BEFORE THE ENVIRONMENT COURT
Auckland Registry

ENV 2015 AKL 0000134

IN THE MATTER	of the Resource Management Act 1991
AND	of an appeal under Clause 14 of the First Schedule of the Act
BETWEEN	**TRUSTEES OF MOTITI ROHE MOANA TRUST**
	Appellant
AND	**BAY OF PLENTY REGIONAL COUNCIL**
	Respondent

STATEMENT OF EVIDENCE OF DAVID GUCCIONE ON BEHALF OF MOTITI ROHE MOANA TRUST

25th October 2017

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Introduction

1 My full name is David Guccione. I have an MSc in Marine Science/Fisheries Management and my expertise is stated in my CV, which is attached as **ANNEXURE A.** I am employed as a Senior Academic Staff Member, Department of Marine and Environmental Science, School of Applied Science, Toi Ohomai Institute of Technology and have 20 years professional experience in fisheries research and tertiary education, as a fisheries observer for the Ministry of Fisheries, a seafood wholesale manager and commercial fisher.

2 I have read and agree to comply with the Environment Court Expert Witness Code of Conduct. I have complied with the code in preparation of this evidence. I have extensive recreational hours and professional survey diving within the Motiti Natural Environment Management Area (MNEA), and believe that my expert opinions given as evidence are well informed by my knowledge of the area. I have had opportunity to review the draft proposed planning provisions prepared by Graeme Lawrence and the associated maps prepared by Diane Lucas (landscape architect) as relevant background material. I understand Mr Lawrence and Ms Lucas will update this material as part of their evidence. I consider that the research discussed below can reasonably be applied to the marine ecology within the Motiti Natural Environment Management Area.

3 I have had opportunity to review the background reports prepared by other experts for Motiti Moana Rohe Trust; Vincent Kerr, Roger Grace, Diane Lucas and Graeme Lawrence. These reports provide the relevant information that assists in understanding the state of the environment at Otaiti Reef (also known as Astrolabe Reef) and MNEA as defined in the planning Maps to be presented by Di Lucas.

4 For this statement of evidence I am defining a 'natural ecosystem' as one that functions as it did, without the influence of humans, other than for subsistence fishing by pre-European populations. It includes highly interconnected apex communities, with all size ranges, of all the naturally occurring species of flora and fauna present.

Bottom trawling and dredging direct damage

5 The evidence that bottom trawling and dredging alter the natural ecosystem of an area is overwhelming and irrefutable. Both methods involve dragging either a heavy chain or a metal bar with teeth designed to penetrate the sediment, across the seabed. Any living creature attached to the bottom and in the path of the gear will be impacted, possibly torn away from its holdfast, possibly crushed by the chain or bar.

6 An illustrative example of the ecological effects can be seen by using the keystone species, the horse mussel or kukoroa (*Atrina zelandica*) (Fig 1) which will have roughly half to one third of its body and shell above the sand and the rest anchored below. Their shells provide an attachment spot for whelk eggs, filter feeding animals like sponges and tunicates, anemones, tube worms, algae and filamentous hydrozoans. The latter two are essential because they act as a place where larval shellfish first settle, and without them, new recruits can't settle. The recruits are the next generation of young that will grow into the adults of tomorrow.

Figure 1 – A horse mussel covered in anemones and other encrusting life. The anemones use the shell as an attachment point in the otherwise soft sediment. Image courtesy of publicdomainarchive.com

7 The attached organisms on the shell, as well as the horse mussels themselves, represent the base of the food chain by filtering plankton from the water column and growing into something that can be eaten by fish and other predators. The horse mussel shells represent a hiding spot for crabs and molluscs that perform scavenging and cleaning services for the surrounding area. Even when the horse mussel itself dies, for a time, the shell remains standing upright, still an attachment and shelter point for a myriad of organisms.

8 When trawling or dredging gear comes over the area where a horse mussel is growing, the exposed portion of the shell is broken away along with all of those creatures attached to which it rely on for survival (1). The horse mussel itself is quickly eaten because it can't protect itself within its suddenly absent refuge. The empty shell below the sand quickly fills in, so the area has become a little less productive with each shell gone. This is just one species that provides structure, integrity and food to the ecology of the area but the domino effect is started and many others are affected or lost. Any large algae or animal protruding from the substrate is vulnerable to bottom trawling or dredging and will be affected in the same way.

9 The extensive mussel beds that used to carpet thousands of hectares of the Firth of Thames and Hauraki Gulf were dredged out and never recovered, most likely due to the lack of associated settlement structure for the new individuals to attach. It has been estimated that there used to be enough mussels to filter the entire volume of water in the Firth of Thames every two days, and now the remaining population would take two years to do the same. This represents a huge loss of the ecosystem services of maintaining water quality by reducing eutrophication and preventing algae blooms (2)(3)(4).

10 Trawling and dredging impoverish not only the benthic (bottom) community (5)(6)(7)(8), but also reduce populations of important finfish species and alter benthic-pelagic coupling (7). One pass of trawl or dredge removed up to 95% of the living benthic organisms in a horse mussel bed with no recovery seen a year later (9). We don't bulldoze a forest in order to hunt deer or rabbits, but this is the direct equivalent of what bottom trawling and dredging do in the ocean and the Motiti Natural Environment Management Area is no different when these activities occur both by dredging and trawling.

Sedimentation from trawling and dredging

11 The effects are over an area much more extensive than just the path of the trawl or dredge gear. As terrestrial animals it often assists to have analogues to understand the marine environment. An example is the recent massive Southeast Asian forest fires that created air pollution and smog problems bad enough to be lethal in downwind cities (10)(11). The marine equivalent, sediment in the water column is stirred up and suspended with the passage of the trawl or dredge gear. The finer the particles, the longer they stay in suspension (12), and this can cause:

a. alteration of feeding patterns in fish (13)
b. increased mortality of eggs (14)(15)
c. inability for juveniles to settle (16)(17)
d. the loss of filter feeding organisms due to their soft structures being directly abraded (18), or their inability to feed while the sediment cloud is present (19)
e. increased light attenuation caused by turbidity reduces visibility, shortens the depth of the photic zone, and can alter the vertical stratification of heat in the water column (20).
f. The continual re-suspension and settlement of the sediments eventually flattens the surface into a uniform texture that is unlike a natural ecosystem (21). Even burrows for animals that live buried in the sediment such as tube worms and hides for octopus are collapsed.

12 Whether there is damage to the ecology of the area is not in question. The resilience of that ecology to the damage from bottom trawling and dredging is the only parameter that is variable. Recovery is generally long term, measured minimally in decades or longer, depending on the marine environment (7)(22).

13 We could view trawling or dredging a new area as no different to the removal of an old growth Kauri forest on land.[1] Neither the integrity nor the productivity of the marine environment can be maintained unless dredging (both recreational and

[1] An analogy first drawn by Watling and Norse in a seminal 1998 paper comparing trawling to clear-cutting of virgin forest (35).

commercial) and trawling are managed spatially so that there are refuges from their impacts.

14 What all this means is loss of productivity and a greatly altered ecosystem. The natural ecosystem, or natural state of a particular environment will be altered, if bottom trawling or dredging, including recreational dredging, are present.

Crayfish Potting and Gill Netting

15 Potting in the near shore environment in the North Island of New Zealand is mostly to catch Red (Jasus edwardsii) and Packhorse (Sagmariasus verreauxi) crayfish, although there is some non-targeted by-catch of snapper, leatherjacket, wrasses, whelks and octopus. The pots may break structures when they land, but probably don't do very much long term physical damage. If not well managed they can lead to adverse ecological effects.

a. If a pot's surface marker is lost, the animals that are trapped within it will die, eventually becoming bait themselves to lure in further victims, and this cycle can continue until the integrity of the pot breaks down (26)(27).
b. Lost gill nets can cause mortality for years until they have enough biofouling to cause them to collapse. So both gill netting and potting can cause long term negative ecological effects that go well beyond the landed catch.
c. Population structure is affected by potting as well with large crayfish being selectively removed from the population (28). Large crayfish have their role to play in the ecology of the area so there need to be areas that are managed as free from potting in order to be considered ecologically intact.

16 The evidence in Quota Management Area - CRA2 is that potting effort has dramatically increased in the last decade in order to catch the same amount and CPUE has dramatically declined (29) and areas such as Motiti Island's surrounding reefs have consequentially suffered reduced crayfish populations. The area surrounding Tauranga has essentially lost its crayfish population, similar to the Hauraki gulf where crayfish are "functionally extinct" (30).

17 A spatially planned regime that provides areas of refuge from crayfish from intensive potting is essential if natural ecosystems are to remain productive. Currently there are none of effective size of which the author is aware in the Bay of Plenty near-shore area. ("Near-shore" is defined as variously the 12 nm coastal zone, or sometimes used in place of the 'inshore' zone, which in fisheries means less than 200m depth).

The QMS and Spatial Planning

18 The Quota management system has no tool to stop fishers from serially depleting local areas within the larger Quota Management Area. The QMS has no way that locals' feedback can be used to limit fishing effort that is altering the natural state of the ecosystem, in any area, even when they notice drastic effects. We of course allow for submissions to be made and consultation within the community on any terrestrial project. Local spatial planning must be part of maintaining a natural ecosystem in the marine environment as well.

19 Importantly and ironically, the Quota Management System was developed in order to manage a fishery that was overfished, even in a time of much lower human population. Above is evidence that an environment can't be maintained in a natural state, a 'natural ecosystem' as defined earlier, while uncontrolled or intensive fishing practices are occurring. Without marine spatial planning to provide refuges from these practices, there are no areas of the marine environment left unaltered.

Outline of Issues

I have been asked to comment on:

(a) Whether a "do nothing" regime, where no restrictions are placed on fishing techniques and methods, including dredging, use of nets, fishing lines, is the most appropriate regime to restore and protect the resilience and integrity of the natural ecosystem?

I believe the above evidence explains how the presence of benthic impacting fishing gear, gill nets and cray pots is incompatible with protecting the natural environment and ecological stability.

(b) As an alternative to (a), whether a spatial planning regime involving resource management controls on fishing techniques and methods, including dredging, use of nets, fishing lines, is the most appropriate regime to maintain and protect the ecological values identified in (a)?

I state above that spatial planning with prohibitions on benthic disrupting gear as well as gill nets and pots is essential.

(c) If I conclude that (b) is preferred to (a) then:

(i) What timeframe should the regime of control be in place;

Section 6 provides a rationale for an indefinite/permanent control framework to bottom trawling, dredging, potting and gill netting methods.

(ii) What are the relevant ecological indicators that demonstrate ecological health;

Abundant populations of all naturally occurring species approximating the age structure of unfished populations. Abundant could be defined as a standing stock biomass set at a minimum 40-50% of virgin biomass (an unfished population).

(iii) what monitoring regime would be appropriate to achieve ecological health;

Monitoring won't achieve ecological health. Limits on extractive activities, and alteration of habitat (including by sedimentation) will allow the natural populations to restore ecological health on their own. Appropriate monitoring will track age structure of targeted populations and kelp coverage, record any changes in benthic sediment makeup and detect point or diffuse inputs of pollutants. Appropriate responses to disruptions will need to be developed with funded policy and infrastructure to implement those responses

(iv) what level of use (or degree of intensity) of fishing techniques and methods will be sustainable once ecological health is restored.

I believe that hand gathering and rod and reel fishing, set at appropriate effort limits, will be compatible with maintaining ecological health.

How we restore MNEA to a healthy state on the basis of:

(a) taking no action;

As stated above, this will lead to continued degradation of the MNEA. It is extremely unlikely that extractive pressure will decrease with increasing human population in the Bay of Plenty.

(b) taking no action but relying on Fisheries Act management;

See discussion above. The Fisheries Act and Quota Management System on their own are not adequate to prevent serial depletion and consequent flow-on changes to the ecological structure of localised areas. They are not responsive to the needs or preference of local people.

(c) taking action by imposing no take areas that are permanent and no take areas that apply until kelp has been restored to a healthy functioning state through the proposed waahi tapu and waahi taonga areas at Motiti NEMA.

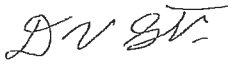
The goals of a no take area must be very specific as different species' population responses vary dramatically to their implementation, both spatially and temporally. There are extensive published meta-analyses of their benefits and limitations (31, 32, 33, 34) which suggest that they will nearly invariably protect diversity, and that ecological functioning changes continue to be noticed even 40 and 50 years after implementation. These, the longest established marine reserves, are still showing signs of recovery. Even so the fisheries benefits are not simple or consistent across all species and do not exist in isolation from the management of adjacent areas.
For the same reasons, I believe that the threshold level of brown kelp is not a good proxy of ecological health. This is a much too simplistic measure of the

extremely complex and interwoven ecological health of myriad native spp. However, I generally concur with Dr Roger Grace and Vincent Kerr's view stated in their evidence that approximate extent of kina barrens is an appropriate measure of ecological productivity.

Conclusions

- A 'natural ecosystem' is one that functions as it did, without the influence of humans, other than for subsistence fishing by small populations.
- Benthic disrupting fishing practices including trawling and dredging are incompatible with maintaining full ecological functioning unless spatially managed. Bycatch has been identified as perhaps the most serious general environmental impact of modern fishing practice. This includes secondary damage resulting from these techniques.(36)
- Crayfish potting and gill netting, depending on effort level, also change ecological function without spatial management.
- The Fisheries Act and Quota Management System are not sufficiently responsive to prevent serial localised depletion, especially in areas close to fishers' home ports.

Dated this 25th day of October 2017



David Guccione

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Curriculum Vitae

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Skills Profile

Marine and Fisheries

- Inshore Launch Master Skippers ticket with 1000s of hours of small boat handling
- Six years commercial fishing experience from small craft to ocean going trawlers to research vessels
- Practical application of New Zealand fisheries legislation, quota management systems and regulatory procedures
- Full understanding of recreational fishing legislation
- Awareness of customary and modern Maori fisheries management including rahui, mataitai and taiapure mechanisms and their relation to the Treaty of Waitangi
- Masters degree in marine biology
- Research diving and mixed gas scuba qualification and skill with a variety of underwater apparatus

Teaching

- In-field marine biology instruction of secondary students **with attention to all safety procedures and risk minimisation**

Personal Attributes

- Boundless enthusiasm for working in the marine environment
- Positive demeanour
- Empathetic to people of different backgrounds combined with the ability and desire to understand their point of view.
- Good team player with the ability to take the initiative and to direct others
- Enjoy the hard work and challenge of setting goals and objectives and following these to completion
- Ability to communicate clearly and effectively to a wide range of audiences

ICT Competencies

- Proficient word processing and PowerPoint skills
- Competency with statistical analysis software
- Spread sheet design and manipulation to process, analyse and present data in most appropriate form
- Interrogation of research software and databases
- Quick to learn new software applications

Career Summary

Senior Academic Staff Member in Marine Science **2006 to Present**
Toi Ohomai Institute of Technology (formerly - Bay of Plenty Polytechnic) Tauranga, New Zealand

- Responsible for all components of managing, organising, creating and delivering courses in Fisheries Management, Marine Invertebrate Biology, Coastal Surveying
- Organizing and directing fieldtrips in various locations ranging from urban to isolated marine islands.
- All aspects of research projects in aquaculture, eelgrass restoration, and longline seabird mortality mitigation
- Directing students in independent research projects
- Winner of 2013 Council Staff Merit Award for Excellence in Teaching Innovation

Dive Survey summary **2011 to present**
Toi Ohomai Institute of Technology (formerly - Bay of Plenty Polytechnic) Tauranga, New Zealand

- **Rena Rapid Response Unit** Responsible for implementing biological surveys of Rena shipwreck, debris field and wider Bay of plenty area and ongoing contamination monitoring.
- **Porirua Harbour Sedimentation Survey** Responsible for all aspects of field work and project management for ongoing sedimentation monitoring for Transmission Gulley roading project.
- **Tauranga City Council Wastewater Outflow** Implementing 10 yearly biological and sediment survey of wastewater outflow effects off of Papamoa Beach
-

Fisheries Observer **December 2000 – October 2002**
Ministry of Fisheries New Zealand, Wellington

- Responsible for monitoring quota and non-quota catch and by-catch on commercial vessels fishing in the EEZ of New Zealand
- Collection of data for stock assessment and scientific observations
- Monitoring the vessel crew adherence to fisheries regulations
- Marine bird and mammal observations
- Liaising with commercial fishing industry representatives

Ocean Foundry Sculptor (part time) **1998 - Present**
Tauranga, New Zealand & Wilmington NC, USA

- Copper sculptor specialising in original ocean life art works
- Competent small business manager with experience in all aspects of running a wholesale - retail business including sales and marketing, book-keeping, exhibition event management and website development .

Property Valuer **2003 to 2006**
Landmass Technology Ltd, Tauranga (Aug 2005 to present)
Quotable Value Ltd, Tauranga (Oct 2002 – Aug 2005)

- Responsible for all aspects of maintaining up-to-date ratings valuations
- Training new staff
- Coordination of timelines and quality control
- Day to day communication and relationship building with local council authorities
- Troubleshooting valuation issues with individual ratepayers
- Maintenance of complex databases

Fisheries Knife Hand June 2000 – December 2000

Sanford's Seafood, Mount Seafood Bazaar, Tauranga

- Processed various species of seafood for restaurant and retail display-
- Processed and packed various species of seafood in factory

University Laboratory Instructor 1997–1999

University of North Carolina, Wilmington, NC, USA

- Responsible for devising lesson plans and delivering lectures in introductory biology for non-majors - roughly 75 students per term
- Administering tests and assessment of student performance

Career Summary continued...

Fisheries Researcher 1997–1999

NC State Sea Grant Program, Raleigh, NC, USA

- Devised an experiment and obtained a grant for $25,000 US to study mortality of juvenile snapper and grouper vs. depth caught in the commercial fishery of the Eastern US and Gulf of Mexico
- Devised two experiments and obtained two grants for roughly $50,000 US to study by-catch reduction in the commercial shrimp trawling industry of the Eastern US and Gulf of Mexico.
- Managed communications, project administration, ongoing reporting and final write up for North Carolina Sea Grant publication

Marine Studies Instructor 1998 – 2000

Carolina Ocean Studies, Carolina Beach, NC, USA

- Led barrier island explorations and off-shore fishing expeditions for groups of between fifty and one hundred twenty children, aged between 8 -2 0 years
- Responsible for planning and delivery of educational talks about the marine environment tailored to the age of the group.

Marine Display Artist Spring 1999

North Carolina State Aquarium, Fort Fisher, NC, USA

- Prepared and assembled a blue marlin skeleton and sea turtle skeleton for display in a public aquarium. The blue marlin skeleton was only the second completed marlin skeleton in the US

Marine Research Diver February 1996

Coral Cay Diving, Belize

- One month cataloguing populations of benthic vertebrates and invertebrates as part of a coral community mapping project. (unpaid volunteer)

Commercial Fisherman 1994-1998

Wilmington, NC, USA

- Worked as a mate for several commercial fishers in the non-specific grouper/snapper fishery, and the hook and line mackerel fishery in US federal waters of the East coast, USA

Fisheries Processing Manager 1991–1997

Hanover Packing Inc. Wilmington, NC, USA (1993-97)
Steamboat Seafood Co, Steamboat Springs, CO, USA (1991-1993)

- Overseer of between 10 and 15 crew. Managed daily seafood wholesale operations including: sales calls to customers, processing and packaging of seafood products, delivery, equipment maintenance and retail sales manager
- Managed daily seafood wholesale operations including: sales calls to customers, processing and packaging of seafood products, delivery, equipment maintenance and retail sales.

Education

University of North Carolina at Wilmington, NC, USA **1997-2001**
- Masters of Science in Marine Biology specializing in fisheries biology.

Saint Lawrence University Canton, NY, USA **1987-1991**
- Bachelor of Science, Biology with minor in Philosophy

Professional Development (relevant to CV)
- First Aid
- DAN O2 provider
- Worksafe NZ certified Scientific Diver
- Inshore Launch Master Qualification (2007)
- PADI
  Divemaster and Rescue Diver qualifications
- Southern Seabird Solutions
  Conference participant and regular recipient of technical updates
- NIWA (ongoing)
  Regular recipient of NIWA's Water & Atmosphere and associated technical updates
- NIWA Bream Bay Aquaculture facility, Ruakaka (2004)
  Unit Standard courses in Paua aquaculture and maintaining water quality in reticulated water systems for onshore aquaculture holding facilities
- National Undersea Research Center , Wrightsville Beach, NC (1999)
  Research Diver Training course completed – The course included DAN Oxygen Administrator, Rescue Diver, Research Diver, mixed gas and Zero Visibility certifications.
- Nautical Know How, Inc. Wrightsville Beach, NC (1998)
  Basic boating safety certification course
- University of North Carolina at Wilmington , NC (1997)
  Volunteer summer position preparing and running samples for high-pressure liquid chromatography and gas chromatography.
- National Undersea Research Center, Wrightsville Beach, NC (1995)
  Enriched-air certified research diver
- Cape Fear Community College, Wilmington, NC 1993-1994
  Emergency Medical Technician and Emergency Medical Technician-Intermediate certifications

Personal

- Age - 48 yrs
- Health - excellent, non- smoker
- Interests - Scuba diving, fishing, music, yoga, soccer.