Project 2.1.2 – Human values and aspirations for coastal waters of the Kimberley: Port Smith (Purnturrpurnturr) visitor survey

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Tourists at Saddle Hill cliffs, Port Smith (J Strickland-Munro)

Key words: values mapping, social values, Port Smith, tourist, Purnturrpurnturr, stakeholders, indigenous protected area.

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Author Contributions: JSM, SB, RS, HK, SM designed the survey. JSM, DP, SB, collected the data. JSM, HK analysed the data. JSM, SB, SM, HK wrote the technical report.

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Corresponding author and Institution: Jennifer Strickland-Munro (Murdoch University, Perth Western Australia, Australia).

Karajarri rangers undertaking visitor surveys, Port Smith Caravan Park (R Swain)

Gourdon Bay beach at low tide (J Strickland-Munro)

Extracted from Project Plan 2.1b (as updated August 2014)

Year 4	July 2015 – December 2015 (project scheduled for completion December 2015)		
	1. Annual project planning completed		
4/1	Confirm completion schedule with Research Team members & WAMSI	July 2015	Completed
	2. Annual field program completed		
	Fieldwork completed in Year 3		Completed
	3. Annual data analysis completed		
4/2	Stated preference data analysed	July 2015	Completed
4/3	Traditional Owners' values information analysed	July 2015	Completed
	4. Annual data management completed		
4/4	GIS data provided to custodian	Aug 2014	Completed
	5. Annual reporting completed (outputs)		
	5.1 Science		
4/5	Stated preferences – Kimberley coastline as technical report 3 (objective 3) (UWA)	Sept 2015	Completed
4/6	Traditional Owner values for a selected marine park as technical report 4 (objective 4) (MU)	Dec 2015	This report
4/7	Complete final report (MU & UWA)	Dec 2015	Completed
4/8	Submit manuscripts: • Social mapping using PP GIS (MU) • Spatially locating human values for marine park planning & management (MU) • Stated preference research & marine parks (UWA)	Dec 2015	*In prep*
	5.2 Communication		
4/9	Present final results at DPaW PVS Annual Conference (MU)	Oct 2015	Completed
4/10	Present findings at Australian Agricultural and Resource Economics Society, Canberra(UWA) Present findings at Sustainable Tourism conference (MU)	Jan 2016	UWA completed MU conference May 2016
	5.3 Knowledge transfer		
4/11	Provide briefing for DEC PVS, marine & planning staff on final results and how they can be presented and used in planning & management (MU & UWA)	Dec 2015	Completed

Personnel and staffing: *Use this section to discuss staffing issues i.e. technicians hired, PhD or MSc or honours students working on the project (project completions etc). This section should be completed anew each 6-monthly reporting cycle. (Note: Do not delete this header text.)*

No personnel or staffing issues.

Data/metadata reporting:

Data collection has been ongoing during this reporting period. PPGIS survey data will be collated and aggregated and will then become available to interested parties e.g. Dept of Parks and Wildlife. Mapping and values data from Year 1 of this project Year 1 of this project (spatial and supporting data from Kimberley interviews) was provided to Bardi Jawi Prescribed Body Corporate on their request.

Prior data reporting: The data from the Kimberley interviews (polygons and accompanying database assigning values to these polygons) were prepared and provided to the Management Planning Branch of the Department

of Parks and Wildlife following an urgent request for this information in late May 2014. The Planning Branch intend to include these data in their spatial planning for the Kimberley marine parks. These data were provided at an aggregated level so individual respondents were unidentifiable (such aggregation is required by the Human Research Ethics Committee at Murdoch University). A MOU regarding use and reporting on use of these data has been finalised between the Department of Parks and Wildlife and Murdoch University.

Links to other projects:

Other issues (including IP) and new or emerging risks:

A data sharing agreement with Department of Parks and Wildlife (Planning Branch) has been finalised.

Communication Activities – Publications, Presentations, Media releases:

Publications

- Brown, G, Strickland-Munro, J, Kobryn, H., Moore, SA (2016) Assessing stakeholder values and preferences for marine conservation using PPGIS. *Applied Geography* 67: 77-93
- Strickland-Munro J, Moore SA, Kobryn H, Palmer D, (2016) How do people value the Kimberley coast? Research Bulletin 4.02, School of Veterinary and Life sciences, Murdoch University, Perth, Western Australia
- Strickland-Munro J, Kobryn H, Moore SA (in press) Valuing the wild, remote and beautiful: Using Public Participation GIS to inform tourism planning on the Kimberley Coast, Western Australia. *Special Issue of the International Journal of Sustainable Development and Planning* (March 2016)
- Brown, G, Strickland-Munro, J, Kobryn, H., Moore, SA (under review). Mixed methods participatory GIS: A review and evaluation of the validity of qualitative and quantitative mapping methods. *Applied Geography*.
- Pearce, J, Strickland-Munro, J, Moore, SA (under review) What contributes to awe-inspiring nature based tourism experiences? *Journal of Sustainable Tourism* (Nov 2015)
- Tonge J, Strickland-Munro J, Moore SA (under review) Review of social science research in marine and coastal environments with a particular emphasis on marine protected areas. *Ocean and Coastal Management* (March 2016)
- Moore, SA, Strickland-Munro, J, Kobryn, H., Palmer, D, Brown, G (in prep) Identifying conflict potential in a coastal and marine environment using participatory mapping. *Ocean and Coastal Management* (March 2016)
- Strickland-Munro, J., Brown, G, Kobryn, H., Moore, SA (in prep) Marine conservation planning for the future: Using Public Participation GIS to inform the human dimension for large marine parks through understanding values and management preferences. *Marine Policy* (March 2016)
- Strickland-Munro J, Kobryn H, Moore SA, Brown G (2016) Human values and aspirations for coastal waters of the Kimberley: Port Smith (Purnturrpurnturr) visitor survey. Technical Report. Kimberley Marine Research Program Node of the Western Australian Marine Science Institution, WAMSI, Perth, Western Australia
- Strickland-Munro J, Moore SA, Kobryn H, Palmer D, (2015) Values and aspirations for coastal waters of the Kimberley: social values and participatory mapping using interviews. Technical Report. Kimberley Marine Science Program Node of the Western Australian Marine Science Institution, WAMSI, Perth, Western Australia

Presentations and Meetings

- Strickland-Munro, J, Kobryn, H, Brown, G, Spencer-Cotton, A, Kragt, ME, Pearce J, Burton, M and Moore, S (2016). How do people value the Kimberley coast? Science on the Broome Coast Seminar Series, Broome, Western Australia, 6 April 2016
- Strickland-Munro, J, Kobryn, H, Brown, G, Spencer-Cotton, A, Kragt, ME, Pearce J, Burton, M and Moore, S (2016). How do people value the Kimberley coast? Department of Parks and Wildlife – West Kimberley region, Broome, Western Australia, 6 April 2016

- Strickland-Munro, J, Kobryn, H, Brown, G, Spencer-Cotton, A, Kragt, ME, Pearce J, Burton, M and Moore, S (2016). How do people value the Kimberley coast? Presentation to the Derby community, Derby Council Chambers, Western Australia, 5 April 2016
- Kragt, ME, Brown, G, Burton, M, Kobryn, H, Moore, SA, Spencer-Cotton, A, Strickland-Munro, J (2016) Estimating spatially explicit values for the Kimberley Coast. Invited presentation for South Australian branch of the Australian Agricultural and Resource Economics Society, University of Adelaide, Adelaide, 16 March 2016
- Kragt, E M, Spencer-Cotton, A, Burton, M (2016) Valuing remote wilderness – estimating spatially explicit values for the Kimberley coast. The 60th Australian Agricultural and Resource Economics (AARES) 2016 Annual Conference, 2-5 February 2016, Canberra ACT
- Spencer-Cotton, A, Kragt, E M, Burton, M (2016) Implications of geographical scope in valuing wilderness management in the Kimberley. The 60th Australian Agricultural and Resource Economics (AARES) 2016 Annual Conference, 2-5 February 2016, Canberra ACT
- Burton, M (2015) Spatially explicit discrete choice experiments: an application to coastal management in the Kimberley. Western Australia Seminar to the Environmental and Resource Economics Group, School of Social Sciences, University of Manchester, October 2015
- Moore, SA, Strickland-Munro, J, Kobryn, H, and Palmer, D (2015) Spatially explicit delineation of the social values of the Kimberley coastal and marine environment. WAMSI Research Conference, Perth, Western Australia, 30 March-1 April 2015
- Strickland-Munro, J, Moore, SA, Kobryn, H, Brown, G, Spencer-Cotton, A, Burton, M and Kragt, M (2015) Human values and aspirations for coastal waters of the Kimberley. Final Project Presentation. Department of Parks and Wildlife, Kensington,15 December 2015
- Strickland-Munro, J, Moore, SA, Kobryn, H, and Palmer, D (2015) Mapping community values for the Kimberley coast. Water Corporation Environmental Masterclass, Leederville, Western Australia, 22 July 2015
- Strickland-Munro, J, Moore, SA, Kobryn, H, and Palmer, D (2015) "Whose values?" Mapping community values for the Kimberley coast. Chamber of Commerce and Industry Environment Committee, Perth, Western Australia, 26 May 2015
- Moore, S, Strickland-Munro, J, Kobryn, H, and Palmer, D (2014) "Whose values?" Mapping community values for the Kimberley coast. Parks for People Annual Parks Conference, KMSCS Kensington WA, 14-16 October 2014
- Pearce, J, Strickland-Munro, J and Moore, SA (2014) Why is the Kimberley coast so awe-some? International Tourism Studies Association Conference, WA Department of Parks and Wildlife, Kensington, WA, 26-28 November 2014
- Strickland-Munro, J, Kobryn, H, Moore, S, Palmer, D and Friedman, K (2014) Valuing the wild, remote and beautiful: Tourism on West Kimberley coast, Western Australia. International Tourism Studies Association Conference, WA Department of Parks and Wildlife, Kensington, WA, 26-28 November 2014
- Strickland-Munro, J, Moore, S, Kobryn, H, and Palmer, D (2014) Mapping and interpreting the social values of the Kimberley coast. Department of State Development, Adelaide Terrace, Perth, 6 August 2014
- Strickland-Munro J, Kobryn H, Palmer D, Moore SA (2014) Mapping and interpreting the social values of the Kimberley coast. WAMSI Seminar Series No. 1. Social Science Contributions to Marine Science. 18 June, CSIRO Floreat, WA
- Strickland-Munro J, Kobryn H, Palmer D, Moore SA (2014) Socio-cultural values of the Kimberley coast: Preliminary feedback. WA Department of Parks and Wildlife Head Office, Kensington, WA, 23 May 2014
- Strickland-Munro J, Kobryn H, Palmer D, Moore SA (2014) Socio-cultural values of the Kimberley coast: Preliminary feedback to Nyamba Buru Yaruwu, NBY offices, Broome, WA, 2 May 2014

- Strickland-Munro J, Kobryn H, Palmer D, Moore SA (2014) Socio-cultural values of the Kimberley coast: Preliminary feedback. WA Department of Parks and Wildlife West Kimberley District, District Office, Broome, WA, 2 May 2014
- Strickland-Munro J, Kobryn H, Palmer D, Moore SA (2014) Socio-cultural values of the Kimberley coast: Preliminary feedback. Broome community, Lotteries House, Broome, WA, 2 May 2014
- Strickland-Munro J, Kobryn H, Palmer D, Moore SA (2014) Socio-cultural values of the Kimberley coast: Preliminary feedback. Karajarri rangers, Mangkuna, WA, 1 May 2014
- Strickland-Munro J, Moore SA (2014) Human values and aspirations for coastal waters of the western Kimberley. WAMSI, Floreat, WA, 15 January 2014
- Moore SA (2013) Human values and aspirations for coastal waters of the western Kimberley. Department of Premier and Cabinet, Perth, WA, 5 August 2014
- Moore SA, Strickland-Munro J, Palmer D, Rodger K, Kobryn H, Burton M, Kragt M, Smith A (2013) Human values and aspirations for coastal waters of the Kimberley. WAMSI North West Australia Symposium, WA Maritime Museum, Fremantle, 21 February 2013

Media and internet

- Anon. (2015) Have your say on future of coastline. Kimberley Echo. 16 April, Kununurra WA
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- Moore SA, Strickland-Munro J (2013) Mapping social values of the Kimberley coast. Goolarri Radio. 10 September, Broome, WA

Communication Activity	Total to date
Peer reviewed publication	6 (1 in press, 3 under review, 2 in prep)
Technical report	4
Popular publication (ie Landscope, newsletter, etc)	4
Conference Presentation	9
Presentations/Meetings with Department of Parks and Wildlife managers & WAMSI	8
Presentations/Meetings with Traditional Owners	5
Presentations/Meetings with other stakeholders	17
Presentations to general public	2
Media releases	4
Radio interviews	6
Newspaper articles	7
Other	4
Total	**75**

Certification

I certify that the reporting is complete and accurate to the best of my knowledge, and I have reported any substantial deviation from the Project Plan and matters which I believe may affect the ability of the project to meet its objectives. I certify that each Project Party has provided Contributions as required under the Project Agreement.

Project Leader: S. A. Moore

Date: 13 March 2016

This section needs to be signed for the Final Project Report only by the relevant Joint Venture Partner Executive.

Certification

I certify that this report has been reviewed by the agency and reflects the standards of this agency in reporting.

WAMSI JV Partner Executive:

Date:

List of Karajarri terms used

Term	English interpretation
Jurarr	Coastal area
Kartiya	White person
Kurriji pa Yajula	Dragon Tree Soak, a Class A Nature Reserve
Malampurr	Eighty Mile Beach
Parnany	Reefs
Pirra	Inland areas
Pukarrikarrajangka	The Dreaming, knowledge and law
Pulany	Mythical serpent
Puntu	Intertidal mudflats/freshwater seepages
Purnturrpurnturr	Name for the area surrounding the Port Smith Lagoon
Rijii or jakuli	Wild pearl shell
Walyarta	Salt Creek, a Ramsar-listed inland wetland system
Wangku	Rocky headlands
Wankayi	Alive
Wintirri	Sandy beaches, dunes and cliffs
	Sea-grass beds

Human values and aspirations for coastal waters of the Kimberley: Port Smith visitor research

Executive summary

This is the fourth report from the "Values and aspirations for coastal waters of the Kimberley" research project funded by the Western Australian Government and administered by the Western Australian Marine Science Institution (Kimberley Research Node Project 2.1.2). The study area extends from the south western end of Eighty Mile Beach to the Northern Territory Border, a coastline 13,296 km in length at low water mark including the islands. The aim of this 3-year research project is to document and analyse the social values and aspirations of people associated with the existing and proposed marine parks at Eighty Mile Beach, Roebuck Bay, Lalang-garram/Camden Sound, Horizontal Falls and North Kimberley, and other coastal waters of the Kimberley.

This report provides results from visitor survey research undertaken to identify and describe visitor values, activities and management preferences regarding the Port Smith (Purnturrpurnturr) coastline and marine environment. Research design and execution followed an agreement-making approach developed through ongoing discussions with the Karajarri Traditional Lands Association (KTLA), the prescribed body corporate responsible for native title and other land management under the authority of Karajarri. This approach involved two complementary stages: (1) introductions, scoping and discussion of research possibilities with KTLA representatives; and (2) providing training in, and subsequently carrying out, questionnaire-based research in the field.

The Port Smith area lies within the recently declared Karajarri Indigenous Protected Area and faces a number of visitor-related challenges including unmanaged tourist access, concomitant environmental pressures (notably overfishing) and lack of recognition of Karajarri cultural rights and jurisdiction. The KTLA sought information on these challenges to assist in their ongoing management efforts. The survey targeted tourists visiting the Port Smith area as well as local residents. A total of 97 people participated in the survey.

The survey asked respondents to mark up to five locations that they had visited on a hard copy, high resolution satellite imagery map of the Port Smith area. Each location was marked using a circle or cross, and numbered from 1 - 5. Respondents were then asked to indicate three things. First, what values they ascribed to each of their selected locations (14 values to choose from). Second, where they had undertaken one or more activities (14 activities to choose from). Third, any desired improvements at the selected locations (selected from a list of 10 improvements). All three mapping questions included an 'other' category. Point density calculations were applied to the results from the markers to determine hotspots. To do this, the point spatial data were overlaid with 100 m grid cells and areas of greatest intensity of values, activities and desired improvements were identified through: i) the defining a 500 m search radius ('the neighbourhood') and ii) counting the number of points within the neighbourhood for each value, activity and desired improvement, and dividing by the total neighbourhood area. Point density maps were presented using a colour scale with a histogram stretch of 2.5 standard deviations from the mean. These densities were relative rather than absolute, being differentiated into low, medium and high densities. Hotspots referred to in this report correspond to areas of high and medium density. Socio-demographic questions were also included in the survey, plus questions about management arrangements for the area. Basic summary statistics were generated from these results.

Mapped social values for the Kimberley coastline and marine environment included indirect use values, direct use, non-consumptive values and direct use consumptive values, and non-use values. A total of 1,574 value markers were mapped. The main mapped values were: bequest (non-use value, 16%); aesthetic (non-consumptive, direct use value, 13%); recreational fishing (direct use, consumptive value, 12%); therapeutic (non-consumptive, direct use value, 8%) and biodiversity (indirect use value, also 8%). Spiritual (non-consumptive, direct use value, 4%) and camping (consumptive, direct use value, 3%) values were the least mapped values. Hotspots were clustered around access points. With the exception of spiritual and camping values, hotspots for all values were evident at Injudine Creek, Cowrie Creek, Port Smith lagoon and lagoon mouth, Saddle Hill and Gourdon Bay. Cowrie Creek and Gourdon Bay appear particularly valued. Value hotspots also exist in two defined 'no-access' zones: between Saddle Hill and Gourdon Bay and south of Cowrie Creek.

Respondents mapped 917 activity markers. Spectating/sightseeing (17%), relaxing (16%) and wildlife/nature interaction or viewing (14%) were the most commonly mapped activities. Diving/ snorkelling and 'other' activities (including spearfishing, kayaking, evening barbeques, photography, and shell collecting) were the least mapped activities (2% and 1%, respectively). Activity hotspots located in close proximity access points including

the Port Smith lagoon area and lagoon mouth, Cowrie Creek, Saddle Hill, Gourdon Bay and Injudine Creek. Hotspots for spectating/sightseeing, relaxing, beach fishing, four wheel driving, boat fishing, experiencing or viewing Aboriginal culture and crabbing were also present in 'no access' zones south of Cowrie Creek. Diving/snorkelling, spectating/sightseeing, walking/other exercise, four wheel driving, boat fishing and crabbing hotspots were also evident in the 'no access' zone between Saddle Hill and Gourdon Bay. Activities involving interaction with, and learning about, Aboriginal people and culture, either informally or via formal tours, were the most desired new activities.

A total of 453 desired improvements were mapped. Visitor guides/maps (24%), information/interpretation boards (20%), walk trails (12%) and shade shelters (11%) were the most commonly desired improvements. Stairs or steps and 'other' activities were the least desired improvements (4% and 2%, respectively). As before hotspots generally aligned with coastal access points. Gourdon Bay was a particular focus for all desired improvements, with the exception of picnic tables. Respondents indicated a number of desired improvements within the 'no access zones' between Saddle Hill and Gourdon Bay and south of Cowrie Creek.

More than half of respondents reported having no interaction with Karajarri rangers during their visit, while almost 71% of respondents indicated that greater interaction with the rangers would have enhanced their visitor experience. Respondents were interested in gaining insights into: fish and other wildlife movements; rules and regulations for the area; local knowledge on a range of topics; and Aboriginal culture and history.

Almost three quarters of respondents were aware of the Karajarri Protected Area Visitor Permit, with the Port Smith Caravan Park being the primary source of information. Just over half of all respondents (55%) considered Visitor Permit fees to be appropriate, while 44% of respondents felt Permit pricing was too high. Concerns regarding the use of funds gathered dominated such responses. Only one respondent indicated the Permit fees were too low.

Management Implications: Knowledge to action

These management implications apply to the areas surround the Port Smith Caravan Park CP (as depicted by study area in Figure 8). This is the area bounded by Gourdon Bay to the north and Mud Creek to the south. The management implications are of most relevance to the Karajarri Traditional Lands Association, Karajarri Indigenous Protected Area managers and Traditional Owners.

1. *Implication 1: Visitors hold a broad range of values for the Port Smith area. Bequest value, aesthetics and recreational fishing are the most common values associated with the study area.*
2. *Implication 2: Visitor activities and desired improvements are co-located with access points, illustrating how pressures and opportunities for management concentrate at certain points along coastlines. It also emphasises how important managing access is for the sustainable future of such areas. The KTLA has the opportunity, based on this information, to manage roads, tracks and the infrastructure on the coastline, as well as the provision of information to support desired management outcomes, at these key locations.*
3. *Implication 3: Port Smith visitors continue to access areas designated as 'no access'. This suggests the need for improved signage to inform and direct visitors regarding any areas where no access is a desired part of management. Concurrently, managers could consider providing culturally appropriate information on the significance and rationale behind access closures, in the IPA Visitor Guide as well as any cultural tourism products that may be developed. The attendance of KTLA representatives at regular Caravan Park visitor forums (e.g., informal, peak season Caravan Park information evenings attended by Karajarri rangers) could complement this information. This forum involves a partnership between the Port Smith Caravan Park leasees, the Karajarri Traditional Lands Association and Bidyadanga community. Other potential management strategies include the increased presence of rangers and exploration of digital management enhancement strategies (e.g., digital smartphone or device applications such as the 'Rock Art Protection' App used on the Burrup Peninsula in the Pilbara or the Welcome to Country App).*
4. *Implication 4: Visitors are greatly interested in engaging with local Aboriginal people, and learning about the area's cultural significance. This suggests the potential for KTLA representatives, including the Karajarri rangers, to develop a range of formal and informal interpretive/cultural tourism activities for engaging with and informing Caravan Park visitors. These activities could additionally provide culturally appropriate information on sensitive sites, local history and IPA rules and regulations, reinforcing messages about IPA no access zones.*
5. *Implication 5: Visitor guides/maps and information/interpretative boards are the two most desired improvements for the area. The KTLA could consider installing or upgrading such information to assist with creating an enhanced visitor experience. These guides or information boards could be used to provide greater insights into the area's*

historical and ongoing cultural significance, supporting IPA management efforts to designate certain areas as 'no access'. Digital smartphone or device technologies present another means of providing this information, with the potential to develop a 'Karajarri' or augmented 3D reality App for the area.

6. *Implication 6: Visitors currently use hold a range of values for the Injudine Creek area and conduct a range of activities. Visitors desire a number of improvements including walk trails, information and interpretative boards, improved vehicle access and carparks. These improvements and the activities undertaken conflict with Injudine Creek's designation as a 'no access' area. Managers could consider improved signage to deter visitation together with greater provision of information outlining the area's cultural significance. This information could be made available upon visitor arrival in the Caravan Park, within the Karajarri IPA Visitor Guide as well as potentially included in any digital device applications developed in the future.*

7. *Implication 7: Concerns exist regarding the pricing and use of funds gathered via the Visitor Permit System. To aid understanding and build greater support for the Permit among visitors, IPA managers could consider including information on funded activities in the Karajarri Visitor Guide, IPA directional and educational signage, the online Permit application website and in both formal and informal engagement activities undertaken. The information could also be included in any digital device applications developed.*

Contents

1 Introduction

1.1 Scope and purpose of research

This is the fourth technical report produced from the Western Australian Marine Science Institution (WAMSI) Kimberley Research Node Project *2.1.2 Values and aspirations for coastal waters of the Kimberley*. The study area for this overarching research encompasses all State coastal waters extending from the south western end of Eighty Mile Beach to the Northern Territory Border (Simpson 2011). The research reported here has a narrower geographic focus within this broader study area, centred on Port Smith. A primary focus of the funding for WAMSI research is to support the management of the proposed marine parks at Eighty Mile Beach, Roebuck Bay, Lalang-garram (Camden Sound), Horizontal Falls and North Kimberley (Figure 1). This research also encompasses the surrounding marine environment which includes Commonwealth marine parks as well as non-marine park waters. Research reported on here relates to the latter environment, that is, non-marine park waters.

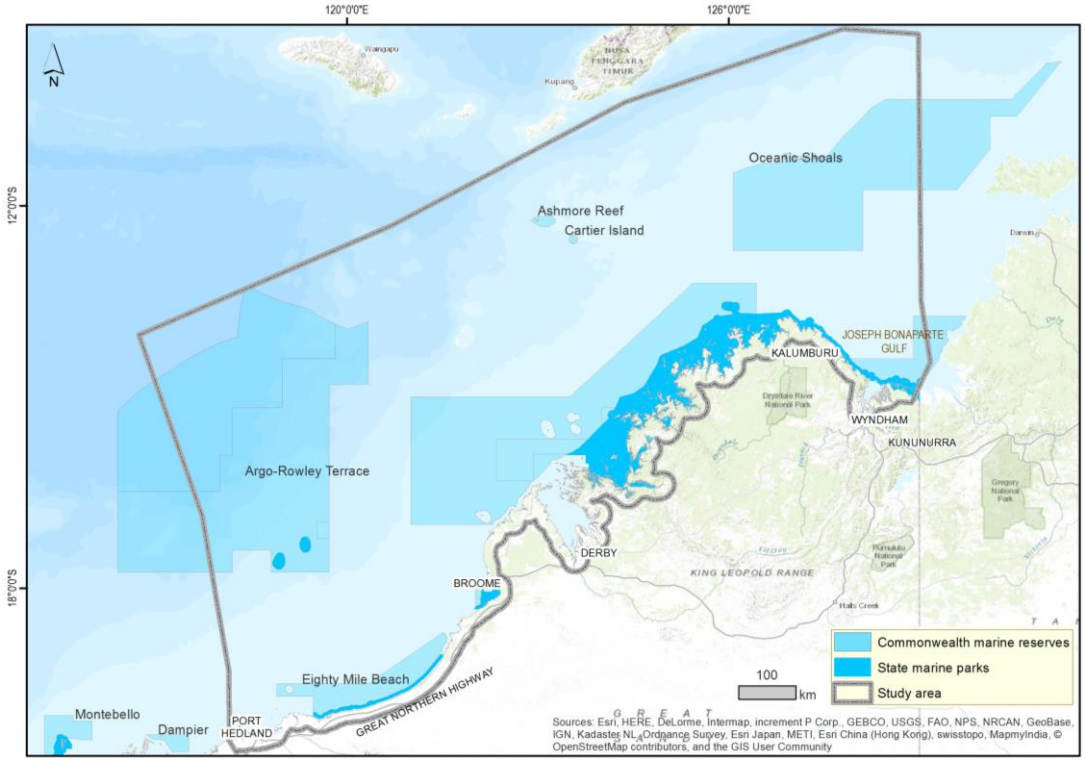


Figure 1. Kimberley marine parks (current and proposed) (Source: Geoscience Australia 2015, Department of Parks and Wildlife Jan 2016)

The Kimberley Marine Research Node Projects are guided by the Kimberley Marine Research Program (Simpson 2011), which focuses on two major areas of research: bio-physical and social characterisation (providing foundational data sets and better understanding impacts) and understanding key ecosystem processes. This technical report addresses the first major area by contributing to social characterisation of the Kimberley coastline and marine environment. It goes beyond a focus on people as 'impacts' to help understand peoples' needs and values. This fourth technical report draws heavily on material from Strickland-Munro et al. (2015) in its description below of social values and broader research context.

Understanding peoples' needs and values is essential for effective planning and management, particularly when 'public' assets such as marine parks are involved. Voyer et al. (2012), in their review of Australian marine park planning, note that the social impacts and values associated with such areas have been inadequately considered to-date. These authors posit that failure to adequately consider social factors in planning and management may have implications for the long-term success of marine protected areas. They note that in two of their three cases studies social and economic arguments were used to delay and block future expansion of such areas. They conclude that where social values and impacts have been considered, they have relied on public participation and economic modeling as surrogates for comprehensive research and analysis of social values, perceptions and aspirations with respect to proposed (and existing) marine parks. Gruby et al. (2015) make a

similar call for greater research into the social dimensions of marine protected areas, as do Cornu et al. (2014) in relation to marine and coastal planning. As such, this research focused on researching social values as a contribution to enhanced decision-making and management.

Through a process of negotiated, agreement-based research with Aboriginal Traditional Owners, the Port Smith (Purnturrpurnturr) area was selected for an in-depth investigation of social values associated with the coastline and marine environment. Port Smith is located immediately to the north of Eighty Mile Beach (Figure 2). Two decades ago, the Wilson report (1994) recommended that the sea country of Port Smith and Lagrange Bay be reserved as Lagrange Bay Marine Park (see Figure 3). While this recommendation has not been implemented, management of the Port Smith area is of primary concern to its Traditional Owners owing to social and environmental impacts arising from unmanaged tourism. The methods employed for this research in the Port Smith area provide a model for a similar approach that could be taken in other parts of the Kimberley where Traditional Owners need information on visitors to help them manage their land and sea country.

Figure 2. Port Smith (Purnturrpurnturr) location relative to the Kimberley.

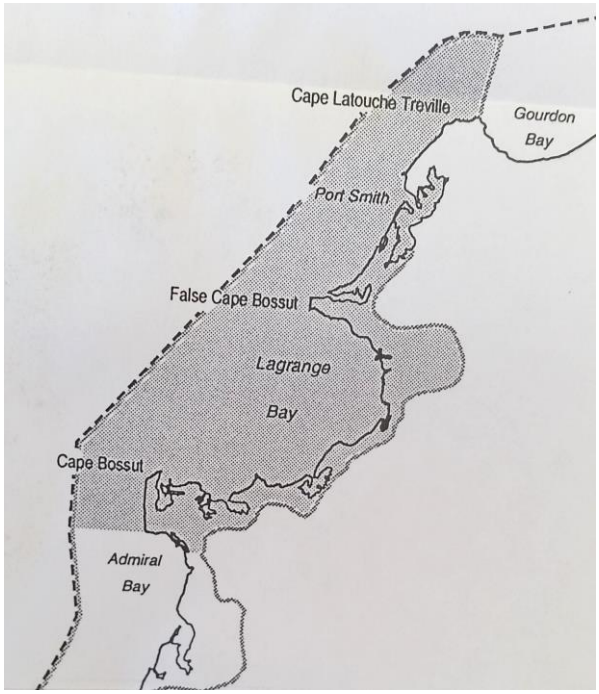


Figure 3. Proposed Lagrange Bay Marine Park (Wilson 1994).

1.2 Social values

No clear-cut and consistent definition of the term 'value' exists, with definitions varying according to the discipline of enquiry. For instance, anthropology, sociology, environment, philosophy and ecological economics all consider the term in different ways (Reser & Bentrupperbaümer 2005, Song et al. 2013). Despite this profusion of uses and lack of clarity, some commonalities are evident. In this research the scope is narrowed to 'values' as identified in the environmental field.

The environmental literature typically classifies human values as either held or assigned. The focus of this research is 'assigned values': "values that people attach to things, whether they are goods such as timber, activities such as recreation, or services such as education" (Lockwood 1999, p382). People also have 'held values', which are much more abstract – they are principles or ideas "that are important to people, such as notions of liberty, justice or responsibility" (Lockwood 1999, p382). Brown (1984) described held values as fundamental underlying ideals that prioritise modes of conduct or desirable qualities, e.g. bravery, loyalty, fairness, beauty. Held values are believed to influence assigned values through subjectively evaluating objects (Brown 1984, Lockwood 1999, Brown & Weber 2012).

While natural features such as waterfalls and turtles are often described as values, they are better understood as natural features that give rise to values (Lockwood 2011). These features are the source of values, rather than being values themselves. The same holds for cultural and historical sites, for example, Aboriginal art sites and shipwrecks. Features can also give rise to multiple values, a waterfall or bay may be aesthetically beautiful, it may have recreational opportunities, and it may have spiritual values for Aboriginal people (Lockwood 2011).

Assigned rather than held values have been argued as more useful for examining values in relation to specific sites (McIntyre et al. 2008). The idea of assigned values having a 'geography' (Davies 2001, 82 in McIntyre et al. 2008) recognises that they are place-based. The spatial nature of assigned values implies that value may be allocated at a range of scales from highly site specific to broader ecosystem, regional, national or global levels (McIntyre et al. 2008).

Knowing about assigned values is important for natural resource managers because these values influence how people behave at a place and the concerns and aspirations they have about it now and in the future. Assigned values also influence how people respond to proposed changes in policy and management. Brown and Weber (2012) suggest that mapping landscape values (they define these as a type of relationship value that bridges held and assigned values) can help managers: identify potential land-use conflict areas; assess the compatibility of land uses (e.g. zoning in marine parks) with landscape values; and provide public input to managing public lands (and waters). A number of other researchers (e.g. McLain et al. 2013) use the term 'landscape values', strongly

influenced by the work of Greg Brown (see Brown & Reed 2000), who developed a list of landscape values for National Forests in the United States, with this list underpinning numerous studies over the intervening period.

In this research we adopt the term **social values** to broaden the suite of values beyond the 'landscape'. Although many landscape value typologies being applied are suitably broad, for example, including health and spiritual values (e.g. Besser et al. 2014), we take a more expansive perspective in this report to avoid such values being narrowly construed as restricted to the 'landscape'. We define social values as "*the importance of places, landscapes, and the resources or services they provide as defined by individual and/or group perceptions and attitudes towards a given place or landscape*".

1.2.1. Value typologies

Many typologies of values exist. Lockwood has written a handful of seminal papers on values, with the most recent (Lockwood 2011) organising values for protected areas into three primary categories: direct use, indirect use and non-use (existence) values, with economic value included as a fourth separate category. Direct use values include nature-based recreation, maintenance of public facilities, personal development (e.g. development of leadership skills), therapeutic and physical wellbeing values, education, research and some forms of resource extraction (e.g. honey production). Indirect use values (equated with ecosystem services) include 'the filtering of air and water, the assimilating of waste, the cycling of nutrients, and the regulation of climate' (Lockwood 2011, 4). Non-use (existence) values include appreciating a protected area just because it is there, as well as knowing it will be there for future generations (bequest value). Non-use values also include spiritual and cultural connections with nature, and personal identity. The latter can encompass elements of personal, family and community histories. Economic values are not separate, with Lockwood (2011) noting they are merely another way of expressing values, especially use values. 'Biodiversity' is considered the source of many different values rather than being a 'value' in its own right.

The Millennium Ecosystem Assessment (2005), in their Total Economic Value Framework, present a similar values typology to Lockwood, discussing direct use, indirect use and option values with respect to ecosystem services. However, they take the typology one step further by dividing direct use values into consumptive (the taking of resources e.g. fishing) and non-consumptive (no reduction in resources, e.g. recreation, spiritual, social aspects) categories. Indirect use values similarly refer to values associated with water purification, waste assimilation and other regulating services. The final category of option values includes existence and bequest value as well as value attached to the potential to use a service in the future.

This research draws on both typologies. Lockwood's research has been specifically directed to protected areas and as such encompasses the complexity of values such areas hold. Such complexity is also likely to typify the Kimberley coast and marine environments. As such, his typology was one of the two frameworks to underpin this study. The second framework is the utilitarian approach taken by the Millennium Ecosystem Assessment (2005) with their Total Economic Value Framework. It was chosen because of the current interest in ecosystem services expressed by protected area managers and the hope that framing the research as such would enable a more rapid uptake of the findings.

We discuss social values (often referred to as landscape or place values in the literature) in four broad ways: (1) Direct use, non-consumptive values. This category of value implies that while the Kimberley coast was directly used in the attainment of value, the quantity of goods or value available was not diminished or reduced as a result. (2) Direct use, consumptive values. This category includes values accrued through direct use of the Kimberley coast and its waters, with a potential concomitant reduction in the quantity of goods and value available due to that use. (3) Indirect use values. Indirect use values are those associated with air and water purification, waste assimilation and other regulating services. Biodiversity is considered one of these 'services'. (4) Non-use values. This final category of value includes those unrelated to physical experience or use of the Kimberley coastline or marine environment.

1.3 Overview of research to-date on marine social values

The marine environment, and marine protected areas (MPAs) in particular, are receiving an increasing amount of attention in regards to biodiversity conservation (Pita et al. 2013). While MPA ecology and economics have been well studied in the past, the social aspects of marine conservation and MPAs have received much lesser consideration, although there is a growing recognition of their importance in terms of the ongoing success of marine conservation (e.g. Charles & Wilson 2008, Pollnac et al. 2010, Voyer et al. 2012). These 'social aspects' include the relationships that people have with the marine environment and may be reflected in the social values they express (people's preferences and opinions regarding management, benefits or ecosystem goods

and services derived, attitudes and perceptions pose other elements of social interest). While understanding people's social values, perceptions and aspirations in relation to the marine environment is increasingly seen as critical for long term conservation, comprehensive investigation and analysis has been lacking to-date (Voyer et al. 2012, Cornu et al. 2014, Gruby et al. 2015).

A recent review of the scientific literature concerning social considerations relating to marine environments (Strickland-Munro et al. in prep) supports the assertions of Voyer et al. (2012) and Gruby et al. (2015). Their review of articles variously exploring social values, perceptions, attitudes, preferences and benefits derived from marine and coastal landscapes highlights a lack of consistency and rigour characterising the investigation of social considerations. For instance, the particular social construct investigated in the articles (e.g. value, perceptions, attitudes) was typically undefined or used interchangeably with other related terms (e.g. concurrent use of the terms attitudes, perceptions, values and views). In addition, articles at times explored more than one (undefined) construct simultaneously. This use of multiple, undefined research constructs contributes to confusion over construct meaning already present within and among different disciplines. It may also be indicative of language 'slippage' within the wider environmental values literature (Reser & Bentrupperbaümer 2005). Strickland-Munro et al. (in prep) conclude that failure of many reviewed articles to provide clear definitions of their social research construct impedes their ability to convey meaning across disciplinary divides and their usefulness for decision making.

Further, their review illustrates that while a range of stakeholder groups (e.g. tourists, recreational, subsistence and commercial fishers, conservation management agencies, government, conservation organisations, the tourism industry, divers, local community members, scientists) have been involved in social research, the vast majority of studies engaged with only two primary stakeholder groups, commercial fishers and local community members. While these stakeholder groups clearly have a close involvement with the local marine environment and are likely to be impacted by management changes (Pita et al. 2013), future research would benefit from engaging with a greater number and more varied range of stakeholders to help provide a greater diversity of perspectives.

The review highlights recreational values as the most frequently identified value evident in existing studies. Economic and biodiversity values were the next most commonly identified social value relating to marine and coastal environments. Over 20 other values were identified, in addition to a number of ecosystem goods and services. These included the notable presence of a range of non-use or intrinsic values including existence, bequest, and option values (Strickland-Munro et al. in prep).

1.4 The Kimberley coast and marine environment as valued places

1.4.1 Aboriginal connection to country

Aboriginal people have occupied the Kimberley region for an estimated 40-60,000 years and evidence an enduring relationship with the landscape. The physical landscape, or 'country', is more than a mere geographical space for Aboriginal people, it is a living entity, as active and responsive as people. As Rose (2002, 14) explains, in Aboriginal English, the word 'country' is both a common noun and a proper noun. People talk about country in the same way that they would talk about a person: they speak to country, sing to country, visit country, worry about country, grieve for country and long for country. People say that country knows, hears, smells, takes notice, takes care, and feels sorry or happy. Country is a living entity with a yesterday, a today and tomorrow, with consciousness, action, and a will toward life. This contrasts to western ontology with its emphasis on geography, location, boundaries, utilitarian use, and topography with flora and fauna. Instead country is life affirming, active and the means through which people can work in conjunction with "the totality of beings that are ever-present in land, water and the heavens" (Doohan 2006, 117).

Long-established ontological traditions and practices connect the health of country to the health of people. Country, and one's relationship to it, entails a suite of personal, cultural and spiritual obligations and responsibilities. Country exceeds the biophysical: it also includes that which cannot be seen including spirits, the old people, the forces that shape behaviour, and laws and rules for conduct. This means that country has the capacity to instruct, direct and influence at the same time as offering people specific sites that allow them to hunt, conduct education, carry out law and ceremony and inspire song, language, story and law (YRNTBC 2011).

The centrality of country to Aboriginal culture means that great value is placed on keeping country healthy. This applies equally to land and sea (or saltwater) country, which are inseparable for coastal Aboriginal people (Smyth 2007). Vigilante et al. (2013, 146) describe saltwater country as a "complex enculturated place". Saltwater country activates all sorts of things for local Aboriginal people. It brings to life story, song and

memory. It brings to life not just a landscape that is 'out there' or truncated from human subjectivity. It holds the imprints and life force of ancestral characters and spiritual activity. It can heal and it can punish. Thus saltwater country calls up and maintains "layer upon layer of relationships to land and ancestors" (Sharp 2002, 77).

A consistent set of themes runs through various Aboriginal ideas about the coast. Most fundamental is the interconnected relationship between people, country and law. These first principles in Aboriginal ontology involve the interweaving of community (through old kin-based social structures and rules), country (through keeping places alive by visiting, walking, hunting and caring) and law (through transmission of song, culture, language, knowledge and story from generation to generation).

Significant archaeological evidence of Aboriginal occupation and use exists along the Kimberley coastline as well as on a number of offshore islands. This evidence includes rock art, stone arrangements, shell middens and other human artefacts (Zell 2007, Vigilante et al. 2013). Saltwater country also provides evidence of Dreamtime events in the form of rock art, stone arrangements, sacred sites, song lines and other in/tangible features of land and sea within which reside ancestral creator beings (Smyth 2007, Vigilante et al. 2013). Maintaining contemporary connections to these Dreaming events is paramount and achieved through complex religious narratives known as 'stories' (Vigilante et al. 2013). The transmission of knowledge via stories is the raison d'être for Aboriginal life, giving elders the chance to have their accounts listened to, young people the chance to learn and Aboriginal culture the chance to rejuvenate.

1.4.2 Overview of Aboriginal values

The enduring and all-encompassing role of country provides insight into a number of ways in which Aboriginal people value country. The following section provides a brief overview of these values but is in no way a comprehensive representation of the special relationship between Aboriginal people and country. Aboriginal values, in particular the strong interconnections between family, country and knowledge, often contrasts with Western science, knowledge systems, and measures (Scherrer et al. 2011). This poses challenges for those seeking to understand Aboriginal values in relation to country. Reticence in sharing culturally sensitive information with outsiders presents another challenge, particularly given the history of scientific research and knowledge extraction from Aboriginal groups (e.g. Klain & Chan 2012). On the other hand there is an emerging interest by Aboriginal groups, particularly encouraged by the growth of collaborations with ranger teams, in combining Indigenous knowledge systems with science (see Altman & Kerins 2012).

Coastal (or saltwater) Aboriginal people continue to rely on coastal and marine environments and the resources therein for their cultural identity, health, wellbeing and domestic as well as commercial economies. Their connections to sea country have remained strong despite the impacts of dispossession (Smyth 2007) that saw traditional Aboriginal language groups placed under enormous pressure and Aboriginal people forcibly removed from their homelands. Beyond the spiritual and cultural values associated with the need to care for country and maintain spiritual health, a number of more tangible values relating to the coastline and marine environment are evident. These include the provision of food resources from the sea and coastal area, with coastal Aboriginal groups noted for their heavy reliance on sea resources to comprise their traditional and preferred diet.

For Kimberley Aboriginal groups the connection between people and country is paramount. This is because in Aboriginal ontology and cosmology learning about traditional kinship obligations is incorporated into the business of looking after 'sea-country'. Indeed to think about people without reference to country is akin to talking about the future of a child without reference to its mother (Rose 2004). As Edwards (1988) further explains this is because in Indigenous cosmology country is the place where present living family, ancestors and as yet unborn children dwell. This means that as a member of one's family, country demands care. In turn, country offers care. To visit country, to travel through it, hunt on it, make fire on it and sing to it is much like visiting an older relative. In both acts one maintains relationships, obligations and 'keeps alive' one's family. In this way, keeping country healthy (by visiting it, dancing on it and warming its soul by fire) also involves the act of keeping community healthy (Collard & Palmer 2006).

1.4.3 Karajarri ngurra

The following sections rely heavily on information contained within the Karajarri Healthy Country Plan 2013-2023 (KTLA 2013). For Karajarri people, all forms of life and ecological processes including the landscape, people, language and customs, are connected to *Pukarrikarrajangka* (the Dreaming). This idea is more than simply a period of time that sits in an abstracted past. It also represents the thread or vehicle through which

the interconnections between people and country are made. To paraphrase Stanner (2009, p23-24), *Pukarrikarrajangka* (he used the term 'the Dreaming') is not simply accounts of the past, a history of what has been. Rather it is everywhere, 'all the instants of being, whether completed or to come'. At one and the same time, *Pukarrikarrajangka* holds the mysteries of life as well as the means of teaching the rules one needs to observe (see Myers 1991, Folds 2001, Glass 2002).

The country, plants, animals and water are *Wankayi* (alive). The responsibility to keep country *Wankayi* is summarised as '*Palanapayana Tukjana Ngurra*', everybody looking after country properly (KTLA 2013). Karajarri people are traditional owners of land and sea (intertidal zone) country along the southwest Kimberley coast. This traditional area is bounded by Thangoo pastoral lease to the north and by Malamburr Well (on the northern end of *Malampurr,* Eighty Mile Beach) to the south. Karajarri country also includes several hundred square kilometres of *pirra* (inland areas) stretching approximately 300 km eastwards from *jurarr* (coastal areas) towards the Great Sandy Desert (KTLA 2013). Figure 4 depicts the extent of traditional Karajarri country, which encompasses a number of pastoral stations.

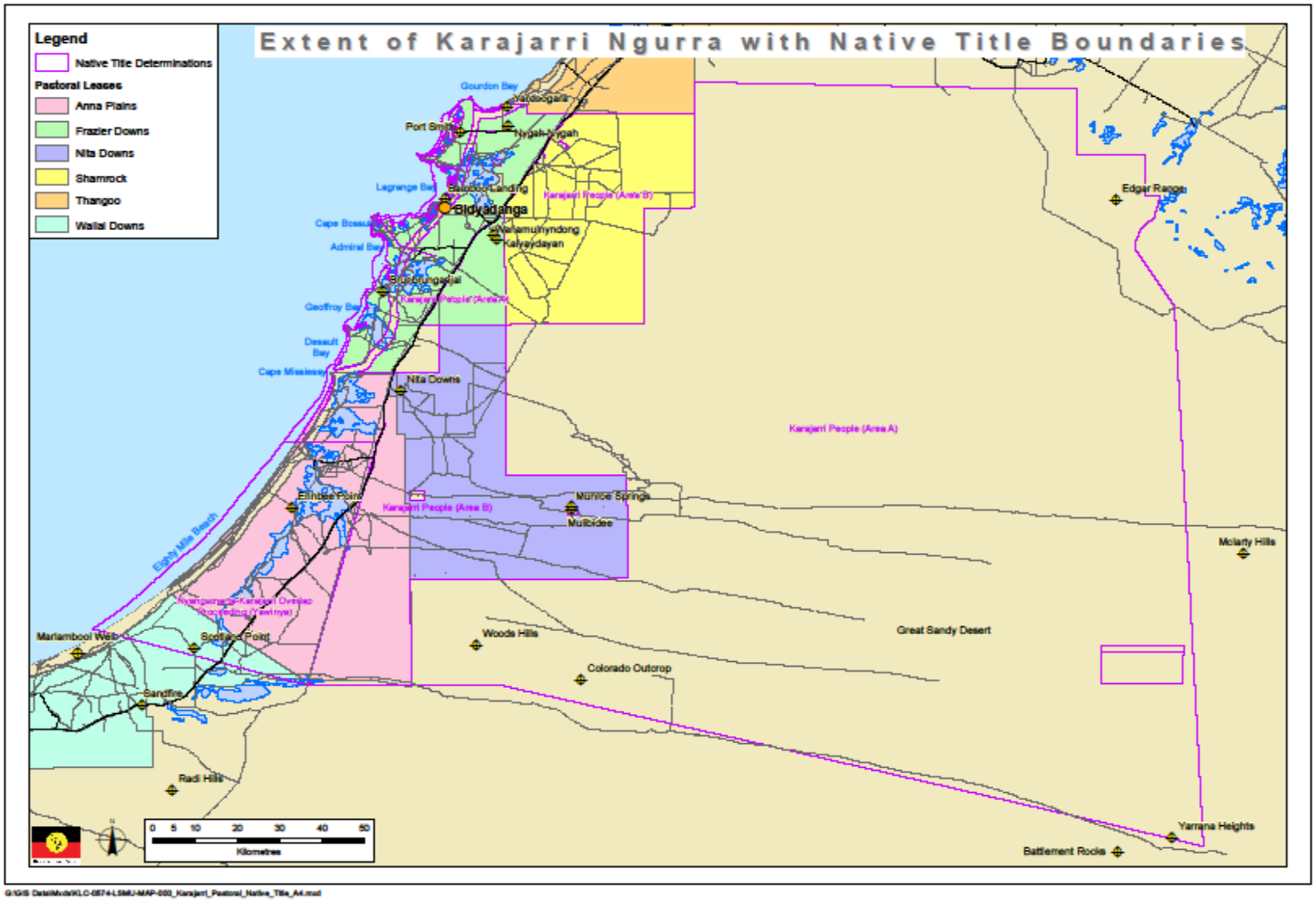


Figure 4. Extent of traditional Karajarri ngurra, showing Karajarri Native Title determination areas (A, B and Yawinya) (Source: Kimberley Land Council).

The *jurarr* (coastal) region is diverse and includes *wintirri* (sandy beaches, dunes and cliffs), bays, *wangku* (rocky headlands), *murri* (tidal creeks) and lagoons, *puntu* (intertidal mudflats/freshwater seepages), *parnany* (reefs) and *wirntirri* (sea-grass beds). The coastal habitat provides breeding area and an important source of food for a number of threatened and migratory sea turtle species including the green, Loggerhead, Hawksbill and Olive Ridley turtles. Other notable marine species include Snubfin dolphin and dugong, while internationally-listed migratory shorebirds utilise the intertidal mudflats as a feeding ground. Wild pearl shell (*Rijii* or *jakuli*) is abundant in coastal waters. *Pirra* (inland areas) are arid and sparsely vegetated, providing habitat for endangered animals including the Gouldian Finch, Marsupial Mole and Northern Quoll. *Pirra* also contains 'living water' wetlands that have been used for generations as a source of permanent water (KTLA 2013). In total, Karajarri country provides refuge to over 30 international migratory species, and to six mammal, nine reptile, five bird and four fish species listed as vulnerable or endangered under the Commonwealth *Environmental Protection and Biodiversity Conservation Act* (1999). Cultural sites include ceremonial increase sites (areas where ceremonies are performed to instruct natural species, e.g. salmon, to be plentiful (Piddington 1932), fish traps, ceremonial areas, burial sites, middens and *Pulany* (mythical serpent) sites. Many of these cultural sites continue to be actively used and maintained by Karajarri people.

1.4.4 European history and current land use

The broader Port Smith area was 'discovered' in 1802 by the French navigator Baudin, who named La Grange Bay (Bidyadanga Aboriginal Community La Grange Inc online). In 1864, men associated with the Roebuck Bay Pastoral Company as well as police established a depot camp near Cape Villaret; this was abandoned in 1866. Karajarri people were involved in the pearling industry which by 1880 was thriving along the northwest coast. Coercion and violence towards Karajarri (and other Aboriginal) people was widespread (Skyring & Yu 2008). In 1889 La Grange Bay became the site of a post office and telegraph station linking Broome, Marble Bar and Perth, and served as an outpost for police patrolling regions south of Broome. The area also offered refuge from the dangers posed by forced labour and violence associated with the pearling industry and European encroachment. Both Karajarri and people from neighbouring Aboriginal groups benefitted in this regard. As the pearling industry gradually replaced Aboriginal workers with Asian indentured labourers, Karajarri people entered into bartering arrangements with the new Asian workforce. In this autonomous economic activity, Karajarri carted wood and water for lugging crews in exchange for receiving an array of provisions and other items such as clothes. Women were also bartered, with the exchange culturally acceptable providing payment was negotiated and given. Mixed-race offspring were common (Skyring & Yu 2008).

In 1931, the West Australian government earmarked 180 ha of land as a ration depot and Aboriginal reserve. This land was subsequently taken over and run as a Catholic Mission. The establishment of missions for Aboriginal people has formed an integral part of Kimberley's history. The La Grange Catholic Mission was established on Karajarri country in 1955 (Bidyadanga Aboriginal Community La Grange Inc online). The Mission's purpose centred on the training and subsequent employment of Aboriginal people. While the Nadja-Nadja (salt-water people who spoke the Karajarri language) were the first Aboriginal people in the area, over time the Mission became home to people from a number of different language groups including Mangala, Yulparija, Juwaliny and Nyanyumarta (Bidyadanga Aboriginal Community La Grange Inc online). In 1984 the Bidyadanga Aboriginal Community La Grange Incorporated took over administrative management of the community.

1.4.5 Karajarri Native Title

Native title determinations are dramatically changing how lands and coastal waters in the Kimberley are delineated, valued and ultimately managed. These determinations have allowed some Indigenous groups to gain rights and interests to their land associated with their traditional laws and practices. Native title rights and interests may include: living on an area; access for traditional purposes such as camping or ceremonies; visiting and protecting important places; hunting and gathering food; and teaching law and custom on country (National Native Title Tribunal 2014). Almost the entire Kimberley coast is subject to native title applications and determinations (refer to http://www.nntt.gov.au/Maps/WA_Kimberley_NTDA_schedule.pdf for the most recent map).

Karajarri people were recognised as Native Title holders for most of their traditional lands through three separate determinations in 2002, 2004 and 2012 respectively (KTLA 2013). The first determination, Karajarri A, covers an area of 24,725 km^2 (Figure 4). The second determination (Karajarri B) covers 5,647 km^2 and the third determination in 2012 relates to a 2,000 km^2 area of land and sea country called Yawinya that includes portions of Anna Plains and Mandora Stations as well as 80 Mile Beach (Figure 4). Native Title for this latter

area is shared between the Karajarri and Nyangumarta Aboriginal groups. In total, Karajarri hold Native Title over 3,020,300 hectares (KTLA 2013).

A large proportion of Karajarri Native Title land is held in exclusive possession. This means that Karajarri have the right to possess, occupy, use and enjoy the land and waters to the exclusion of all others. The remainder of Karajarri Native Title land is held in non-exclusive possession, conferring rights to enter and remain on land, access natural resources and water, engage in rituals and ceremony, take flora and fauna and to maintain and protect sites of significance in areas where others share certain rights to use land. For example, some parts of the determined area include pastorals leases controlled by non-Karajarri.

The Karajarri Traditional Lands Association (KTLA), a Registered Native Title Body Corporate established in 2002 following the first Karajarri (A) Native Title determination, administers these Native Title areas,. KTLA holds and manages native title interests on behalf of all Karajarri. KTLA oversees group interests and acts as a conduit for negotiating with external interests. KTLA, like other corporate bodies, is governed by a constitution, elects directors to represent the interests of Karajarri, has members, and provides governance for the operation of its business.

1.4.6 Karajarri Indigenous Protected Area

In 2014 Karajarri Traditional Owners entered into an agreement with the Commonwealth of Australia to declared an Indigenous Protected Area (IPA) over some of the coastal areas (24,797 km2) (Figure 5) within the Native Title determined area. The Western Australian State Government, the Kimberley Land Council, neighbouring pastoral stations and other stakeholders, supported the agreement. To assist in the planning and development of the IPA, Karajarri people have developed a management plan which provides direction for addressing threats and for focusing on priorities for land and cultural management (Karajarri Traditional Lands Association 2013). An IPA does not change land tenure and it is not legally binding; however, it provides a mechanism for indigenous groups to assert their Native Title rights, create a vision, engage their community and external stakeholders and importantly offers a funding stream to implement their management plan.

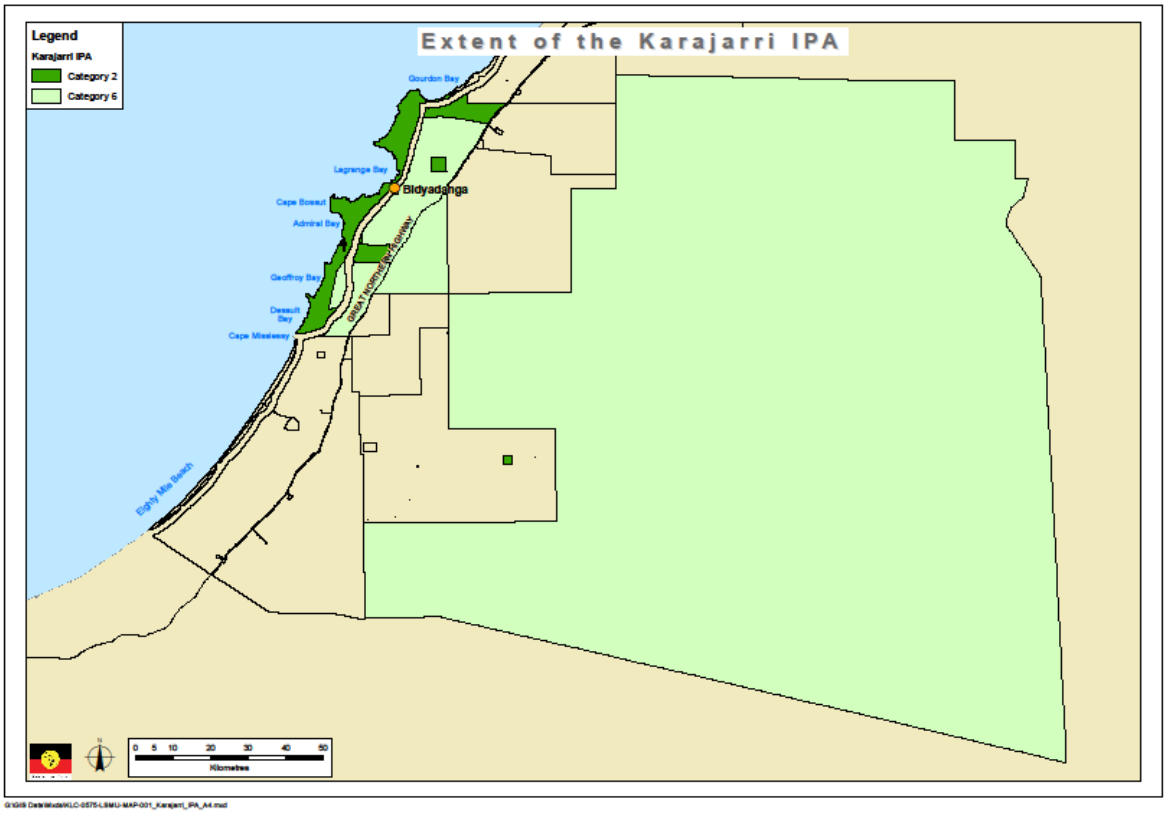


Figure 5. Karajarri Indigenous Protected Area (Source: Kimberley Land Council).

In 2014 Karajarri Traditional Owners declared an Indigenous Protected Area (IPA) over much of their land estate (2,479,700 ha) (Figure 6). The Karajarri IPA comprises two different management categories based on the management objectives set out in the Karajarri Healthy Country Plan (KTLA 2013): Category 2 and Category 6. These management categories are based on guidelines set by the International Union for Conservation of Nature (IUCN). Table 1 outlines the primary management objectives of each category according to the Karajarri Healthy Country Plan (KTLA 2013).

Table 1. IPA Category 2 and 6 management objectives.

Category	Management Objectives
IPA Category 2 - Recreational & Conservation Management	To protect biological diversity and natural environments To preserve and maintain Karajarri social, ceremonial and cultural uses To protect and maintain recreational values To promote cultural tourism development To ensure that any development or use of their natural resources occurs in a manner consistent with the above purposes
IPA Category 6 – Multi use Landscapes	To protect natural ecosystems To use natural resources sustainably, when conservation and sustainable use can be mutually beneficial. (e.g. Sustainable grazing)

Declaration of the Karajarri IPA was supported by the Federal and State Governments, the Kimberley Land Council, neighbouring pastoral stations and other stakeholders. To assist in the planning and development of the IPA, Karajarri people have developed a management plan which provides direction for addressing threats and for focusing on priorities for land and cultural management. An IPA does not change land tenure and it is not legally binding; however, it provides a mechanism for indigenous groups to assert their Native Title rights, create a vision, engage their community and external stakeholders and importantly a funding stream to implement their management plan (Department of the Prime Minister and Cabinet 2016). Funding for the Indigenous Protected Areas programme is provided under the National Landcare Programme, with $73.08 million allocated from 2013- 2018. IPAs typically have a number of core management objectives: to protect natural and cultural values, strengthen governance, to map and record traditional knowledge, and manage or mitigate threatening processes (Department of the Prime Minister and Cabinet 2016). In time it is hoped that the KTLA can further assert their Native Title rights and extend their IPA over further sections of their sea country. The Karajarri IPA is one framework that informs ranger operations and on ground activities.

Karajarri Ranger Program

In 2006, the Karajarri ranger program was established. The ranger team is principally funded by the Commonwealth Department of the Environment under the Working on Country Programme, and is managed locally through the Kimberley Land Council. At the time of research, 11 rangers were employed with the task of delivering land and sea management outcomes on Karajarri country. The rangers are involved in diverse land, sea and cultural management activities, such as: feral animal and noxious weed removal, cultural site management, visitor management, fire management, training and capacity building, water and wetland management. IPA management is guided by a Cultural Healthy Country Advisory Committee, members of which act as community representatives for the ranger group and who advise on ranger activities and planning. This Committee comprises eight people and is in turn governed by senior advisors from the KTLA board of management (KTLA 2013).

Visitor permit system

In 2015 the KTLA through their Land and Sea Management Program began the process of introducing a Protected Area Visitor Permit System (Visitor Permit). While recognising that tourism can offer a number of positive community benefits, there was an associated recognition of the need to manage for adverse environmental and cultural impacts, to increase the amenity of the area and to assert Karajarri Native Title rights. In addition the KTLA recognise that Federal funding for IPA and ranger programs will not last forever and that alternate sources of income, big and small are needed to keep jobs open for community members.

At the time of research, the Visitor Permit was not operational although indicative costs had been released to the public. These were (cost is per vehicle): two day permit $15; 7 day permit $50; and season permit (April-October) $120. Funds raised through the Visitor Permit will be used to fund operational works by the

Karajarri rangers. Explanatory information leaflets associated with the Visitor Permit show the areas permissible for tourist access as well as the permitted and restricted activities for each location. Under rules implemented through the Karajarri IPA, tourist access is restricted to four designated areas: the Port Smith Lagoon, Cowrie Creek, Saddle Hill and Gourdon Bay (Figure 6). The Visitor Permit system will also act as a conduit for the KTLA to enter into both tourism management (e.g. managing existing impacts and benefits from visitors) and tourism development (e.g. developing new enterprises). The Traditional Owners for the area and the overarching KTLA have aspirations for developing a wilderness campground, walking trails and a cultural festival.

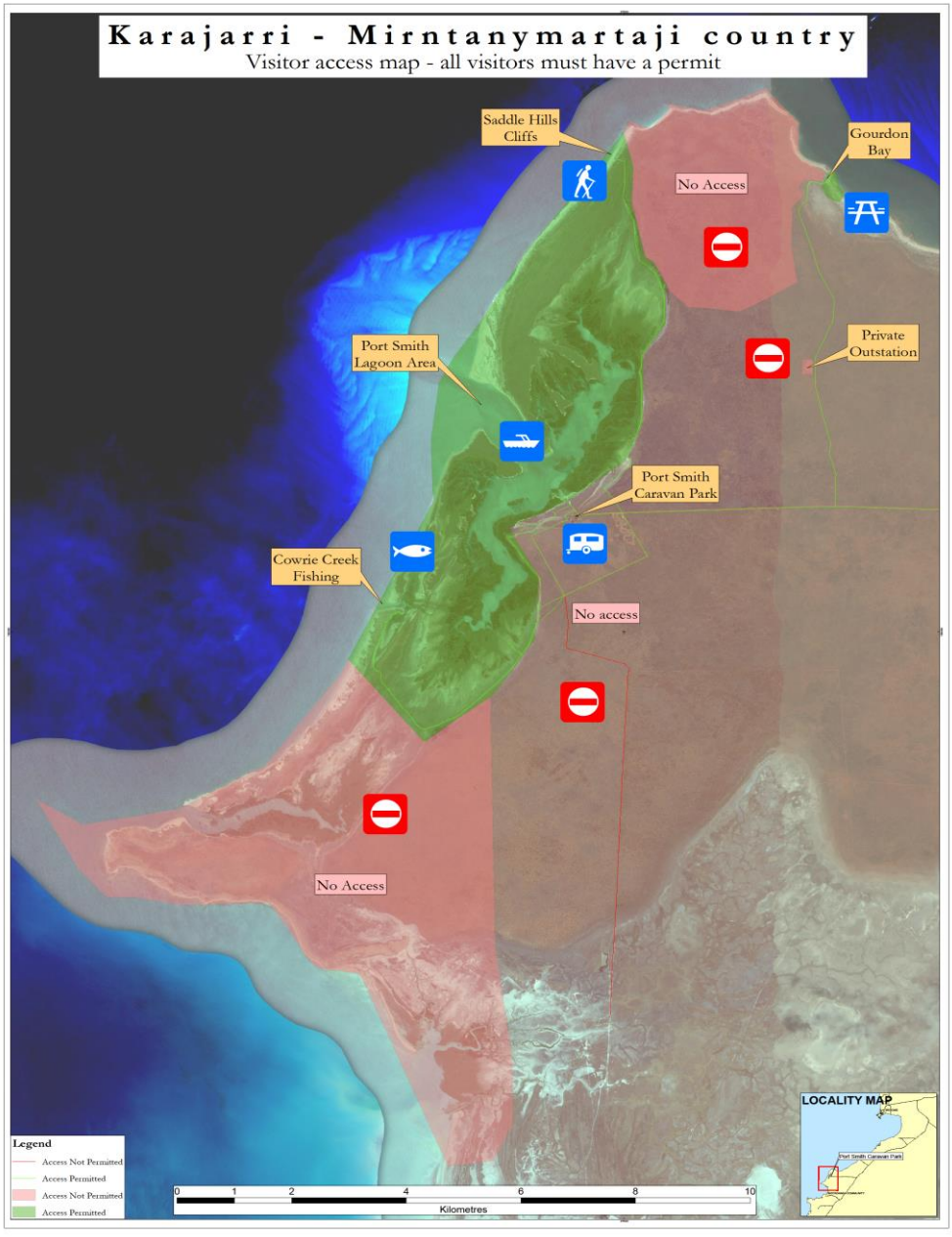


Figure 6. Port Smith study area showing tourist-accessible areas and no access zones (Source: Kimberley Land Council).

1.4.7 Port Smith (Purnturrpurnturr)

The Port Smith area (and its Caravan Park), located approximately 160 km south of Broome, is the key tourism area on Karajarri lands (*cf.* Figure 4). The Caravan Park itself is located on a private lease excised from the surrounding Frasier Downs Pastoral station. Access to the Caravan Park and coast is via a well-maintained, 23 km dirt road from the highway. The immediate area around Port Smith comprises several different environments including a tidal lagoon, mangroves, reefs, clifftops and open beach. The tidal lagoon is 1200 ha

with sand shoals extending approximately 3 km seaward (Short 2005). The Caravan Park is located directly opposite the creek mouth. The area is a popular tourist destination with activities centred on beach and boat fishing (Hema Maps 2012).

A large number of unmarked access tracks exist in the area and many of these are accessed by visitors as well as by local residents from nearby Bidyadanga Aboriginal community and Broome. A four-wheel drive vehicle is required to navigate the majority of tracks. In addition to fishing, the area offers opportunities for mud crabbing, walking, exploration, relaxing, four-wheel driving, wildlife-viewing, kayaking, boating, bird-watching and cultural interaction with local Traditional Owners.

People visit the Port Smith Area from neighbouring towns such as Broome, Derby and Port Hedland as well as attracting many interstate and overseas visitors. The Port Smith Caravan Park offers a range of accommodation options including 100 caravan and camping sites as well as six basic self-contained cabins. The Park shop stocks basic food supplies and sells fuel. While visitor statistics for the Port Smith area were not available, the tourism industry is a significant contributor to the Kimberley economy. An estimated 402,400 people visited the broader West Kimberley region in 2014 (Tourism Western Australia 2015), with visitation being highly seasonal.

The KTLA have identified a number of management priorities for the Port Smith area. Three of these were of primary concern at the time of research: unmanaged visitation, uncontrolled recreational fishing, and lack of recognition of Karajarri jurisdiction. Each has attendant environmental and socio-cultural impacts. Unmanaged visitation, for instance, has resulted in a proliferation of four-wheel drive access tracks along the Port Smith coastline. This is of concern to the KTLA for many reasons including potential (and existing) damage to dunes, rock platforms, mangroves, cliffs and vegetation; potential biosecurity risks; and damage to cultural heritage sites and values. Uncontrolled recreational fishing poses a threat to fish stocks and little scientific research has been conducted in this regard.

Finally, the KTLA expressed concern regarding a seeming lack of recognition of Karajarri jurisdiction and cultural authority. As Traditional Owners, the KTLA welcome others to visit Karajarri country, in return requested they be acknowledged as the Traditional Owners of their lands and that their protocols and management regimes be respected.

2 Methods

2.1 Research approach

2.1.1 Research questions and objectives

This technical report contains the fourth set of results from the 3-year social research project (*Socio-cultural values of the Kimberley coastline and marine environment*), reporting on the fourth part of the project: a detailed analysis of the social values for up to two marine parks through extended consultation with Aboriginal Traditional Owners and others with a particular interest in the chosen marine park(s).

The overarching aim of this 3-year research project is to document and analyse the social values and aspirations of people associated with the existing and proposed marine parks at Eighty Mile Beach, Roebuck Bay, Lalang-garram (Camden Sound), Horizontal Falls and North Kimberley and other coastal waters of the Kimberley between Eighty Mile Beach and the Northern Territory border.

This research aim is being pursued through the following research objectives. This report addresses the fourth one.

1. Describing and analysing how people value the Kimberley coastline and marine environment and what places are important to them, especially for Aboriginal people, through 167 in-depth face-to-face interviews accompanied by participatory mapping in the Kimberley region, Perth and Darwin.
2. Undertaking a follow-up web-based Public Participation GIS (PPGIS) survey to extend and validate the results from Objective 1.
3. Undertaking comprehensive stated preference choice analyses. This was achieved by including a series of questions designed to elicit respondents' preferences regarding future activities on the Kimberley coast and future management of this coastline and its waters in the web-based PPGIS survey detailed under Objective 2.

4. Undertaking a detailed analysis of the social values for up to two marine parks through extended consultation with Aboriginal Traditional Owners and others with a particular interest in the chosen marine park(s).

The latter objective was refined following a process of agreement-based research negotiation with KTLA representatives. This resulted in a shift in focus away from designated marine parks to exploring values for a defined (non-marine park) area of coastline.

2.1.2 Agreement-based research

In the past researchers have tended to treat Indigenous groups as subjects of research, peripheral to the research process, to be ignored or quickly consulted. Recent developments in native title, human rights conventions, legislation and government policy now make it imperative for researchers to review and change their practice. As a consequence, it is no longer reasonable for researchers to assume access to country, data and informants. Likewise, the new conditions of research demand that researchers enter into arrangements with Aboriginal people regarding joint management of the research work. One response has been a shift to 'agreement-making', where researchers enter into arrangements for data sharing, intellectual property rights, training, resource exchange, fee for service arrangements, commercial partnerships and protocols for research activity. An agreement-making approach underpins design and execution of this research project, as does our commitment as researchers to mutually beneficial, collaborative and ethically conducted research.

As the representative body for Traditional Owners of the Port Smith region, the KTLA was an essential partner in designing and conducting the research. Negotiated, agreement-based procedures with the KTLA has involved two stages to-date (as of December 2015): (1) introductions, scoping and discussion of research possibilities with the KTLA, Traditional Owners, Karajarri IPA, and ranger group representatives; and (2) the carrying out of research in the field with Murdoch University researchers, Karajarri rangers and Karajarri Traditional Owners including KTLA directors and Cultural Advisors. A third stage of collaboration (to take place in May 2016) will focus on the joint development of map products. In the first stage, researchers from Murdoch University contacted the Karajarri IPA and ranger coordinators to discuss the possibility and potential interest of research on Karajarri country. The focus of these discussions was twofold. First, researchers were focused on conducting research that met identified information needs and that provided useful research outcomes and other benefits to Aboriginal people. As highlighted previously, the KTLA identified a number of information needs surrounding issues of tourist access, cultural sovereignty, market opportunities and environmental pressures, with information sought for use in guiding future management. Second, the research was required to complement the aims of the WAMSI social values research project, ensuring mutually beneficial outcomes. Ongoing activities include the development of a formal Memorandum of Understanding between the KTLA and Murdoch University and the development of cultural tourism in the Port Smith region.

2.1.3 Research design

The study area for this research was the environs surrounding the Port Smith Caravan Park, 160 km south of Broome along the Eighty Mile Beach coastline. The area of interest was a coastal strip bounded by Gourdon Bay to the north and Cowrie Creek to the south (Figure 7). Respondents were sought from among tourists staying at the Caravan Park as well as from local Port Smith residents. All were asked to focus their responses on the coast and associated waters of the Port Smith area. The study area is located within the Frasier Downs pastoral station, which is leased by the KTLA. The region forms part of the broader Karajarri IPA. The Port Smith Caravan Park is private property excised from Frasier Downs.

A variety of methods have been used to collect socio-spatial data, including open-ended personal interviews, questionnaire surveys and web-based tools (McLain et al. 2013). A questionnaire methodology was used in this study, for five reasons. One, questionnaires are useful for collecting a large amount of information from a large number of people, in a relatively short period of time. The use of closed-ended (e.g. tick box) questions and answers facilitates this efficiency. Two, a number of different people can conduct questionnaires simultaneously, with negligible impact on compromising survey validity or reliability (Neuman 2009). Three, questionnaires are a less intrusive form of collecting socio-spatial information than face-to-face interviews, which were used in an earlier stage of this research. Four, questionnaires are well suited to capturing information on user needs, expectations, perspectives, priorities and preferences. Finally, the use of questionnaires containing a mapping component is a common means of collecting spatial information on ecosystem services as well as people's values and management preferences (Brown & Fagerholm 2015). Data collected in this manner can provide planners and managers with socio-spatial information needed to identify i) the compatibility of land uses (e.g.

zoning in marine parks, or Indigenous Protected Areas as considered here) with landscape values and ii) potential land-use conflict (Brown & Weber 2012).

Usually, socio-spatial data collection using interviews, questionnaires and web-based approaches relies on pre-defined value categories, most often those developed by Brown and Reed (2000). The visitor survey reported on here applied pre-determined value categories generated through an earlier interview-based phase of research (Strickland-Munro et al. 2015). These interviews used an interpretivist approach (Neuman 2009) to generate a set of emergent social values for the Kimberley coast and its waters, including the Port Smith area. Table 2 presents the 17 mutually exclusive value categories obtained from these interviews.

Table 2. Social values derived from an earlier stage of this research and their definitions (Strickland-Munro et al. 2015).

Value category	Definition
1. Direct use, non-consumptive values	
Physical landscape	Values derived from components of the physical landscape. Major elements: aesthetics, tidal phenomenon, coastal geology, unique nature experiences, the Kimberley's 'pristine untouched environment', and the coastline being 'wilderness' and a 'last frontier'.
Aboriginal culture	Values derived from the transmission of Aboriginal wisdom, knowledge, traditions, and way of life. Major elements: cultural sites, connection to country, evidence of historical use, and transmission of cultural knowledge. DOES NOT include SPIRITUAL values relating to profound or awe inspiring nature experiences as expressed by non-Aboriginal people.
Therapeutic	Values derived from places that make people feel mentally better, calm, or recharged. Major elements: escapism, relaxation, remoteness, and personal recharge.
Social interaction and memories	Social values derived from a place. Major elements: social experience and home/childhood memories.
Recreation–other	Values derived from places that provide opportunities for outdoor recreation unrelated to camping or fishing. Major theme: exploration.
Learning and research	Values derived from the ability to learn from a particular place. Typically expressed in terms of scientific research, but also monitoring, exploration, discovery and more generally the ability to learn about the environment (i.e.' lay' learning). DOES NOT include transmission of cultural knowledge within Aboriginal society (included in ABORIGINAL CULTURE).
Experiential	Values derived from places offering a unique personal experience. Major elements: adventure, iconic destination, 'blown away' experience, private experience.
Historical	Values derived from places of natural and human history that matter to an individual, others, Australia or the world. Major elements: European and missionary history. DOES NOT include evidence of historical Aboriginal use (included in ABORIGINAL CULTURE).
Spiritual	Values derived from places that are sacred, religious, unique, or that provide deep and/or profound experiences of nature. Typically related to an expressed reverence/respect for nature by non-Aboriginal people. Major elements: nature as a spiritual landscape. DOES NOT include ABORIGINAL CULTURE e.g. those values related to the transmission of wisdom, knowledge, traditions and way of life.
2. Direct use, consumptive values	
Recreation–camping	Values derived from places that offer recreational activities centred on overnight or longer stays in transient and/or fixed accommodation in coastal areas.
Recreation–fishing	Values derived from places that offer recreational activities relating to the catching of fish species as well as gathering of other marine life e.g. mud crabs, cockles, oysters and stingrays. DOES NOT include fishing undertaken by Aboriginal people as this activity was more commonly referenced as subsistence rather than recreational pleasure.
Subsistence	Values derived from places that provide for basic human needs. Major elements: subsistence food collection and fresh water provision. DOES include Aboriginal hunting where specifically mentioned in the context of subsistence hunting.
Economic–tourism	Generic tourism values, or more specifically refers to eco or nature based tourism, or Aboriginal cultural tourism.
Economic–commercial fishing, pearling and aquaculture	Values derived from commercial fishing, aquaculture and pearling activities. DOES NOT include subsistence food collection (included in SUBSISTENCE).
3.Indirect use values	
Biodiversity	Values derived from the presence of flora, fauna and/or other living organisms. Major elements: marine fauna, reef biodiversity, migratory shorebirds and mangroves.
4.Non-use values	
Bequest	Values derived from places that offer future generations the ability to know and experience places, landscapes and habitats as they are now.
Existence	Values derived from knowing that a particular place, environmental resource and/or organism exists, regardless of having physically been to or directly used an area.

These values accord with the body of knowledge on landscape values developed and extensively used by Brown and colleagues in their values and preference mapping work (e.g. Brown & Reed 2000, Brown & Weber 2012, Brown 2014, Brown & Donovan 2014). Table 3 provides an example of the landscape values commonly applied by Brown and colleagues in their mapping studies. The 17 emergent value categories outlined above complement this established typology in broad terms while explicitly recognising the unique characteristics and nuances of human-environment interactions in the Kimberley region (for example, values relating to Aboriginal culture and subsistence).

Table 3. Landscape values used in Victorian public lands value and preference mapping online survey (Brown et al. 2014).

Values	Operational definition
Scenic/aesthetic	These areas are valuable to me because they contain attractive scenery including sights, smells, and sounds
Recreation	These areas are valuable to me because they are where I enjoy spending my leisure time – with family, friends or by myself, participating in outdoor recreation activities (e.g., camping, walking or fishing)
Economic	These areas are valuable because they provide natural resources or tourism opportunities
Life Sustaining	These areas are valuable because they help produce, preserve, clean, and renew air, soil and water
Learning/education/research	These areas are valuable because they provide places where we can learn about the environment through observation or study
Biological/conservation	These areas are valuable because they provide a variety of plants, wildlife, and habitat
Heritage/cultural	These areas are valuable because they represent natural and human history or because they allow me or others to continue and pass down the wisdom and knowledge, traditions, and way of life of ancestors
Therapeutic/health	These areas are valuable because they make me feel better, physically and/or mentally
Spiritual	These areas are valuable because they are sacred, religious, or spiritually special places or because I feel reverence and respect for nature here
Intrinsic/existence	These areas are valuable in their own right, no matter what I or others think about them
Wilderness/pristine	These areas are valuable because they are wild, uninhabited, or relatively untouched by European activity

A condensed set of the social values outlined in Table 2 was used in the questionnaire. Inclusion was based on the relative importance of each value as determined by its percentage representation in the results from the earlier stage of this research (Strickland-Munro et al. 2015) as well as consideration of values unique, or not applicable to, the Port Smith area. For example, 'economic-commercial fishing, pearling and aquaculture' emerged as an important value for the broader Kimberley coast (Strickland-Munro et al. 2015), however, this value was not included in the survey as none of these activities occur in the immediate Port Smith (lagoon) area. Similarly, values relating to tourism were not included in the survey as much of the area holds cultural significance making tourism development inappropriate. Further information on the refined value set used in the survey may be found in *2.3.1 Data collection*.

Sampling design

Sampling design was informed by a desire to provide an understanding of tourist and resident values and preferences for the Port Smith area, with this information intended to support ongoing KTLA management. Groups involved in previous phases of this research included people affiliated and/or self-identifying as Aboriginal Traditional Owners; Aboriginal and non-Aboriginal residents; tourists and the tourism industry; commercial and recreational fishing, and aquaculture; federal, state and local government; industry (mining, oil, gas and tidal energy interests); marine transport and aviation; and environmental non-government organisations (see Strickland-Munro et al. 2015, Strickland-Munro et al. 2016). This research however had a much narrower focus.

The KTLA expressed a specific interest in identifying existing and potential tourism impacts, as well as exploring the potential for cultural tourism products. Given this emphasis, the population of interest was refined to focus on *walypila* (tourists) visiting and/or staying at the Port Smith Caravan Park, as well as local Port Smith residents. Both groups were purposively targeted for inclusion in the research, a particularly useful sampling strategy in instances where stakeholder groups are known to researchers (Neuman 2009).

Recruitment was driven by the need to engage with the greatest possible number of respondents. Researchers aimed to achieve a census of all visitors and residents during the research period. All Caravan Park visitors were targeted regardless of the length of their stay or previous visitation to the area. Similarly, all local residents were approached to participate in the research. Previous values mapping research has relied on a wide range of respondent numbers, from 22 responses in an interview-based study on the Welsh marine environment (Ruiz-Frau et al. 2011), through to 1,905 responses in an online study of values associated with public lands in Victoria, Australia (Brown et al. 2014) (Table 4).

Table 4. Selection of recent studies and respondent numbers in values mapping research

Study focus	Authors & date	No. of respondents
Bitterroot National Forest, USA	Black & Liljeblad (2006)	15 interviewees
Murray-Darling, Australia	Raymond et al. (2009)	56 interviewees
Wales, UK	Ruiz-Frau et al. (2011)	22 interviewees
Kangaroo Island, Australia	Brown & Weber (2012)	115 responses (web-based)
Hinchinbrook Island, Australia	Van Riper et al. (2012)	209 responses (on-site and mail back questionnaires)
North Vancouver Island (marine), Canada	Klain & Chan (2012)	30 interviewees
Suriname, South America	Ramirez-Gomez et al. (2013)	198 participants
Victoria, Australia	Brown & Weber (2014)	1905 responses (web-based)

Respondents were identified on the basis of i) permanent residence in the area (a known population of eight people at the time of research) and ii) physical location in the Caravan Park (determined by the presence of either a vehicle(s) or camping accommodation). Following this identification, tourists and residents were approached and invited to participate in the research. Researchers sought to obtain as wide a range of respondents as possible, in terms of age, gender and life cycle stage (e.g., with young family, retired etc.). Where multiple respondents were present at any one Caravan Park site, all adults (aged 18 years and over) were invited to participate in the study individually.

2.2 Conducting ethical research

The research was conducted in accordance with approvals gained from the Murdoch University Human Research Ethics Committee (Permit No. 2015/014). Transparent research processes, requirements for informed consent and the right to refuse or withdraw participation helped to ensure the project was conducted in an ethical manner. Participants were required to acknowledge, and indicate their consent to, research procedures and particulars including data confidentiality, anonymity and right to refuse or withdraw participation at any stage (Appendix 1). Access to raw survey data was restricted to members of the research team. Project partners and funders were provided with access to higher level, aggregated data only.

2.3 Data collection

2.3.1 Visitor surveys

Data collection relied on self-completed questionnaire surveys. Participation was voluntary, and respondents were able to withdraw at any time. The survey consisted of 16 open and close-ended questions and comprised three sections. The first of these focused on eliciting standard socio-demographic visitor information such as age, residence, gender and visitation history (Appendix 2). The second section sought information on where people visited in the area. A Google Earth® image of the study area was provided, annotated with key location names, environmental features such as reefs and pools, and major and minor access tracks (Figure 8).

Visitors were asked to indicate and number on this map up to five places they had visited. For each of place indicated, visitors were asked to then indicate why they valued each place, specify the activities they had undertaken during their visit, and any desired improvements (mostly relating to infrastructure). An open-ended question was also included seeking information on what new tourism offerings (including cultural tourism) visitors desired, if any.

Figure 7. Study area centred on Port Smith Caravan Park, showing key locations and access tracks.

Respondents were provided with a list of 14 pre-defined value descriptions to choose from (Table 5, see also Appendix 2). To assist respondents, the survey provided a short description of each value rather than simply listing the value category. For example, 'future generations can enjoy this place' was used to describe the 'bequest' category. This approach served to limit potential differences in respondent interpretation of the term 'value' as well as interpretation of the meaning of value categories. The value categories contained in the visitor

survey were arrived at following the process of i) analytical refinement and the combination of similar value categories and ii) alignment with key literature as discussed previously (see Section 2.1.3 *Research design*). An 'other' option was provided for to allow respondents to express values not contained in the pre-defined survey list.

Table 5. Values and their descriptions contained in the visitor survey.

Value category	Description provided in visitor survey
Bequest	Future generations can enjoy this place
Aesthetics*	It has attractive scenery
Historical	It is a place of human history
Spiritual	It is a place that is sacred, religious and/or provides a profound experience
Existence	It is important in its own right irrespective of how I use it
Therapeutic	It makes me feel physically or mentally better / recharged
Experiential	It offers opportunities for a unique personal experience of nature
Aboriginal culture and heritage	It offers insights into Aboriginal culture and heritage
Recreation - camping	It offers opportunities for camping
Learning and research	It offers opportunities for learning and research
Recreation - fishing	It offers opportunities for recreational fishing
Social interaction and memories	It offers opportunities for social interaction and memories
Biodiversity	The presence of particular plants / animals/ other living organisms are valued
Other	Other (please specify)

*Included under 'Physical landscape' category in Table 2

A shortlist of pre-defined activities and desired improvements, produced in consultation with the KTLA, was provided for respondents to select from (Figure 8, see also Appendix 2). These pre-defined options were designed to encompass i) the full range of permissible activities allowed for the area and, for desired improvements, ii) relate to the management priorities and capabilities of the Karajarri ranger group. Both questions also included an 'other' option to allow respondents to express activities or desired improvements not included within the selection available.

Activity
Beach fishing
Boat fishing
Crabbing
Diving or snorkelling
Experiencing / viewing Aboriginal culture and heritage
Four wheel driving
Kayaking
Relaxing
Spearfishing
Spectating or sightseeing
Swimming
Walking or other exercise activity
Wildlife / nature interaction or viewing

Improvement
Information / interpretative boards
Visitor guides or maps
Shade shelters
Picnic tables
Stairs or steps
Walk trails
Improved vehicle access
Car park
Toilet facilities
Other (please specify) _____

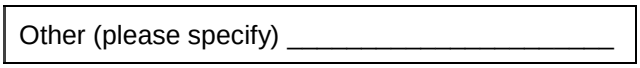


Figure 8. Activity and desired improvement choice options contained within the visitor survey.

The final section of the survey contained a series of questions relating to visitor knowledge and understanding of the management arrangements for the Port Smith region. This included questions relating to the Frazier Downs pastoral station, interactions with rangers, and the incoming Karajarri Visitor Permit.

The visitor survey was pilot tested in July 2015. This involved asking respondents to complete the survey and then obtain detailed design and readability feedback from them. Two different groups were approached to assist with this task. First were social science researchers from the Nature Based Tourism Research Group at Murdoch University. A second group of people involved were associated with the Kimberley Land Council and Karajarri Traditional Lands Association. Feedback from these two sources was used to improve the flow and readability of the survey as well as to increase the clarity of mapping instructions.

Pre-survey training workshop

Two pre-fieldwork training workshops were held with Karajarri rangers prior to data collection. The workshops were intended to provide an overview of questionnaire design and rationale and to build ranger confidence in conducting the survey and explaining its purpose to Caravan Park visitors. Workshops were held at the Bidyadanga ranger base as well as at the Port Smith Caravan Park itself. Rangers, the Karajarri Ranger Coordinator and IPA Coordinator, cultural advisers and Traditional Owners were involved.

The workshops had three parts. First, at each of the workshops, researchers explained survey intent and alignment with KTLA interests and provided an overview of each of the survey questions. Second, Rangers performed a role play in small groups to familiarise themselves with survey delivery and methods of approaching visitors. Discussion points included how to introduce themselves as Rangers and how to introduce the research to visitors. The role play highlighted a number of differences in Indigenous rangers versus *kartiya* (white person) approaches to personal interaction, with rangers identifying the need for enhanced eye contact and clear personal introductions. The third part of the workshops involved the brainstorming of potential questions arising from interactions with visitors. Responses to anticipated questions surrounding Indigenous Protected Areas, the Karajarri Traditional Lands Association and Prescribed Body Corporate, and rationale and funding allocation for the incoming Karajarri Visitor Permit were discussed. During the training workshops, participants also discussed KTLA interests in developing cultural tourism opportunities in the future. As part of these discussions, the Murdoch University and KTLA researchers visited a range of areas along the nearby coastline to gain a better understanding of the region's cultural and environmental values.

Following these training workshops, the visitor surveys were administered and/or distributed by Rangers, Traditional Owners, cultural advisers and Murdoch University researchers working singly as well as in groups of 2-4 people. Survey distribution took place over a 10-day period, with 15 people involved in data collection at various times over that period. The study was conducted during peak tourism season although anecdotal reports from Caravan Park operators suggest that the season was atypical in terms of visitor numbers, with greatly reduced Park bookings (S. Appelbee, pers. comm., 3 August 2015). Most surveys were completed within five to ten minutes, and all surveys were administered/distributed within the Caravan Park grounds. Residents were approached to participate during the same time period and typically completely their survey overnight.

2.3.2 Karajarri kiyungari

Prior to beginning data collection and soon after arriving on Karajarri country, Murdoch University researchers participated in a *kiyungari* ceremony at Cowrie Creek. Presided over by a senior Karajarri woman and ranger cultural adviser, *kiyungari* represents a 'cultural health and safety' practice intended to introduce and welcome strangers to Karajarri country. According to Yu (1999), the act of *kiyungari*, in which strangers take a mouthful of water and spray it out in several directions, serves as a means for Karajarri to speak to *pulany*, powerful beings who are to be respected and approached in prescribed ways. *Kiyungari* allows Karajarri to inform *pulany* that they are kin and asking it to welcome newcomers to country.

2.4 Data cleaning and analysis

2.4.1 Data cleaning

Survey data were refined and cross-checked through a number of procedures. First, data were cleaned to correct for spelling, inconsistences and multiplicity of terms resulting from entries in open-ended survey questions. For example, responses pertaining to desired new activities or cultural experiences (Appendix 2, Q10) were aggregated into groups for summary purposes, for example 'learn about local traditions' and 'learn how to catch a mud crab' were grouped together under a category of 'cultural tourism'. Secondly, mapping data were standardised to clarify the location of places visited (Appendix 2 – Q8) in instances where this was not clear or confusing, for example where a respondent had circled or underlined the location name 'Port Smith' but had not actually placed an 'X' as requested. In such instances a decision was made to assign an 'X' to the assumed area being referred to. This data cleaning rule was simplified somewhat by the limited number of coastal access tracks available to respondents, which in turn limited the number of places that they could access, and hence mark, along the coast.

2.4.2 Data analysis

Analysis involved two distinct phases. One, summary statistics were generated for a range of closed-ended questions contained within the survey. Two, spatial point density analyses were conducted using a Geographic Information System (GIS). The point density analysis conducted in this study was used to identify areas of greatest intensity for values held, activities undertaken and desired improvements. To achieve this, the spatial data were overlaid with 100 m grid cells; this resolution matched the extent of geographic features on the ground, for example the Port Smith lagoon. Calculating point density involved i) defining a 500 m search radius ('the neighbourhood'), with this choice of radius based on the rationale that it was capturing spatial uncertainty of marker placement given the scale of the hard copy maps used in the survey and ii) counting the number of points within the neighbourhood for each value, activity undertaken and desired improvement, and dividing by the total neighbourhood area. Point density maps were presented with relative rather than absolute high and low densities for each value, activity undertaken and desired improvement. Point density maps are displayed in this report using a colour scale with a histogram stretch of 2.5 standard deviations from the mean as this suited all the themes being mapped and illustrating a range from low to high.

3 Results

3.1 Response and respondent details

A total of 96 surveys were completed. The sample size for results presented below varies however as some respondents did not to answer certain questions. The relevant sample size is indicated for each question as applicable.

3.1.1 Respondent socio-demographics

Approximately equal numbers of male (52%) and female respondents (48%) were obtained. The majority of respondents (69%) were aged 55 years and over, with those aged 65 years and older being the largest age grouping (Figure 9, N=94). People aged 18-24 years accounted for just over one percent of responses.

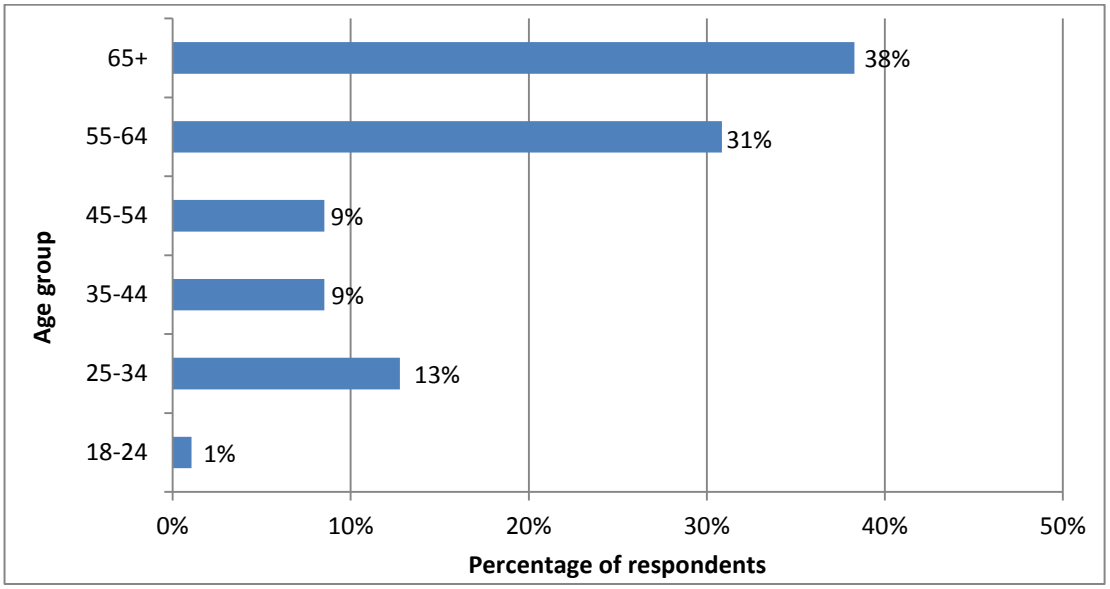


Figure 9. Age of respondents (N=94).

Eighty percent of respondents were travelling with another adult, while 7% of respondents were travelling solo. Only one percent of respondents indicated travelling in a group of 5 adults. Sixteen children (in family groups with accompanying adults) were recorded during the survey.

3.1.2 Residency

Almost 93% of respondents were Australian residents (N=95). Non-Australian respondents (7% collectively) identified as of New Zealand (4% of total sample), Belgian, German and Swedish origin (1% of total sample respectively). Of the Australian respondents (N=88), almost 57% were West Australian residents (Figure 10). Queensland residents accounted for almost 20% of respondents, while visitors from the Northern Territory and South Australia accounted for 1% of respondents, respectively.

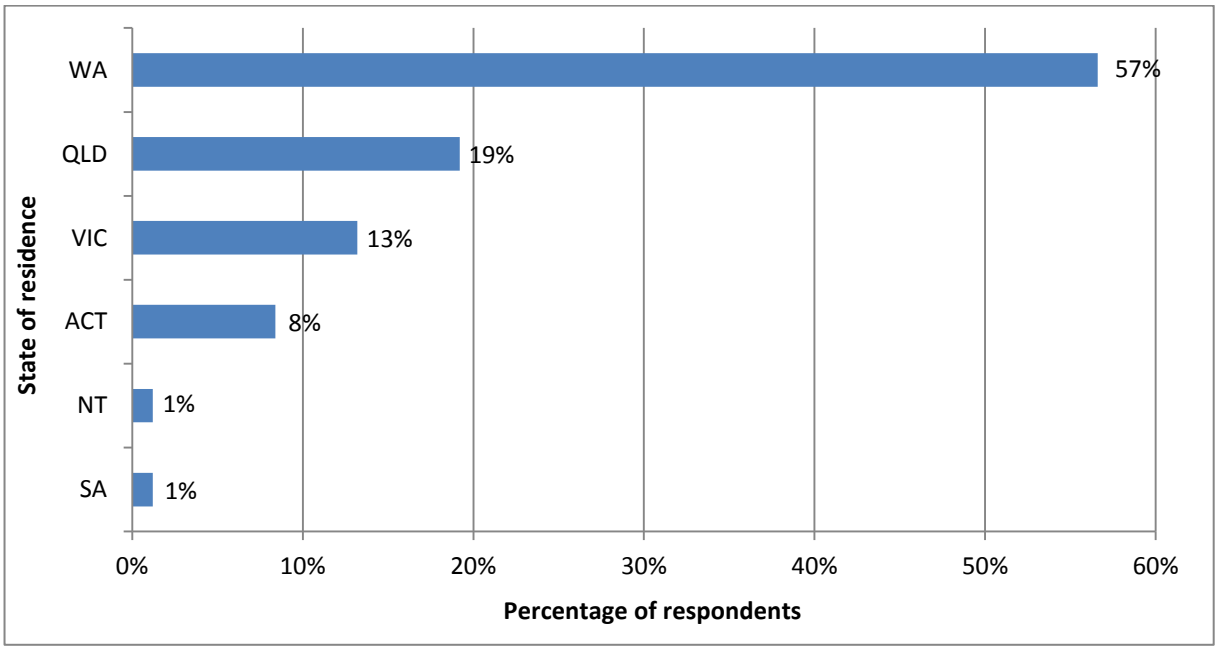


Figure 10. Australian state of residence (N=84).

3.1.3 Visitation to the Port Smith area

Most respondents (56%) were first time visitors to Port Smith. The remaining respondents had visited the area previously, with one fifth of these (19%) having visited the area more than ten times (Figure 11, N=94).

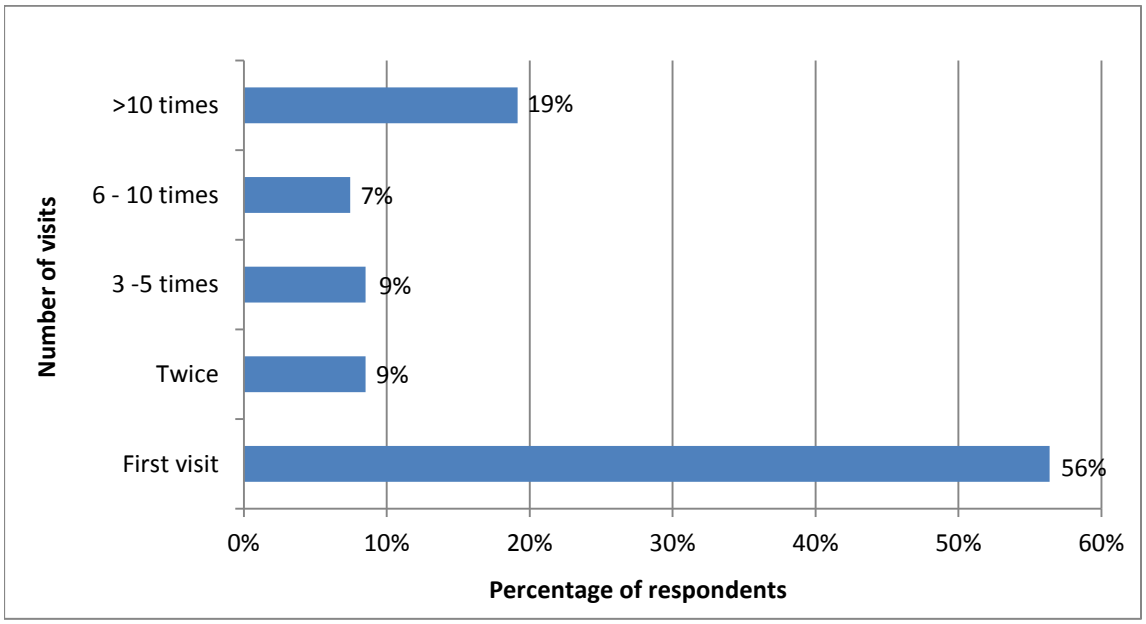


Figure 11. Number of visits to the Port Smith area (N=94).

Respondents who indicated visiting Port Smith more than 10 times (N=18) were asked to provide further context by specifying the number of years that they had been visiting. Results demonstrate that most respondents had visited the area over a 10 or 11 year period (25% and 19% of responses, respectively) (Figure 12). Respondents who had visited the area for more than 20 years accounted for over 31% of responses.

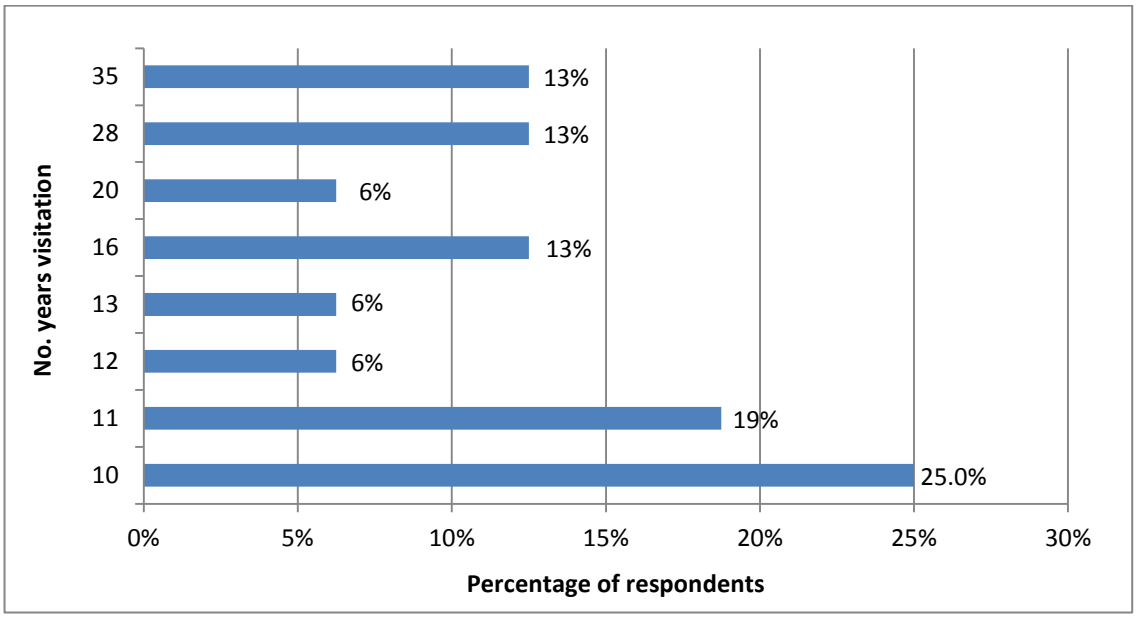


Figure 12. Number of years visitation (for visits in excess of 10 times, N=18).

Length of stay in the area varied. The majority of respondents indicated an actual or anticipated stay of one week or less (Figure 13, N=94). Of those people staying one week or less (N=66, 70% of all respondents), most had, or planned to, stay one or two nights (43% of responses). People staying for three months were the next largest grouping (7% of all respondents).

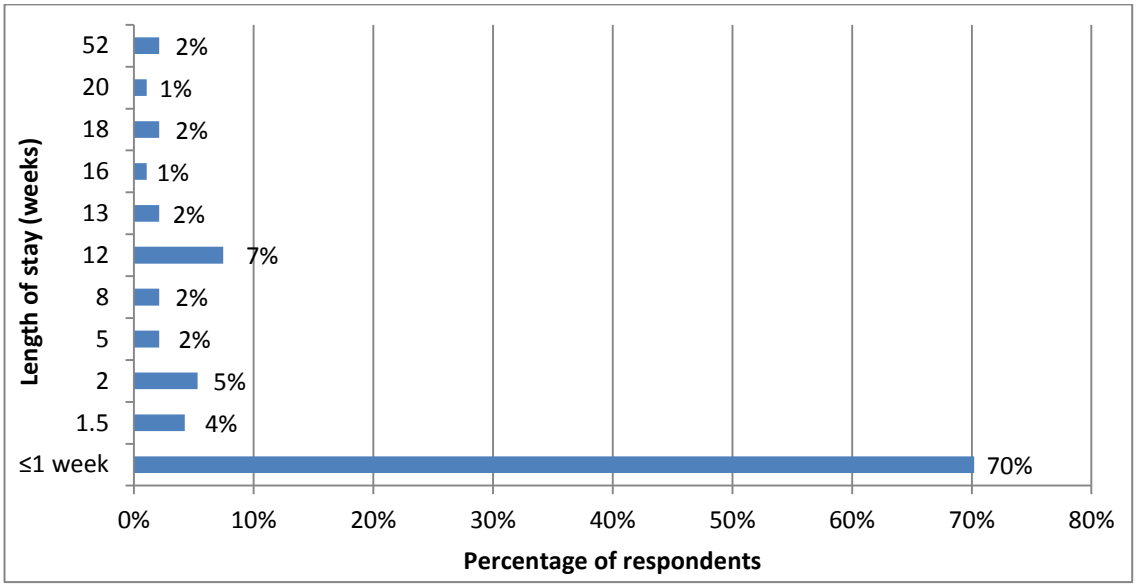


Figure 13. Length of stay at Port Smith (nights, N=94).

3.3 Values mapping

Figure 14 depicts the relative percentage of value markers mapped for each value category. A total of 1,574 value markers were mapped. Bequest, aesthetic and recreational fishing values were most prominent (16%, 13% and 12% respectively). Camping and spiritual values were the least numerous values mapped.

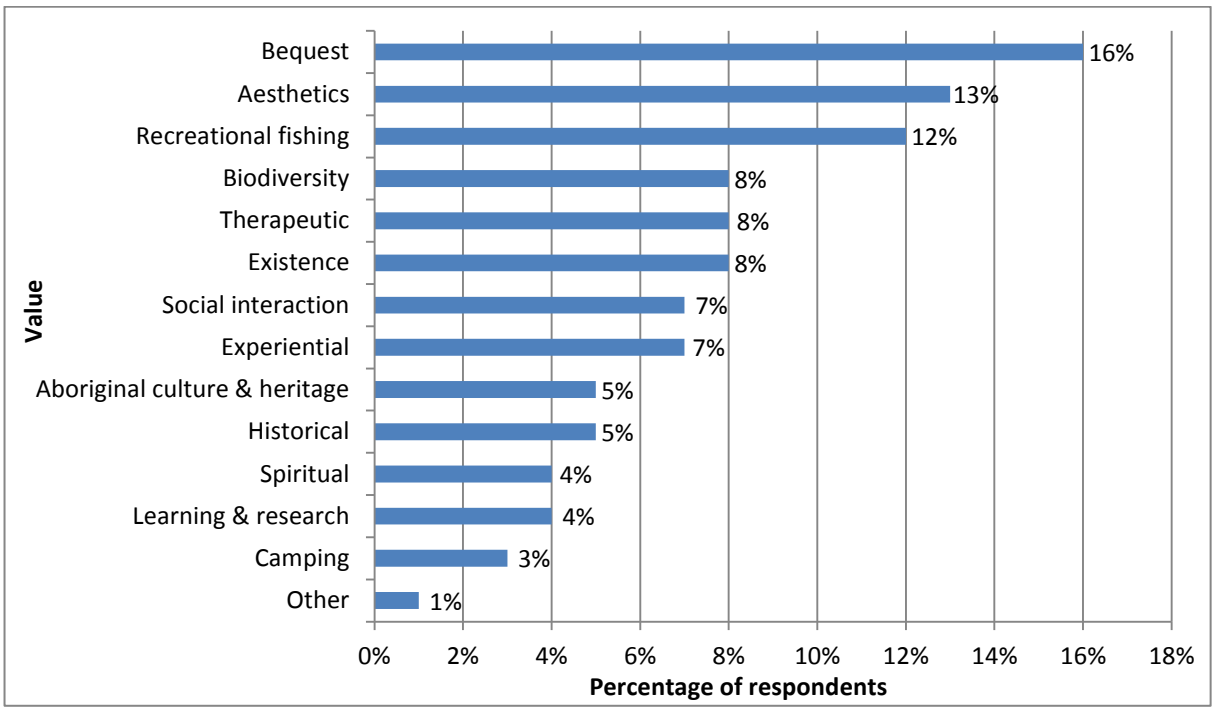
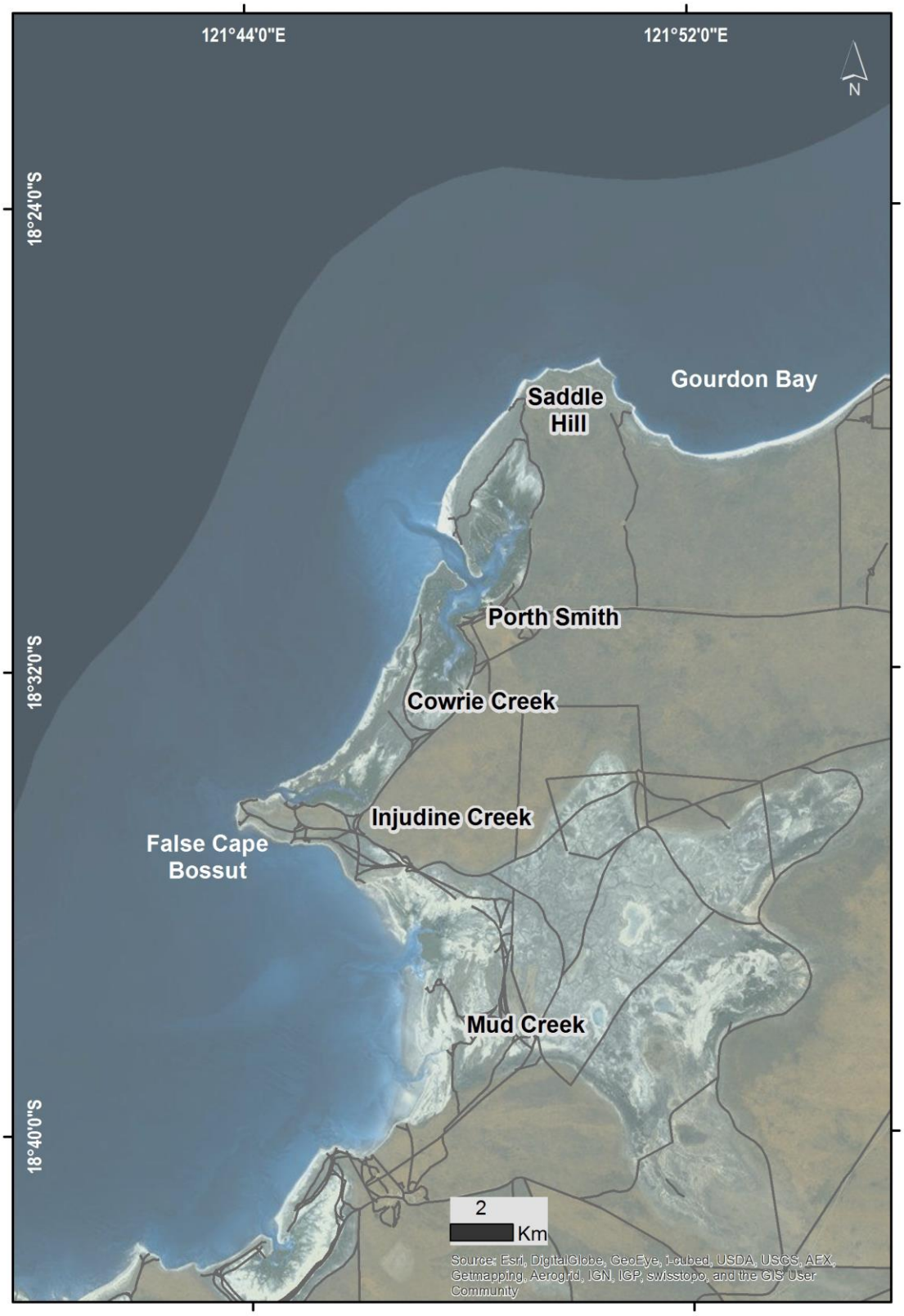


Figure 14. Values mapped for the Port Smith area (N=1574).

Figure 15 depicts the composite map for all values, with these values spread across the study area. Distinct clusters are evident near Gourdon Bay, Saddle Hill, Port Smith lagoon and the lagoon mouth, Cowrie Creek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Gourdon Bay
Saddle Hill
Porth Smith
Cowrie Creek
Injudine Creek
False Cape Bossut
Mud Creek
2
Km
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

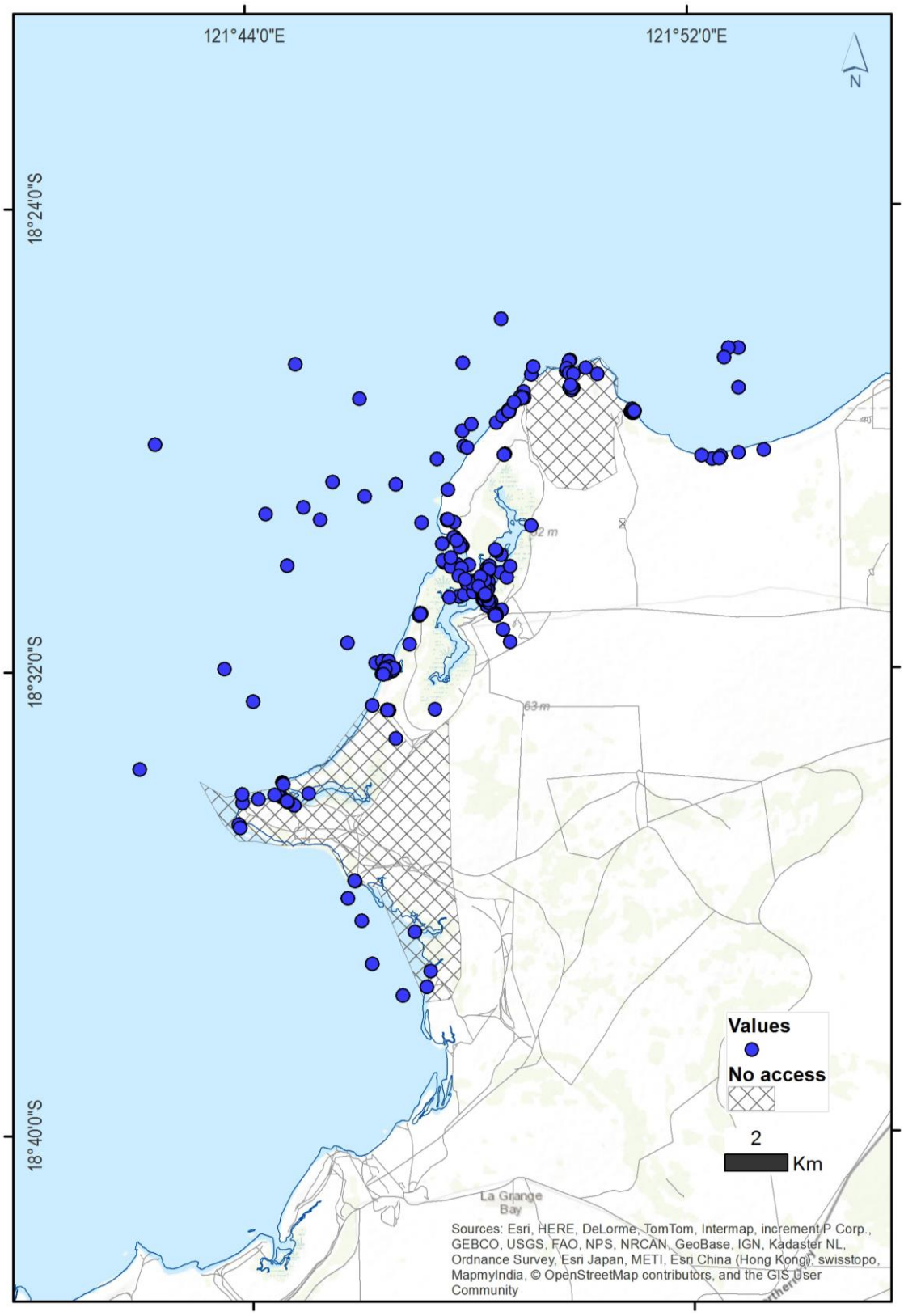

Figure 15. Composite mapping output (raw data) for all values mapped in the Port Smith area (N=1,574).

In this section the point density maps (Figures 16 - 28) are presented according to number of markers placed, moving from the desired improvement with the most markers placed to the desired improvement with the fewest markers placed (reverse order of values listed in Figure 14).

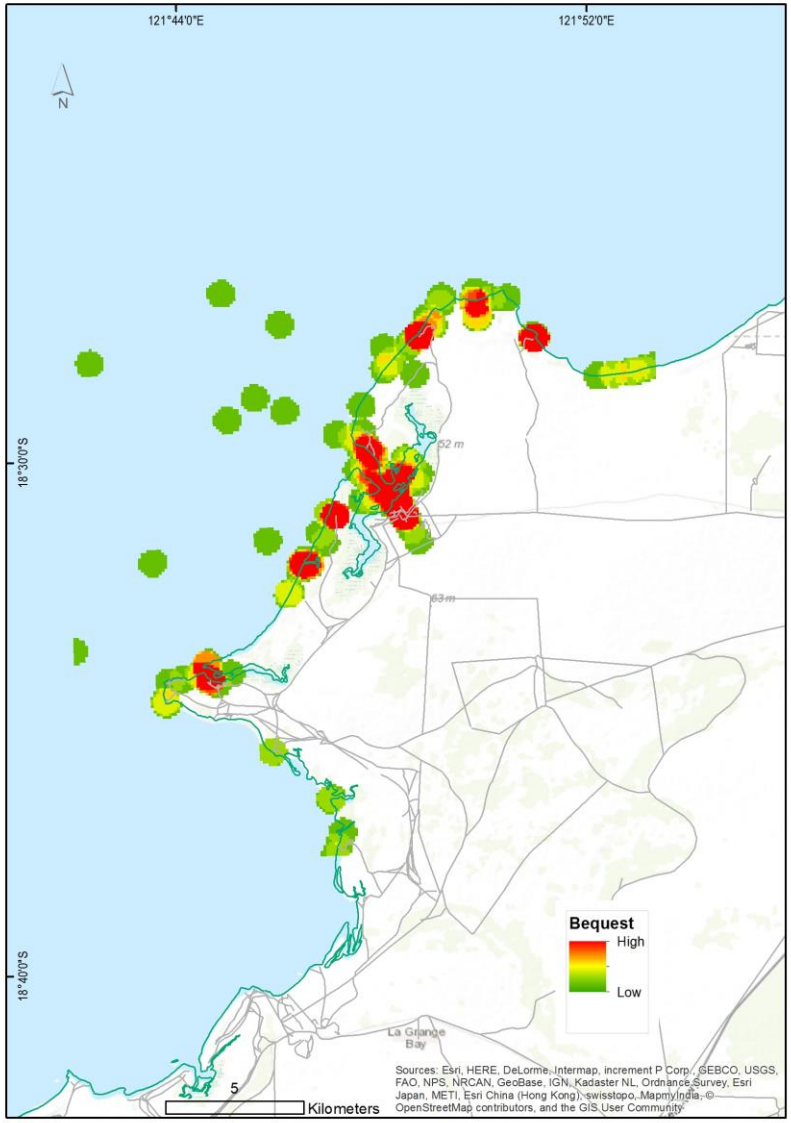

Figure16. Point density map for bequest value (N=245)

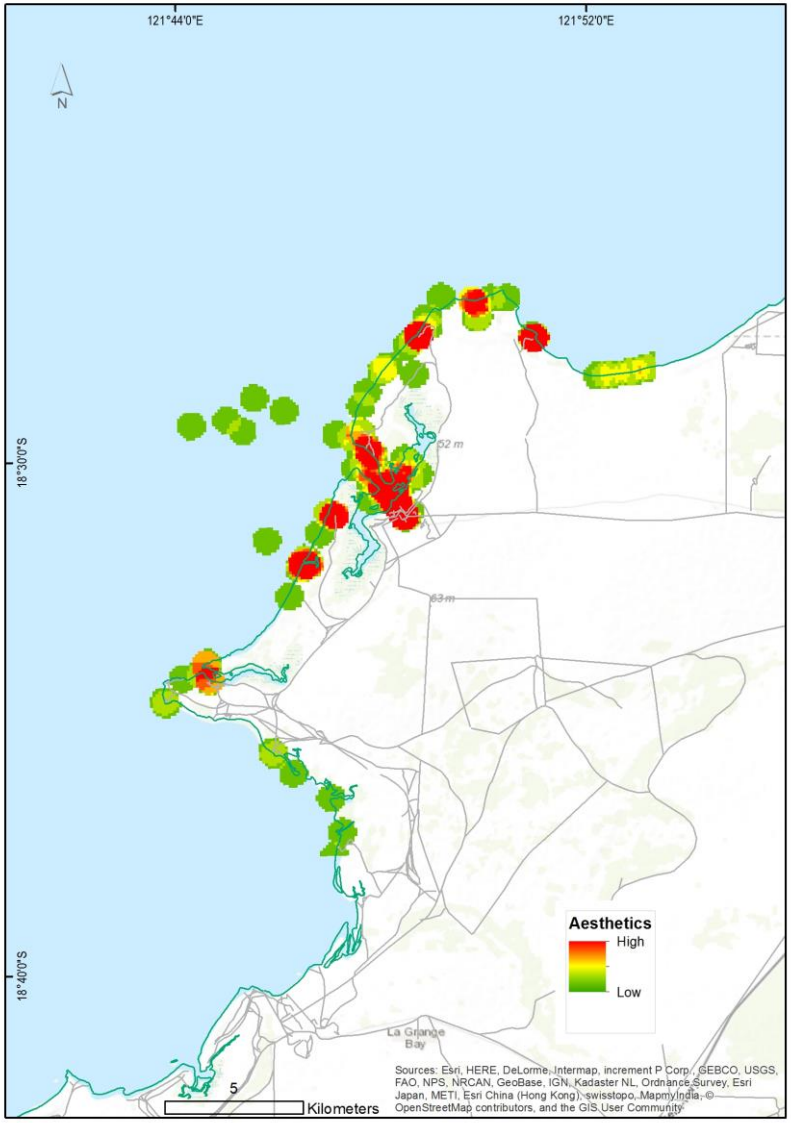

Figure 17. Point density map for aesthetic value (N=204)

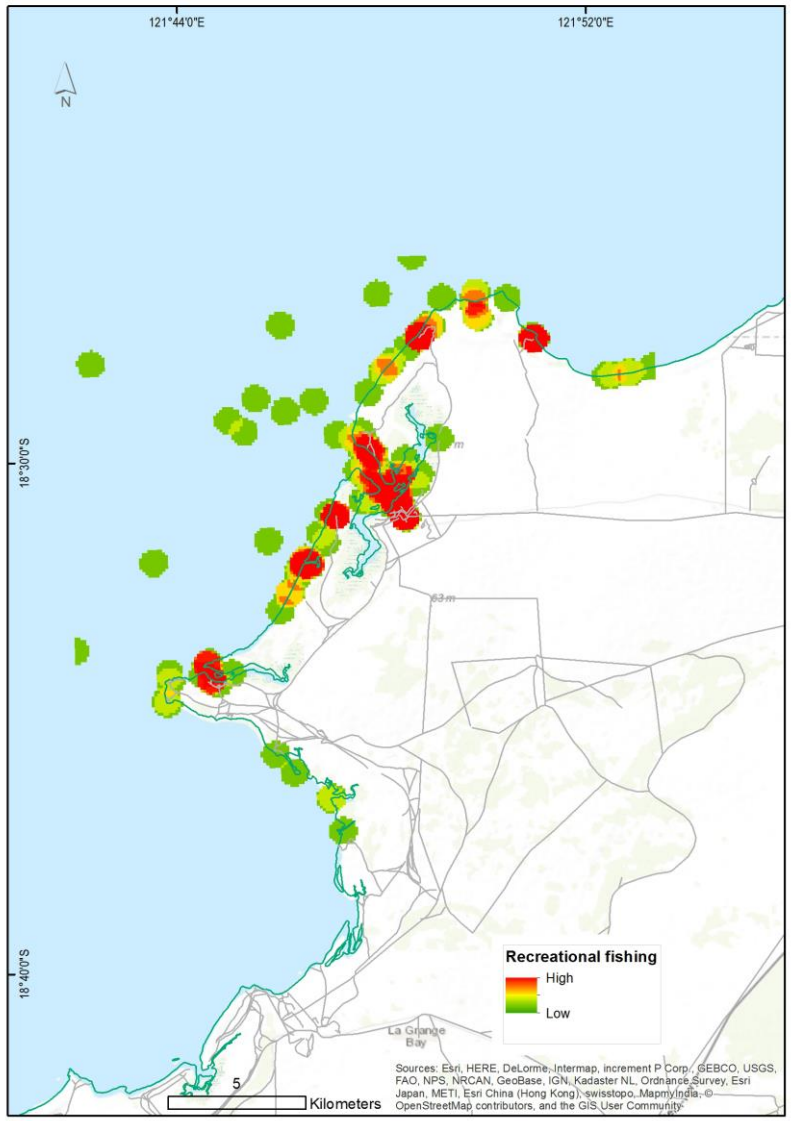

Figure 18. Point density map for recreational fishing value (N=173)

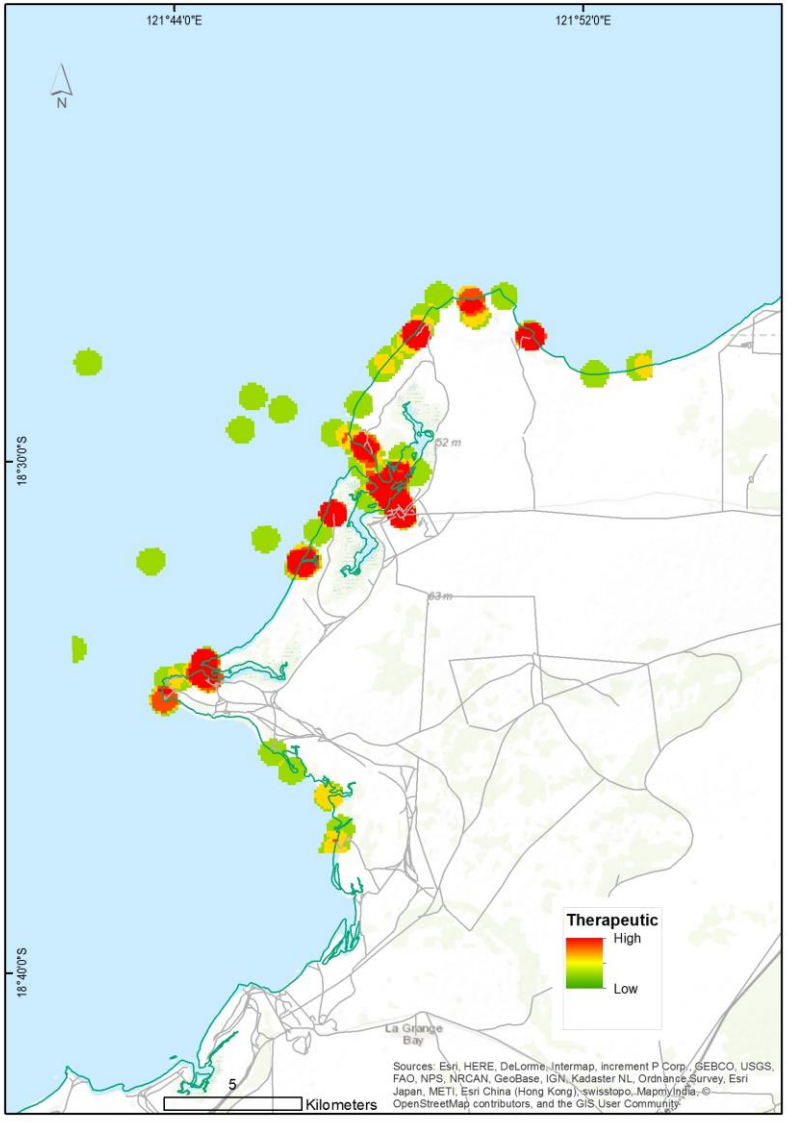

Figure 19. Point density map for therapeutic value (N=128)

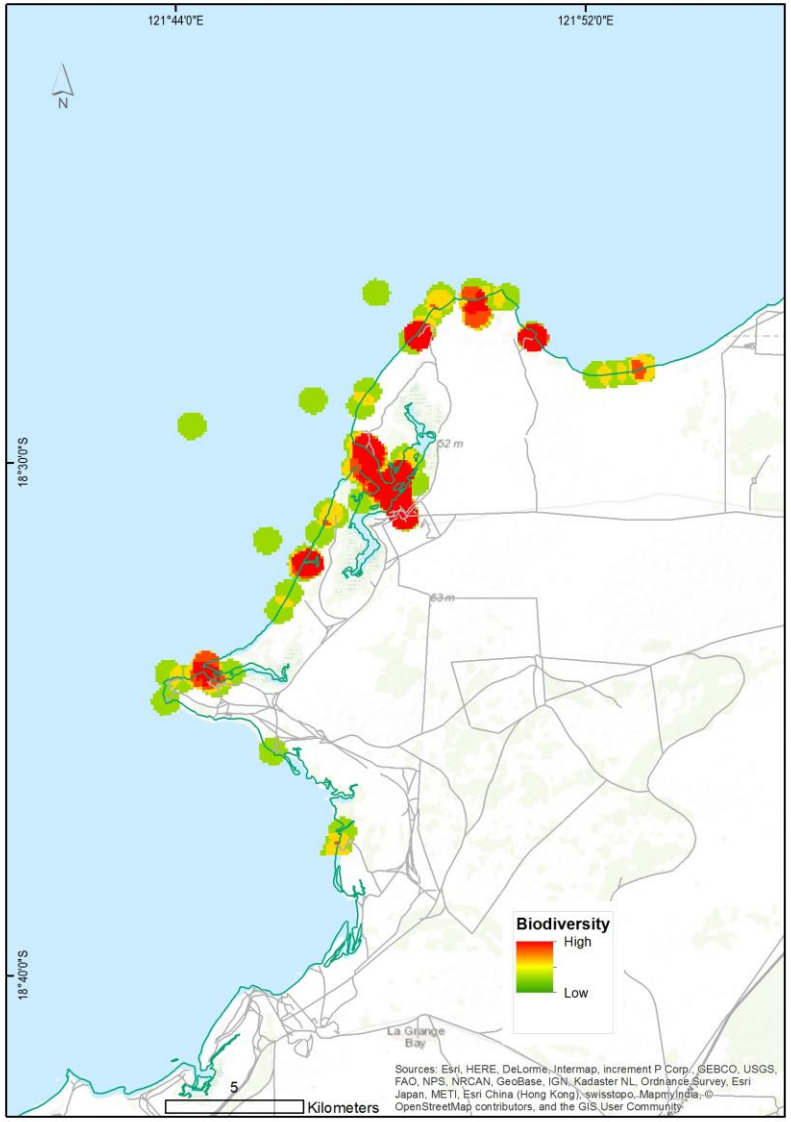

Figure 20. Point density map for biodiversity value (N=127)

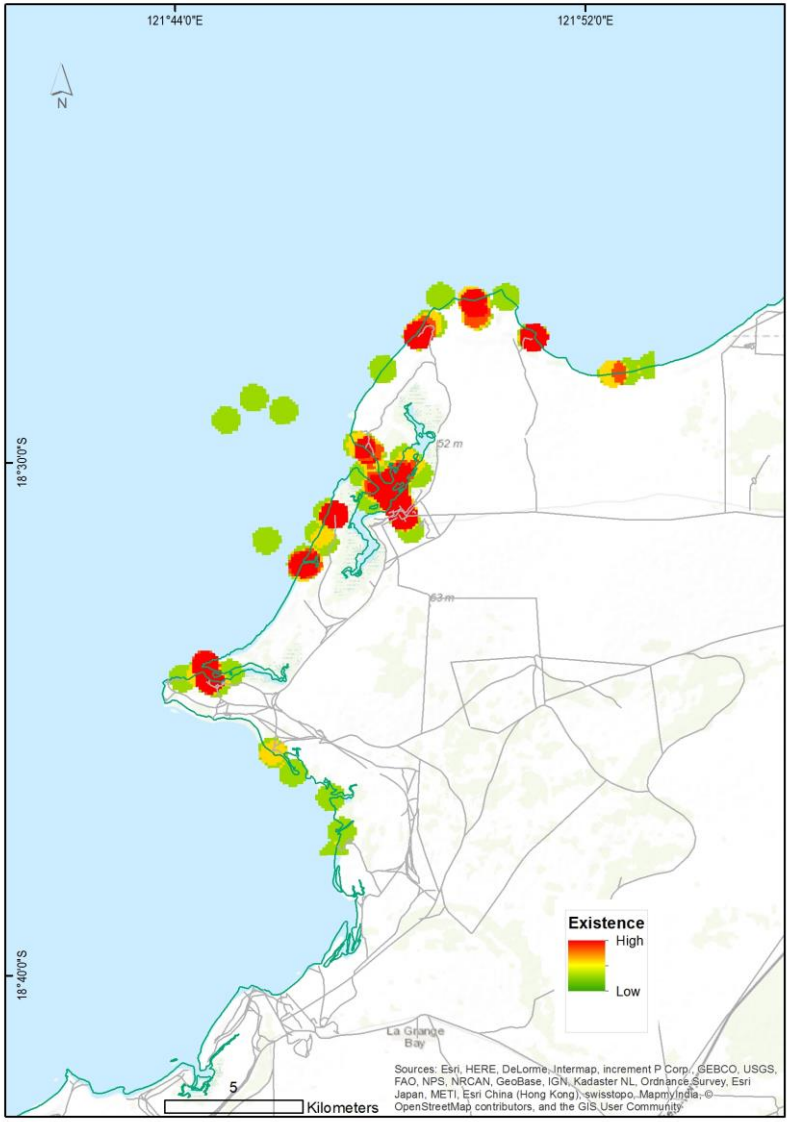

Figure 21. Point density map for existence value (N=124)

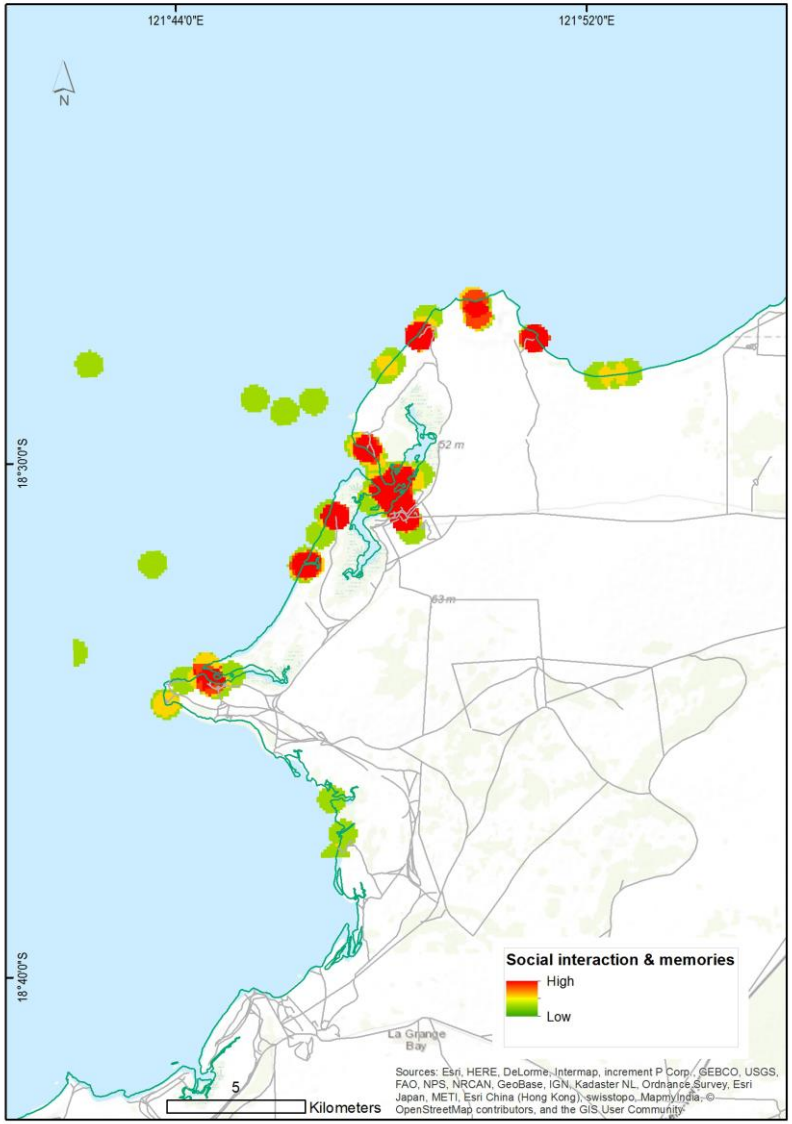

Figure 22. Point density map for social interaction and memories value (N=112)

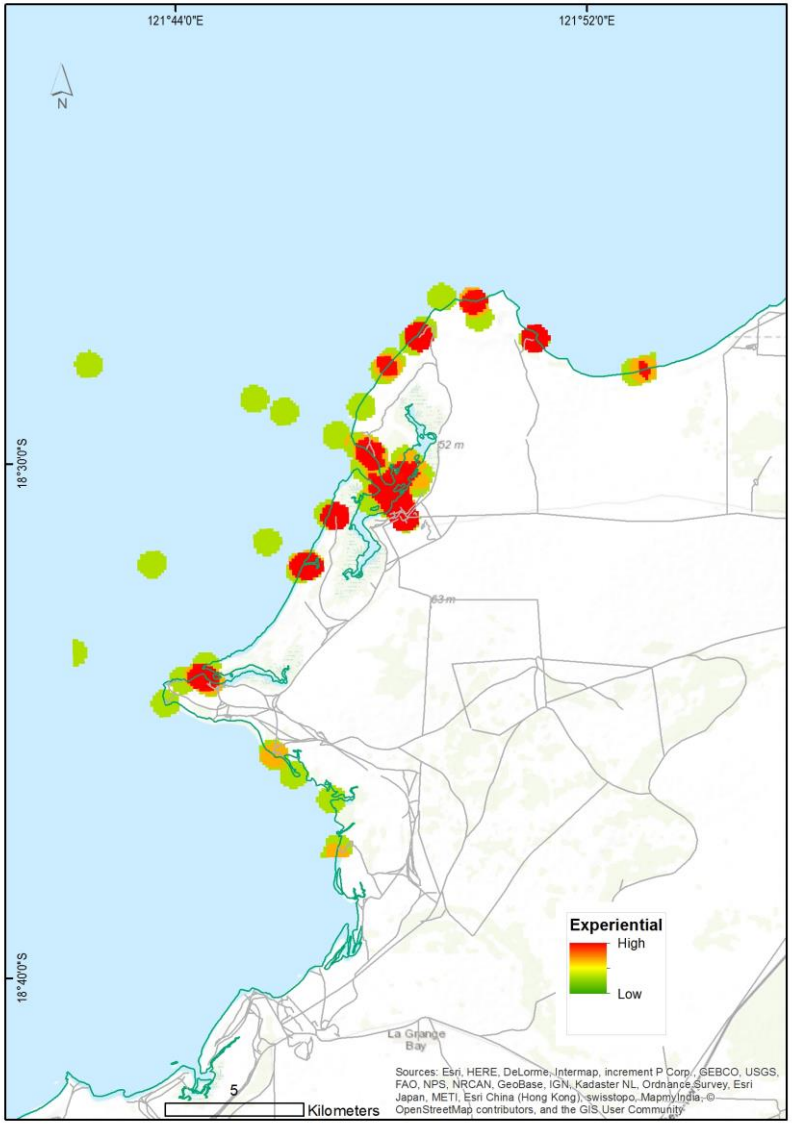

Figure 23. Point density map for experiential value (N=107)

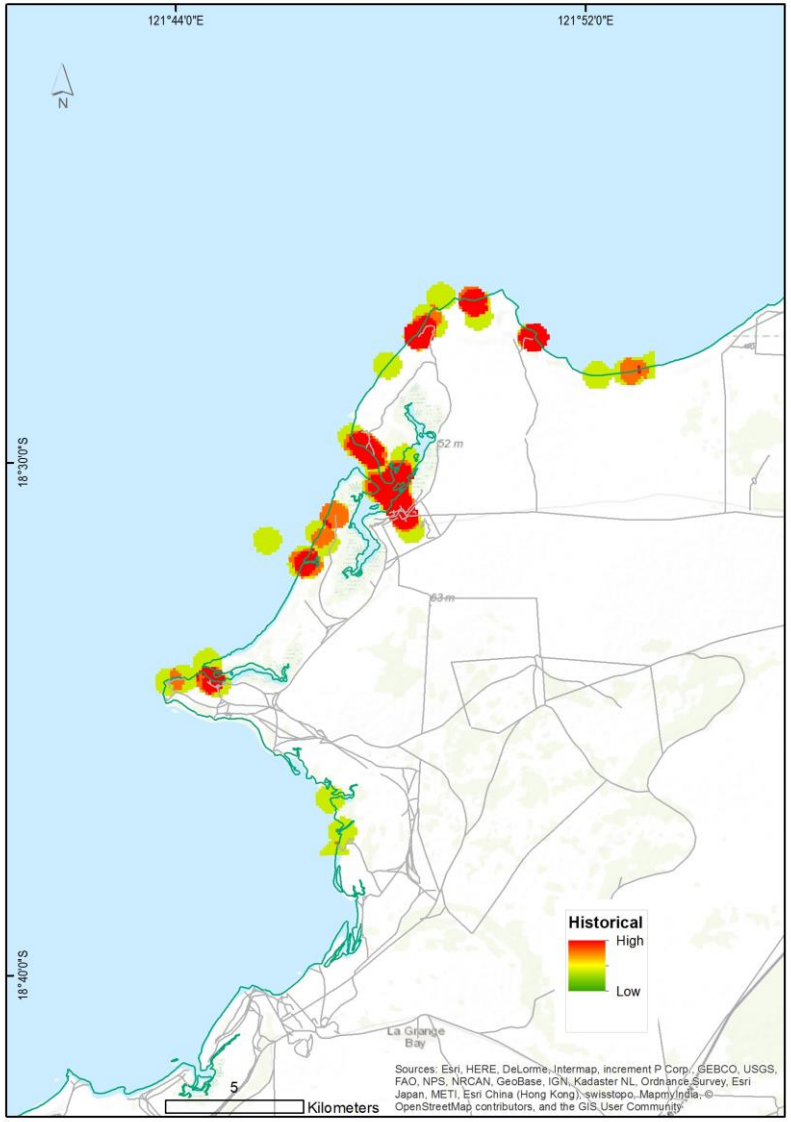

Figure 24. Point density map for historical value (N=85)

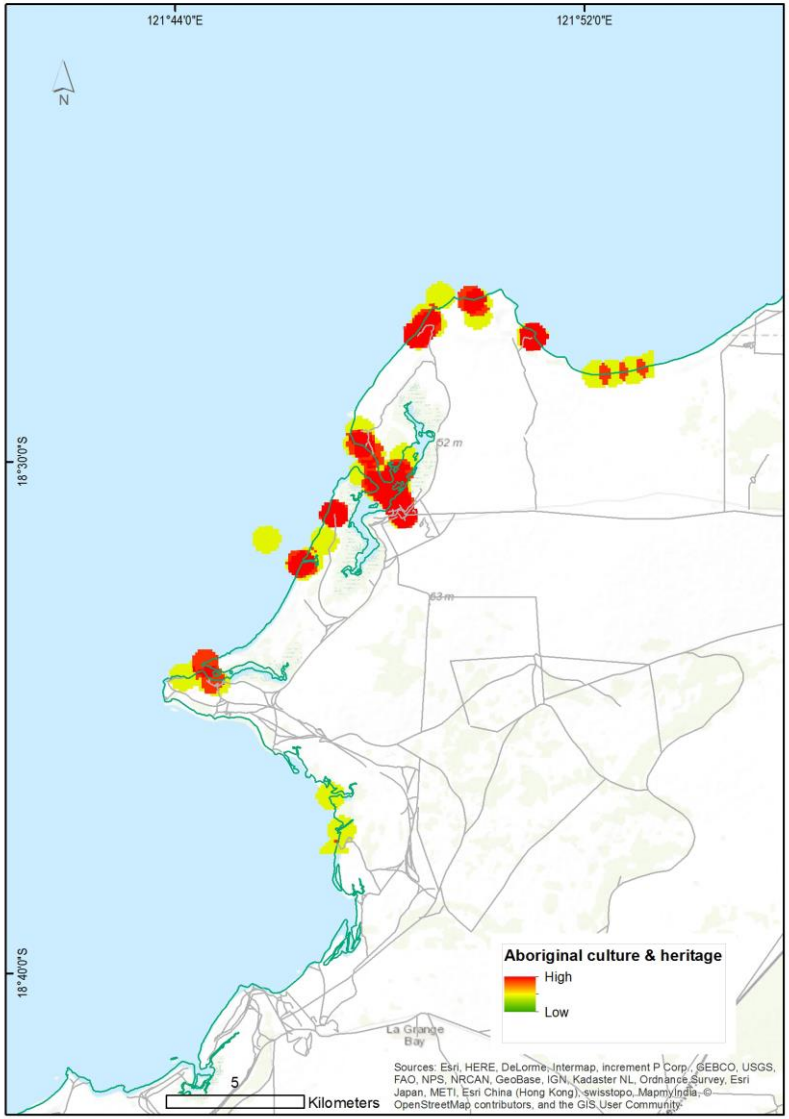

Figure 25. Point density map for Aboriginal culture and heritage value (N=74)

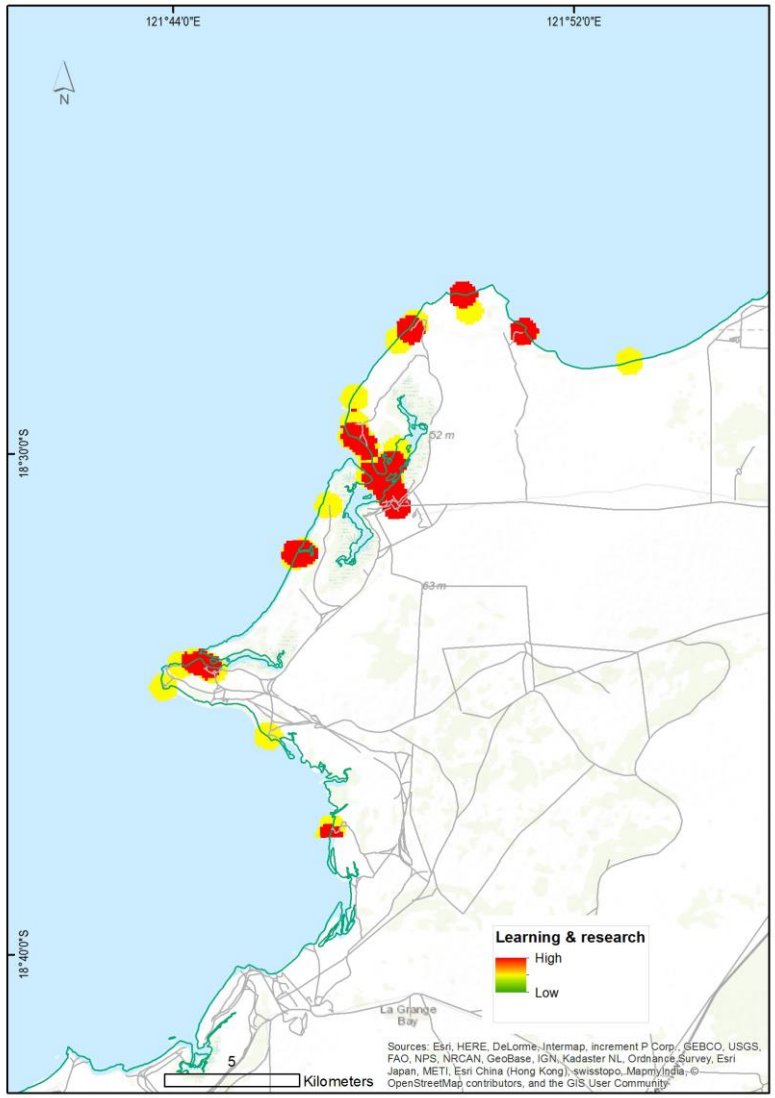

Figure 26. Point density map for learning and research value (N=60)

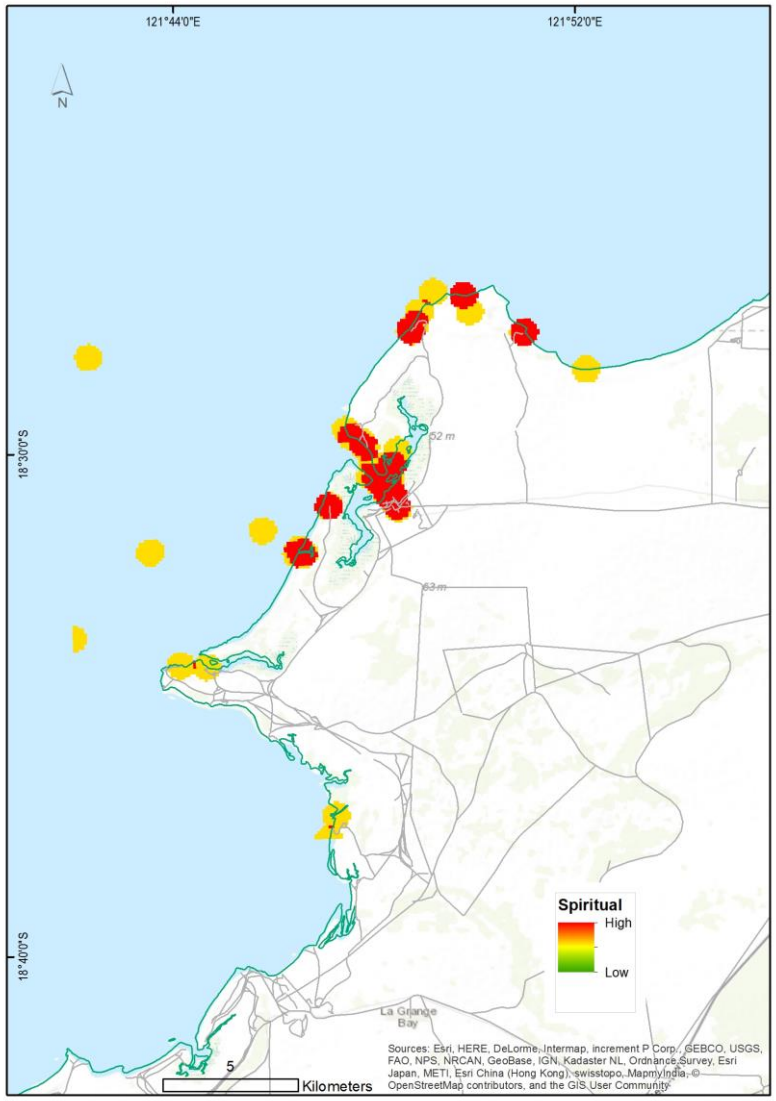

Figure 27. Point density map for spiritual value (N=57)

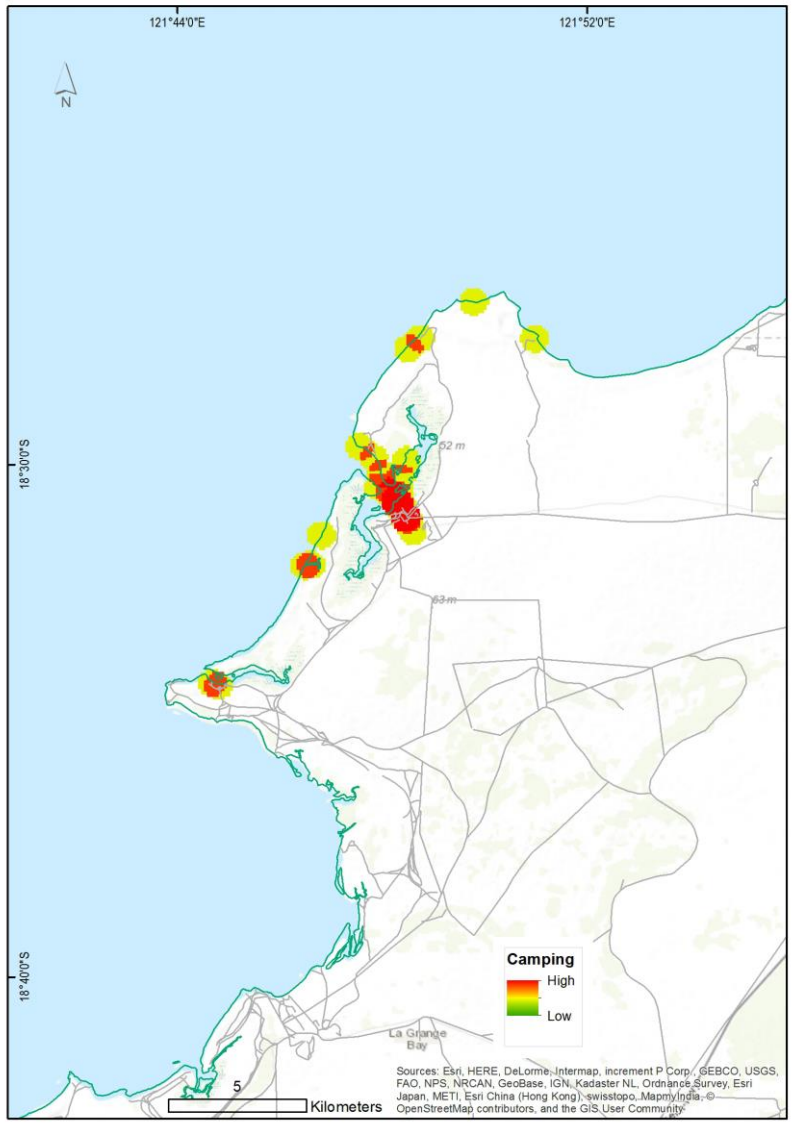

Figure 28. Point density map for camping value (N=43)

Figures 16 – 28 indicate the spread of values across the study area, with distinct clustering of hotspots around access points. With the exception of spiritual and camping values, hotspots for all values were evident at Injudine Creek, Cowrie Creek, Port Smith lagoon and lagoon mouth, Saddle Hill and Gourdon Bay (*cf.* Figure 7). The Cowrie Creek area appears to be particularly valued, with most value categories recording two distinct hotspots. Gourdon Bay also displayed a greater number of hotspots for some values, notably Aboriginal culture and heritage, which evidenced four distinct hotspots.

The no access zone between Saddle Hill and Gourdon Bay (Figure 29) was a hotspot for all value categories. The no access area south of Cowrie Creek was a hotspot for bequest, aesthetic, recreational fishing, biodiversity, existence, social interaction and memories, experiential, historical, Aboriginal culture and heritage, and camping values (with each value type having one hotspot respectively). Therapeutic and learning and research values recorded two hotspots respectively in this southern no access zone, centred on Injudine Creek, False Cape Bossut/Injudine Point and the Mud Creek area (*cf.* Figure 7).

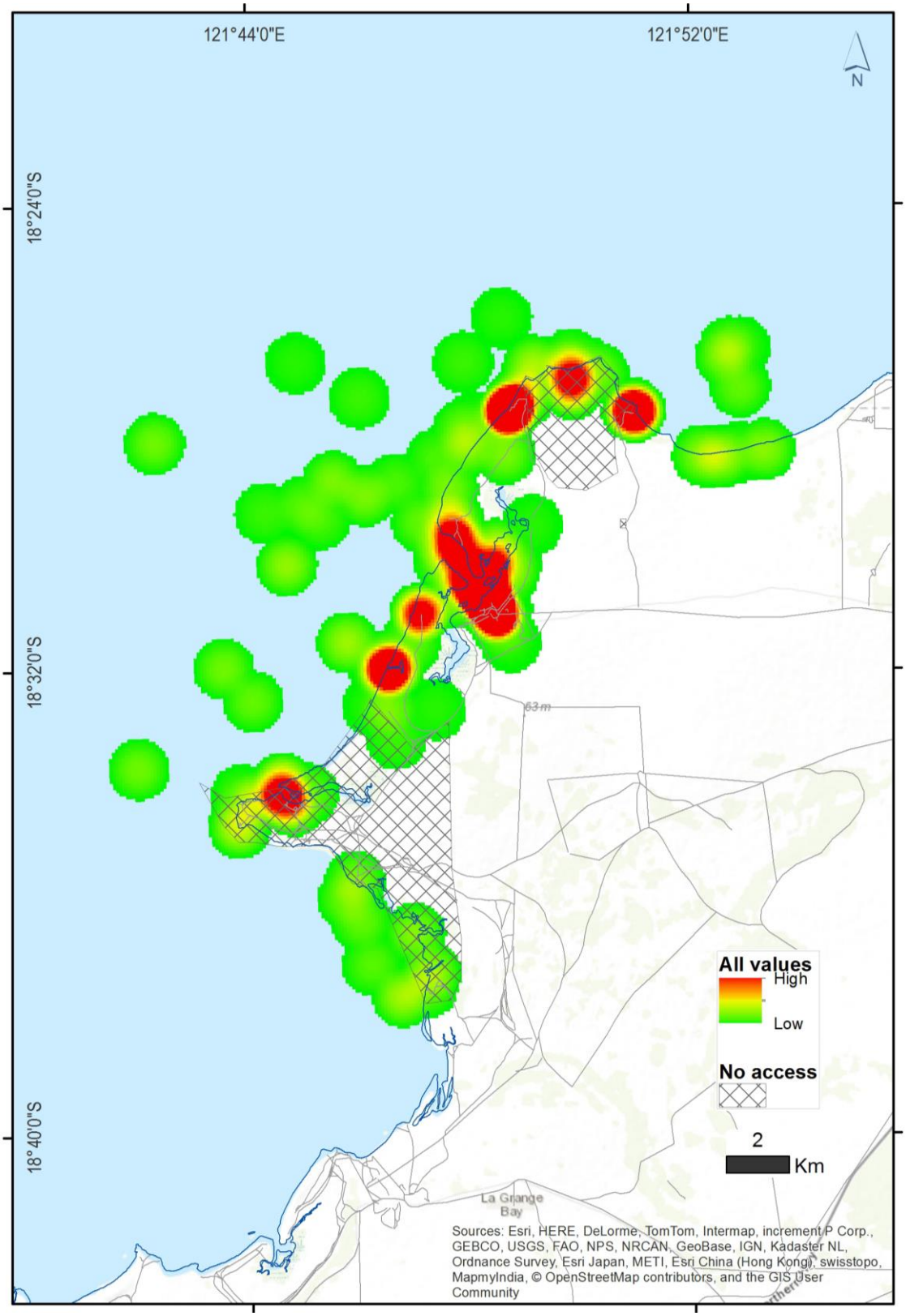

Figure 29. Hotspots for all values relative to 'no access' areas.

3.4 Activities undertaken at Port Smith

Respondents were asked to indicate the places where they had undertaken specific activities (see Q9, Appendix 2). A total of 917 activity markers were placed. Figure 30 depicts the relative count for each activity category. Spectating/sightseeing (17%), relaxing (16%) and wildlife/nature interaction or viewing (14%) were the most commonly mapped activities. Diving/ snorkelling and 'other' activities (including spearfishing, kayaking, evening barbeques, photography, and shell collecting) were the least mapped activities (2% and 1%, respectively).

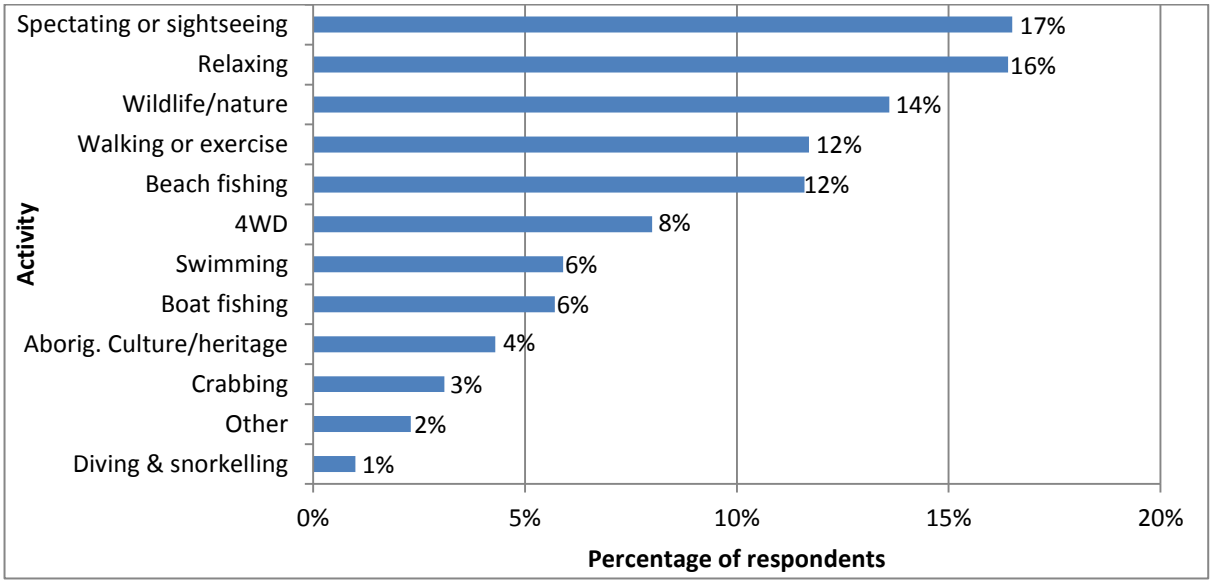

Figure 30. Activities undertaken at Port Smith (N=917).

Figure 31 depicts the composite map for all activities, showing that recreational activities occur along almost the entire Port Smith coastline. Concentrations of activities occur at Gourdon Bay, Saddle Hill, Port Smith lagoon and lagoon mouth, Cowrie Creek and Injudine Creek (*cf.* Figure 7).

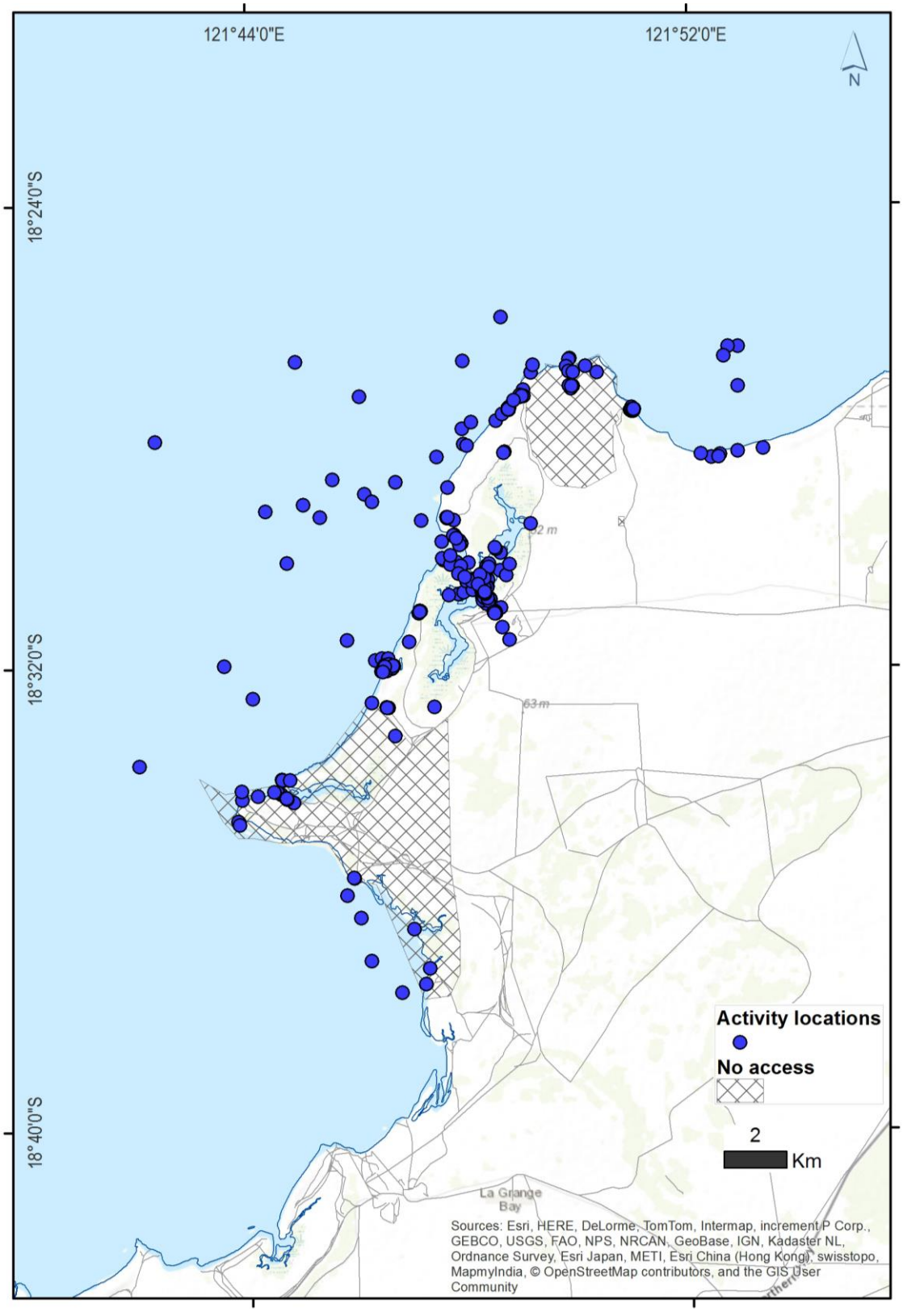

Figure 31. Composite mapping output (raw data) for activities undertaken in the Port Smith area (N=917).

In this section the point density maps (Figures 32 - 42) are presented according to number of markers placed, moving from the activity with the most markers placed to the activity with the fewest markers placed (reverse order of activities given in Figure 14).

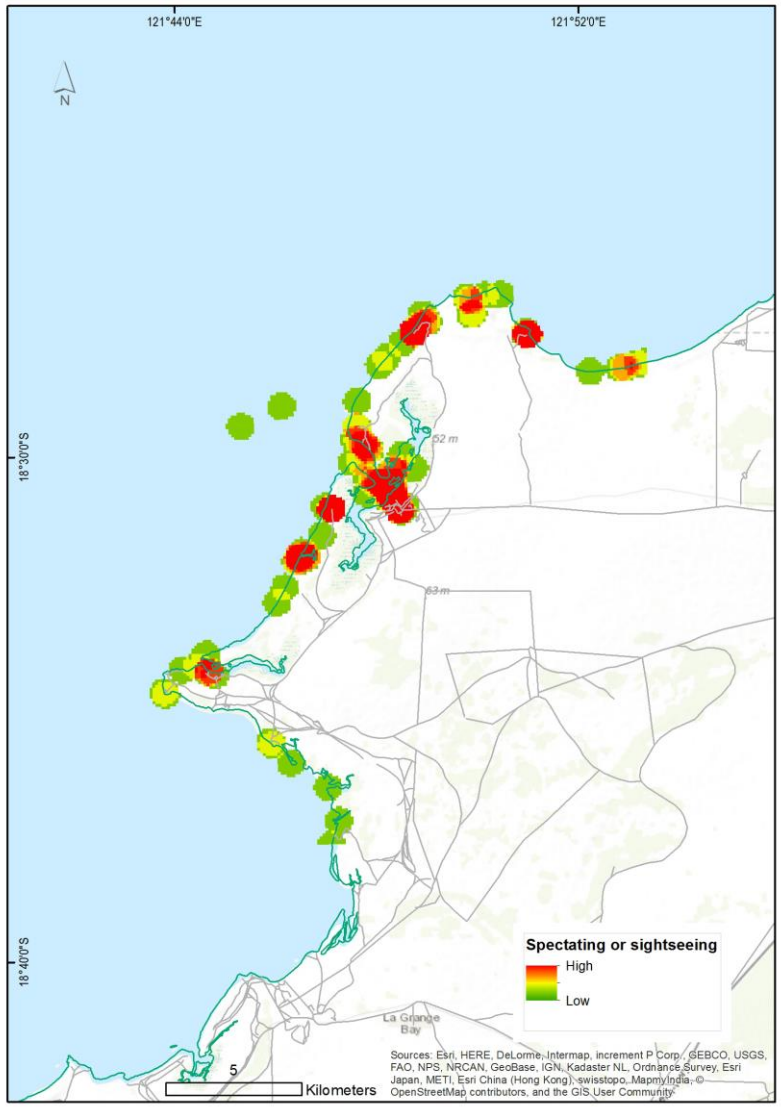

Figure 32. Point density map for spectating or sightseeing (N=151).

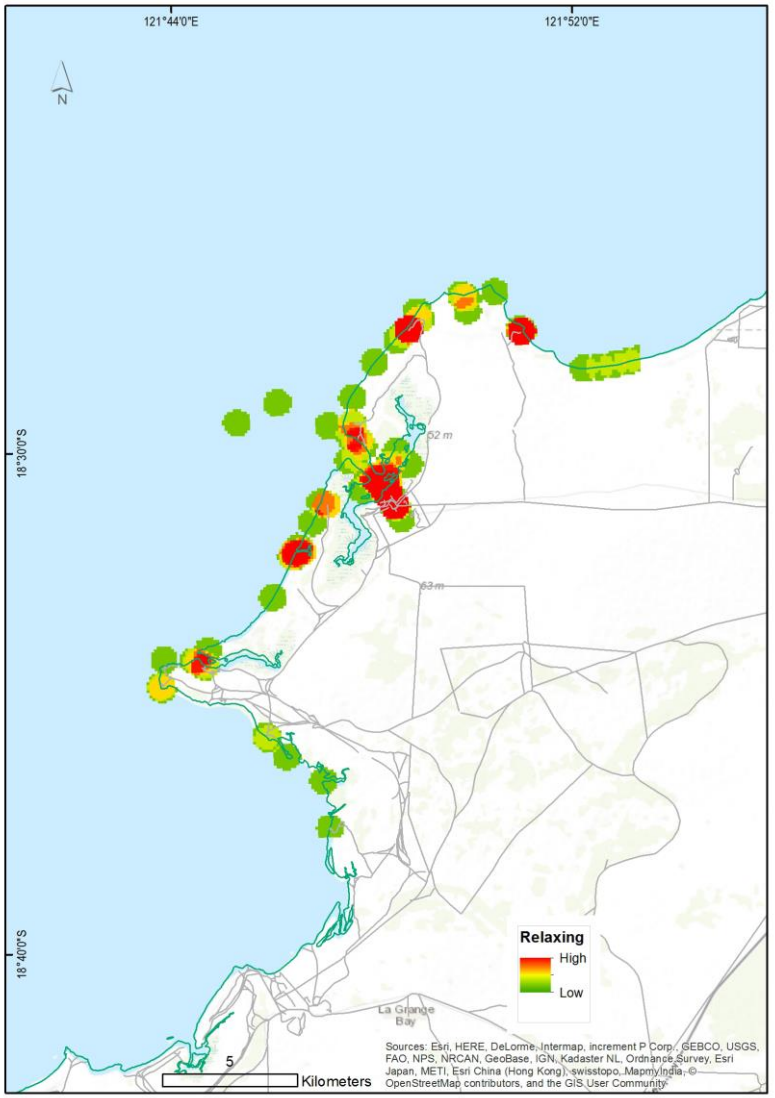

Figure 33. Point density map for relaxing (N=150).

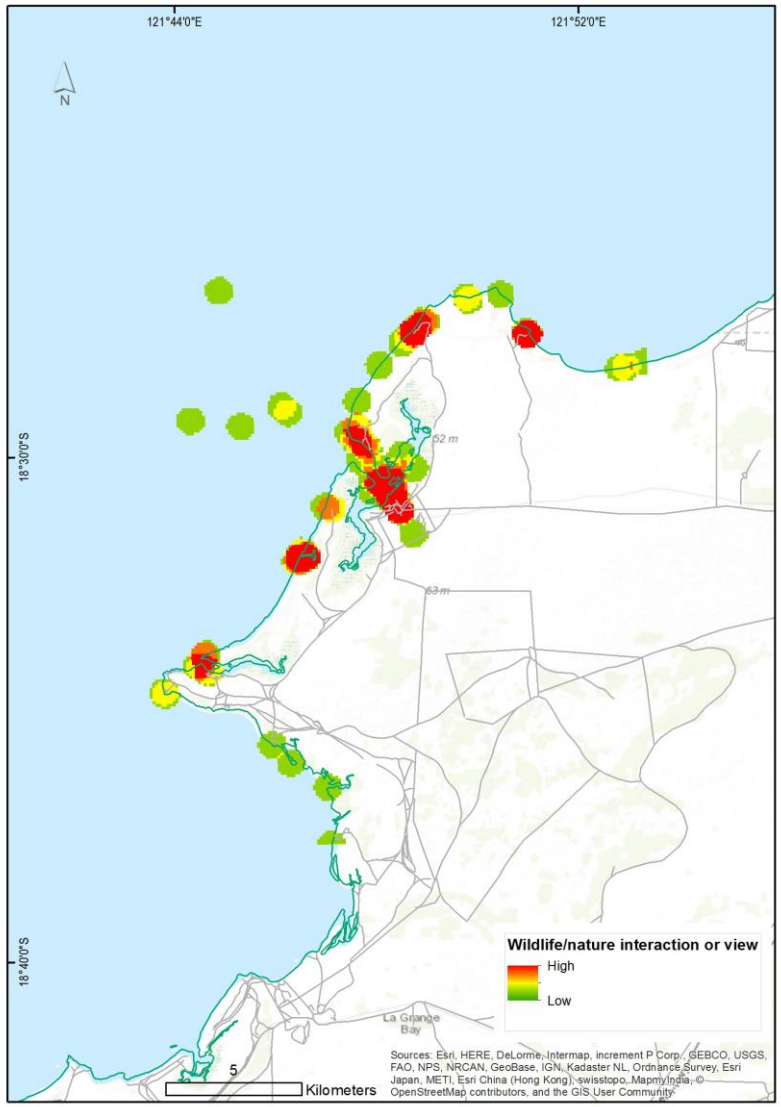

Figure 33. Point density map for wildlife/ nature interaction or viewing (N=125).

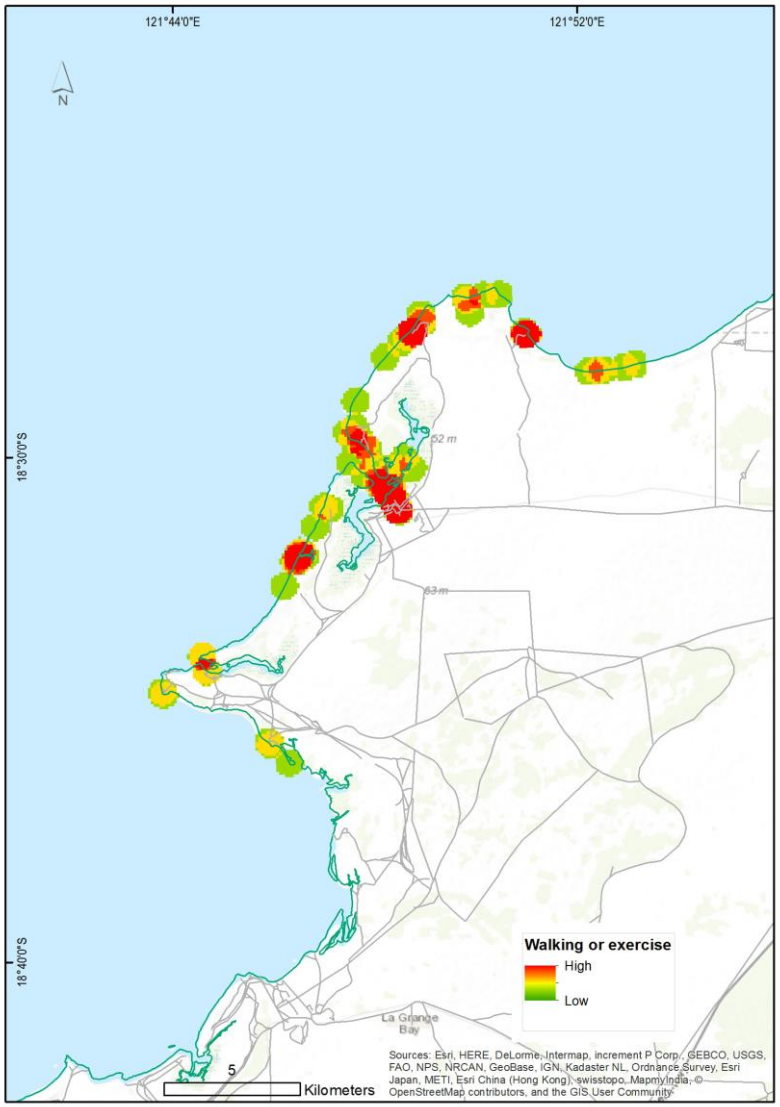

Figure 34. Point density map for walking or other exercise (N=107).

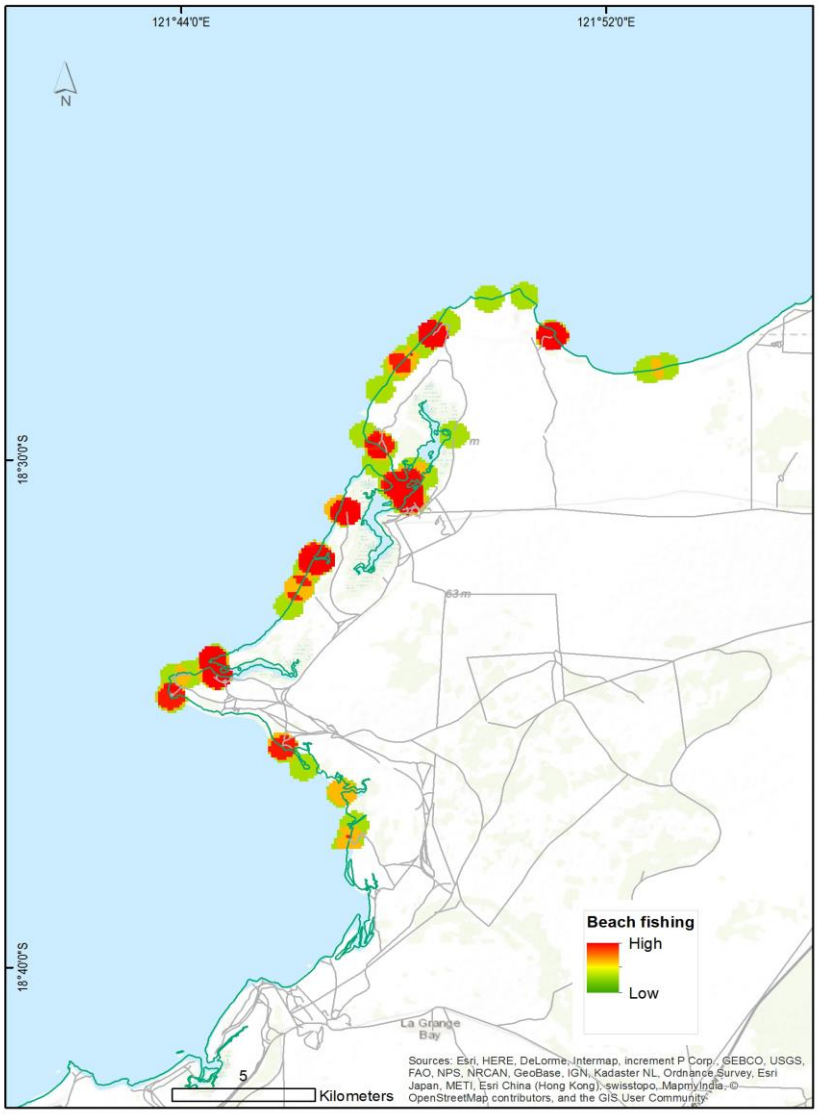

Figure 35. Point density map for beach fishing (N=106).

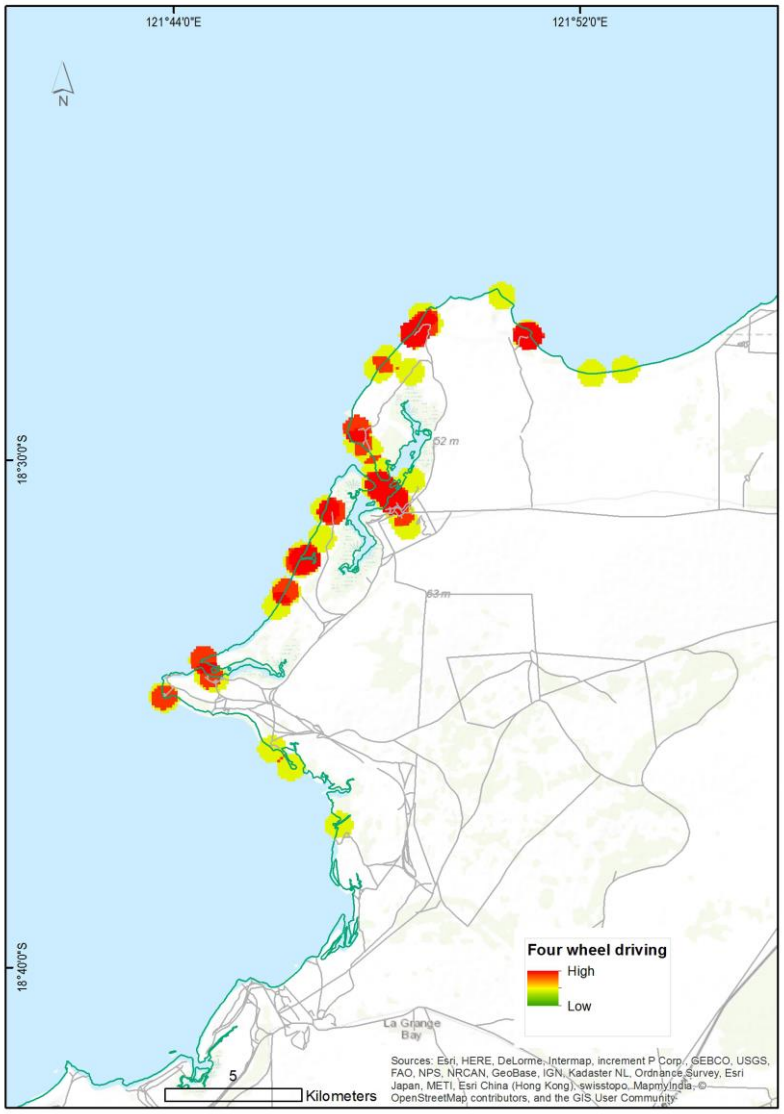

Figure 36. Point density map for four wheel driving (N=73).

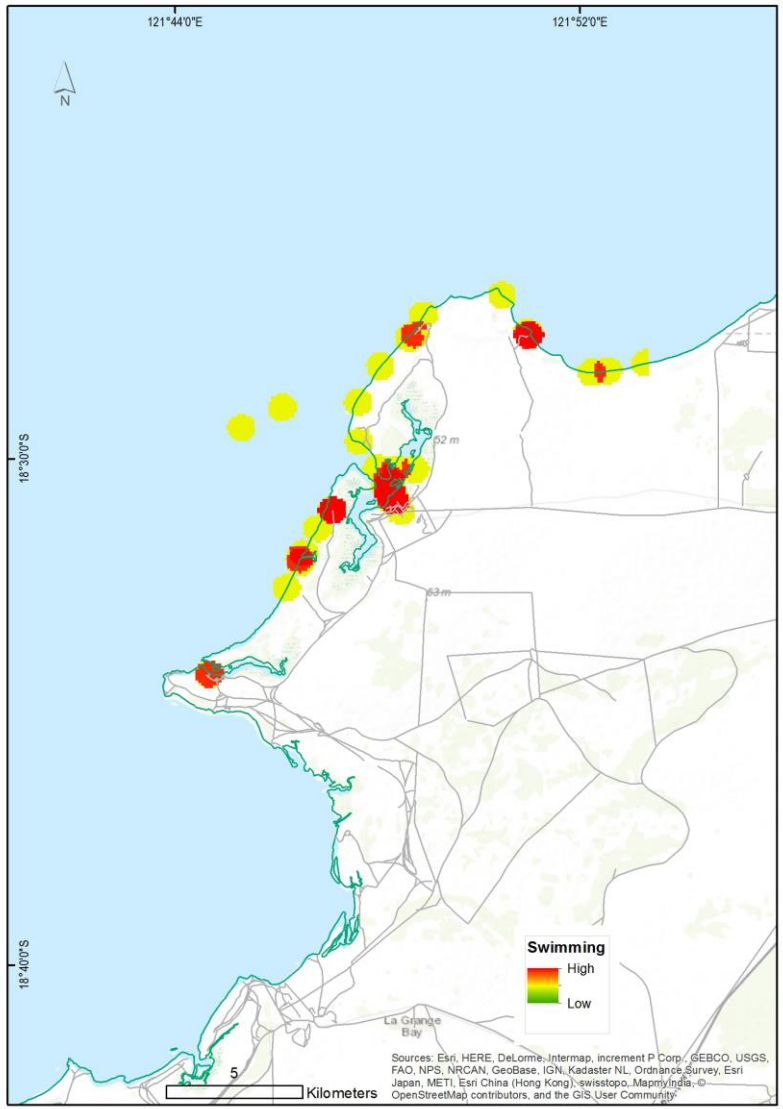

Figure 37. Point density map for swimming (N=54).

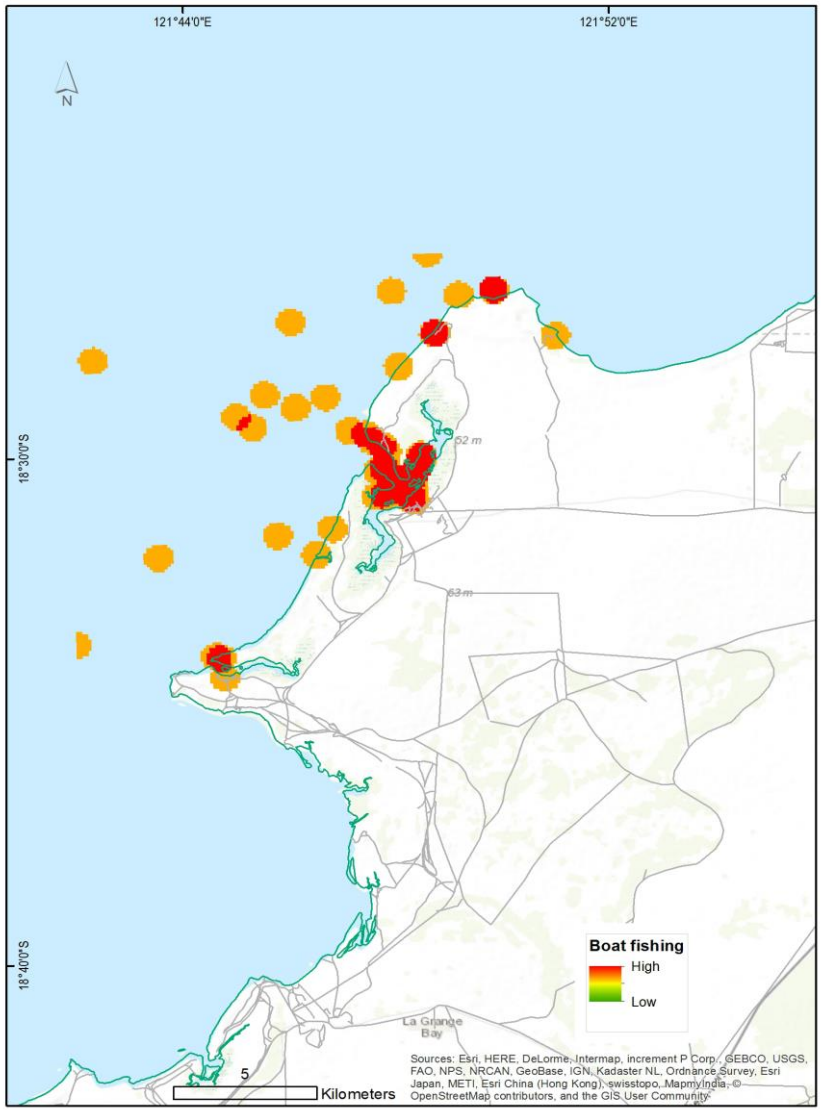

Figure 38. Point density map for boat fishing (N=52).

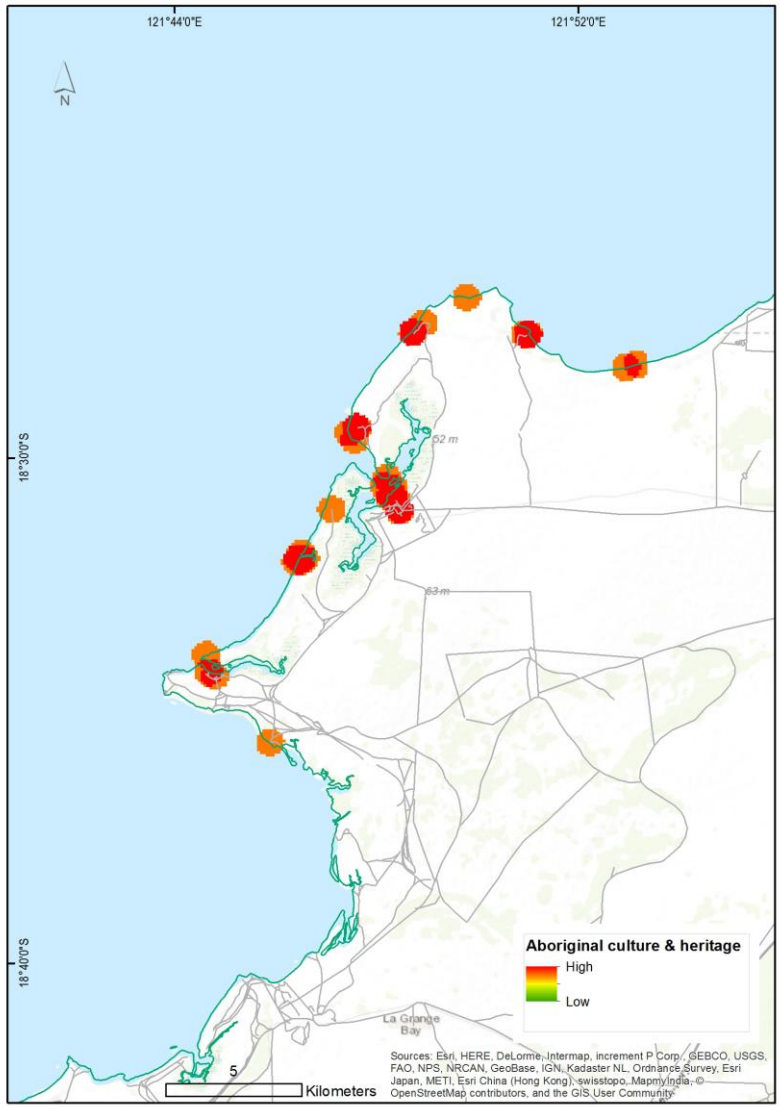

Figure 39. Point density map for experiencing or viewing Aboriginal culture & heritage (N=37).

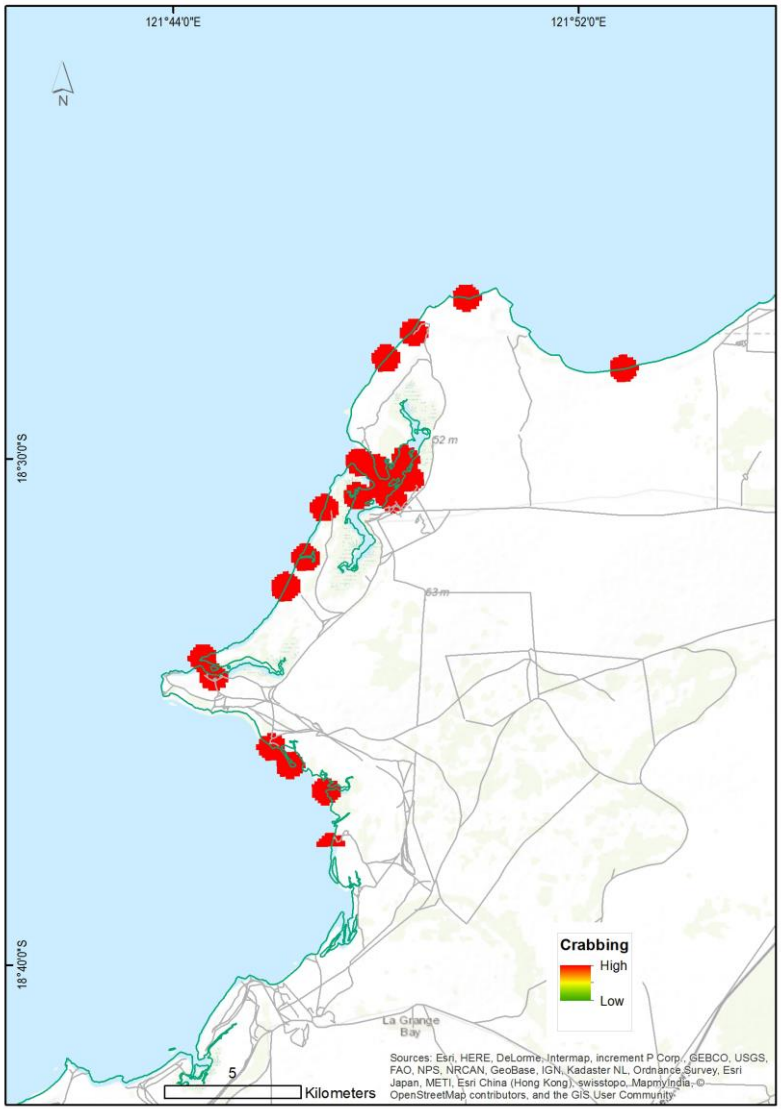

Figure 40. Point density map for crabbing (N=28).

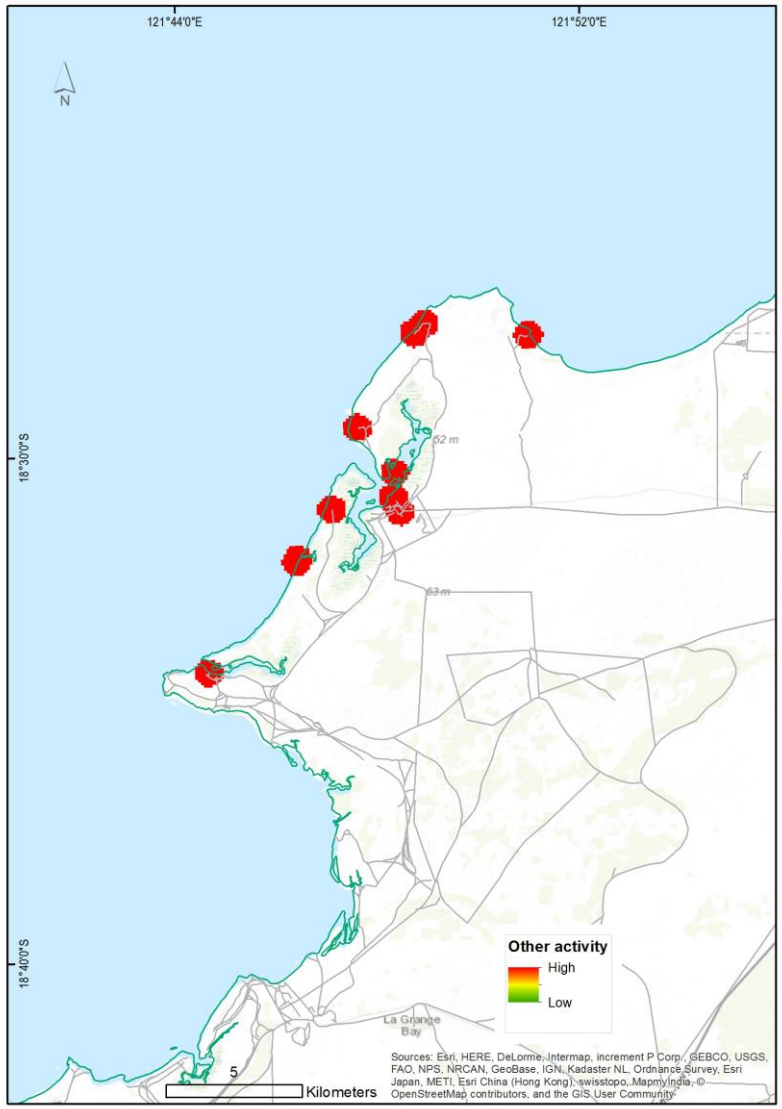

Figure 41. Point density map for 'other' activities (N=21).

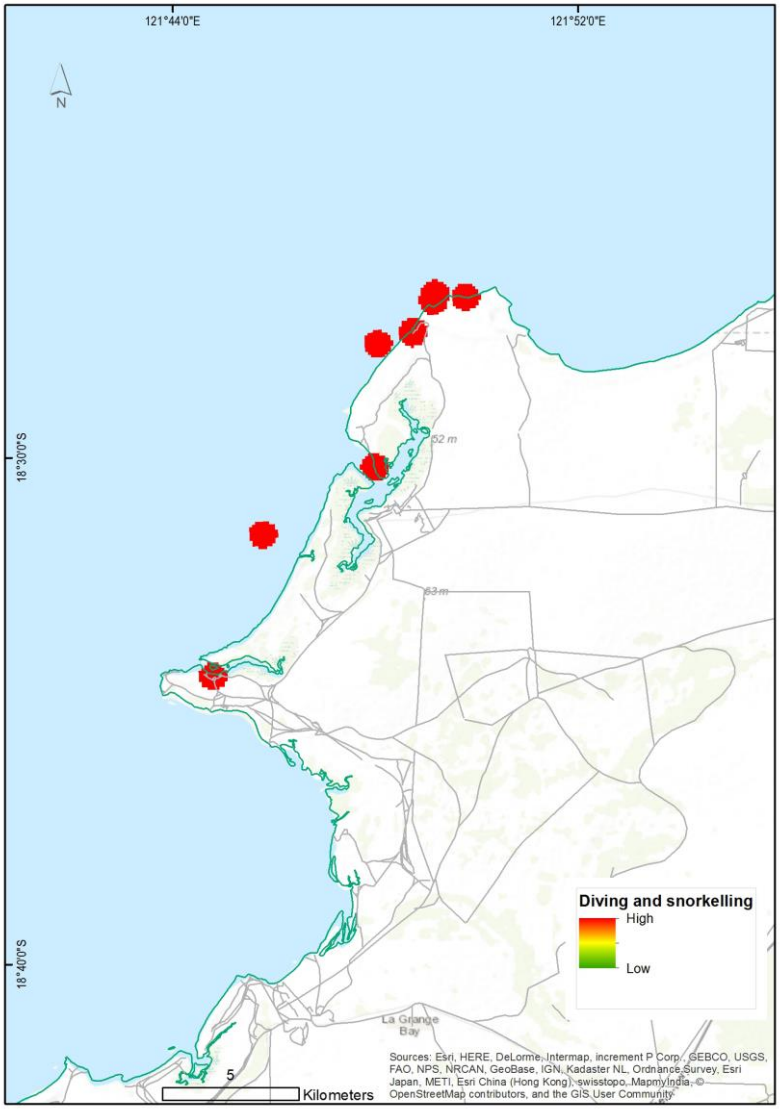

Figure 42. Point density map for diving or snorkelling (N=9).

It is apparent from Figures 32 – 42 that activities are located in close proximity to four-wheel drive access points including the Port Smith lagoon area and lagoon mouth, Cowrie Creek, Saddle Hill, Gourdon Bay and Injudine Creek (*cf.* Figures 7 & 31). However some spatial differences are apparent for various activities. Spectating and sightseeing, for instance, was the most frequently mapped activity and occurs along the majority of the study area coastline. Hotspots are evident at all access points, with Cowrie Creek recording two and Gourdon Bay three hotspots. Relaxing, wildlife/ nature interaction or viewing, walking/other exercise, beach fishing and four wheel driving are similarly spread along most of the coastline, and display hotspots located in close proximity access routes. Swimming activity is less diffuse, concentrating on the lagoon area, Cowrie Creek, Injudine Creek, Saddle Hill and Gourdon Bay. Boat fishing is predominantly focused on the lagoon area and mouth. Experiencing or viewing Aboriginal culture and heritage, crabbing, 'other' activities and diving and snorkelling received the fewest number of markers. These latter activities displayed a pronounced spatial concentration resulting in distinct hotspots, which again corresponded to access points.

A number of activities displayed hotspots in the 'no access' zone south of Cowrie Creek (Figures 6 & 43 [southern no access zone]). These included spectating/sightseeing, relaxing, beach fishing, four wheel driving, boat fishing, experiencing or viewing Aboriginal culture and crabbing. Crabbing recorded the greatest number of hotspots within this no access area, with five separate hotspots evident. This was followed by beach fishing (three hotspots) and four wheel driving (two hotspots). Hotspots within this no access zone centred on Injudine Creek, False Cape Bossut/ Injudine Point and Mud Creek (*cf.* Figure 7).

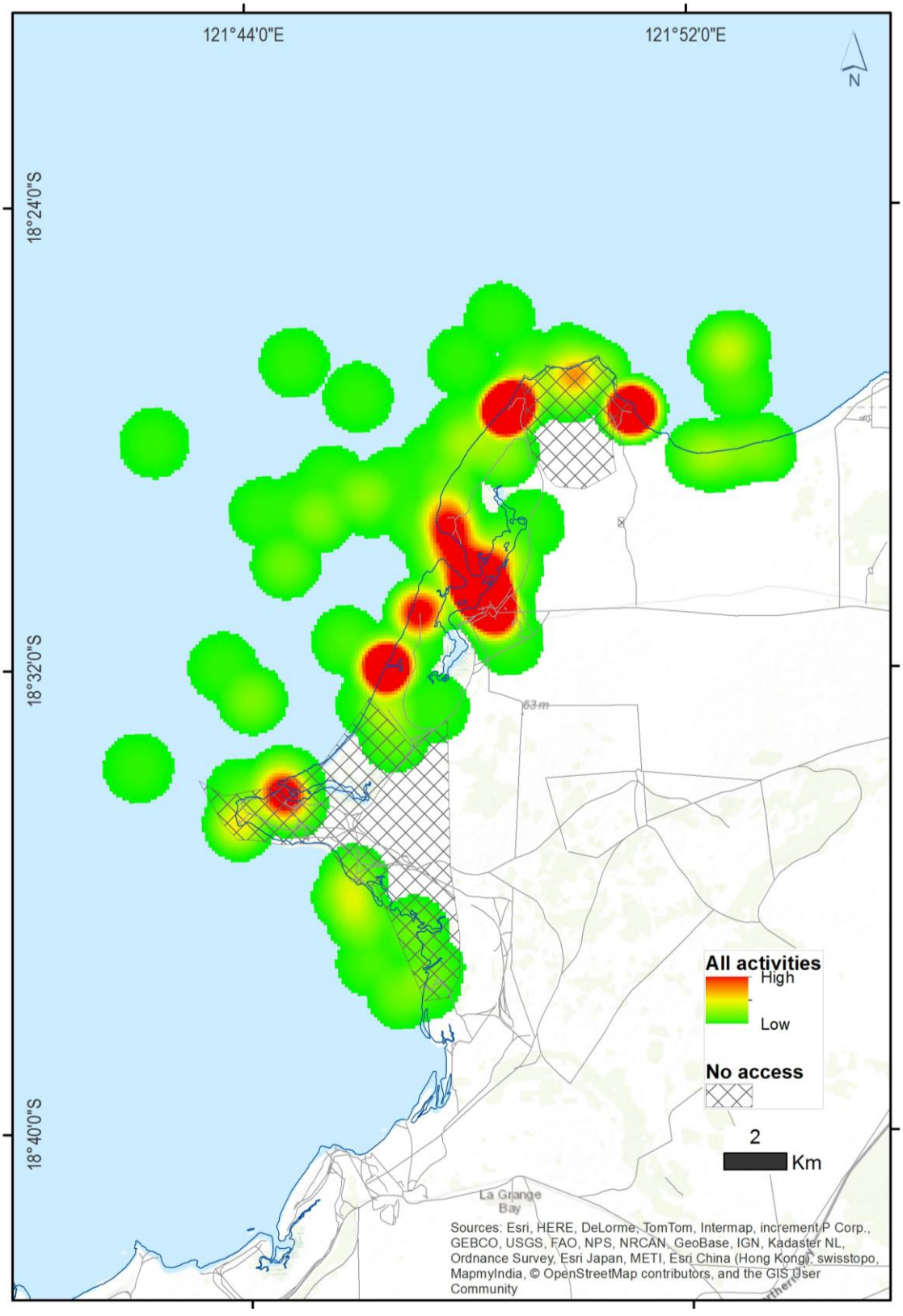

Figure 43. Hotspots for all activities relative to 'no access' areas.

Almost all activities (excluding 'other' activities) were undertaken in the 'no access' zone between Saddle Hill and Gourdon Bay access points (Figures 6 & 43 [northern no access zone]). Diving and snorkelling displayed two hotpots in this no access region, with spectating/sightseeing, walking/other exercise, four wheel driving, boat fishing and crabbing all displaying one hotspot.

3.5 New activities desired

Respondents were asked to indicate desired new activities or cultural experiences that they would like to experience in the Port Smith area. Over half of all respondents (54%) responded to this open-ended question. Two related categories were evident. The first and most prevalent of these concerned respondent desire to interact with local Aboriginal people through a variety of tours. Proposals included the establishment of small-scale fishing, mud crab, birdwatching, cooking and bush tucker tours, with comments typically expressing an interest in learning about Aboriginal culture through the experience. A second desired activity centred on informal interactions with local Aboriginal people, with the intent of learning about the area and its cultural significance. This was variously expressed in terms of "*guided walks with Aboriginal rangers*", "*more Aboriginal music*", "*listening to the local Indigenous people telling stories of their life and past and hopes for their future*" and "*cultural information*".

3.6 Desired improvements

Respondents were asked to indicate areas where certain improvements were desired. A list of pre-defined options was provided together with a 'free choice' option (see Q11, Appendix 2). A total of 453 markers for desired improvements were placed. Figure 44 depicts the relative count for each improvement category. Visitor guides/maps (24%), information/interpretation boards (20%), walk trails (12%) and shade shelters (11%) were the most commonly desired improvements. Stairs or steps and 'other' activities were the least desired improvements (4% and 2%, respectively). 'Other' included a range of desired improvements such as greater capacity for rubbish collection, provision of caravan dump sites, vegetation maintenance along tracks, providing fish cleaning tables and the presence of a ranger office at Port Smith.

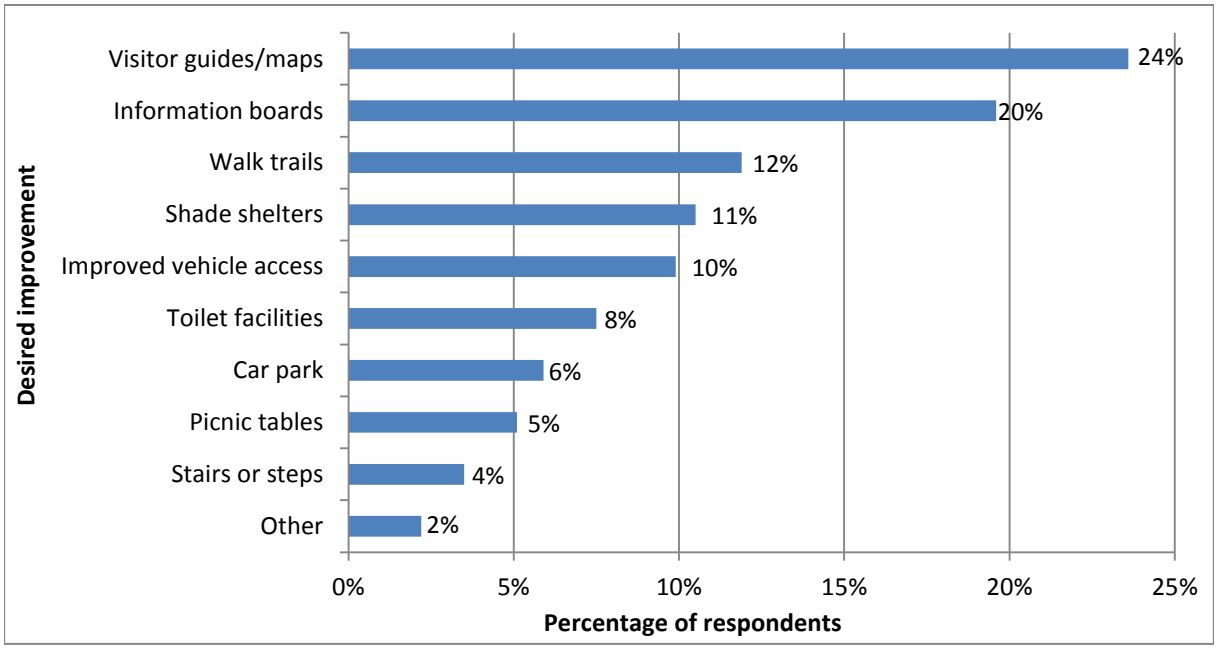

Figure 44. Desired improvements in the Port Smith area (N=453).

Figure 45 depicts the composite map for all desired improvements, with these concentrated around Gourdon Bay, Saddle Hill cliffs, Port Smith Lagoon, Cowrie Creek and Injudine Creek (*cf.* Figure 7).

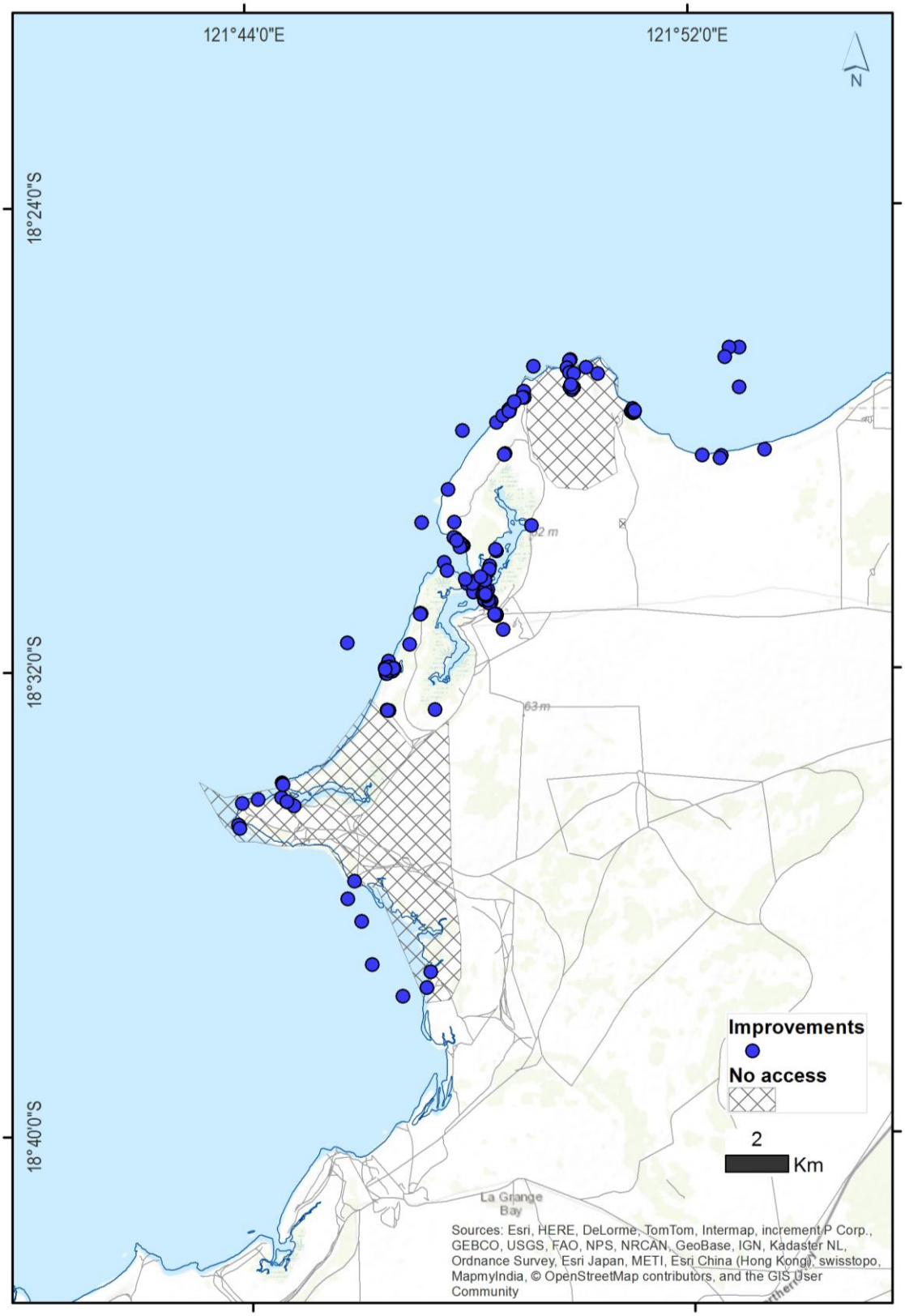

Figure 45. Composite mapping output (raw data) for desired improvements in the Port Smith area (N=453).

In this section the point density maps (Figures 46 - 55) are presented according to number of markers placed, moving from the desired improvement with the most markers placed to the desired improvement with the fewest markers placed (reverse order of improvements given in Figure 44).

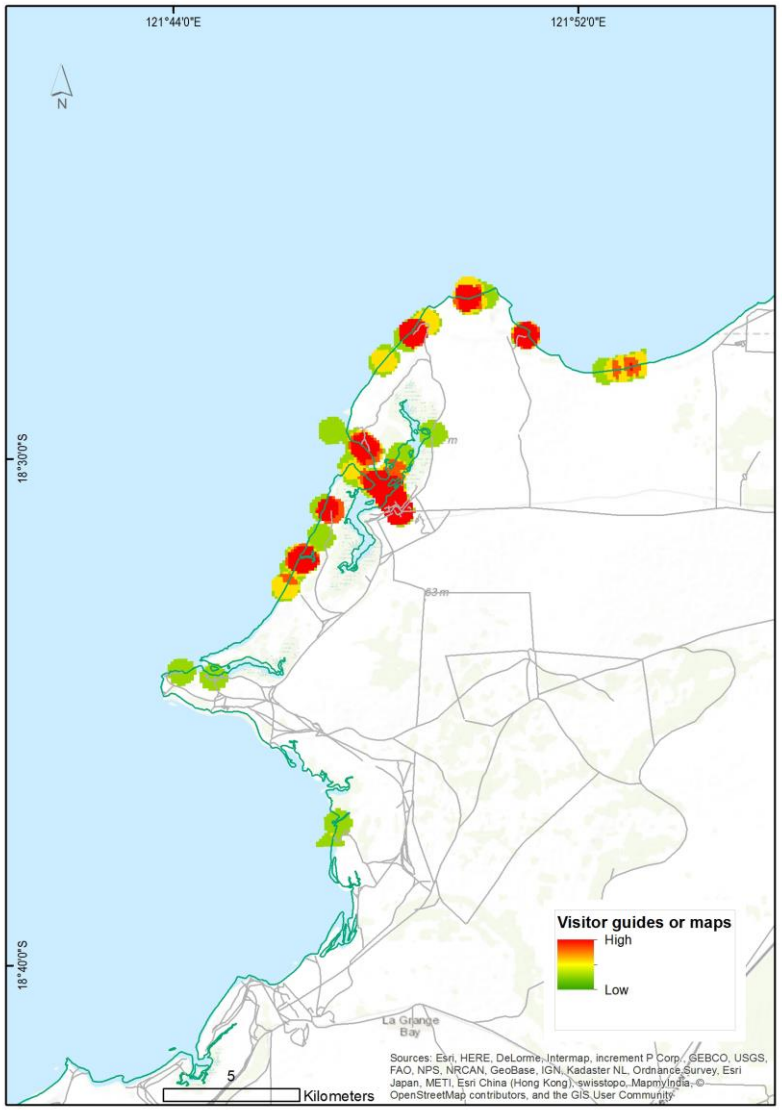

Figure 46. Point density map for visitor guides or maps (N=89).

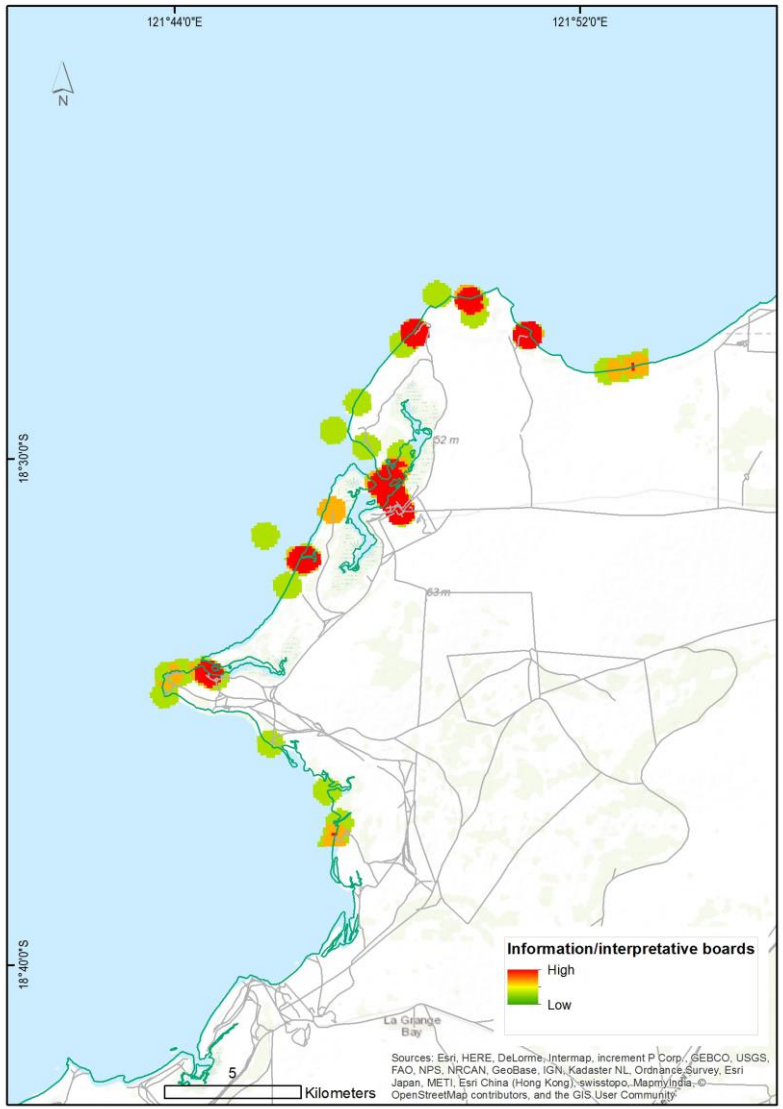

Figure 47. Point density map for information / interpretative boards (N=105).

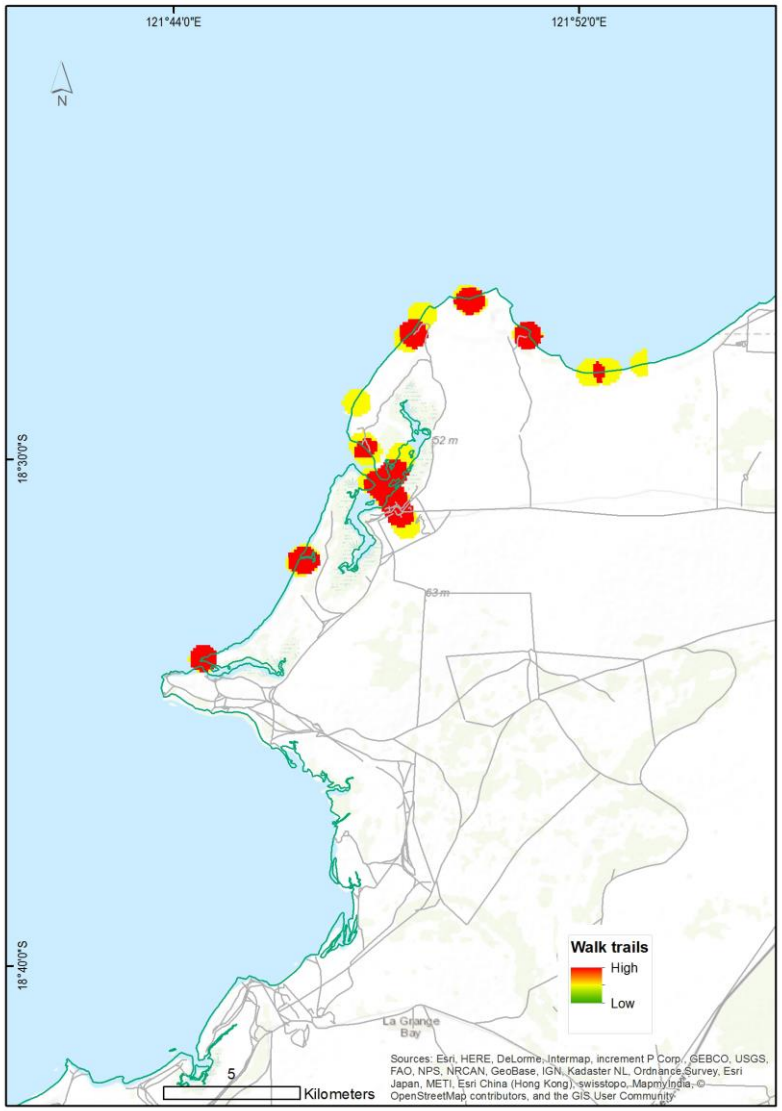

Figure 48. Point density map for walk trails (N=54).

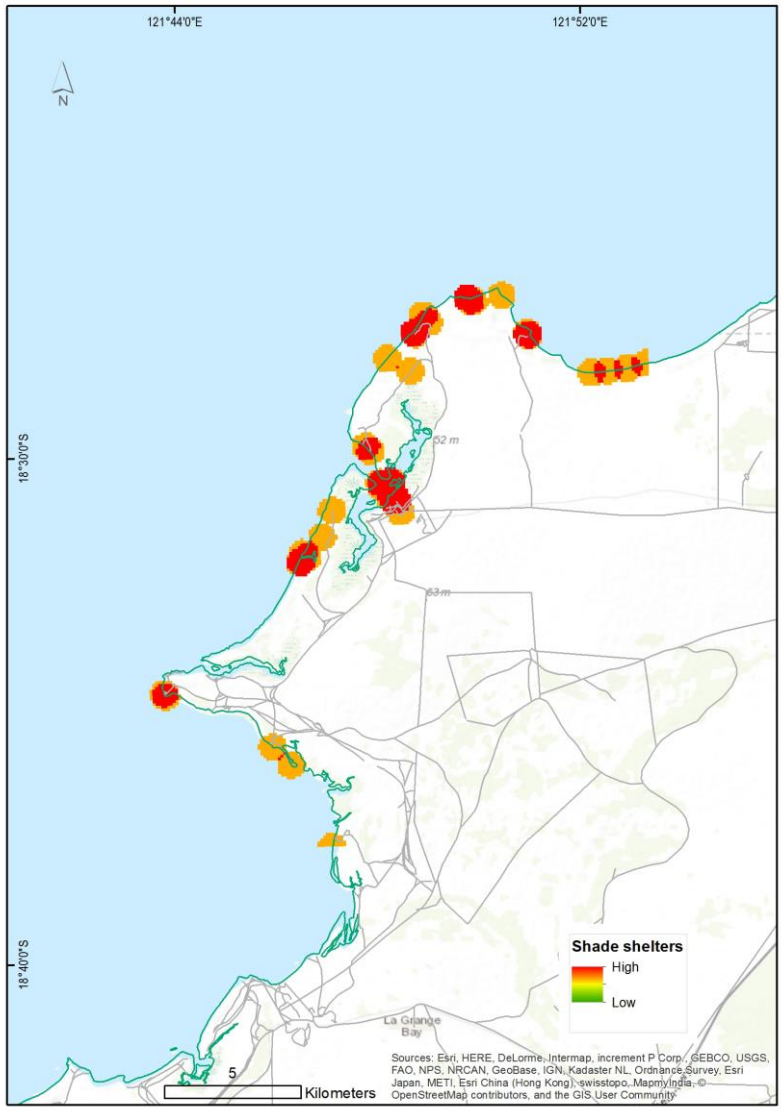

Figure 49. Point density map for shade shelters (N=48).

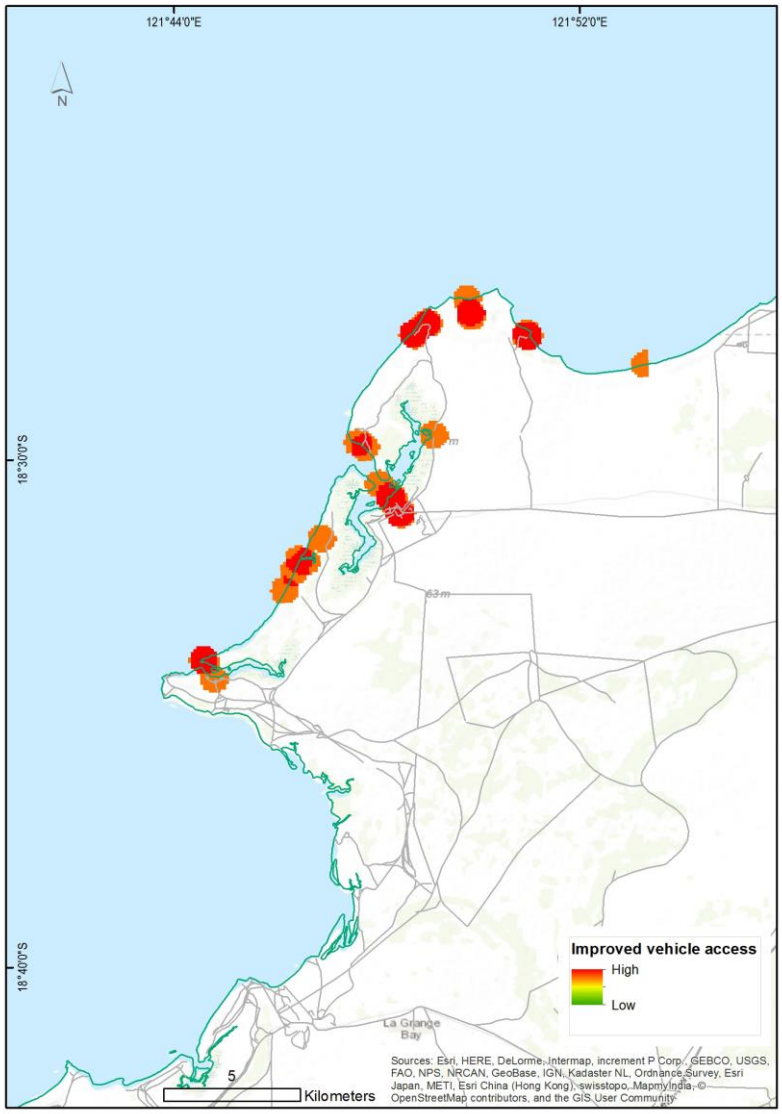

Figure 50. Point density map for improved vehicle access (N=38).

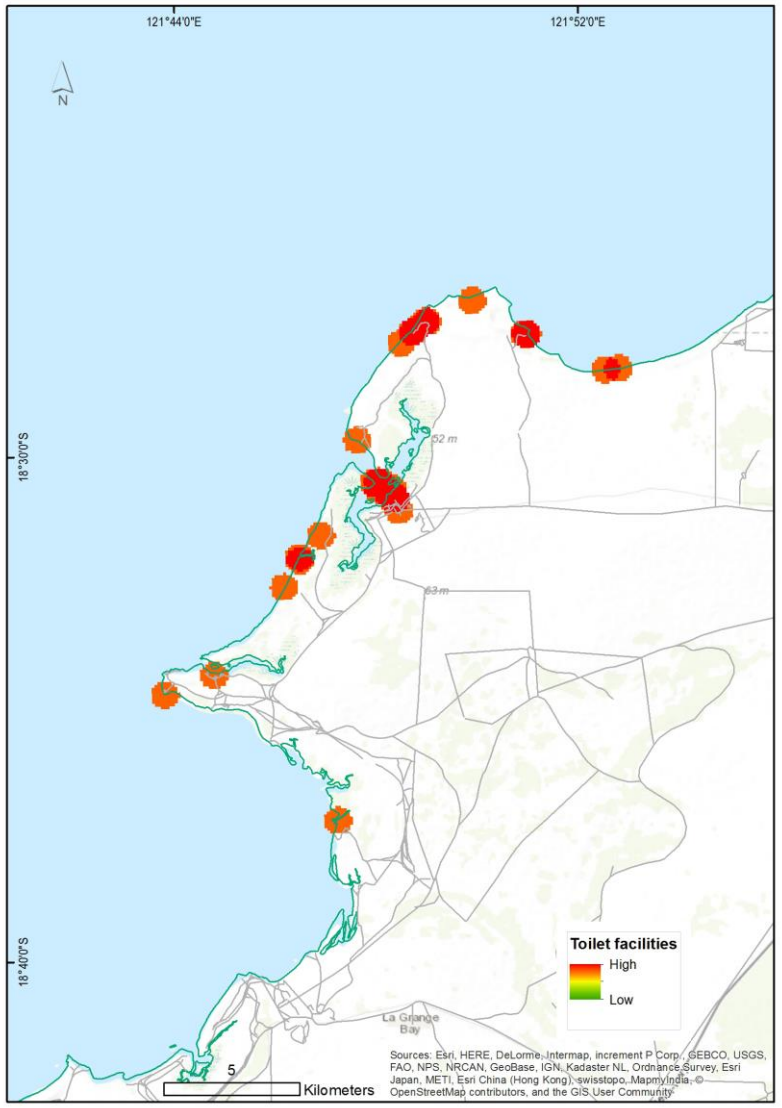

Figure 51. Point density map for toilet facilities (N=34).

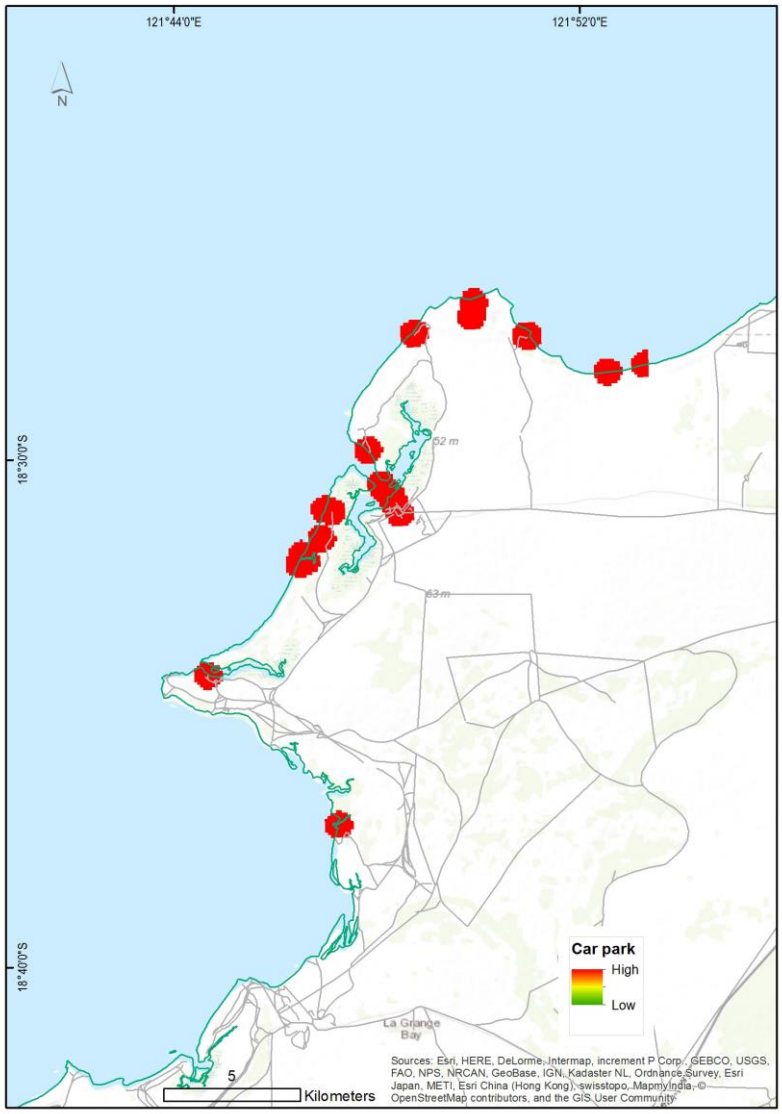

Figure 52. Point density map for car park (N=27).

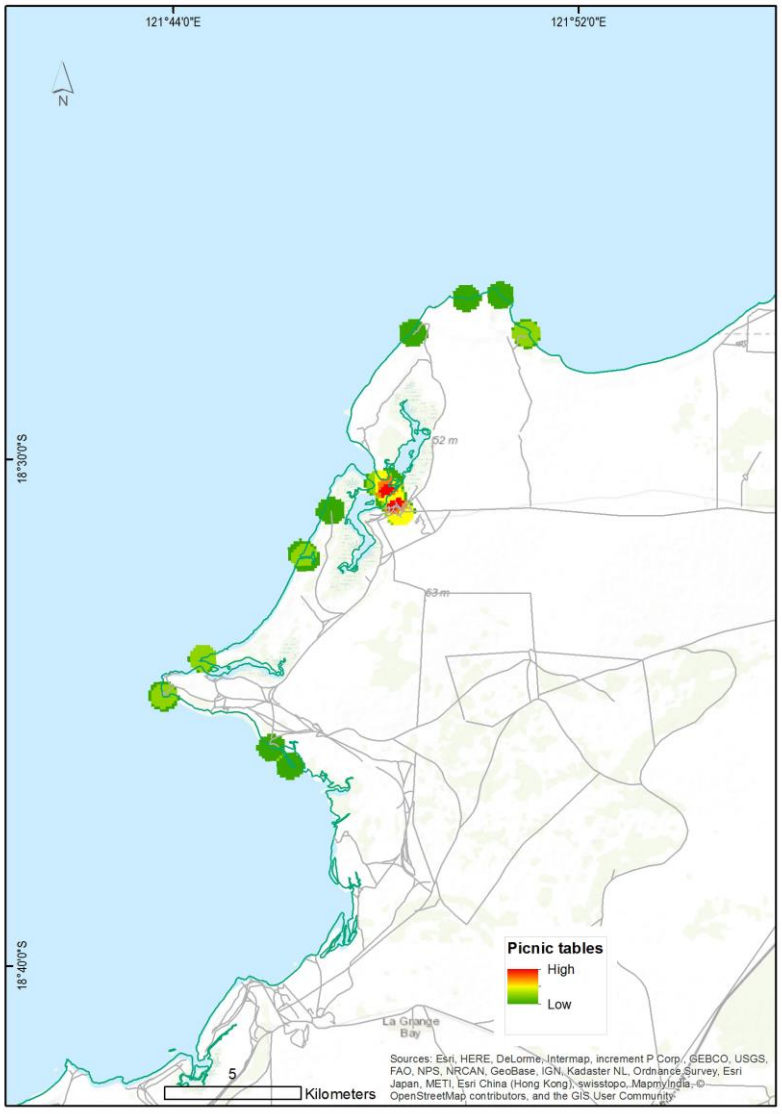

Figure 53. Point density map for picnic table (N=23).

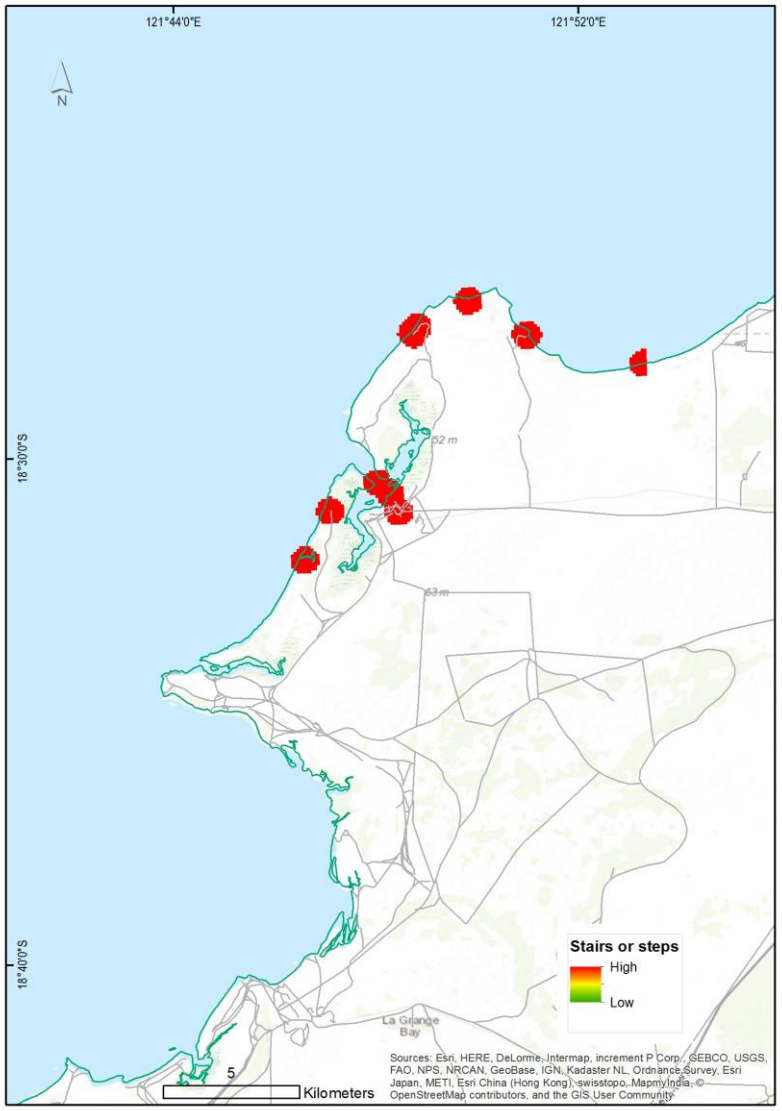

Figure 54. Point density map for stairs or steps (N=16).

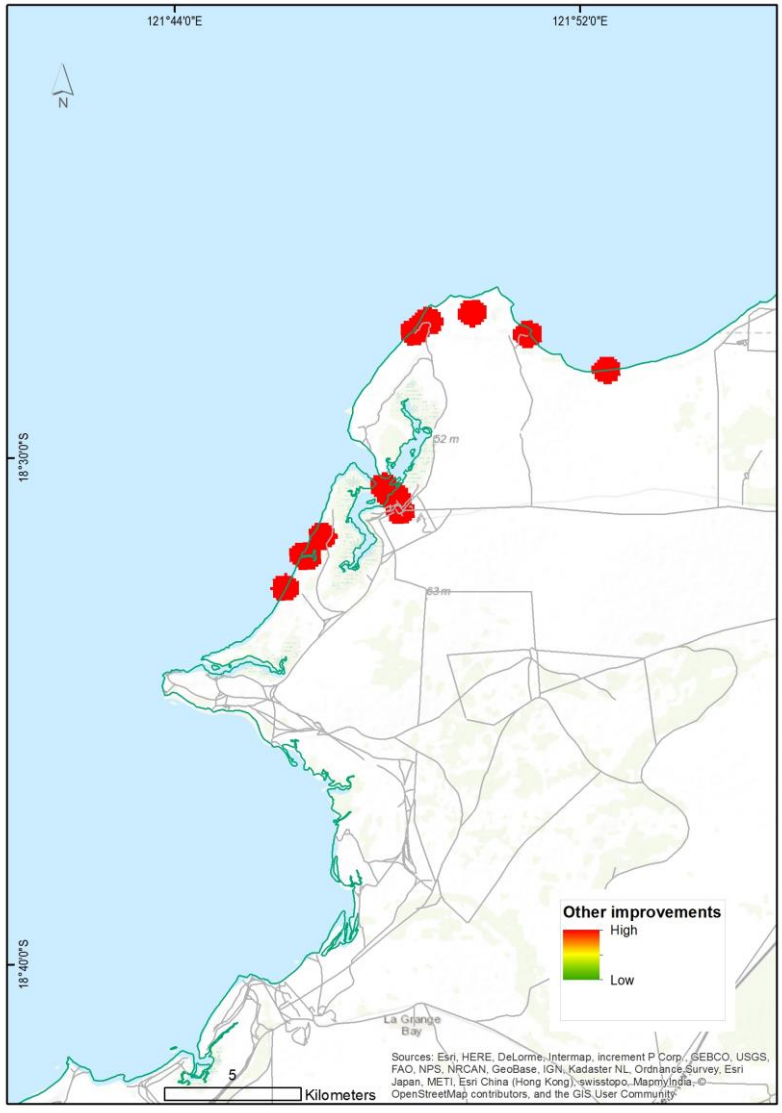

Figure 55. Point density map for other improvements (N=10).

Figures 46 – 55 illustrate that hotspots for desired improvements generally align with key access points (*cf.* Figure 7). Visitor guides and maps, the most chosen improvement, were desired at Port Smith Lagoon and lagoon mouth, Saddle Hill, Cowrie Creek (two hotspots) and Gourdon Bay (three hotspots). Six hotspots were evident for information/ interpretative boards. Most of these aligned with access points although one, located between Saddle Hill and Gourdon Bay, was independent of access points. Walk trails, shade shelters, improved vehicle access and carparks were desired at all access points.

Gourdon Bay was a particular focus for all desired improvements, with the exception of picnic tables. The desire for shade shelters was most prevalent (four hotspots). This was followed by the desire for carparks (three hotspots), walk trails, toilets, stairs or steps and 'other' (two hotspots respectively). Cowrie Creek was notable for desired car parks and 'other' (three hotspots each) as well as visitor guides/maps and stairs or steps (two hotspots each).

Respondents indicated a number of desired improvements within the no access zone south of Cowrie Creek (Figure 42). This included a desire for information/interpretative boards, walk trails and improved vehicle access (one hotspot each, centred on Injudine Creek) as well as shade shelters and carparks (two hotspots each).

The no access zone between Saddle Hill and Gourdon Bay carparks (*cf.* Figure 7, Figure 56) was a hotspot for a number of desired improvements, including visitor guides/maps, information/interpretative boards, walk trails, shade shelters, improved vehicle access, picnic tables, stairs and 'other'. Toilet facilities were the only improvement not desired for this 'no access' area.

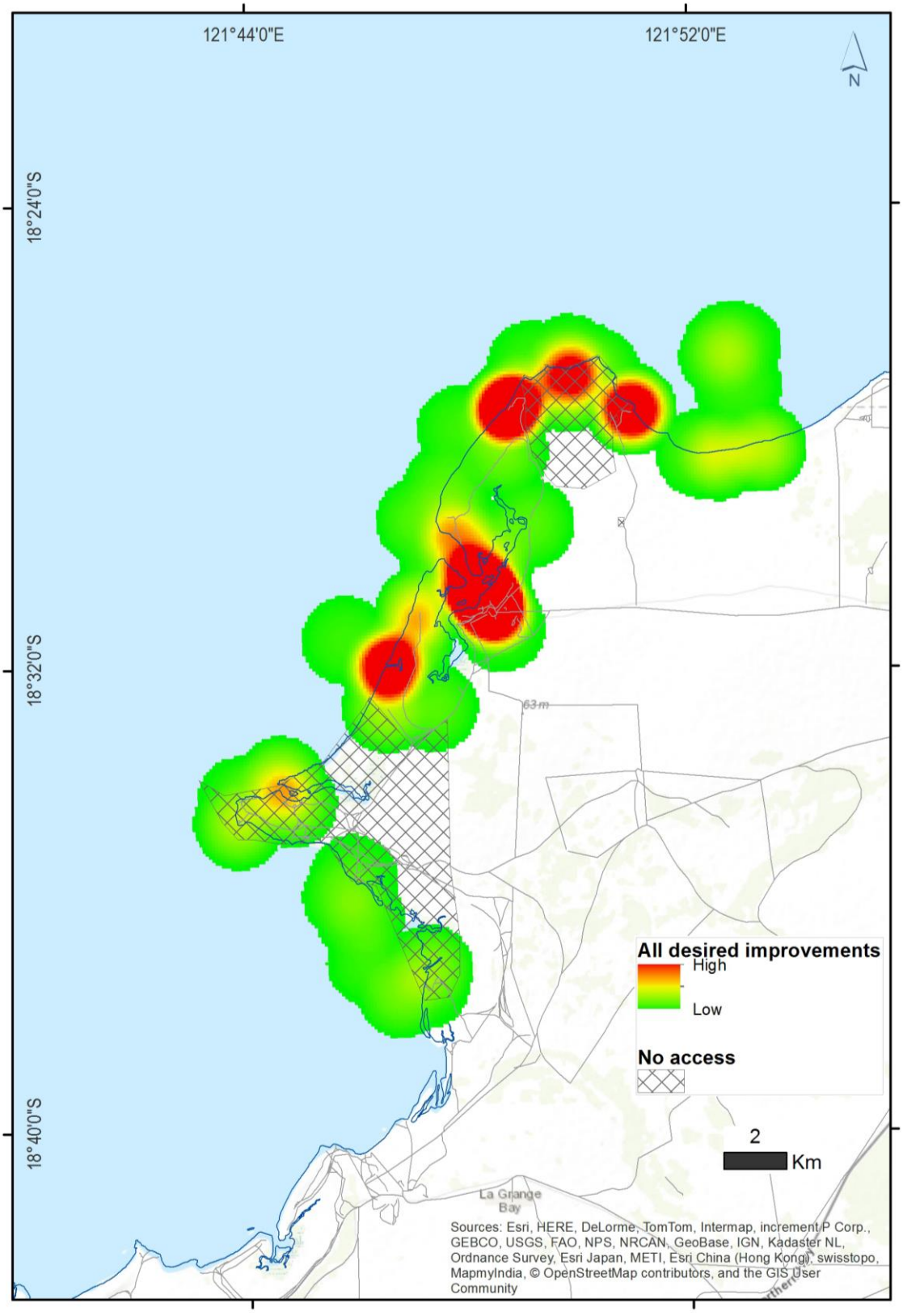

Figure 56. Hotspots for all desired improvements relative to 'no access' areas.

3.7 Knowledge of current management arrangements

Almost half of all respondents (47%, N=93) were unaware of Port Smith's land tenure arrangements. The remainder (53%) were aware that Port Smith was surrounded by the Frasier Downs pastoral lease. However two-thirds of those respondents did not know the identity of the station's leaseholder. Just over half of the respondents indicating knowledge of the leaseholder correctly identified the Karajarri Traditional Lands Association as leasee (59%, N=17).

3.8 Interaction with Karajarri rangers

Respondents were asked to indicate their level of interaction, if any, with Karajarri rangers during their visit to Port Smith (Figure 57). More than half of respondents (53%) reported that they had had no interaction with rangers. Smaller, similar numbers reported having either seen (18%) or talked to the rangers (17%). A smaller percentage indicated the more passive act of listening to rangers (12%).

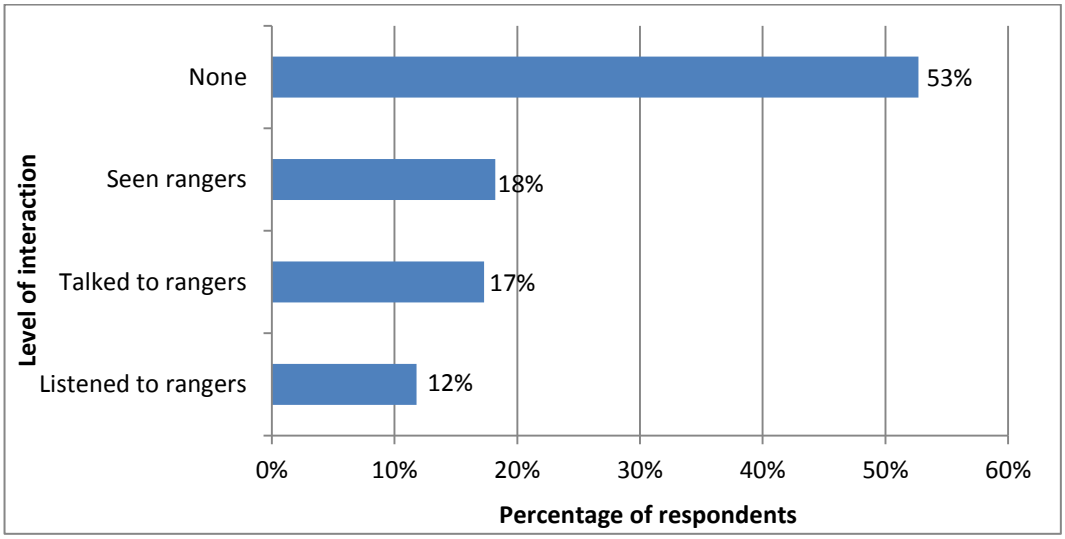

Figure 57. Level of interaction with Karajarri rangers during respondents' visit to Port Smith (N=110).

Almost 71% of respondents (N=86) indicated that the opportunity to have a greater level of interaction with rangers would have enhanced their visitor experience. Four related themes emerged regarding desired information: insights into fish (and other wildlife) movements; information on rules and regulations for the area; local knowledge on a range of topics; and insights into Aboriginal culture and history. The latter was of particular significance for many respondents, with comments highlighting an interest in learning more about "*the history of areas... significance of the area to Karajarri people*".

3.8.1 Karajarri Protected Area Visitor Permit

Almost three quarters of respondents (73%, N=92) were aware of the Karajarri Protected Area Visitor Permit (Permit). The majority of these (79%) became aware following information received from the Port Smith Caravan Park. Just over 10% of respondents were made aware of the Permit following discussions with Karajarri rangers while a further 11% reported learning about the Permit system through 'other' avenues. These 'other' avenues included sources such as family members, long term Caravan Park and other visitors, and the Internet.

Figure 58 depicts respondent views regarding Permit pricing. Just over half of all respondents considered the Permit fees appropriate (55%). However, 44% of respondents felt that Permit pricing was too high. Only one respondent (1.2%) indicated the Permit fees were too low.

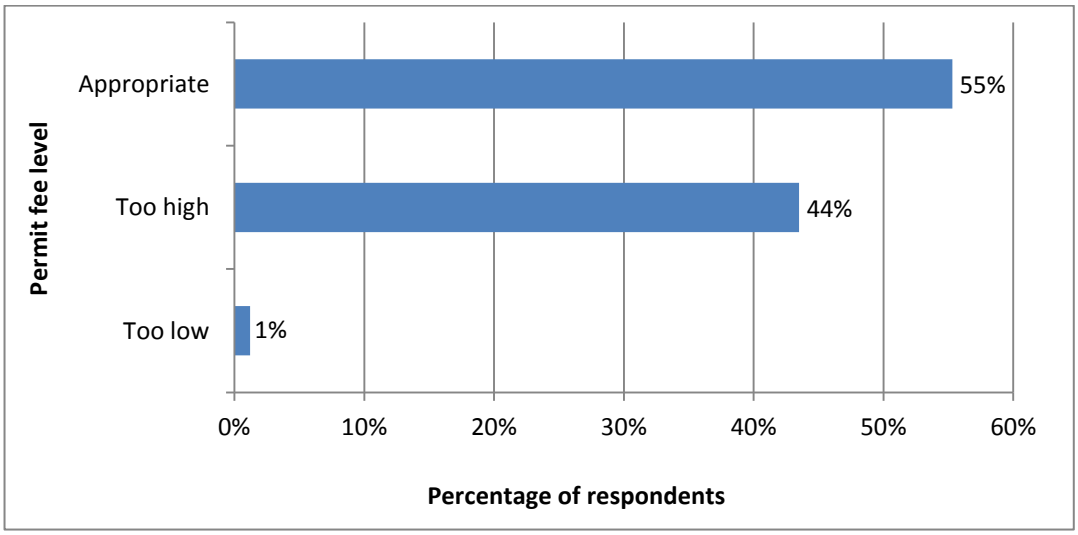

Figure 58. Views regarding Karajarri Visitor Permit pricing (N=85).

Comments associated with the Permit system included concern, or interest, regarding how the Permit funds would be used. In general respondents appeared willing to pay Permit fees "*as long as the funds gathered from these permits are put back into improvements for the area*". Others intimated that visitor acceptance of Permit fees would increase as the "*ranger Program progresses and visitors gain a better picture of the richness of the cultural perspective*". The desire to see value for money was a central theme, particularly among repeat or long-time visitors: "*since we have had access to these areas without having to purchase this permit it seems that we get nothing extra for this payment*". Respondents who considered the Permit fees too high often included comments such as "*I don't think any Australian should pay to see any part of his/her country*" and "*I can't see why you would have to pay a fee to enjoy the nature - which belongs to everyone*".

3.9 Study limitations

This analysis represents a snapshot of visitor values, activities and preferences for the Port Smith area at a given point in time. Marine and coastal systems, and their provision of ecosystem services (often equated with values) and benefits derived, are highly variable in both space and time (Koch et al. 2009). Socio-cultural values and management preferences captured in this research are by necessity contingent in nature and reflective of the particular people who participated in the visitor survey. Further, they are likely to be influenced by the respondent's social and cultural experience, habits & belief systems, traditions of behaviour, judgement, and styles of living (Kumar & Kumar 2008). While the Port Smith Caravan Park was experiencing lower than average occupancy at the time of research (S. Appelbee, pers. comm., 3 August 2015), these documented activities, values and management preferences provide a basis for ongoing dialogue about what is important to people in the Port Smith area. They provide valuable information to supplement KTLA policy and planning and provide further information to support the work of the Karajarri rangers.

4 Policy and management implications

4.1 Policy and management implications

These management implications apply to the areas surround the Port Smith Caravan Park CP (as depicted by study area in Figure 8). This is the area bounded by Gourdon Bay to the north and Mud Creek to the south. The management implications are of most relevance to the Karajarri Traditional Lands Association, Karajarri Indigenous Protected Area managers and Traditional Owners.

1. *Implication 1: Visitors hold a broad range of values for the Port Smith area. Bequest value, aesthetics and recreational fishing are the most common values associated with the study area.*
2. *Implication 2: Visitor activities and desired improvements are co-located with access points, illustrating how pressures and opportunities for management concentrate at certain points along coastlines. It also emphasises how important managing access is for the sustainable future of such areas. The KTLA has the opportunity, based on this information, to manage roads, tracks and the infrastructure on the coastline, as well as the provision of information to support desired management outcomes, at these key locations.*
3. *Implication 3: Port Smith visitors continue to access areas designated as 'no access'. This suggests the need for improved signage to inform and direct visitors regarding any areas where no access is a desired part of management. Concurrently, managers could consider providing culturally appropriate information on the significance and rationale behind access closures, in the IPA Visitor Guide as well as any cultural tourism products that may be developed. The attendance of KTLA representatives at regular Caravan Park visitor forums (e.g., informal, peak season Caravan Park information evenings attended by Karajarri rangers) could complement this information. This forum involves a partnership between the Port Smith Caravan Park leasees, the Karajarri Traditional Lands Association and Bidyadanga community. Other potential management strategies include the increased presence of rangers and exploration of digital management enhancement strategies (e.g., digital smartphone or device applications such as the 'Rock Art Protection' App used on the Burrup Peninsula in the Pilbara or the Welcome to Country App).*
4. *Implication 4: Visitors are greatly interested in engaging with local Aboriginal people, and learning about the area's cultural significance. This suggests the potential for KTLA representatives, including the Karajarri rangers, to develop a range of formal and informal interpretive/cultural tourism activities for engaging with and informing Caravan Park visitors. These activities could additionally provide culturally appropriate information on sensitive sites, local history and IPA rules and regulations, reinforcing messages about IPA no access zones.*
5. *Implication 5: Visitor guides/maps and information/interpretative boards are the two most desired improvements for the area. The KTLA could consider installing or upgrading such information to assist with creating an enhanced visitor experience. These guides or information boards could be used to provide greater insights into the area's historical and ongoing cultural significance, supporting IPA management efforts to designate certain areas as 'no access'. Digital smartphone or device technologies present another means of providing this information, with the potential to develop a 'Karajarri' or augmented 3D reality App for the area.*
6. *Implication 6: Visitors currently use hold a range of values for the Injudine Creek area and conduct a range of activities. Visitors desire a number of improvements including walk trails, information and interpretative boards, improved vehicle access and carparks. These improvements and the activities undertaken conflict with Injudine Creek's designation as a 'no access' area. Managers could consider improved signage to deter visitation together with greater provision of information outlining the area's cultural significance. This information could be made available upon visitor arrival in the Caravan Park, within the Karajarri IPA Visitor Guide as well as potentially included in any digital device applications developed in the future.*
7. *Implication 7: Concerns exist regarding the pricing and use of funds gathered via the Visitor Permit System. To aid understanding and build greater support for the Permit among visitors, IPA managers could consider including information on funded activities in the Karajarri Visitor Guide, IPA directional and educational signage, the online Permit application website and in both formal and informal engagement activities undertaken. The information could also be included in any digital device applications developed.*

4.2 Future research

The questionnaire and accompanying mapping methodology used in this study provided detailed information on the activities, preferences and values held by visitors and residents at Port Smith in the Kimberley region. These data provide important information for land managers, the Karajarri Traditional Lands Association and the Karajarri Rangers, to use in their ongoing planning and management for the region. Opportunities exist to

repeat the survey at regular intervals to ascertain any changes in visitor access patterns, activities, preferences and values, to ensure that Karajarri planning and management remains adaptive and current for the region's visitor profile.

This research has direct implications for the KTLA in its planning and implementation of the Protected Area Visitor Permit. The KTLA have indicated a desired to continue working in close partnership with Port Smith Caravan Park and the community, to ensure that increasing management of the area improves amenity, the visitor experience and maintains or strengthens cultural and ecological values. Further, the KTLA have expressed an interest in pursuing further partnership with tertiary institutions. The KTLA have few staff, and any additional resources offered by partnerships, that also complement KTLA desires and values, would assist greatly. From joint research studies to hosting of student projects, many opportunities exist, for example the development of cultural interpretation APPS and other communication products, documentation of modern occupational use, and assistance with development of cultural walks and heritage trails etc.

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6 Appendices

Appendix 1 – Survey information letter

Purnturrpurnturr (Port Smith) Visitor Survey

www.murdoch.edu.au

Visitor activities and values for the *Purnturrpurnturr* (Port Smith) area

Dear Visitor

We would like to know your views about your visit to the *Purnturrpurnturr* (Port Smith) area to help support future planning and management. To help us achieve this, we ask you to complete a brief survey. The survey will ask general questions about the activities you undertake here, desired improvements and how you value this area. You can choose not to answer any of the questions.

You can decide at any time to withdraw your consent to participate in this research. If you decide to withdraw, any material you have given us will be destroyed.

If you have any questions about this project please feel free to contact either Jennifer Strickland-Munro (email j.strickland-munro@murdoch.edu.au or mobile 0414 737 076) or Sam Bayley (email s.bayley@klc.org.au or mobile 0409 437 067). We are happy to discuss any concerns you may have about this study.

Sincerely

J. Strickland-Munro

Dr Jennifer Strickland-Munro
School of Veterinary and Life Sciences
Murdoch University

Sam Bayley
Karajarri Traditional Lands Association

This study has been approved by the Murdoch University Human Research Ethics Committee (Approval 2015/014). If you have any reservation or complaint about the ethical conduct of this research, and wish to talk with an independent person, you may contact Murdoch University's Research Ethics Office (Tel. 08 9360 6677 or e-mail ethics@murdoch.edu.au). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

CRICOS Provider Code: 00125J
ABN 61 616 369 313

Visitor Survey

We value your feedback

Dear Visitor,

Welcome to the Karajarri Indigenous Protected Area (IPA), managed by the Karajarri Traditional Lands Association through the Karajarri Rangers. We hope you have an enjoyable and safe stay on Karajarri *Ngurra*.

We'd like to know about your visit to the *Purnturrpurnturr* (Port Smith) area. Your feedback will help to protect and improve this beautiful area for future use.

Thank you.

> *"Everything, all the animals, birds, people and seasonal changes, comes from the country, and the country is Pukarrikarrajangka. Ngurra Yalawarra. Everything sits in the belly of the country. We stand here as Karajarri, from Pukarrikarra ('Dreamtime')… We want to look after that country for our young people. We belong to that country*"
>
> Donald Grey Wuntupu [Karajarri elder], 1999

The Murdoch University Human Research Ethics Committee has approved this study (Approval 2015/014). If you have any reservation or complaint about the ethical conduct of this research, you may contact Murdoch University's Research Ethics Office (Tel. 08 9360 6677 or e-mail ethics@murdoch.edu.au).

Q1. Including this visit, how many times have you visited the Port Smith area? *Please tick [✓] one box only*

❑ First visit ❑ Twice ❑ Three to five times

❑ Six to ten times ❑ More than 10 times (over how many years?) _____

Q2. How long did you (plan to) stay in the Port Smith area on this visit? *Please tick [✓] one box only*

Short stop (less than 4 hours)	All day (5 to 8 hours)	Overnight (how many nights?)	Weeks (how many weeks?)
❑	❑	_____	_____

Q3. How did you find out about the Port Smith area? *Please tick [✓] all that apply*

❑ Word of mouth/friends ❑ Visitor centre (local tourism office) ❑ Kimberley Land Council website or Facebook

❑ Local knowledge ❑ Dept Parks and Wildlife office/ staff member ❑ Tourist magazine/map

❑ Other (please specify) _____

Q4. Which age group do you belong to? *Please tick [✓]*

18-24	25-34	35-44	45-54	55-64	65 or older
❑	❑	❑	❑	❑	❑

Q5. Which gender are you? *Please tick [✓]*

M	F
❑	❑

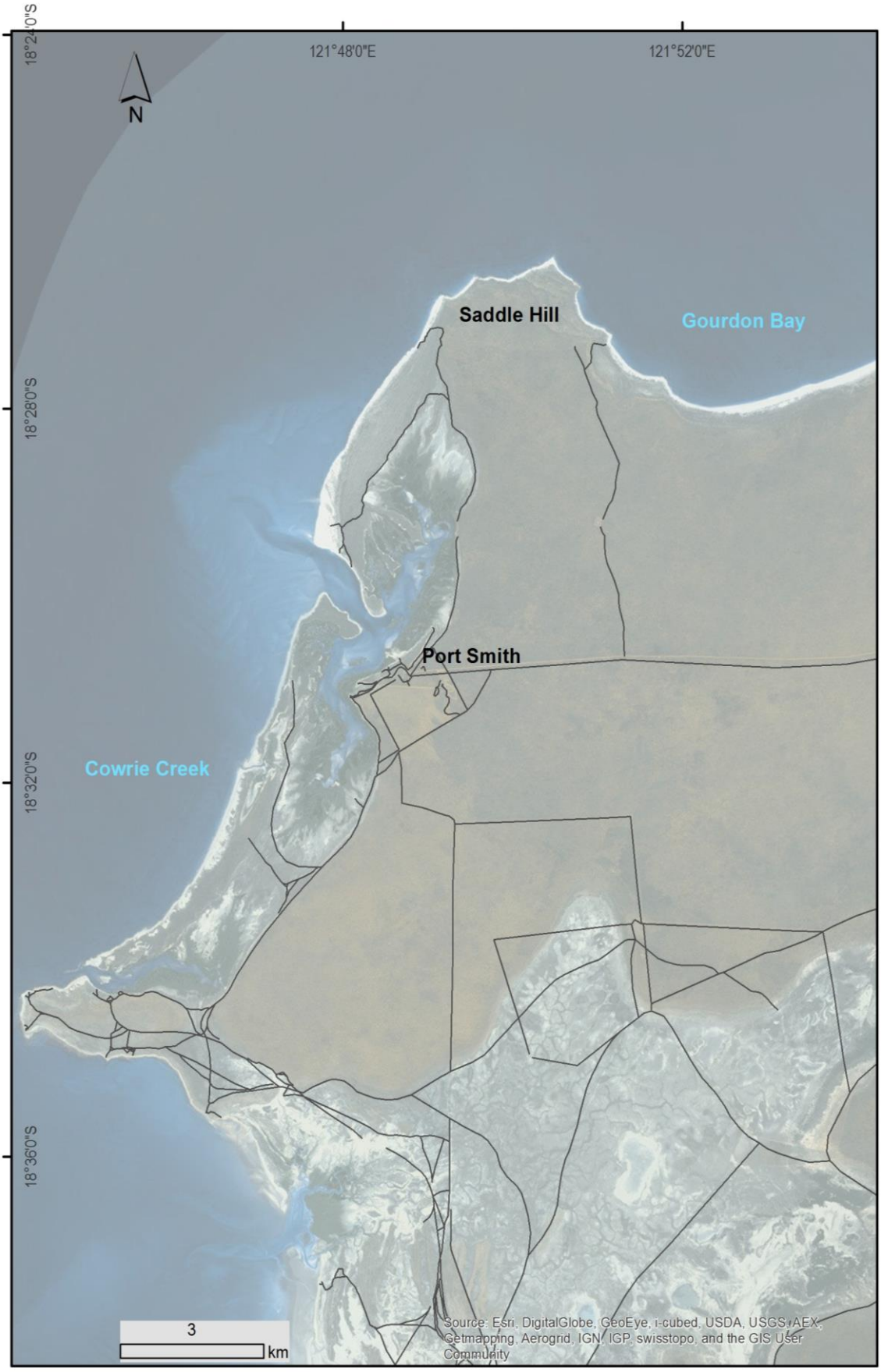
Q6. Including yourself, how many people in your personal (i.e. travelling) group are adults and how many are children?

Number of adults _____ Number of children (aged 17 and Under) _____

Q7. Where is your usual place of residence? *Please tick [✓] and specify further information*

❑ Australia - Postcode _____ ❑ Overseas – Country _____

Q8. Please mark <u>up to 5 places</u> where you have undertaken activities during <u>this visit</u> on the map below. *Please mark each place with an 'X' and number from 1 to 5.*



Q9. What <u>activities have you undertaken</u> at each place you marked (1-5) on the map? *Please tick [✓] all that apply*					
	Your Place Number (on map)				
Activity	**1**	**2**	**3**	**4**	**5**
Beach fishing	❑	❑	❑	❑	❑
Boat fishing	❑	❑	❑	❑	❑
Crabbing	❑	❑	❑	❑	❑
Diving or snorkelling	❑	❑	❑	❑	❑
Experiencing or viewing Aboriginal culture and heritage	❑	❑	❑	❑	❑
Four wheel driving	❑	❑	❑	❑	❑
Kayaking	❑	❑	❑	❑	❑
Relaxing	❑	❑	❑	❑	❑
Spearfishing	❑	❑	❑	❑	❑
Spectating or sightseeing	❑	❑	❑	❑	❑
Swimming	❑	❑	❑	❑	❑
Walking or other exercise activity	❑	❑	❑	❑	❑
Wildlife / nature interaction or viewing	❑	❑	❑	❑	❑
Other (please specify) _____	❑	❑	❑	❑	❑

Q10. What new activities or cultural experiences would you like to see in the Port Smith area?
Please list up to 5 suggestions

1. _____
2. _____
3. _____
4. _____
5. _____

Q11. What <u>improvements</u> would you like to see at each place you marked (1-5) on the map? *Please tick [✓] all that apply*

	Your Place Number (on map)				
Improvement	**1**	**2**	**3**	**4**	**5**
Information/ interpretative boards	❑	❑	❑	❑	❑
Visitor guides or maps	❑	❑	❑	❑	❑
Shade shelters	❑	❑	❑	❑	❑
Picnic tables	❑	❑	❑	❑	❑
Stairs or steps	❑	❑	❑	❑	❑
Walk trails	❑	❑	❑	❑	❑
Improved vehicle access	❑	❑	❑	❑	❑
Car park	❑	❑	❑	❑	❑
Toilet facilities	❑	❑	❑	❑	❑
Other (please specify) _____	❑	❑	❑	❑	❑

Q12. What is <u>important to you</u> at each place you marked (1-5) on the map? *Please tick [✓] all that apply*

	Your Place Number (on map)				
Important to you	**1**	**2**	**3**	**4**	**5**
Future generations can enjoy this place	❑	❑	❑	❑	❑
It has attractive scenery	❑	❑	❑	❑	❑
It is a place of human history	❑	❑	❑	❑	❑
It is a place that is sacred, religious and/or provides a profound experience	❑	❑	❑	❑	❑
It is important in its own right irrespective of how I use it	❑	❑	❑	❑	❑
It makes me feel physically or mentally better / recharged	❑	❑	❑	❑	❑
It offers opportunities for a unique personal experience of nature	❑	❑	❑	❑	❑
It offers insights into Aboriginal culture and heritage	❑	❑	❑	❑	❑
It offers opportunities for camping	❑	❑	❑	❑	❑
It offers opportunities for learning and research	❑	❑	❑	❑	❑
It offers opportunities for recreational fishing	❑	❑	❑	❑	❑
It offers opportunities for social interaction and memories	❑	❑	❑	❑	❑
The presence of particular plants / animals/ other living organisms are valued	❑	❑	❑	❑	❑
Other (please specify) _____	❑	❑	❑	❑	❑

Q13. Did you know that the Port Smith area is surrounded by the Frasier Downs Pastoral lease? *Please tick [✓]*

❑ Yes ❑ No

If YES, do you know who the pastoral station leaseholder is? *Please tick [✓]*

❑ Yes (please specify) _____

❑ No

Q14. What level of interaction have you (or your group) had with the Karajarri rangers during your current visit to the Port Smith area? *Please tick [✓] all that apply*

❑ None ❑ Seen rangers ❑ Listened to rangers ❑ Talked to rangers

Would having more interaction with the rangers have added to your visitor experience?

❑ Yes ❑ No

What kind(s) of information would you like to gain from your interaction(s) with the rangers? (please specify)

_____

_____

Q15. Are you aware of the Karajarri Protected Area Visitor Permit system? *Please tick [✓] one box only*

❑ Yes ❑ No

If YES, how did you become aware of the system?

❑ Spoke with ranger ❑ Caravan park information

❑ Other (please specify) _____

Q15a. Visitor permit fees are currently $15 (2 day permit), $50 (7 day permit) or $120 (season permit April-October). Do you think these fees are: *Please tick [✓] one box only*

❑ Too low ❑ Appropriate ❑ Too high

Comments:_____

_____

Q16. Other comments

_____
_____
_____
_____

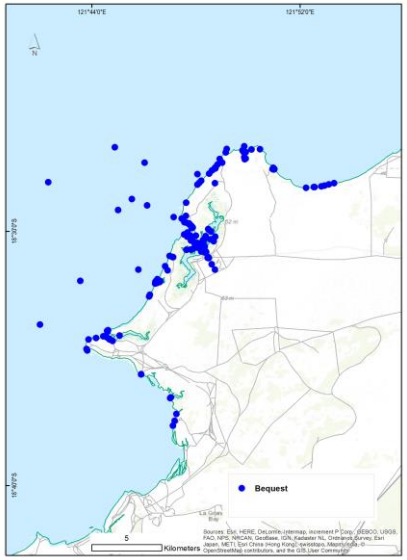
Thank you for participating. Your contribution will help to manage this area better.

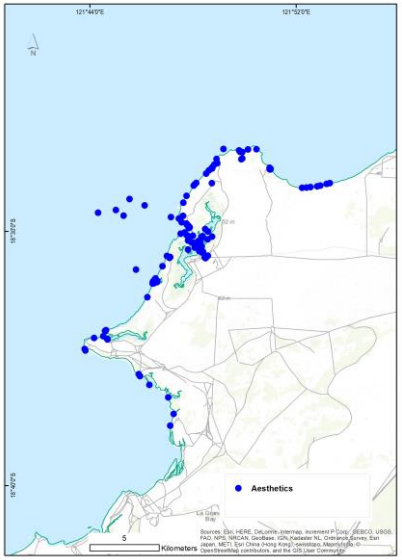
Office use only

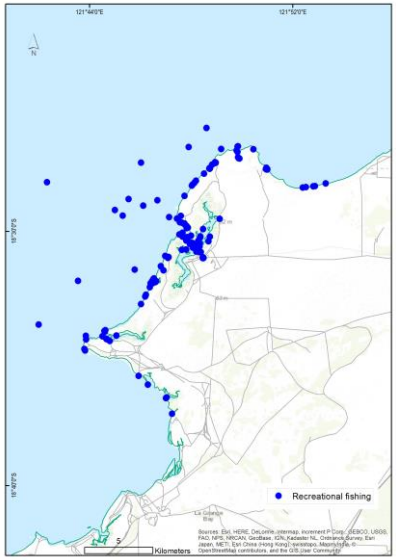
Date: _____ *Location:* _____

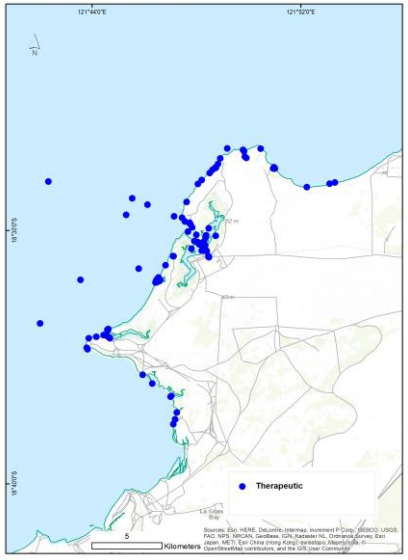
Survey Number: _____ *Surveyor(s):* _____

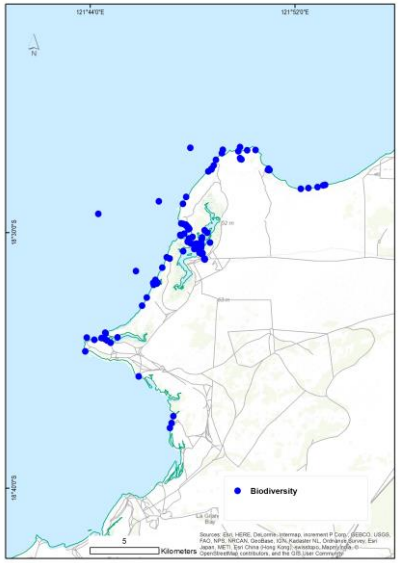
Appendix 3 - Values mapping data

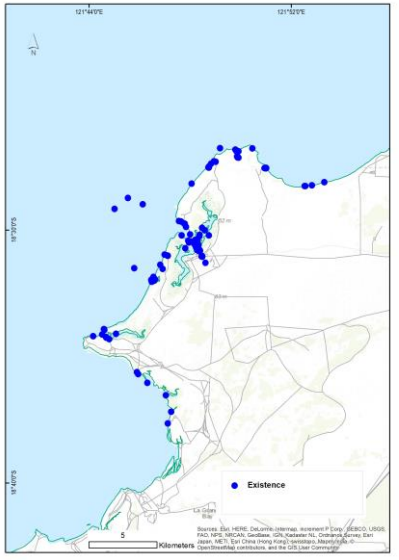


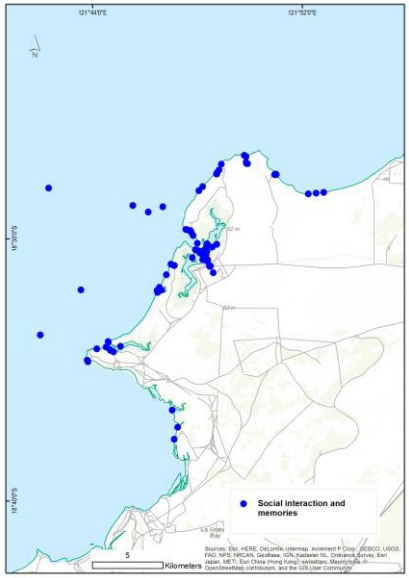


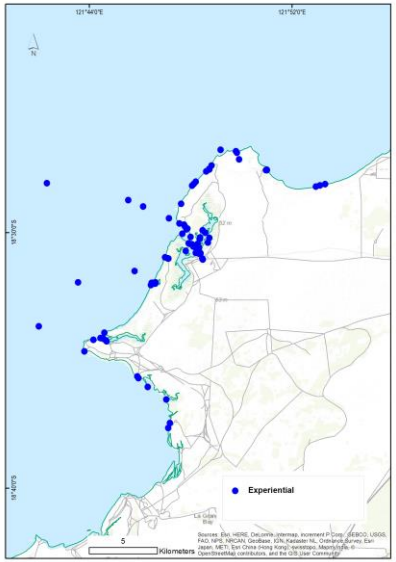


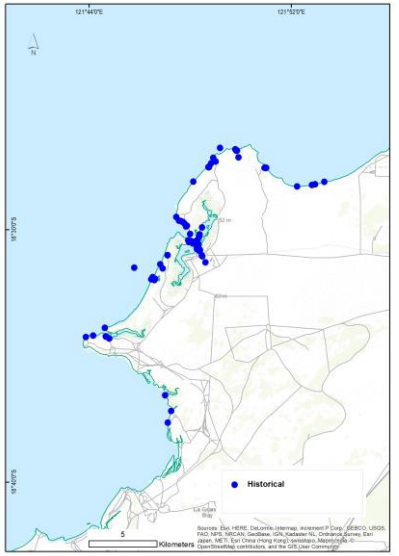


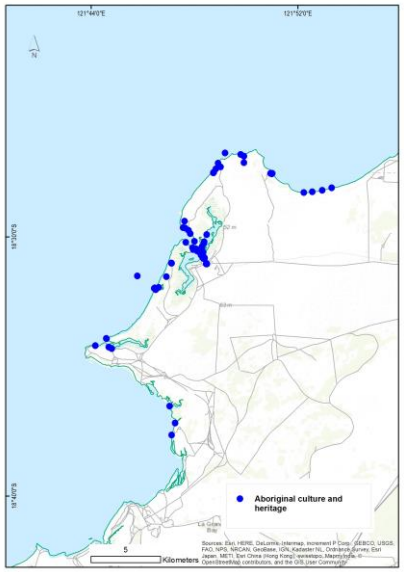


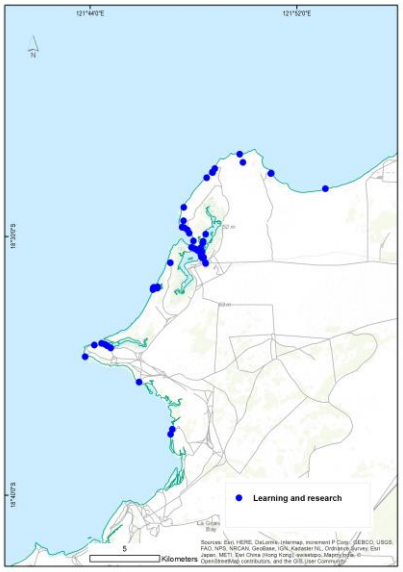


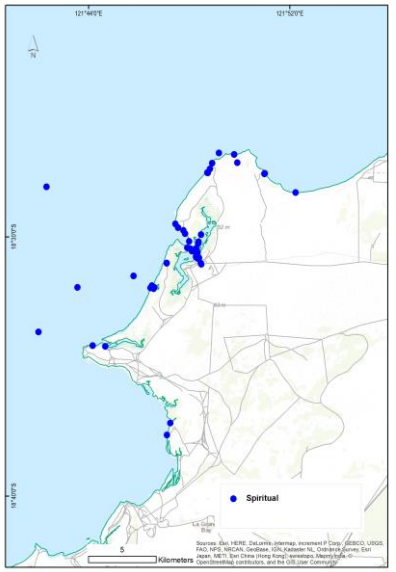

Social interaction and memories
Kilometers

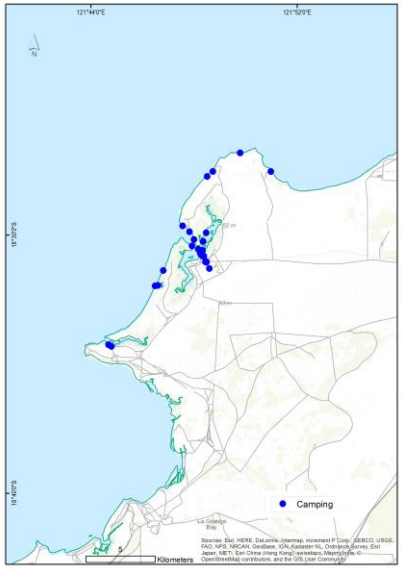

Experiential
Kilometers


Historical
Kilometers


Aboriginal culture and heritage
Kilometers


Learning and research
Kilometers


Spiritual
Kilometers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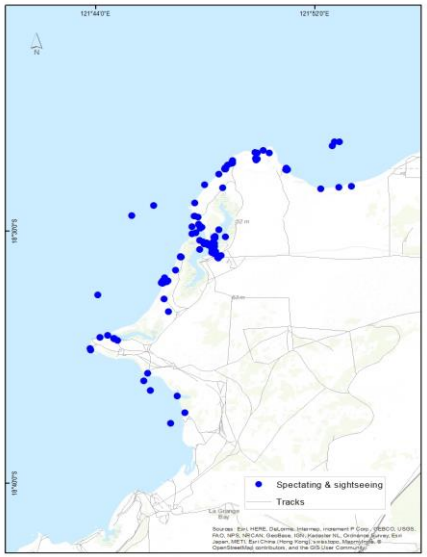
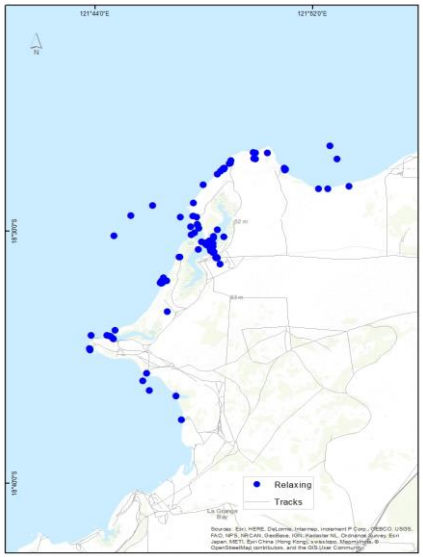
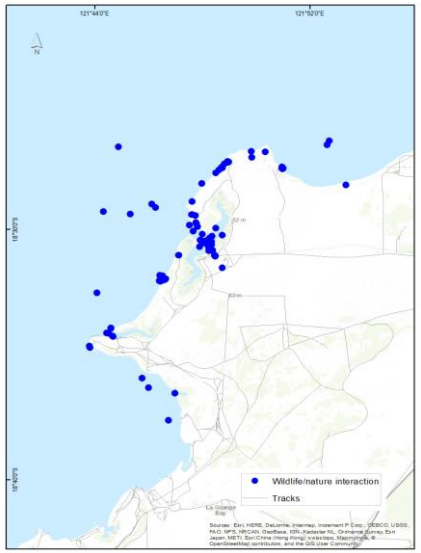
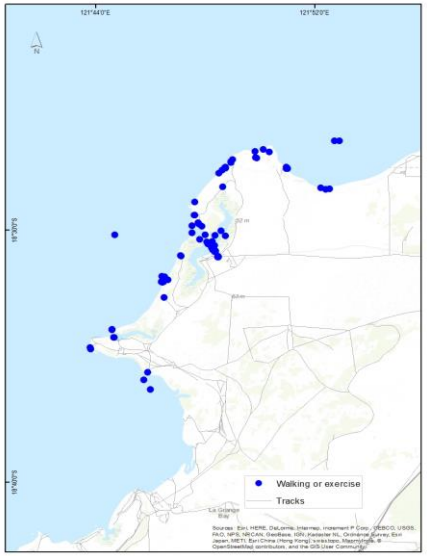
121°15'0"E
Camping
5
Kilometers

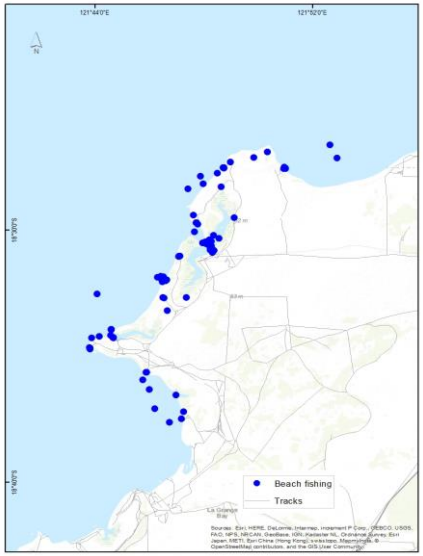
Appendix 4 – Activity mapping data

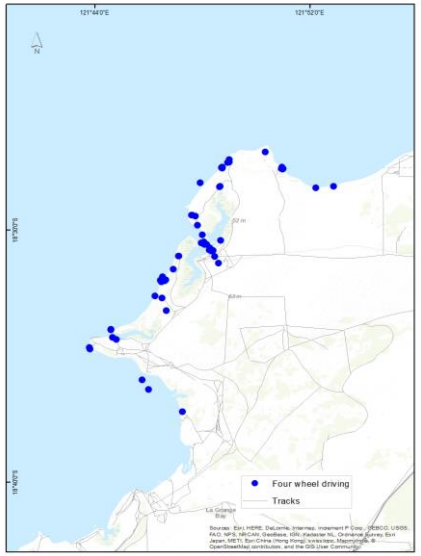


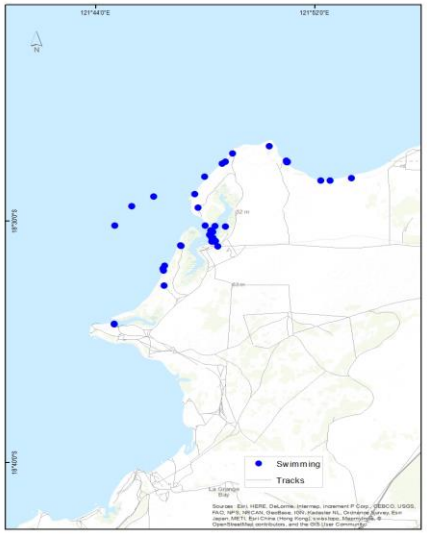


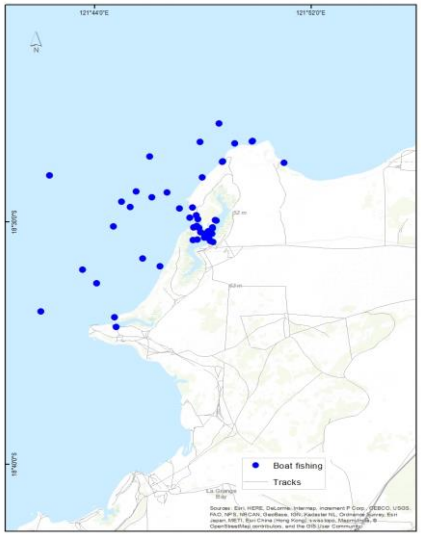


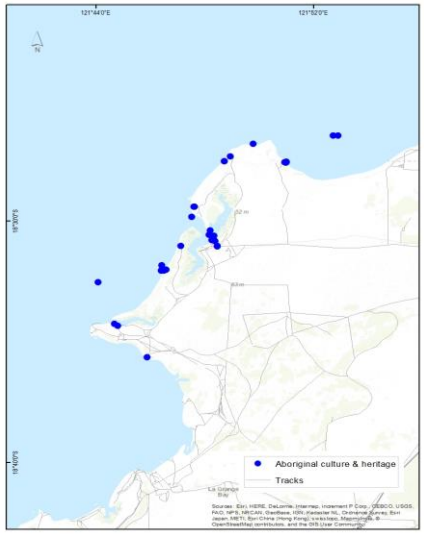


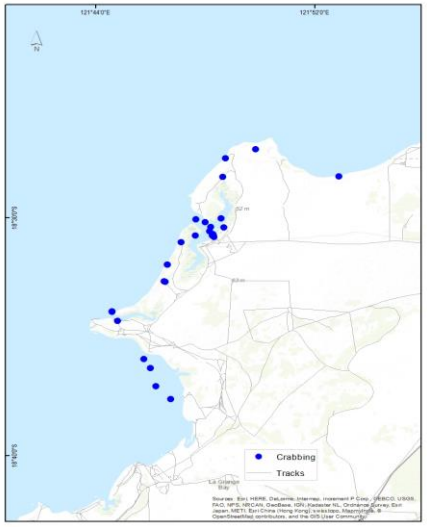


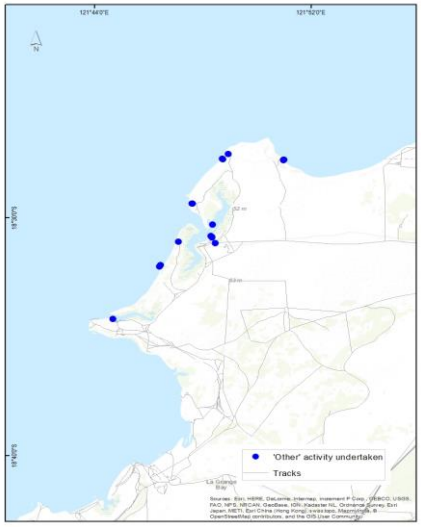


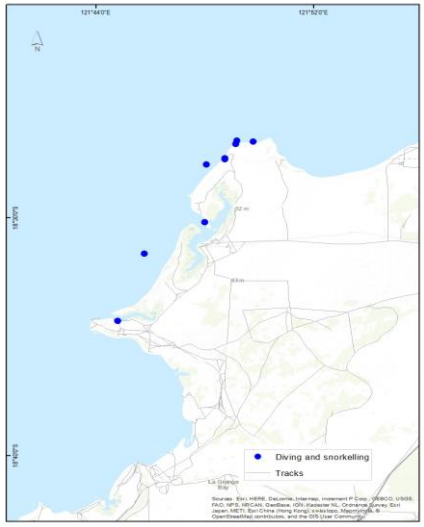

Swimming
Tracks


Boat fishing
Tracks

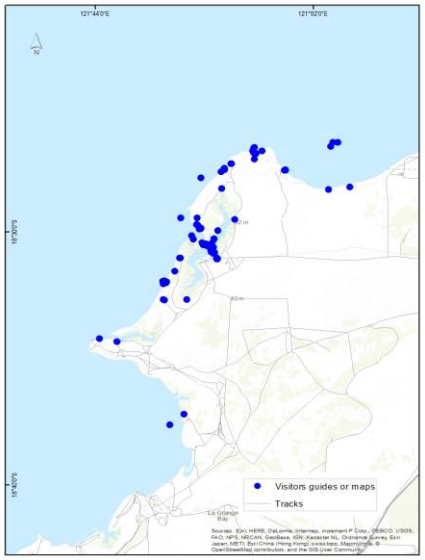

Aboriginal culture & heritage
Tracks

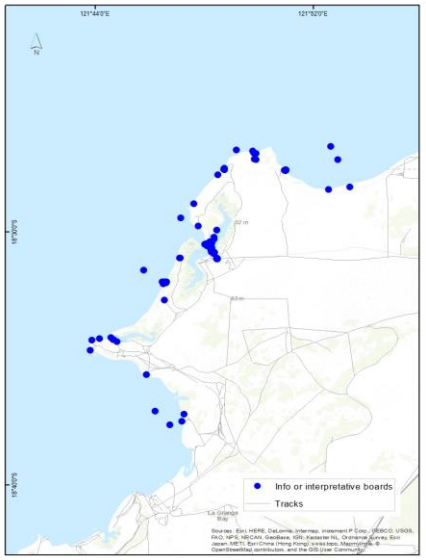

Crabbing
Tracks

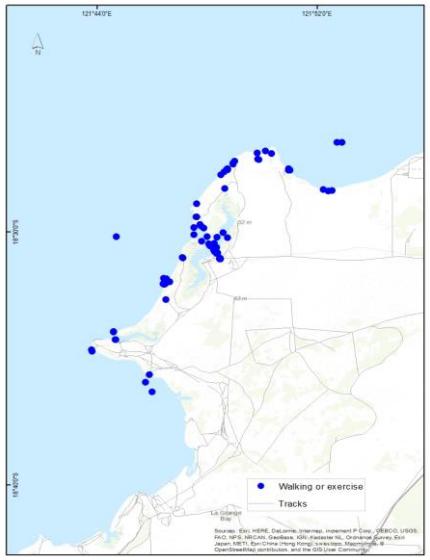

'Other' activity undertaken
Tracks

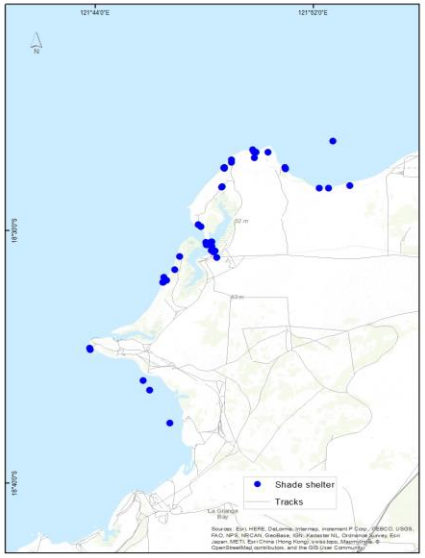

Diving and snorkelling
Tracks

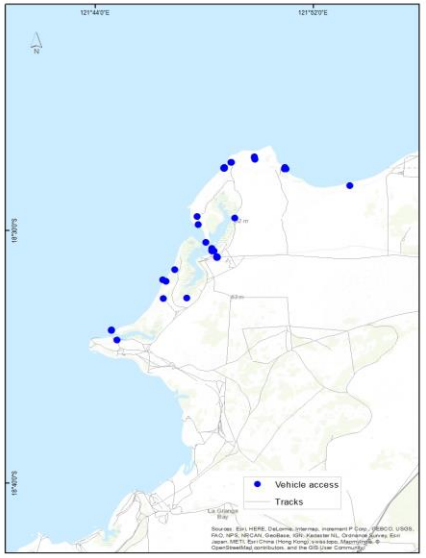
Appendix 5 - Desired improvements mapping data

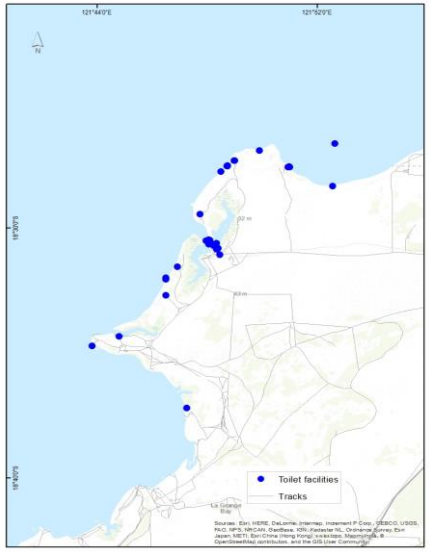


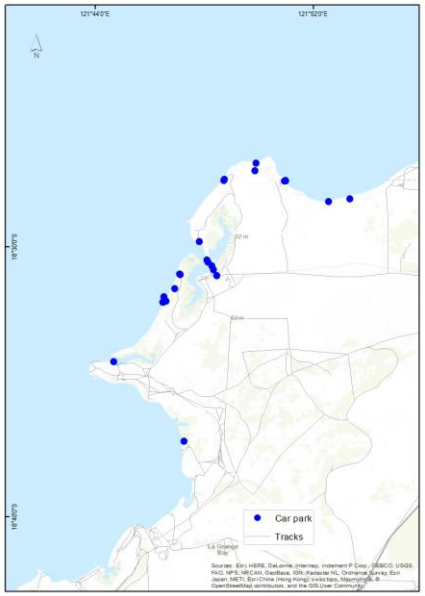


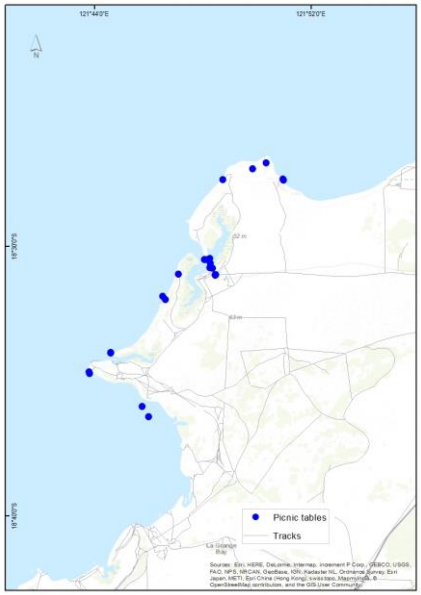









121°44'0"E
121°52'0"E
18°30'0"S
18°36'0"S
Car park
Tracks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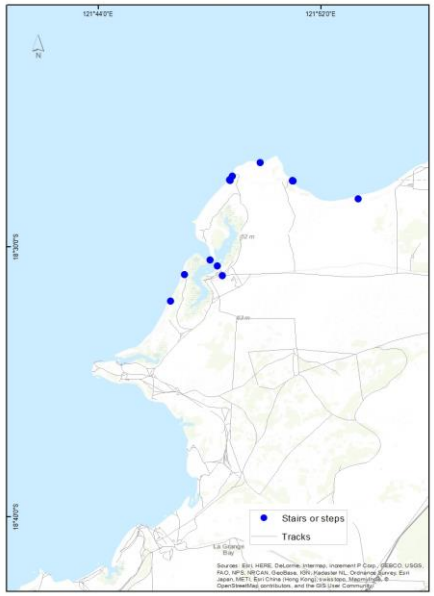
18°30'0"S
18°36'0"S
Picnic tables
Tracks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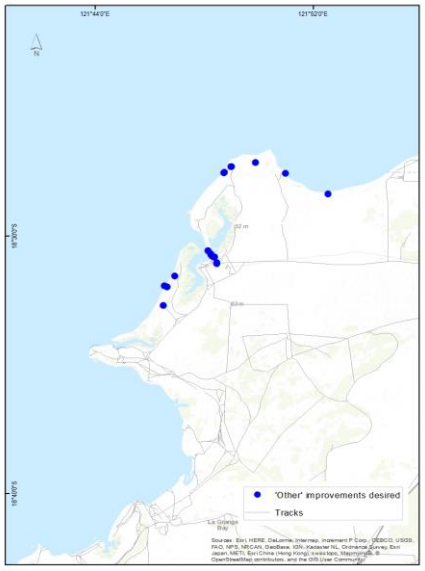
121°52'0"E
18°30'0"S
18°36'0"S
Stairs or steps
Tracks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121°52'0"E
18°30'0"S
18°36'0"S
'Other' improvements desired
Tracks

Appendix 6 - Research administration details

Research Type and Category

Type
Baseline – Quantifying the value, status, variability and trends

Category
Social

Objectives (*What is the project doing?)*
Research question and objectives

This technical report contains the fourth set of results from the 3-year social research project (*Socio-cultural values of the Kimberley coastline and marine environment*), reporting on the second part of the project: a web-based Public Participation GIS survey to validate and extend findings from previous project research.

The overarching aim of this 3-year research project is to document and analyse the social values and aspirations of people associated with the existing and proposed marine parks at Eighty Mile Beach, Roebuck Bay, Lalang-garram (Camden Sound) and North Kimberley and other coastal waters of the Kimberley between Eighty Mile Beach and the Northern Territory border.

This research aim is being pursued through the following research objectives. This report addresses the fourth one.

1. Describing and analysing how people value the Kimberley coastline and marine environment and what places are important to them, especially for Aboriginal people, through approximately 160 in-depth face-to-face interviews accompanied by participatory mapping in the Kimberley region, Perth and Darwin.
2. Undertaking a follow-up web-based Public Participation GIS (PPGIS) survey to extend and validate the results from Objective 1.
3. Undertaking comprehensive stated preference choice analyses. This will be achieved by including a series of questions designed to elicit respondents' preferences regarding future activities on the Kimberley coast and future management of this coastline and its waters in the web-based PPGIS survey detailed under Objective 2.
4. Undertaking a detailed analysis of the social values for up to two marine parks through extended consultation with Aboriginal Traditional Owners and others with a particular interest in the chosen marine park(s).

Management Questions *(Why?)*
List the management questions that were used to guide and frame the research question, It is expected that the final report will provide answers to these questions. Thus, note for each question where the research project will not fully answer the question, but will provide information towards answering it.

1. Stakeholder values research results will provide a baseline regarding values held today. They will help understand stakeholder responses to MPA proposals and inform how these responses are managed.
2. The activity, value and management preference mapping will assist in the development of management plans and identify assets of high social value/management importance that may warrant special management and protection.

Extracted from Revised Project Plan 2.1b (as of June 2014)

Key Stakeholders/End-users *(Who will use this?)*
List the individuals in as much detail as possible who will have a use for this study and whether this is through a decision-making capacity or operational role.

Key stakeholders/End users	Use – decision making	Use – operational
Karajarri Traditional Lands Association	X	X
WA DEC	X	X
WA Department of Fisheries	X	X
WA Department of Premier and Cabinet	X	
Aboriginal PBCs (inc Kimberley Land Council)	X	X

Extracted from Revised Project Plan 2.1b (as of June 2014)

Outputs (*What do they want?)*
List the outputs expected from the research, including the format in which these will be presented.

Year	Technical reports	Journal articles	Other
30 June 2014	Technical report (TR1): Social values and mapping – Kimberley coast	• Social values in marine environments	Information for Aboriginal PBCs, agency briefings
30 June 2015	Technical report (TR2) PP GIS for Kimberley coast	• Indigenous values of the Kimberley coast • Mapping social values for Kimberley coast • Tourism and awe: the Kimberley coast	Information for Aboriginal PBCs, agency briefings, conference papers
30 September 2015	Technical report (TR3): Stated preferences –Kimberley coast	• Social values & tourism • Social mapping using PP GIS	Information for Aboriginal PBCs, agency briefings
30 December 2015	Technical report (TR4): Traditional Owner values for a selected marine park	• Social values & tourism	Information for Aboriginal PBCs, agency briefings
31 December 2015	Final report (TR5)	• Spatially locating human values for MPAs • Stated preference research & MPAs	Information for Aboriginal PBCs, agency briefings, conference papers

Extracted from Revised Project Plan 2.1b (as of June 2014)

Links to other projects *(How will the science be integrated?)*
List the projects within the KMRP that will provide additional information in the reporting and interpretation of findings for this project. Also list projects that will be similarly informed by the outcomes of this project. Include information on how this project will interact with the linked projects to ensure information sharing.

Informed by outcomes	Approach to information sharing
1.2.2 Key biological indices required to understand and manage nesting sea turtles along the Kimberley coast	Invitations to key researchers to attend briefings (Tony Tucker, Scott Whiting)
1.5 Collating and integrating Indigenous coastal knowledge for marine conservation and management	Project has recently been refocused to centre around on-ground works with/for ranger groups
2.1.1 Human use patterns and impacts in the coastal waters of the western Kimberley	Regular exchange of information as CIs are co-located at Murdoch University (Moore & Beckley)
2.2.8 Knowledge integration and predicting biological and social response to climate change: MSE modelling	Regular (3-6 monthly) exchange of information with potential for use of our social values data in MSE modelling kept under review (contacts: Michael Hughes, Fabio Boschetti)

Synthesis reports that will require input from this project *(How will the science be integrated?)*
List the key KMRP synthesis reports that will require input from this project.

See row 5 above.