Before the Expert Fast-track Panel

FTAA-2511-1150

Under	the Fast-track Approvals Act 2024 (**FTAA**)
And	
In the Matter	of an application for approvals by **MCCALLUM BROTHERS LIMITED** for the Te Ākau Bream Bay Sand Extraction Project located at Te Ākau Bream Bay, Northland

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Evidence of Richard Owen Boyd on behalf of McCallum Brothers Limited in Response to Invited Comments

(Fish and Fisheries)

Dated 12 August 2026

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Introduction

1. My name is Richard Owen Boyd.

2. I am a retired fisheries scientist and consultant. I hold a BSc (Hons) in zoology from UBC in Canada and a MSc (1st Class Hons) in zoology from the University of Auckland.

3. I have 54 years' experience with my career including employment as a fisheries biologist for the federal government in Canada, employment as a fisheries management scientist with the (then) Ministry of Agriculture and Fisheries, Fisheries Management Division in New Zealand (now Ministry of Primary Industries, Fisheries New Zealand [**MPI/FNZ**]), and several decades as a fisheries consultant in New Zealand. My career included experience in a wide range of areas, including:

    a. management and research of commercial and recreational fisheries including the tāmure (snapper) fishery in the Hauraki Gulf, Bay of Plenty and Northland;

    b. policy development associated with those fisheries and the inshore fishery nationally;

    c. fisheries assessments associated with dredging at ports and disposal of dredged material, for proposed port developments, and sand extraction;

    d. projects on recreational fisheries;

    e. provision of expert evidence in relation to fisheries matters at consent hearings, in the District Court, Environment Court, and Waitangi Tribunal.

4. This evidence is provided as part of McCallum Brothers Limited's (**MBL**) response to invited persons, in particular Ngatiwai Trust Board and Te Patuharakeke Te Iwi Trust Board.

5. I prepared the following material lodged in support of MBL's application:

    a. Report titled Assessment of Fish and Fisheries Effects dated February 2025 included as Attachment 16 to the MBL Assessment of Environmental Effects.

Code of Conduct

6. Although this is not a hearing before the Environment Court, I confirm that:

    a. I have read and am familiar with the Environment Court's Code of Conduct for Expert Witnesses as specified in the Environment Court's Practice Note 2023 (**Code**); and

    b. The report referred to above authored by me:

        i. Is within my area of expertise (except where I state that I rely upon the technical reports of other expert witnesses provided in support of the application);

        ii. Have been prepared in accordance with the Code; and

        iii. I have not omitted to consider any material facts known to me that might alter or detract from the opinions expressed.

Scope of Evidence

7. My evidence responds to matters contained in the statement of evidence of Dr Darren Parsons on behalf of Ngatiwai Trust Board and Te Patuharakeke Te Iwi Trust Board provided in Appendix 5 of the comments from invited persons.

Responses

8. My responses are provided by reference to paragraph numbers in Dr Parsons evidence.

9. **Issues: Parsons 4.4 – 4.7. The utility of the trawl surveys has limits and caveats that need to be acknowledged. They do not provide strong evidence to support statements about relative differences in abundance between Te Ākau Bream Bay and other areas of Tīkapa Moana – Te Moananui-ā Toi (Hauraki Gulf).**

10. While there have been only two recent surveys, with a very small number of trawls in Te Ākau Bream Bay, in my opinion the recent surveys confirm that the historic spatial pattern of relative abundance of tāmure (snapper) in the various areas of the Tīkapa Moana – Te Moananui-ā Toi (Hauraki Gulf) remains substantially unchanged. I elaborate below.

11. My opinion relies on several things that the survey data shows. One is the overall pattern observed for tāmure (snapper) throughout Tīkapa Moana – Te Moananui-ā Toi (Hauraki Gulf). Highest abundance areas remain unchanged. I would not expect a small part of the population such as Te Ākau Bream Bay to show a different spatial pattern of abundance than the remainder of Tīkapa Moana – Te Moananui-ā Toi (Hauraki Gulf) due to its connectedness to this wider population. Dr Parsons acknowledges the connection through fish movement.

12. Tāmure (snapper) abundance data from the two recent research trawl surveys indicates that the results are consistent with the historical series. In a discussion of the results of both the 2019 and 2020 research trawl surveys, (Parsons et al. 2021, Parsons & Bian 2022) note that catches of snapper were predominantly from the inner to mid gulf, noting that has been a trend seen throughout the survey series. Examination of the occurrence of various species and relative catch rates of the various species in the two surveys also show a strong correspondence to the historical series. In my opinion this indicates a stable and largely unchanged demersal fish community. Overall, the spatial pattern of relative abundance of each of the other main species in Tīkapa Moana – Te Moananui-ā Toi (Hauraki Gulf) found in the two recent surveys also remains broadly the same as the historical surveys. My conclusion is that the two recent surveys results can be reliably interpreted as confirming the spatial distribution of tāmure (snapper) is largely the same as

the historical pattern throughout Tīkapa Moana – Te Moananui-ā Toi (Hauraki Gulf), at least in spring.

13. I agree that because the surveys took place in spring, they are not necessarily representative of the whole year due to seasonal movement that occurs at the end of summer when snapper disperse again into the wider Tīkapa Moana – Te Moananui-ā Toi (Hauraki Gulf). However, I point out that the spatial distribution of catch and effort by commercial fishing, which occurs throughout the year, is broadly the same as that shown in the research trawl surveys.

14. Overall, I interpret the results of the recent surveys as valuable and informative, confirming the spatial distribution of tāmure (snapper) has not changed from the historical series. In my opinion it is appropriate to use as part of the basis for reaching the conclusions in my Report (Attachment 16 to the MBL Assessment of Environmental Effects.

15. **Paragraphs 4.9 – 4.12 of Dr Parsons's statement: Issues, importance of Bream Bay for commercial fin-fishery, old data, the fishery is dynamic, shifting spatial patterns.**

16. My response is that I agree the commercial fishery is dynamic and that a number of factors influence fishing patterns. Based on my experience working on the Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf) fishery from 1978 to 1989, there has always been a consistent overall pattern of commercial fishing throughout the wider Hauraki Gulf, including Te Ākau Bream Bay. This is because within the legal framework that restricts where some or all commercial fishing methods are allowed to operate, the primary drivers of fishing patterns are primarily driven by the location of target species and the potential for economic return, as commercial fishing is fundamentally a profit-driven activity.

17. Regulations affecting where commercial fishers may operate change from time to time as they have for more than a century. Market demand changes, and the seafood industry adapts, continuing to fish where it is profitable. For

example, when an area is closed to commercial bottom trawling, bottom longlining may replace the catch in that area formerly taken by trawlers. Until the 1980s, there were locations within Auckland Harbour still open to some commercial fishing, including Panmure Basin and Shoal Bay, regularly fished for flounders by small dayboat set net fishers. In that example, once the areas were closed, the set net vessels owners moved their fishing effort to other areas.

18. All the factors Dr Parsons list result in commercial decisions being made by the seafood industry. This has occurred in Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf) including Te Ākau Bream Bay since the modern commercial fishery developed in the early 20th century. Paul (2014), cited in my Report, documents the fishery's history up to 2006.

19. Some of the most significant recent changes in the history of the Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf) fishery occurred during the period 1977 to 1986. These included changes in market demand for certain tāmure (snapper) products prompting longline vessels to target areas where tāmure (snapper) were of the right size and quality to achieve the best price. A snapper catch quota was introduced in 1977, followed by the introduction of a limited licence regime in 1983 resulting in considerable adjustments within the industry as some vessels did not receive licences. This new licencing regime was then totally replaced shortly after in 1986 with the introduction of the Quota Management System (QMS) nationally. Throughout this period there were also ongoing amendments to fishing method restrictions and closed areas. These changes resulted in major structural changes at all levels within the seafood industry. However, spatial fishing patterns remained broadly unchanged because the underlying drivers remained the same, commercial vessels targeting where the fish are and whether it is profitable, within changing legal constraints of where they may operate.

20. I accept that the commercial fishery spatial information provided in my Report is dated. Dr Parsons suggests that more recent information could be obtained for the whole of Te Ākau Bream Bay. What I understand he means by the whole of Te Ākau Bream Bay is the total commercial catch of all vessels in the

entire area. I agree this more recent information might be available provided MPI accept that this spatial information would not compromise commercial confidentiality under the provisions of the Official Information Act (OIA). That acceptance is not guaranteed: my experience spanning more than 30 years in making such OIA requests is that MPI have an extremely cautious approach to releasing catch and effort data for any defined area. However, if it was provided, in my opinion it would provide little or no understanding of the effects of sand extraction within the proposed site itself on commercial fishing. For example, to understand the degree to which the sand extraction site may or may not affect the operations of bottom trawlers, longliners and set netters, spatial catch and effort data is needed within various parts of Te Ākau Bream Bay. The data presented in Figures 14-19 in my Report clearly show that there are specific areas of most importance to each method. That is the value of that information, even if dated. In my opinion, these local patterns are unlikely to have materially changed because they include the preferred habitat of tāmure (snapper) as well as environmental and physical factors best suited to the operation of each method. Those do not change over time. For example, longline vessels mainly operate along the western side of Te Ākau Bream Bay where tāmure (snapper) are abundant, bottom trawlers do not operate, and they can shelter from prevailing westerlies as shown in my Figures.

21. I acknowledge the error Dr Parsons identifies at the last sentence of his paragraph 4.11. I am and have been aware of the requirement for trawlers to report both the start and end positions of each individual trawl since about 2020.

22. In my opinion the data I have used reflects where each fishing method still predominantly occurs and the areas and spatial pattern where much of the commercial catch is taken by each fishing method within the constraints of where it is legally allowed. The recent research trawl surveys discussed earlier in this statement do not point to any recent changes in the spatial pattern of tāmure (snapper) abundance in Tīkapa Moana – Te Moananui-a-Toi (Hauraki

Gulf). The drivers of where commercial fishing mainly occurs continues to be where the fish are found and profitability.

23. I expect there will continue to be new developments influencing spatial patterns of commercial fishing from time to time in the next 35 years. For example, the recent adoption of a range of new marine protections in Hauraki Gulf / Tīkapa Moana / Te Moananui ā Toi Marine Park closed some areas to commercial fishing and some to bottom contact fishing methods. The latter may open opportunities to longline vessels. I also note that the recreational fishery now harvests more than 50% of the tāmure (snapper) catch taken from Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf)[1]. I anticipate the growing population of the greater Auckland area as well as new technology will result in ongoing growth of recreational catches along with public pressure to restrict or close more areas to commercial fishing and/or commercial fishing bottom contact methods.

24. Overall, Dr Parsons suggests I underestimate the importance of the area for commercial fishing and therefore I underestimate the potential adverse effects of the proposed sand extraction on commercial fishing. I agree Te Ākau Bream Bay is important to commercial fishing. However, the demersal habitat occupied by tāmure (snapper) and the other highly mobile demersal fishes found there extends throughout Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf) and the highly mobile fish populations are distributed over this entire area, as is the commercial fishery. The main spawning areas for tāmure (snapper) occur elsewhere in Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf), it is not an area where snapper aggregate for spawning and are vulnerable as they are in the inner Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf) where they do aggregate in spring and summer. While dated, the catch and effort information in Figures 14-19 of my report shows the sand extraction area does not occur in the most commercially fished areas of Te Ākau Bream Bay, and in my opinion, as explained above, this pattern is unlikely to have changed because it reflects key influences that affect where vessels

[1] Fisheries New Zealand (2025). Fisheries Assessment Plenary, May 2025: stock assessments and stock status. Compiled by the Fisheries Science Team, Fisheries New Zealand, Wellington, New Zealand. 1941 p.

operate. My assessment of effects takes all these matters into account and in my opinion does not underestimate potential adverse effects.

25. **Dr Parsons' paragraph 4.13 – Issue: Te Ākau Bream Bay is not a low effort or catch area and that it is an important longlining area.**

26. I agree. My Report does not say that it was a low catch area. Figures 16 and 17 of my Report show the distribution of longline effort and catch. Both longline effort and catch occur throughout Te Ākau Bream Bay but are highest close to shore and generally highest inshore of the bottom trawl limit line and the sand extraction area. I agree it is an important longline fishing area and comment further on that below.

27. **Dr Parsons' paragraph 4.13 – Issue: importance of Te Ākau Bream Bay to Moana New Zealand (MNZ), that it provides shelter to vessels, information on catches of various species over the last five years.**

28. My response is that I note that the factors influencing the importance of Te Ākau Bream Bay to MNZ are the same as I identified earlier, balancing availability and economic returns.

29. The inshore western coast of Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf) stretching from Te Ākau Bream Bay south to East Coast Bays in Auckland offers shelter to commercial longline vessels from prevailing westerly winds – this pattern is clearly evident in the distribution of fishing effort and catch in Figures 16 and 17 of my Report. As part of my familiarisation with the Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf) commercial fishery from 1978 to 1989, I went on commercial vessel fishing vessel trips of all commercial fishing methods to observe their operations and amongst other things to understand the factors that influence where they choose to fish. Longline vessel owners emphasised the importance of the shelter this western coastline offered them, including Te Ākau Bream Bay.

30. Dr Parsons provides information that between 3.8 and 24.3 t of MNZ's tāmure (snapper) catch came from Te Ākau Bream Bay in the last 5 years. This is a modest proportion of the Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf)

tāmure (snapper) harvest. Total estimated average commercial tāmure (snapper) catch in the whole of the Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf) from 2020 to 2022 (the latest year available) was about 2,100 t, of which about 1,100 t was taken by bottom longline[2].

31. **Dr Parsons' paragraph 4.14 – Issue: No mention of the mōhimohi (pilchard) fishery.**

32. My response is to address the information gap is to provide information from FNZ 2025 and from my personal knowledge and experience.

33. Pilchards are a small (10-20 cm) productive schooling pelagic planktivorous fish. In Aotearoa New Zealand they tend to be found in gulfs, bays, and harbours although they also extend out to the inner shelf from time to time.

34. As a small pelagic fish they are highly exposed to predators from above and below. Predators include predatory fishes, diving seabirds and marine mammals. The schooling behaviour of pilchards, particularly when they form small dense schools, reduces the risk of predation to an individual fish when it masses with others. This is a common behaviour of many small pelagics that use the same strategy. Movement of schools is both food and predator driven. As mōhimohi (pilchard) are particularly at risk from predators, they respond quickly to unusual or sudden changes in the environment around them, including taking flight from the activity and noise of vessels and nets. My personal experience in purse seining for small pelagic fishes for research and on commercial fishing vessels is that it requires skill and experience to find moving schools and avoid their escape when attempting to catch them.

35. Mōhimohi (pilchards) exhibit diel vertical migrations, typically forming schools in mid-water to move and avoid predators, or close to the seabed when they are not feeding during the day, and dispersing into the water column at dusk and dawn to feed. They then re-aggregate during the day.

[2] Fisheries New Zealand (2025). Fisheries Assessment Plenary, May 2025: stock assessments and stock status. Compiled by the Fisheries Science Team, Fisheries New Zealand, Wellington, New Zealand. 1941 p.

36. The schooling behaviour in mid water means that purse-seining is the only effective way of harvesting commercial quantities. It is a low value fish with little demand for human consumption; the value is higher when used for bait. The commercial fishery in Te Ākau Bream Bay and adjacent coast is primarily to supply the bait market for commercial and recreational fisheries.

37. Recreational fishers rarely target mōhimohi (pilchard), when they do it is for use as bait.

38. It is my understanding that the purse seine vessel operating from Whangarei is the only vessel currently targeting mōhimohi (pilchard) in Aotearoa New Zealand. In the 10 year period to 2023-2024, annual landings for the PIL1 fishstock (North Cape to Cape Runaway) averaged about 190 t, with some of that being from the bycatch of other vessels.

39. **My assessment of effects on mōhimohi (pilchard)**

40. As a schooling planktivorous fish mostly found in the water column, it is my opinion, based on the negligible predicted water quality effects of sand extraction[3], that sand extraction will have a negligible effect on the planktonic food supply of mōhimohi (pilchard). I also refer to the Assessment on Food-web effects, Attachment 12 – Assessment of Benthic Ecology Effects (Appendix C) - "Small pelagic fish, which form the primary prey based for seabirds (including tara iti) and marine mammals, are mobile and not dependent on benthic production within the extraction area. Accordingly, the magnitude of effects on marine-web processes is assessed as Negligible within the sand extraction area and Negligible in the wider Te Ākau Bream Bay. (Exec. Summary, Page ii)".

41. The assessment of noise levels[4] indicates that small behavioural responses are unlikely to occur beyond 205m although this was unable to be determined accurately. My experience in observing the behaviour of small pelagic fishes

[3] Attachment 9 to MBL Assessment of Environmental Effects

[4] Attachment 11 to MBL Assessment of Environmental Effects

when I was present on both research and commercial purse seine vessels, is consistent with this estimate.

42. In my opinion, mōhimohi (pilchard) in the vicinity of active sand extraction will avoid *William Fraser* within an area 200-250 m around it (including the draghead) as it moves. Sand extraction will occur over a limited time and not every day.
43. Taking the above considerations into account, along with my personal observations and experience with small pelagic fishes, any effect on mōhimohi (pilchard) in Te Ākau Bream Bay, or the ability of the local purse seine vessel to harvest them will be negligible.

44. **Dr Parsons' paragraphs 4.15 – 4.18 Issue: Importance of Te Ākau Bream Bay to the former scallop fishery, recent survey results, future recovery**.

45. Dr Parsons indicates that my Report does not provide a full description of the Northland (SCA1) fishery and the Te Ākau Bream Bay commercial scallop fishery – thus lacking context and the full picture. In response, I accept his observation, and he provides an accurate and more complete summary of the overall Northland fishery and the Te Ākau Bream Bay scallop fishery contribution to it. I agree that the Northland commercial dredge scallop fishery was a regionally important fishery, involving local vessels and processor with Te Ākau Bream Bay making a significant contribution to the total Northland catch some years, especially prior to 2000.

46. While regionally important, it was a small and intermittent fishery.

47. I refer to Figure 1 (attached) taken from the RFI 1 response by Simon West that shows the boundaries of the Te Ākau Bream Bay scallop survey strata for the fishery independent dredge surveys undertaken by FNZ in 2007 and 2021 and the cameral based survey in 2024 to estimate estimated absolute biomass of scallops >100mm in key strata. The FNZ dredge survey strata boundaries encompass the areas of Te Ākau Bream Bay that are known to have historically supported commercially viable dredging for scallops. These are not all areas where commercial vessels have dredged in the past as I am aware that

extensive exploratory dredging by commercial fishers occurred throughout much of Te Ākau Bream Bay over the years.

48. The scallop survey strata used for the FNZ surveys capture the extent of the known commercial scallop fisheries in Te Ākau Bream Bay. Williams et al. 2024[5] labels stratum 8 as Bream_Bay_medium with an area of 62.55 km^2. Stratum 8.1 is labelled Bream_Bay_high and is 19.77 km^2. Most of these two strata survey areas lie in depths of less than 20m. The sand extraction area extends over approximately 7.7 km^2 (12%) of stratum 8 and 9% of the combined total survey strata.

49. Dr Parsons notes that Te Ākau Bream Bay is a location where a scallop recovery would be expected. I agree but add that scallop beds with fishery potential are not likely to occur everywhere. Future recovery supporting a commercial scallop fishery will almost certainly be based on spatially defined beds of commercial densities in specific areas. While scallops are present throughout Te Ākau Bream Bay, most areas have very low scallop density that have no commercial potential and make a minimal contribution to reproductive output. In my opinion, the spatial distribution of the historical scallop dredge fishery as defined by strata 8 and 8.1 in Figure 1 is the area where any future recovery with commercial potential is most likely to occur.

50. **Dr Parsons' paragraphs 4.19 Issue: Figure 20 in my Report (a heatmap of recreational fishing activity) does not show the extraction area, making it difficult to understand the spatial overlap between recreational fishing and sand extraction activities.**

51. In response, I have prepared Figure 2 (attached) which shows the extraction area and control areas overlaid on the heatmap. It is the same heatmap with the additional information. As part of this statement, I also provide new information showing marine activity spatial patterns and temporal data that

[5] Williams JR, Bian R, Buckthought D, Evans O, Hughes R, Jordan L, Middleton CJ, Parkinson D, Taylor R (2024) Dive and dredge surveys of scallops in SCA 1 and SCA CS, 2021. New Zealand Fisheries Assessment Report 2024/36. 64 p.

support the understanding of recreational vessel activity in the whole of Te Ākau Bream Bay and within the sand extraction area.

52. Figure 2 clarifies what I say in my Report in relation to recreational fishing activity in Te Ākau Bream Bay. The aerial-access survey shows recreational fishing vessels were highest south of Te Whara (Bream Head) and generally lower (in fact, more than an order of magnitude lower) throughout the extraction area.

53. In my opinion this pattern of recreational fishing occurs because of considerations by recreational fishers that include where the fish being targeted may be, the cost of fuel, the travel time from launching points, and small boat safety. Figure 2 shows those influences with the higher activity occurring in areas that are not far from ports/harbours, provide shelter from northerly and westerly winds, and where there is seabed structure. The sand extraction area has none of those attributes.

54. I attach Appendix A with the new information which includes a technical note describing the information, heatmaps showing spatial patterns, temporal information, and the proportion of activity in Te Ākau Bream Bay occurring within the sand extraction and within the control areas.

55. The new information in Appendix A to this statement provides detailed spatial activity patterns and temporal information from anonymised mobile device data collected through smart phone and device apps. The dataset includes time-stamped latitude and longitude observations that allow activity to be summarised spatially and temporally.

56. The Technical Note in Appendix A indicates the analysis was limited to cleaned records between 04:00 and 22:00 for the period 1 January 2023 to 30 April 2026. It represents unique devices with the outputs cleaned and normalised to support comparisons across time periods and spatial areas. A unique device should be interpreted as a proxy for observed activity, not a count of vessels, fishing trips or individual people. The heatmaps that follow the Technical Report show normalised device activity, allowing relative concentrations of

activity to be compared across the study area, including on weekdays and on weekend/public holidays.

57. The Technical Note sets out important limitations or caveats that I have carried through in my use of the mobile device information in this statement. Briefly they include the following:

    a. Not all mobile devices are captured, some have location services disabled, and some devices are not included in the provider data.

    b. The mobile device activity does not identify the purpose of a vessel's/occupants' trip, in particular whether or not the vessel was recreational fishing.

    c. The heatmaps should not be interpreted as counts of vessels.

58. I assume in using this information that most of it comes from mobile devices on board recreational vessels (including fishing and non-fishing) and only a small part of it comes from commercial vessels. This assumption comes from my general knowledge and familiarity with the inshore waters along this coast and Te Ākau Bream Bay.

59. Key results in Appendix A include the following:

    a. Within the Te Ākau Bream Bay boundary shown the Technical Report:

        i. More than 99% of all observed activity occurred outside the sand extraction area;

        ii. On all days, 0.38% of all activity occurred within the sand extraction area (lower at 0.34% on weekdays, higher at 0.44% on weekends and public holidays);

        iii. On all days, 0.25% of activity took place within the control areas, (lower at 0.18% on weekdays, higher at 0.35% on weekends and public holidays);

iv. Weekdays accounted for 40% of all activity and weekends 60% of all activity.

60. The mobile device activity patterns, including the heatmaps of spatial activity, weekday/weekend and public holiday differences, time of day, and seasonal patterns in Appendix A all show close alignment with recreational fishing information from FNZ recreational fishing surveys. In my opinion, this indicates many of the devices from which activity data was captured are held by people involved in recreational fishing. However, the spatial activity heatmap also includes many general recreational vessels that are not fishing as these other recreational vessels are subject to the same weather, cost, time and safety considerations as recreational fishing vessels that affect where they go.

61. There are some clear differences between the aerial-access recreational fishing heatmap (Figure 2) and the mobile device heatmaps in Appendix A. For example, the mobile device heatmap indicates there is a corridor of activity to and from Te Ākau Bream Bay in the direction of Marotere (Chicken) Islands. This is not obvious in the aerial-access survey heatmap (Figure 2) which was a count taken of stationary recreational fishing vessels around the middle of the day. The mobile device spatial data incorporates activity of all vessels from 04:00 to 22:00 hours each day. This corridor of activity probably represents vessels travelling to the islands and return traffic from Whangarei Harbour rather than recreational activities that are taking place from stationary vessels. Therefore, the spatial heatmap from mobile devices needs to be interpreted with this understanding and with some caution in relation to describing spatial patterns of recreational fishing.

62. In my opinion, the primary value of the mobile device activity information is that it shows very low vessel activity in the sand extraction and in the control areas, regardless of the purpose of each vessel's presence. It also provides metrics (presented above) on the relative level of activity in these areas relative to the whole of Te Ākau Bream Bay. The metrics do need to be treated with appropriate caution in relation to understanding recreational fishing patterns.

63. It is particularly valuable that the mobile device activity information presented in Appendix A captures slightly more than three years of information. This addresses potential annual variability in recreational fishing activity due to the strong influence of weather patterns that affect how much recreational activity (including fishing) takes place from small boats each year and at particular times of the year, including the peak summer season and the Christmas/New Year holiday period.

64. I also observe that the mobile device activity spatial information does not indicate any 'hotspots' for recreation of any type occurs within the sand extraction area. Although weather, cost and distance are factors influencing where most recreational fishing is concentrated, it is my experience that does not deter recreational fishers targeting locations where catch rates are high in spite of weather, distance or other factors. If the fishing at a particular location is better than elsewhere, it will definitely be targeted irrespective of factors that make it more difficult than other areas. Such locations invariably become common knowledge and modern satellite navigation means they are easily pinpointed. If they exist within the sand extraction area, I am certain that the mobile device data would indicate their presence.

65. In my opinion, and with some caution due to the caveats associated with this data, the very low mobile device activity in the sand extraction area clearly shows that the sand extraction area appears to have a very low use by recreational fishers.

66. Overall, all the available information supports my conclusion that the effect of the sand extraction on recreational fishing in Te Ākau Bream Bay will be negligible.

67. **Dr Parsons' paragraphs 4.19 Issue: 50% of daily recreational fishing occurs in the afternoon when sand extraction will be occurring.**

68. My response in relation to time of day is to refer to the operating times and days of sand extraction and provide information on the temporal patterns of recreational fishing.

69. Styles Group has generated a plot of 'excess noise' generated by non-AIS vessels assumed to be recreational recorded by the hydrophone near Waipu[6]. I attach Figure 3 with the plot. The pattern is consistent with Parson's evidence with a peak late morning and a long tail into the afternoon and evening, especially in summer. It is also consistent with the hourly pattern in Appendix A although the mobile device activity pattern peaks slightly later at 13:00.

70. Parsons' comment does not mention the significant difference in recreational fishing effort between weekends and weekdays.

71. The operational windows for *William Fraser* have recently been updated in Condition 29, as follows:

> Sand extraction must only occur between the hours of:
>
> a. 1200 to 1800 during the months of April to September (inclusive); or
> b. 1200 to 2000 during the months of October to March (inclusive).
>
> A sand extraction event must not exceed 3½ hours from the time sand extraction commences. If there is a stoppage during the sand extraction, this period of time shall not be considered as part of the permitted 3½ hours sand extraction period.
>
> No sand extraction is to occur from the 23rd of December to the 6th of January (inclusive) or on Waitangi Day, Good Friday, Easter Monday, Anzac Day, the Sovereign's birthday, Te Rā Aro ki a Matariki/Matariki Observance Day, and Labour Day. If Waitangi Day or Anzac Day falls on a Saturday or a Sunday then no sand extraction is to occur on the following Monday.

72. In my opinion, and consistent with my experience in undertaking recreational fishing surveys, recreational fishing effort is higher on weekends and public holidays and lower during the working week. This is not a surprising pattern for any recreational activity. The aerial recreational fishing surveys

[6] Styles Group Plot. Noise from individual passbys of boats (the CPA timestamp is when they were closest to the hydrophone during its passby). The 'excess noise' is based on Hendricks et al. 2025. The plot can serve as a proxy for vessel activity.

undertaken for FNZ recognise this[7] and incorporate the weekday/weekend and public holiday differences in the aerial-access survey design.

73. The distribution of daily digital camera-based counts of the number of boats returning to the club boat ramp at Parua Bay shows that midweek recreational fishing boat activity is less than half that on weekends and public holidays[8]. The results of the mobile device activity patterns in Appendix A confirms that weekday mobile device activity in Te Ākau Bream Bay is lower (40% of all activity) compared to weekends and public holidays (60%).

74. As sand extraction will only occur for a 3 ½ hour period after 12:00 pm, and does not occur every day, potential interaction between recreational fishing and sand extraction is very limited. The recreational fishing survey heatmap (Figure 2), supported by the mobile device spatial activity analysis heatmaps and hourly activity information in Appendix A provide further evidence that there will be very limited potential interaction between recreational fishing and sand extraction. This reinforces my conclusion that there will be a negligible effect of sand extraction on recreational fishing in Te Ākau Bream Bay

75. **Dr Parsons' paragraphs 5.1 – 5.4. Issue: changes in habitat, avoidance and direct mortality, habitat quality, localised sediment.**

76. I refer to West's s53 responses where he presents results from the dedicated post-sand extraction recovery study at Pakiri[9]. The results of that study indicate that sediment characteristics will reach control conditions there in approximately two years and that benthic communities are expected to recover in 1 – 3 years. This suggests that the recovered habitat there has regained the main characteristics that support a biological community, and potentially suitable for the settlement of scallop spat. In my opinion, the Pakiri study indicates that the habitat in the Te Ākau Bream Bay sand extraction area

[7] Hartill B, Rush N, Armiger H, Bian R, (2019. Aerial-access recreational harvest estimates for tāmure (snapper), kahawai, red gurnard, tarakihi and trevally in FMA 1 in 2017-18. New Zealand Fisheries Assessment Report 2019/23. 39p.

[8] B Hartill, R Bian (2020) Comparison of recreational harvest estimates provided by the National Panel Survey and aerial-access survey in 2017–18. New Zealand Fisheries Assessment Report 2020/16. 17p.

[9] Evidence of Simon Andrew West on behalf of McCallum Brothers Limited in Response to Section 53 feedback comments

will recover progressively after each sand extraction event and after the expiry of the consent in 35 years, providing a biologically amenable site for any future scallop settlement.

77. I agree there is no empirical evidence to support that scallops will be able to avoid the suction head. Where scallops occur at very low densities (such as found in the benthic studies in the sand extraction area), they make no reproductive contribution to the wider population. Mortality of these scallops is of no consequence to the future recovery or maintenance of the scallop population in Te Ākau Bream Bay. Where they occur in higher densities (i.e., a scallop bed with densities capable of supporting a commercial fishery) they will be avoided by closing cells to extraction as set out in Attachment 29 – Environmental Monitoring Management Plan (EMMP).

78. **Dr Parsons' paragraphs 5.9 – 5.14. Issue**: **availability of benthic fauna as food for fishes, no estimate of annual loss of productivity, context considering signs of food limitations.**

79. To my knowledge there is no stomach contents biomass information that allows the annual food consumption of benthic fauna from the seabed by tāmure (snapper) or other demersal fishes to be reliably estimated. There is insufficient information to estimate the numbers of tāmure (snapper) and other mobile demersal species that feed in the sand extraction area, and what proportion of their annual nutritional requirements come from the area. There is no information on the annual production of the benthic biomass from re-establishment through natural processes following ongoing and repeated grazing by demersal fishes.

80. We do know the area that will be impacted annually by sand extraction. At his paragraph 5.10, Dr Parsons suggests the annual loss of benthic biomass could be estimated by combining estimated mortality rates of benthic fauna and multiplying that by the annual area where extraction will occur.

81. My response is to adopt his suggested calculation, by assuming all benthic fauna biomass in the annually extracted area is required as food for fishes.

In other words, adopt 100% mortality of the biomass in the extracted area. This does not require sampling fish, and it does not require measuring biomass consumed or estimating survival and re-establishment of benthic fauna.

82. At the initial extraction rate of 150,000 tonnes of sand per annum, we know that 22% of the sand extraction area will be impacted each year.

83. The worst-case situation is a 100% loss of annual benthic biomass (benthic fauna) as food for fishes in the 22% of the area where sand extraction occurs. We know that re-establishment is predicted to occur, but I will assume that in this worst-case example, it will not.

84. For the initial volume of sand extraction, this provides an estimate of an ongoing annual total loss of the benthic fauna biomass within 22% of the sand extraction area of 15.4 km^2, or 3.38 km^2. This estimate does not rely on predicted survival from the drag head pass and re-establishment of benthic fauna discharged from the moon pool.

85. While this loss will occur in a small part of Te Ākau Bream Bay, the loss is to the highly mobile population of tāmure (snapper) of Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf). Te Ākau Bream Bay does not have an isolated or separate population; the tāmure (snapper) that are found there are part of this wider mobile fish population. Through ongoing emigration and immigration, the effect will be dispersed throughout the population and the wider area it occupies. The stock assessment undertaken by FNZ[10] considers tāmure (snapper) found in the Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf) either as a separate substock, or as a combined Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf)/Bay of Plenty substock due to the movement between these two areas.

86. In my opinion, the abundance of tāmure (snapper) in Te Ākau Bream Bay is substantially determined by the population of which it forms a part. This is

[10] Fisheries New Zealand (2025). Fisheries Assessment Plenary, May 2025: stock assessments and stock status. Compiled by the Fisheries Science Team, Fisheries New Zealand, Wellington, New Zealand. 1941 p.

the population in the whole of Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf). When the lost benthic biomass is considered in the light of the known information on the spatial distribution of the population, the effect on the food supply is extremely small. The 3.38 km^2 area where biomass would be lost annually during the initial phase of sand extraction would be about 0.1% of the total benthic habitat (3500-4000 km^2) of Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf).

87. Ongoing monitoring of benthic community recovery will be occurring in the sand extraction area before the annual volume of extraction can be lifted to 250,000 m^3 per annum. At this higher extraction level, the annual dredging footprint would be larger at about 5.63 km^2 annually, resulting in a loss of about 0.16% of the annual benthic biomass potentially available to the population from the total benthic habitat (3500-4000 km^2) of Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf).

88. Neither of the above losses take into account the predicted ongoing progressive re-establishment of benthic fauna in the area directly affected by sand extraction, or the survival of organisms from the drag head, or any re-establishment of benthic fauna discharged from the moon pool.

89. Dr Parsons points out that there is evidence that tāmure (snapper) in the Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf) are food limited to some extent and that sand extraction would exacerbate nutritional limitation with a flow on effect to fisheries productivity. He also refers to nutritionally deprived milky fleshed tāmure (snapper). While most reports of Milky White Flesh Syndrome (MWFS) came from the inner Tīkapa Moana – Te Moananui-a-Toi (Hauraki Gulf), several were reported from Te Ākau Bream Bay in summer by recreational fishers, but none in winter. A report on the distribution and cause of MWFS in 2023 concluded that it was most likely caused by a combination of factors[11]. A more recent study[12] found that MWFS may result from the

[11] Johnson KS, Gadd J, Bian R, Noll B, Pinkerton MH, Taylor R, Madden B, Parsons DM. (2024). Distribution and potential causes of milky fleshed tāmure (snapper) in SNA 1. New Zealand Fisheries Assessment Report 2024/25. 57 p.

[12] Lockton L, Jeffs A, Hickey A, Parsons D. (2026). Milky-white flesh syndrome in Australasian snapper (*Chrysophrys auratus*) in New Zealand: characteristics, causes, and consequences. Rev Fish Biol Fisheries (2026) 36:33. https://doi.org/10.1007/s11160-026-10039-2

combined effects of dietary deficiency, environmental change, and host susceptibility.

90. In my opinion, the loss of a very small part of the annual food supply of tāmure (snapper) and other demersal fishes from the sand extraction area is very unlikely to materially reduce the overall food supply and productivity of these populations. Nor in my opinion would the loss be high enough to influence or exacerbate the prevalence of MWFS. The specific causes of MWFS remains uncertain. The prevalence of MWFS has dropped to much lower levels since 2023, indicating environmental factors other than nutrition may be a key factor influencing MWFS.

91. **Dr Parsons' paragraphs 6.1 – 6.9. Issue: likelihood of scallop recovery seems likely, rather than uncertain.**

92. My response is that I accept Dr Parsons opinion that a recovery is likely, provided future fishery extraction is managed sustainably.

93. The 2024 scallop biomass survey in Te Ākau Bream Bay referred to by Dr Parsons confirms that some recovery is occurring. In my opinion it remains uncertain whether biomass will recover to former levels. If it does recover to that extent, my experience in fisheries management suggests the history of collapse means the commercial fishery may not be allowed to exploit the resource as intensively as in the past.

Richard Owen Boyd

12 August 2026

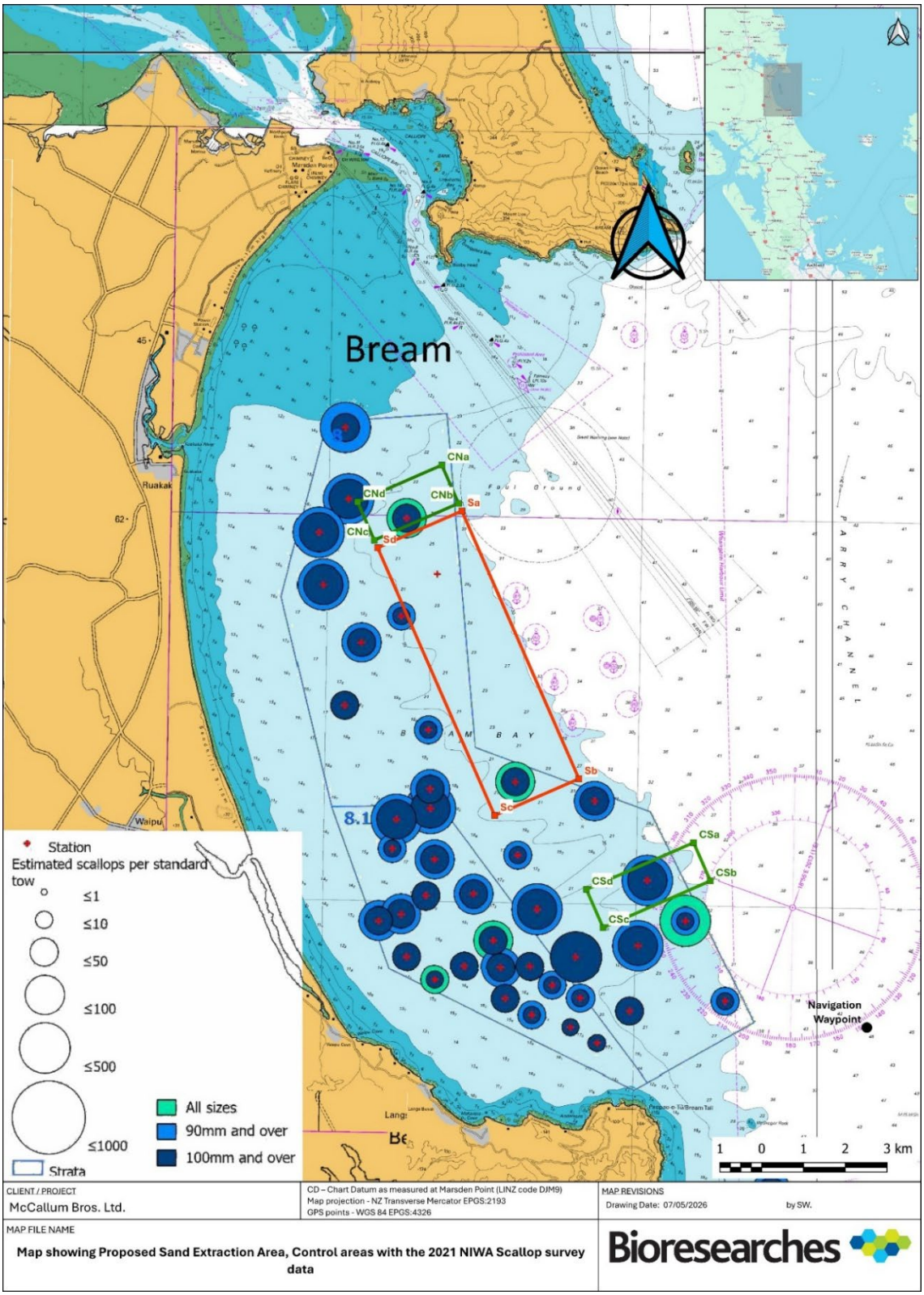


Figure 1: Scallop strata boundaries for Te Ākau Bream Bay showing overlap with the sand extraction and control areas. Label for stratum 8 (the larger area) is obscured by the data. Stratum 8.1 is the smaller area.

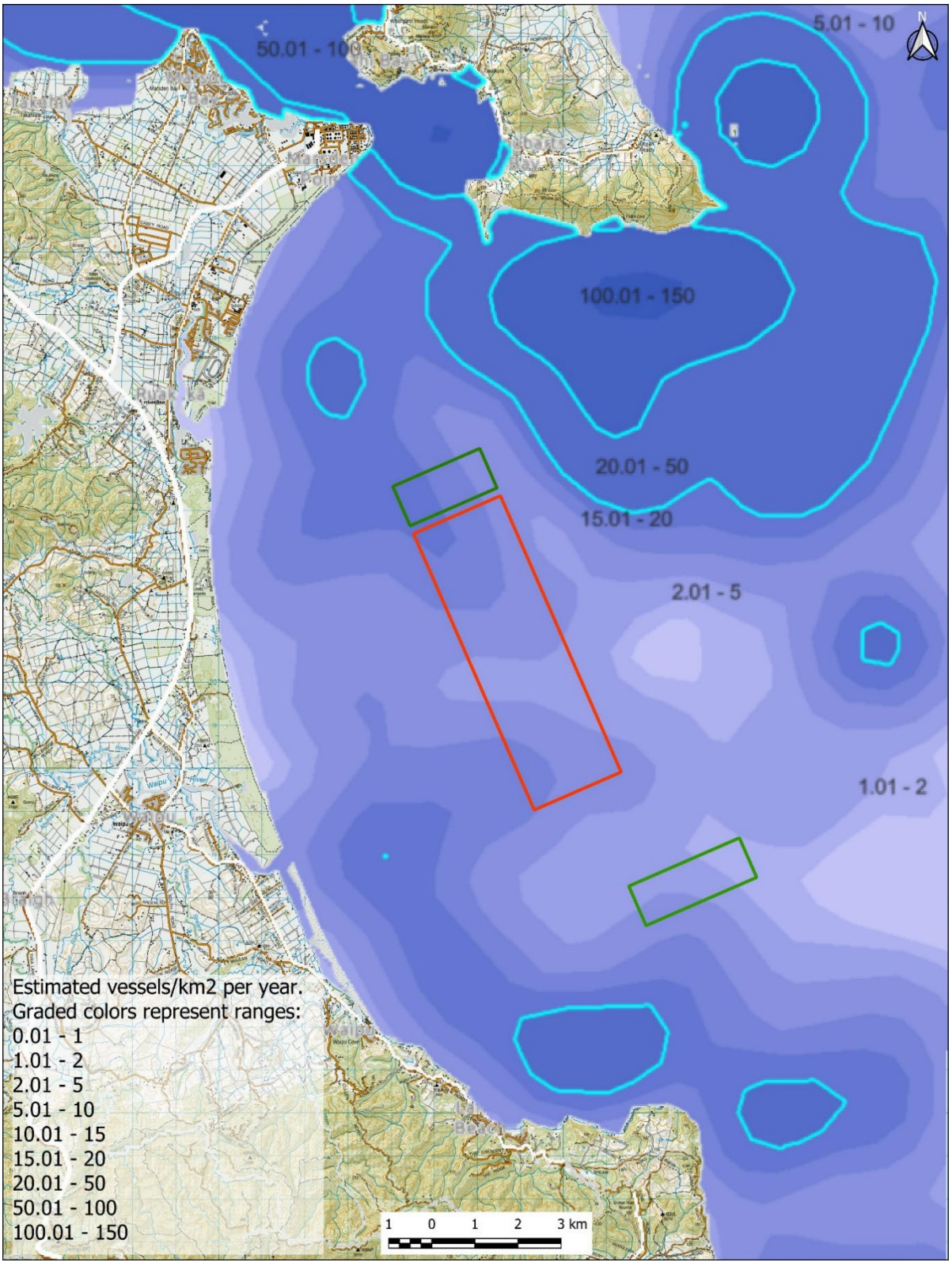


Figure 2: Heat map showing recreational fishing vessel numbers in Te Ākau Bream Bay with the boundary of the sand extraction area and control areas.

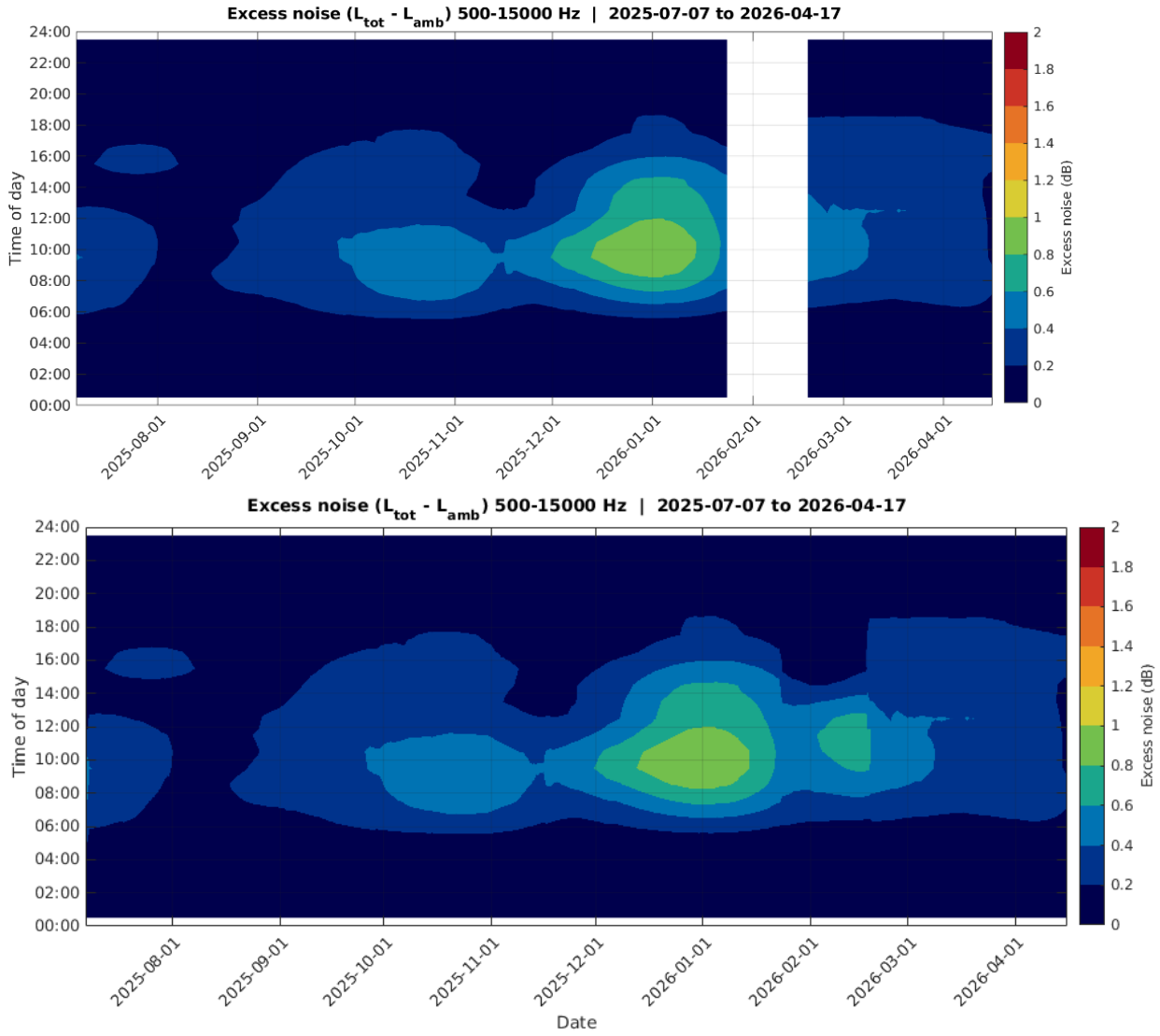


Figure 3: Styles Group Plot. Vessel induced excess noise. The plot shows non-AIS vessel noise contributions to the hourly averaged sound pressure levels as received at the hydrophone at Waipu as a proxy for recreational boating temporal variation. Top, with missing data gap. Bottom, with missing data gap filled with linearly estimated values constrained by the nearest-neighbour behaviours at the convex hull edges

APPENDIX A

Bream Bay Marine Activity
People Movement Data Technical Note

Prepared for: McCallum Group
Purpose: Supporting interpretation of recreational vessel activity patterns in relation to the proposed Bream Bay sand extraction area
Disclaimer: While care has been taken to ensure the accuracy of information presented, Data Consulting and Twin Fin Consulting accept no liability for decisions made based on this technical note.
Data source: Azira anonymised mobile device location data
Analysis period: 1 January 2023 to 30 April 2026
Analysis hours: 04:00–22:00 NZT
Prepared by: Data Consulting & Twin Fin Consulting
Prepared on: 19 Jun 2026

1. Purpose of this note

This technical note summarises People Movement Data outputs prepared for the wider Bream Bay area to assist McCallum Group in considering recreational vessel activity patterns relevant to the proposed sand extraction area.

The analysis was requested to help address identified information gaps relating to:

- spatial patterns of recreational vessel activity across Bream Bay;
- relative activity inside and outside the proposed sand extraction area;
- weekday compared with weekend and public holiday activity;
- seasonal and time-of-day patterns; and
- the extent to which mobile device movement data can be used as an indicator of recreational activity.

The outputs are intended to support interpretation of broad activity patterns. They should be read as an indicator of recreational vessel position and movement, not as a direct count of recreational fishing activity.

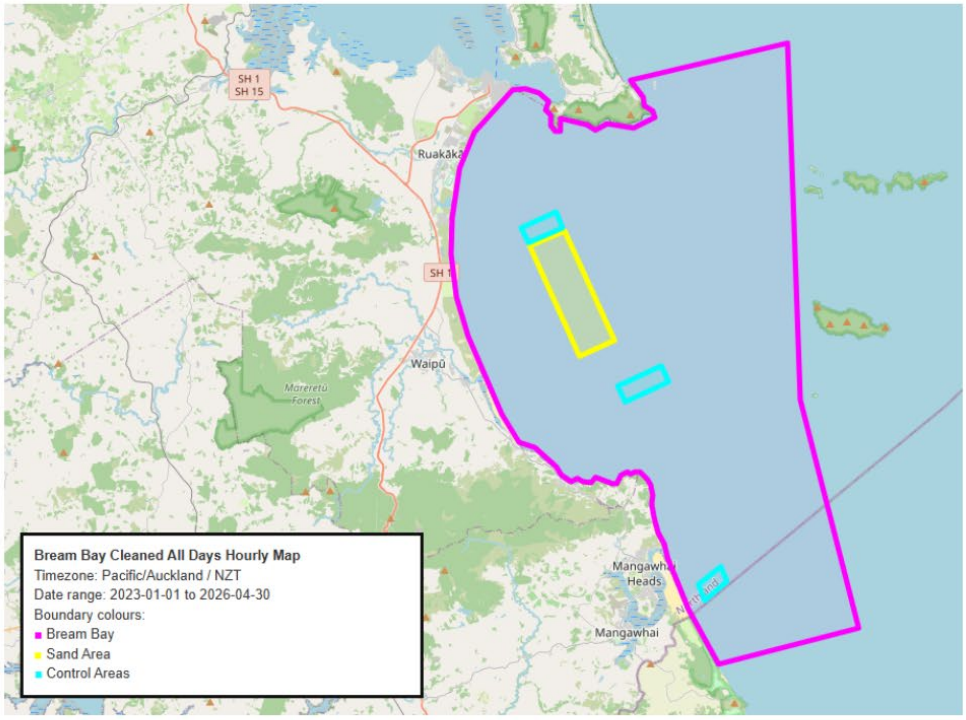


Figure 1: Bream Bay analysis map

2. Data source and methodology

The analysis uses anonymised People Movement Data (PMD) represented by anonymised mobile-device data collected through smart phone apps. With millions of data points being ingested every second worldwide from participating Bid Stream Ad exchanges and Partner SDKs, the dataset comprises time-stamped latitude and longitude observations. These observations allow activity to be summarised spatially and temporally within defined boundaries.

For this project, a wider Bream Bay analysis boundary was prepared, extending across the relevant coastal and nearshore area. Within this boundary, the proposed sand extraction area and selected control areas were separately identified. Activity was then summarised for the full Bream Bay boundary, the proposed sand extraction area, and the control areas.

The analysis was limited to cleaned records between **04:00 and 22:00 NZT** for the period **1 January 2023 to 30 April 2026** with **907,302 datapoints collected**. The activity metric represents **unique devices**, with outputs cleaned and normalised to support comparison across time periods and spatial areas. A unique device should be interpreted as a proxy for observed activity within the analysis area, not as a count of vessels, fishing trips, or individual people. Heatmaps show **normalised device activity**, allowing relative concentrations of observed activity to be compared across the wider study area.

The key outputs prepared were:

- all-days heatmap for the wider Bream Bay area;
- weekday heatmap;
- weekend and public holiday heatmap;
- hourly activity profile from 04:00 to 22:00;
- summer hourly profile, defined as October to March inclusive;
- winter hourly profile, defined as April to September inclusive;
- percentage of total activity occurring within the proposed sand extraction area;
- percentage of total activity occurring within selected control areas; and
- weekday compared with weekend/public holiday activity split.

For this analysis, the weekend and public holiday category includes weekends and New Zealand public holidays. The non-extraction period from **23 December to 6 January inclusive**, was not separately analysed except for those dates that separately fall on weekends or public holidays. This should be noted if the results are used to describe proposed extraction and non-extraction periods.

3. Key results

3.1 Spatial activity patterns

The heatmap outputs show observed activity distributed across the wider Bream Bay analysis area, with areas of higher and lower normalised device activity visible across the bay.

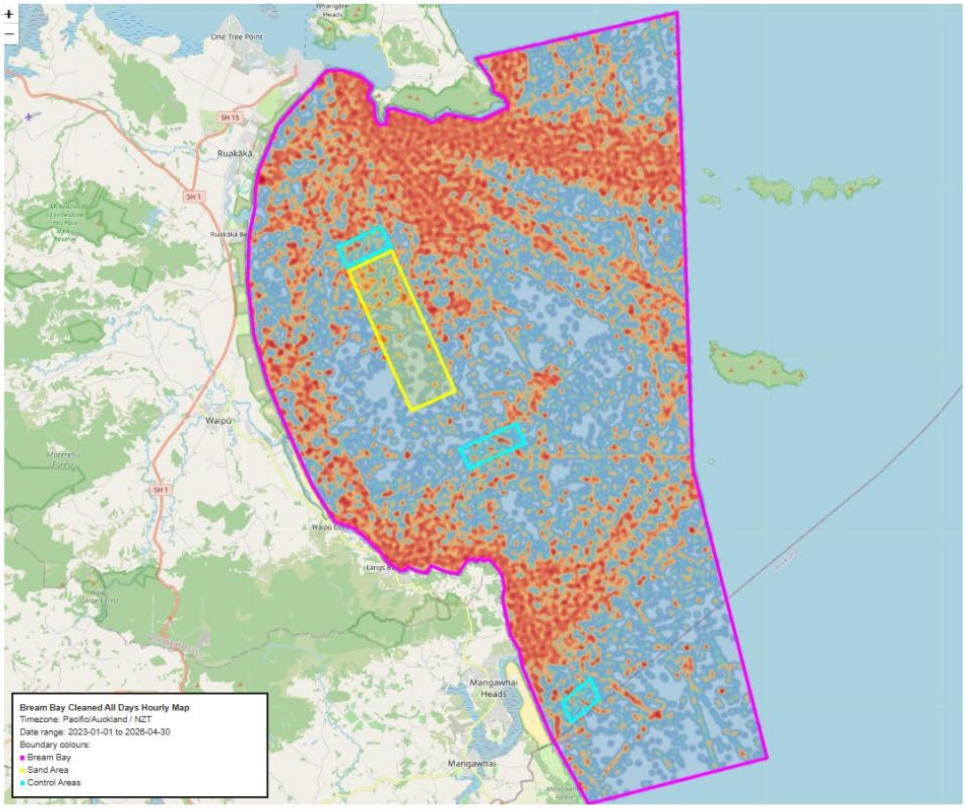


Figure 2: Bream Bay All Days Hourly Map

Across all reporting categories, more than 99% of observed activity occurred outside the proposed sand extraction area.

The proposed sand extraction area accounted for a very small proportion of observed activity within the full Bream Bay boundary:

Category	Share of activity within sand extraction area
Weekdays	0.34%
Weekends and public holidays	0.44%
All days	0.38%

Activity within the selected control areas was also low:

Category	Share of activity within control areas
Weekdays	0.18%
Weekends and public holidays	0.35%
All days	0.25%

These results suggest that, at the scale of the full Bream Bay analysis boundary, observed activity within the proposed sand extraction area was very low. The data does not indicate that the extraction area is a major concentration point for observed activity within the wider Bream Bay study area.

3.2 Weekday compared with weekend and public holiday activity

Across the full Bream Bay analysis boundary, weekends and public holidays accounted for the majority of observed activity.

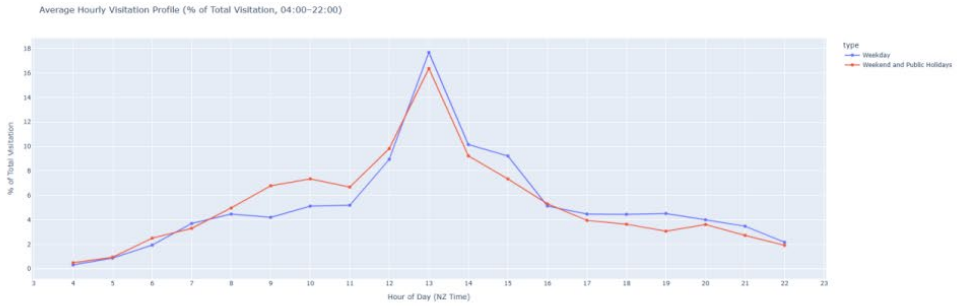
Category	Share of total activity
Weekdays	39.94%
Weekends and public holidays	60.06%

This indicates a clear weekend/public holiday effect, with higher activity occurring during periods when recreational use would be expected to increase. This distinction is relevant to the proposed sand extraction activity because in the event extraction is proposed on weekends or specified public holidays.

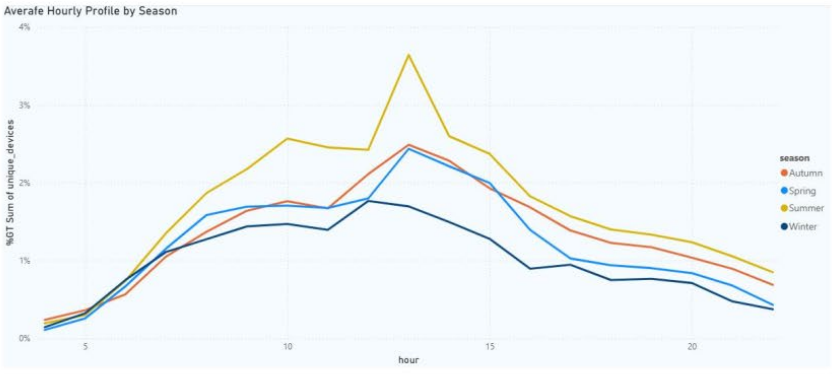
3.3 Time-of-day patterns

Hourly profiles were prepared for activity between 04:00 and 22:00 NZT. The overall profile shows activity building from early morning, increasing through the morning, and peaking around early afternoon before tapering through late afternoon and evening.

The hourly profile supports the interpretation that recreational vessel activity is primarily a daytime activity, with the most prominent activity period occurring from late morning through early afternoon. Weekend and public holiday activity is generally higher than weekday activity, consistent with the broader weekday/weekend split.



The seasonal hourly profile shows broadly similar patterns across all seasons. When expressed as a percentage of total observed activity, summer shows the sharpest early afternoon concentration, with a clear peak around 13:00. Spring and autumn follow a similar profile, with activity increasing steadily through the morning and remaining elevated from approximately 12:00 to 15:00. Winter activity is flatter overall, with a less pronounced midday peak and a clearer decline after early afternoon.



4. Interpretation

The PMD outputs provide a consistent, objective and spatially detailed indication of observed mobile device activity across Bream Bay over a multi-year period.

The analysis indicates that observed activity within the proposed sand extraction area was very low relative to the wider Bream Bay analysis boundary. Across all days, 0.38% of observed activity occurred within the proposed extraction area, meaning more than 99% occurred outside it. Weekend and public holiday activity was higher than weekday activity across the wider bay, accounting for 60.06% of total observed activity. Hourly profiles show activity concentrated during daylight hours, particularly from late morning to early afternoon.

These results suggest that the proposed sand extraction area does not overlap with a major concentration of observed activity within the wider Bream Bay area. However, the data should be treated as an indicator of recreational vessel movement rather than a direct measure of recreational fishing activity.

5. Limitations and caveats

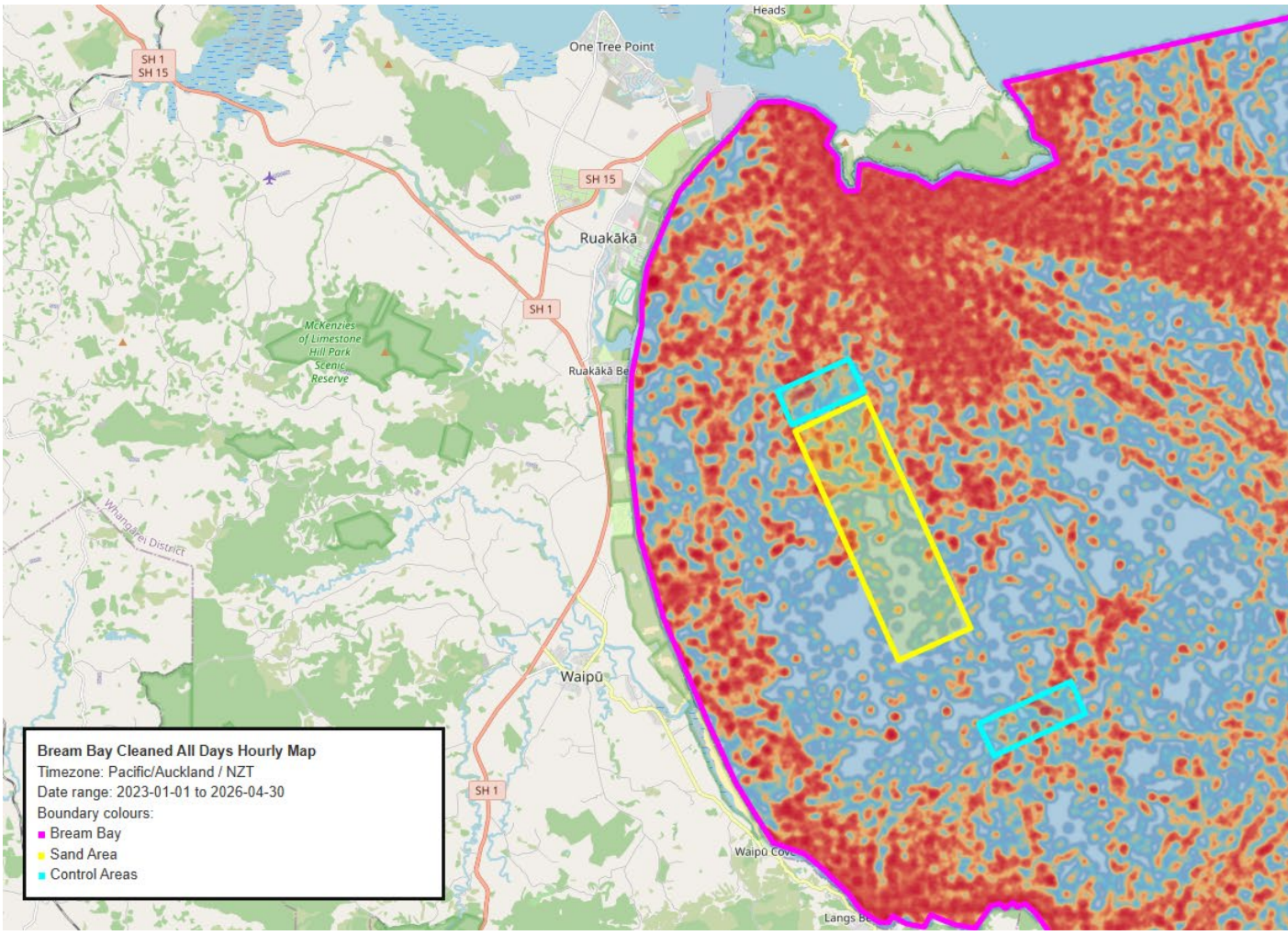
The data has several important limitations that should be carried through if it is referenced in expert evidence.

First, the dataset represents anonymised and aggregated mobile device activity from opted-in devices. It does not capture every person, vessel, or fishing trip within Bream Bay. People without mobile devices, devices with location services disabled, or devices not included within the provider dataset will not be captured.

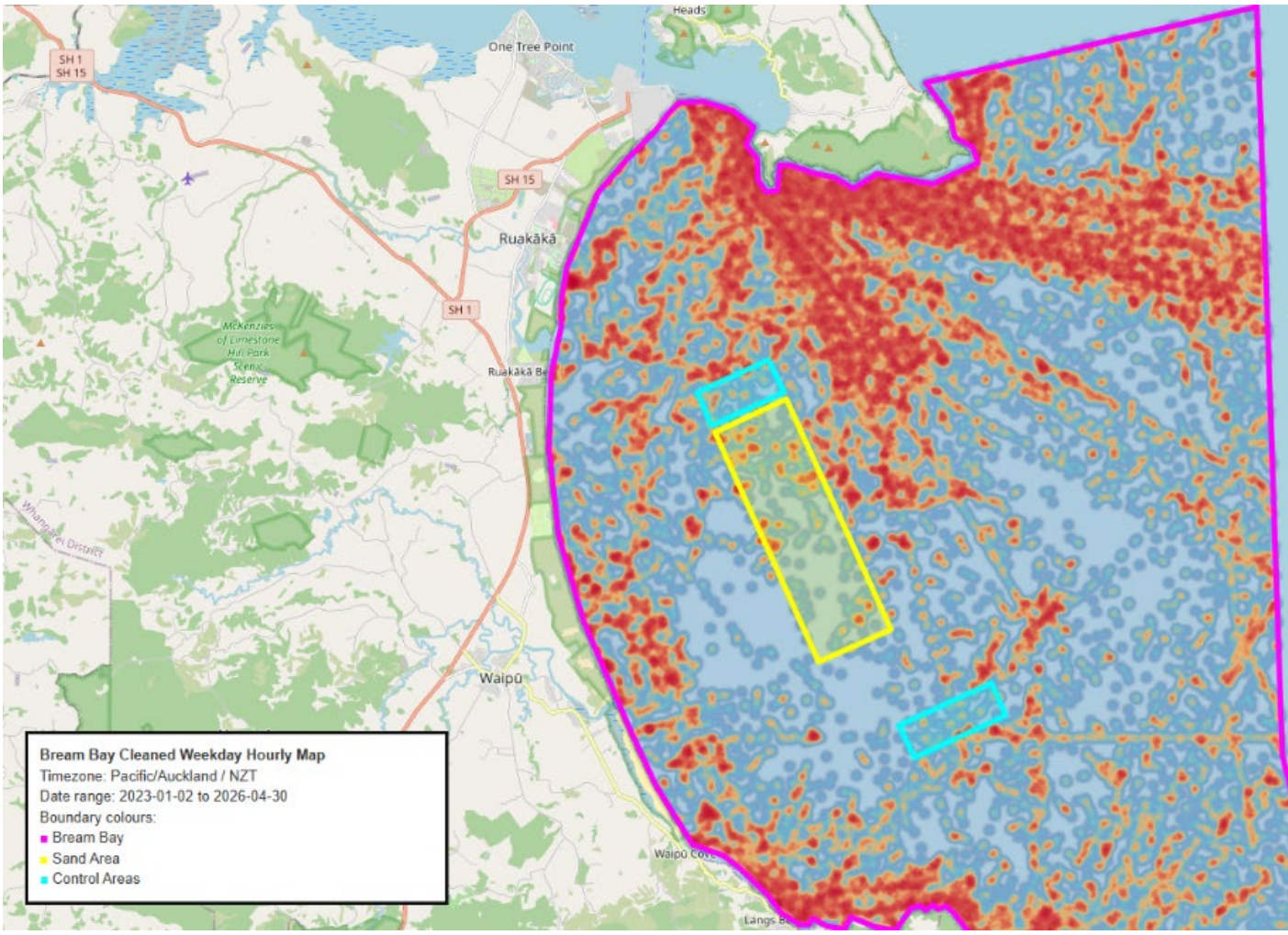
Second, the data identifies the presence and movement of unique devices within defined spatial areas. It does not directly identify the purpose of the trip, vessel type, fishing behaviour, catch, number of people on board, or whether a person was actively fishing at the time of observation.

Third, the heatmaps show normalised device activity. They are useful for comparing relative concentrations of activity across the study area but should not be interpreted as precise counts of all recreational vessels.

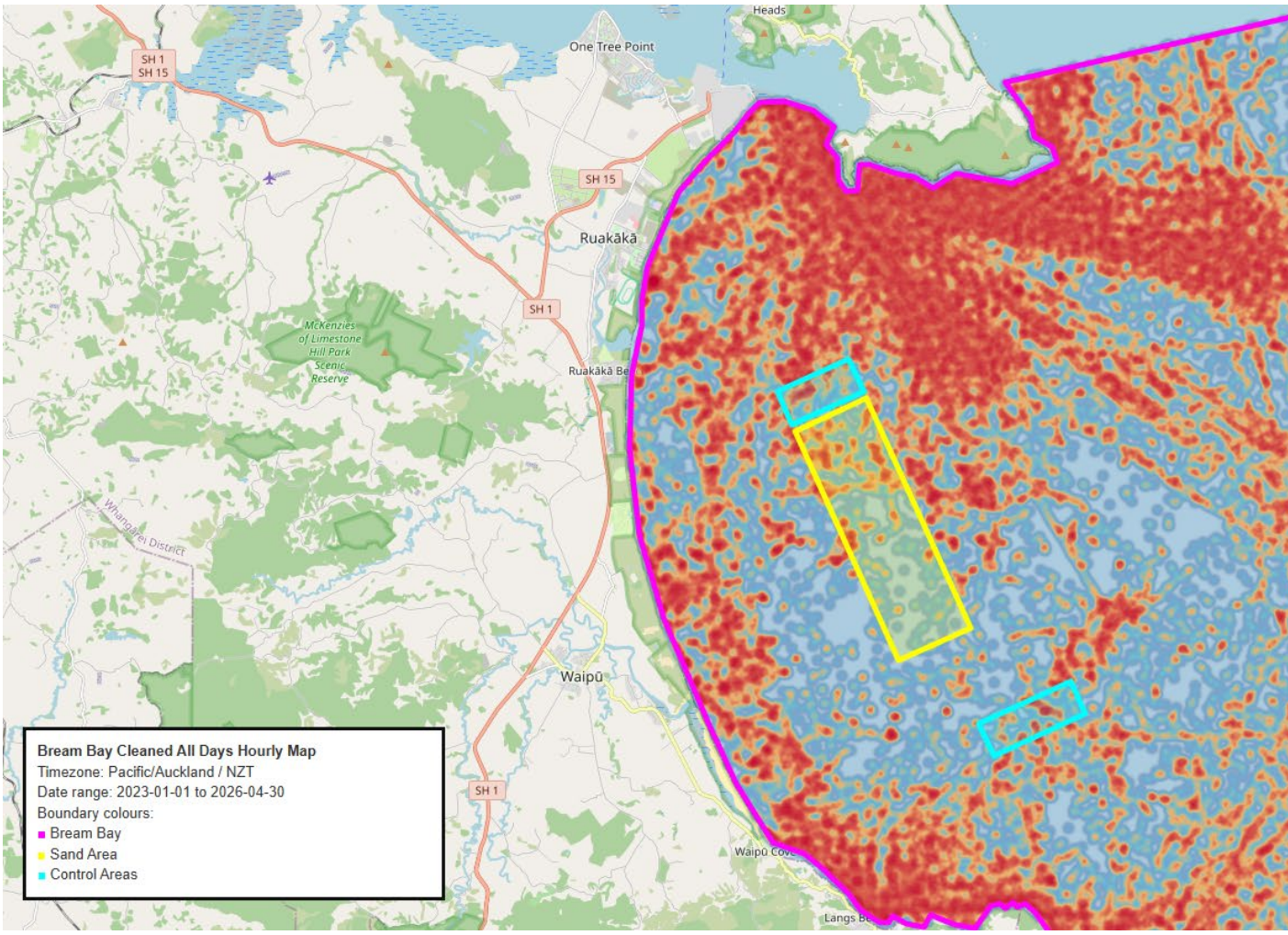
Finally, the percentages reported for the sand extraction area and control areas are calculated against the full Bream Bay analysis boundary. They therefore describe the share of all observed activity occurring within each defined area, not the share of activity among known fishers or known dredging-interaction events.



Te Akau Bream Bay Mobile Device Data All days



Te Akau Bream Bay Mobile Device Data Weekdays



Te Akau Bream Bay Mobile Device Data Weekends and Public Holidays