. Inherited vs recent accretions (comment). *Rock Art Research* 28(1): 7–8.

Berry, M. 2018. Murujuga Desert, Tide, and Dreaming: Understanding Early Rock Art Production and Lifeways in Northwest Australia. Unpublished PhD thesis, University of Western Australia.

Bird, C. and S. J. Hallam. 2006. Archaeology and rock art in the Dampier Archipelago. Perth: National Trust of Australia (WA). Retrieved from <<https://www.nationaltrust.org.au/wp-content/uploads/2017/01/20060920-Dampier-Rock-Art-ROE35.pdf>> retrieved 13 December 2011.

Clayton, L. 2015. From landscape to seascape: a spatial analysis of Murujuga rock art, Western Pilbara. Unpublished MA thesis, University of Western Australia.

CRAR+M. 2021. Dating Murujuga's Dreaming 2021–2026. UWA. <<https://www.crarm.uwa.edu.au/murujuga-dating>>.

Daniel, D. 1990. *Thalu Sites of the West Pilbara*. Perth: Department of Aboriginal Sites, Western Australian Museum.

Dix, W. 1977. Facial representations in Pilbara rock engravings. *Form in Indigenous Art: Schematisation in the Art of Aboriginal Australia and Prehistoric Europe*, ed. P. J. Ucko. Canberra: Australian Institute of Aboriginal Studies, pp. 227–285.

Donaldson, M. 2009. *Burrup Rock Art: Ancient Aboriginal Rock Art of Burrup Peninsula and Dampier Archipelago*. Perth: Wildrocks Publications.

Donaldson, M. 2011a. Understanding the rocks: rock art and the geology of Murujuga (Burrup Peninsula) [with comments]. *Rock Art Research: The Journal of the Australian Rock Art Research Association* 28(1): 35–43. <https://search.informit.org/doi/abs/10.3316/informit.265664199623302>

Donaldson, M. 2011b. Geological processes and semantics (a reply). *Rock Art Research* 28(1): 8–9.

DAFF (Department of Agriculture, Fisheries and Forestry). 1997. *Collaborative Australian Protected Areas Database (CAPAD) 2020 – Terrestrial* [dataset]. Retrieved from <http://www.environment.gov.au/fed/catalog/search/resource/details.page?uuid=%7B4448CAD-9DA8-43D1-A48F-48149FD5F-CFD%7D>, last updated 4 November 2020.

DCCEEW (Department of Climate Change, Energy, the Environment and Water). 2015. *Commonwealth Heritage List* [dataset]. Retrieved from <https://data.gov.au/dataset/ds-nsw-9ba5dd0-9c61-4797-8192-c1422206b8e2/details?q=>, last updated 31 January 2023.

DPLH (Department of Planning, Lands and Heritage). 2022. *Aboriginal Heritage Places (DPLH-001)* [dataset]. Retrieved from <https://catalogue.data.wa.gov.au/dataset/aboriginal-heritage-places>, last updated 7 April 2022.

Fullagar, R. and J. Field. 2011. Happy Valley Grinding Patches. Unpublished Scarp Archaeology report to RioTinto.

Gunn, R. G. and K. Mulvaney. 2009. Happy Valley Aboriginal Site (P0409) Inventory Part 1: Eastern Ridge. Unpublished report to Rio Tinto, Dampier.

Hayes, E., R. Fullagar, K. Mulvaney and K. Connell. 2018. Food or fibercraft? Grinding stones and Aboriginal use of *Triodia grass* (spinifex). *Quaternary International* 468: 271–283. <https://doi.org/10.1016/j.quaint.2016.08.010>

Hickman, A. H. and C. A. Strong. 2000. *Dampier-Barrow Island, WA. Sheet SF 50-2 and part sheet SF 50-1 (2nd edn). 1:250000 Geological Series*. Perth: Western Australia Geological Survey.

Hickman, A., H. D. L. Huston, M. J. Van Kranendonk and R. H. Smithies. 2006. *Geology and Mineralization of the West Pilbara – A Field Guide*. Records of the Geological Survey of Western Australia. Perth.

- Lorblanchet, M. 2018b. *Archaeology and Petroglyphs of Dampier (Western Australia): An Archaeological Investigation of Skew Valley and Gum Tree Valley*, eds G. K. Ward and K. Mulvaney. *Technical Reports of the Australian Museum (online)* 27. <https://journals.australian.museum/ward-2018-tech-rep-aust-mus-online-27-945/>.
- McDonald, J. 2009a. Archaeological survey of Deep Gorge on the Burrup Peninsula (Murujuga) Dampier Archipelago WA. Jo McDonald Cultural Heritage Management Pty Ltd. Unpublished report to the Western Australian Department of Indigenous Affairs.
- McDonald, J. 2009b. Heritage inventory methodology report Dampier Archipelago. Jo McDonald Cultural Heritage Management Pty Ltd. Unpublished report to Western Australian Department of Indigenous Affairs.
- McDonald, J. 2015. I must go down to the seas again: Or, what happens when the sea comes to you? Murujuga rock art as an environmental indicator for Australia's north-west. *Quaternary International* 385: 124–135. <https://doi.org/10.1016/j.quaint.2014.10.056>
- McDonald, J. and E. Beckett. 2022. Murujuga Rock Art Monitoring Project: Fieldwork to Assess Heritage Sensitivity at Locations Chosen for Air Quality Monitoring Stations and Geological Sampling. Report to Calibre on behalf of Murujuga Aboriginal Corporation and the Department of Environment and Water. Perth: CRAR+M, University of Western Australia.
- McDonald, J. and P. Veth. 2006. A Study of the Distribution of Rock Art and Stone Features on the Dampier Archipelago. Jo McDonald Cultural Heritage Management Pty Ltd. Unpublished report to Heritage Division, Department of Environment and Heritage, Canberra.
- McDonald, J. and Veth, P. 2009. Dampier Archipelago petroglyphs: archaeology, scientific values and National Heritage Listing. *Archaeology in Oceania* 44(S1): 49–69.
- McDonald, J. and P. Veth. 2010. Pleistocene rock art: a colonizing repertoire for Australia's earliest inhabitants. *Préhistoire, art et sociétés: Bulletin de la Société Préhistorique de l'Ariège* 65: 172–183. <https://blogs.univ-tlse2.fr/palethnologie/wp-content/files/2013/fr-FR/version-longue/articles/AUS2_McDonald-Veth.pdf>
- McDonald, J. and P. Veth. 2013. Rock art in arid landscapes: Pilbara and Western Desert petroglyphs. *Australian Archaeology*, 77: 66–81. <https://doi.org/10.1080/03122417.2013.11681980>
- McDonald, J., K. Mulvaney, E. Beckett, J. Fairweather, P. Morrison, S. de Koning, J. Dortch and P. Jeffries. 2021. Seeing and managing rock art at Nganjarli: a tourist destination in Murujuga National Park, Western Australia. *Australian Archaeology*, 87(3): 268–293. <https://doi.org/10.1080/03122417.2021.1978915>
- Mulvaney, K. 2010. Murujuga Marni – Dampier Petroglyphs: Shadows in the Landscape, Echoes across Time. Unpublished PhD thesis, University of New England.
- Mulvaney, K. 2011a. Happy Valley Aboriginal Site (P0409) Inventory Part 2: Central Valley. Dampier: Rio Tinto.
- Mulvaney, K. J. 2011b. About time: toward a sequencing of the Dampier Archipelago petroglyphs of the Pilbara region, Western Australia. *'Fire and Hearth' Forty Years On: Essays in Honour of Sylvia J. Hallam*, eds C. Bird and R. E. Webb. *Records of the Western Australian Museum* 79 (supplement): 30–49.
- Mulvaney, K. 2013. Iconic imagery: Pleistocene rock art development across northern Australia. *Quaternary International*, 285(8): 99–110. <https://doi.org/10.1016/j.quaint.2011.07.020>
- Mulvaney, K. 2015. *Murujuga Marni: Rock Art of the Macropod Hunters and Mollusc Harvesters*. Perth: UWA Publishing.
- Mulvaney, K. 2018. Murujuga at a crossroads: considering the evidence of nineteenth-century contact, Dampier Archipelago, northwest Australia. *Australian Archaeology* 84(3): 248–262. <https://doi.org/10.1080/03122417.2018.1543108>
- Nearmap. 2022. *Western Australia Latest*. Accessed via Web Mapping Service. Copyright © 2022 Nearmap and its licensors. All rights reserved. For more information visit <https://www.nearmap.com/au/en>.
- Piercy, J. 2011. Variability in headdress petroglyphs in the Pilbara, Western Australia: an archaeological investigation of headdress motifs in the Pilbara. Unpublished BA(Hons) thesis, UWA.
- Taçon, P. S. C., R. Fullagar, S. Ouzman and K. Mulvaney. 1997. Cupule engravings from Jinmium-Granilpi (northern Australia) and beyond: exploration of a widespread and enigmatic class of rock markings. *Antiquity* 71(274): 942–965. <https://doi.org/10.1017/S0003598X00085847>
- Veth, P., E. Bradshaw, T. Gara, N. Hall, P. Haydock, and P. Kendrick. 1993b. Burrup Peninsula National Estate Grants Project. Unpublished report to Department of Conservation and Land Management, Perth.
- Vinnicombe, P. 2002. Petroglyphs of the Dampier Archipelago: background to development and descriptive analysis. *Rock Art Research: The Journal of the Australian Rock Art Research Association* 19(1): 3–27.
- Virili, F. L. 1977. Aboriginal sites and rock art of the Dampier Archipelago. *Form in Indigenous Art: Schematisation in the Art of Aboriginal Australia and Prehistoric Europe*, ed. P. J. Ucko. Canberra: Australian Institute of Aboriginal Studies, pp. 439–451.

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