

**BEFORE THE BAY OF PLENTY REGIONAL COUNCIL**

**Application No. 66758**

**IN THE MATTER** of the Resource Management Act 1991

**AND**

**IN THE MATTER** of an application under section 88 of the Act  
for resource consent to discharge  
stormwater to land where it may enter water  
at Jellicoe Street, Te Puke

**APPLICANT** Pukepine Sawmills (1998) Limited

**STATEMENT OF EVIDENCE OF GENE NORMAN BROWNE**

**Dated** 9 August 2019

**1 Introduction**

- 1.1 My name is Gene Norman Browne. I am the managing director of Bioscientific Solutions Ltd. I have reviewed ecological reports prepared by Gwilym Environmental Services (**GES**) and Speed Environmental in respect of Pukepine Sawmills (1998) Ltd's (**Pukepine**) application for resource consent for stormwater discharge. I have been engaged to act Pukepine as an ecological consultant alongside GES.

**2 Qualifications and experience**

- 2.1 I have over twenty years' experience as a consulting scientist. I hold the qualifications of BSc in Zoology, MSc with Honours in applied entomology, certificates of proficiency in statistics/biostatistics, and a PhD in biological sciences from the University of Auckland. I have previously been the principal ecological consultant for FBA Consulting, and a senior environmental consultant with Kingett Mitchell Ltd. My particular areas of expertise are in applied entomology and biostatistics, albeit I have spent many years undertaking various and numerous ecological projects both in New Zealand and internationally. I am a founding member of the Asia Pacific Mosquito Control Association, the Entomological Societies of Auckland and New Zealand, part of the World Chironomid Research group, the United Kingdom Simuliid group, Pest Management Association of New Zealand, and hold memberships in other various international technical Mosquito Associations.

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## CURRICULUM VITAE

**NAME:** GENE NORMAN BROWNE  
**DATE OF BIRTH:** 12 February 1971  
**NATIONALITY:** New Zealand  
**QUALIFICATIONS:** PhD Applied Entomology, Biosecurity (2005)  
Post-graduate Research in Biostatistics (1994 - 1998)  
MSc (Hons.) Applied Entomology (1994)  
BSc Zoology (1992)

**CERTIFICATIONS:** NZQA Agrichemical application (Level 4) Aquatic (2011)  
NZQA Advanced Auditor certificate (2010)  
Approved Hazardous Substances Handler (CIT1011786)  
Certified electro-fishing operator (2002)  
Growsafe qualified Agrichemical Applicator (current)  
Special Fisheries Permit (436)  
New Zealand First Aid (current)  
Dangerous goods transport license  
AgExcel qualified trainer, Primary ITO  
NZQA driver trainer and assessor

### PROFESSIONAL MEMBERSHIPS:

Asia Pacific Mosquito Control Association  
American Mosquito Control Association (AMCA)  
Mosquito Control Association Australia (MCAA)  
Entomological Society of New Zealand  
United Kingdom Simuliidae Group  
New Zealand 4WD Association  
Karate New Zealand (KNZ)

### LANGUAGE & DEGREE OF PROFICIENCY

English – excellent

### COUNTRIES OF WORK EXPERIENCE

Australia, Fiji, New Zealand, Norfolk Island, Papua New Guinea, Rarotonga, Samoa, Solomon Islands, Tonga, United States, Vanuatu.

**EMPLOYMENT RECORD:**

**From:** 1992 - Current  
**Employer:** Bioscientific Solutions Ltd)  
**Position Held:** Director & Principal Consultant

**Description of Duties:**

Starting in 1992 I was head hunted for the role of chief consultant to the Ministry of Health for mosquito surveillance and control in New Zealand. This position involved the management of national surveys, local spot checks, and training for Health Protection Officers throughout New Zealand. The position also involved biosecurity audits of Public Health Units and as a source of advice for the MoH for mosquito biosecurity issues.

Various significant finds of international vector species such as the Asian tiger mosquito (*Aedes albopictus*), the yellow fever mosquito (*Aedes aegypti*), *Aedes japonicus*, and *Culex annulirostris* from around New Zealand were made and successfully eradicated. A nationally significant episode was identifying *Aedes (Ochlerotatus) camptorhynchus* in Napier (December 1998) and I was instrumental in the successful eradication in Napier (at the Exotic Mosquito Control Centre, Napier which I help establish). During the 2 ½ years involvement in Napier I organised the science behind the project. This involved establishing and maintaining a quarantine laboratory, establishing and managing different sections of the operation, training staff until they could manage the work and responsibility (surveillance, operations, technical duties). Following this I then held an overseeing role over product applications and helicopter co-ordination, logistic operations between staff teams, and the daily surveillance program. I was part of the core decision making group undertaking eradication. Due to the wide involvement in the project, I was involved in staff selection and their subsequent training. Since the Napier program I was instrumental in the discovery of *Ae. camptorhynchus* in Gisborne, Mahia, Porangahau, Kaipara and Mangawhai. Later with my work in FBA Consulting I was engaged by MAF Biosecurity to complete the national eradication in Coromandel, Kaipara, and Blenheim.

I have retained a position as consultant to the RNZAF as a medical entomologist at Whenuapai Airbase (Auckland) and Ohakea Airbase. I am regularly invited to help with training of medics and EHO's in mosquito surveillance and control measures in operation zones during deployment. I have also helped as a specialist trainer with the RNZAF pest management course. Over the last 3 years I have also retained a position as consultant to the RNZN as a medical entomologist at Devonport Naval Base (Auckland)

For a number of years I helped lead medical entomology training for New Zealand HPO's and other invited service providers at Burnham Military Base, as part of the National Biosecurity training course run by the Ministry of Health. Other key clients and projects have included mosquito related biosecurity matters to *Ports of Auckland Ltd* and *the Auckland International Airport Ltd*; development of IPM strategies at the Te Maunga wetlands (Tauranga District Council) and at the Pukekohe-Tuakau wastewater treatment wetlands (Franklin District Council). I was also asked to undertake mosquito resistance trials for the MoH for the World Health Organisation and helped test and redevelop the successful Robocan pest control products.

Recent contracts have seen me recognized as a biosecurity subject matter expert by NZ's Ministry for Primary Industries (MPI). I conduct regular visits around the Pacific and Melanesia conducting audits and training for Giant African snail, various ants, and other biosecurity issues as part of the successful Sea Container Hygiene System.

-See projects conducted

**From:** 2006 - 2012  
**Employer:** Flybusters Insect Control (NZ) Ltd  
(trading as FBA Consulting).  
**Position Held:** Manager FBA Consulting  
**Description of Duties:** Manager, Principal consultant

I was employed in 2006 to expand a successful pest control company into larger environmental and biosecurity consultancy work. As such I provided strategic direction and strong leadership to start FBA Consulting, a division of *Flybusters Pest Control (NZ) Ltd*. Since the inception of FBA Consulting I have expanded my biosecurity and ecological skills both in New Zealand and internationally. By the end of my tenure I managed the FBA consulting group as well as being retained as the principal consultant for a number of clients.

As the parent company is primarily a pest control I introduced environmental consulting and had no difficulty recruiting key consultants more aligned with environmental science and provided quality environmental services under the FBA Consulting flag. I have over 20 years experience as a scientific consultant in terrestrial and marine ecology, biostatistics, entomology with a speciality in mosquito and midge taxonomy, biology, surveillance and control measures. A key highlight of my career was starting the eradication programme against the Australian southern saltmarsh mosquito *Aedes camptorhynchus* in 1998 in Napier and completing the eradication a decade later having ensured this species was cleared from several sites nationally (a world first).

Carrying on from my research and environmental work in my previous employment, I continue to undertake research on ecological and chemical methods to control and eradicate pest populations, often undertaking trials on new control products and technologies for a range of clients. This is combined with producing operational management documentation to ensure best practise is carried in various biosecurity and quarantine roles.

My skills have recently expanded into the control of ant species, particularly Argentine ants (*Linepithema humile*) and other invasive ants of Biosecurity concern. This work ranges from identification of Biosecurity issues, assessing the real and potential impacts of the invasive species, and finding solutions to control or eradicate the insects. Recent projects have included building international clients throughout Melanesia and the Pacific. I have worked with MAF Biosecurity to enhance the Sea Container Hygiene System in various island nations to the point where AQIS has adopted the programme in January 2011. I was pivotal in a 2009 meeting of ant experts in Santa Cruz, California, which saw our company selected for delimiting surveys and providing a control/eradication strategy for *The US Nature Conservancy*. This was a significant victory in being able to enter and out-compete other companies in the US market.

During my time at FBA Consulting I have put in place processes and implemented standards for QA/QC and implemented quality standard of report writing. I enjoy giving presentations and have won industry awards for many of them. I am a strong communicator and have been used to deliver presentations to hostile audiences on behalf of MAF Biosecurity New Zealand. As part of the company management team I also have roles incorporating sales skills, training staff, data analyses and resolving database issues, and examining opportunities for growth, development and leadership within our company structure. A recent DISC profile determined I held key leadership qualities which make me suited to leading teams of people.

**From:** 2000 to: 2006  
**Employer:** Kingett Mitchell Ltd.  
**Position Held:** Senior Consultant  
**Description of Duties:** Entomology, Ecology, Biostatistics, Biosecurity.

I have a strong ecological and biostatistical background and provided robust statistical advice for *Kingett Mitchell Ltd.* Initially employed as the company statistician I branched out into developing the use of GIS in the company, operational and logistical leadership for ecological and environmental studies, leading teams in difficult or remote locations, was a key member designing and performing surveillance activities in marine and freshwater environments, and introduced entomological skills into the more mainstream environmental consultancy.

I was involved in designing sampling regimes for ecological assessments, bioassay trials, and experimental designs. I have an extensive work history surveying communities inhabiting the intertidal zone. Work has involved survey design and implementation, data collation, database construction, statistical analysis and report writing.

My specialist area of expertise in mosquito identification, biology, surveillance and control measures led me to undertake research on ecological and chemical applications to control or eradicate pest populations, often undertaking trials for new mosquito control products and technologies for a range of clients. This expanded into the control of nuisance midges in waste water treatment plants. This work ranges from identification of nuisance issues, assessing nuisance impacts, and finding solutions to problems related to a variety of nuisance insects.

Kingett Mitchell was regarded as New Zealand's premier environmental consultancy and as such I was exposed to a wide variety of environmental projects. Experience ranged from various ecological field investigations in freshwater, marine and estuarine environments to aspects of surface water quality. Skills developed include; physical and ecological surveying, water quality monitoring, data analysis and interpretation, report writing, presentation, communication and project management. Work experience over the past seventeen years has included technical, research and client focussed consultancy positions. While employed at Kingett Mitchell, work has involved a wide range of projects covering a number of sectors including the mining industry, wastewater, stormwater, and industrial developments, power generation, biosecurity, coastal and ports developments, fisheries and aquaculture. Work in these sectors has included development and implementation of monitoring and environmental management plans, assessments of effects, evidence writing and compilation of detailed technical reviews.

At Kingett Mitchell I had the opportunity to partake in a variety of projects which involved the selection and management of staff and external teams in a variety of roles. As I have a knack of getting jobs done I was tasked with other internal management duties. These included staff training for analytical methods, survey and experimental design, statistical software usage; off-road driving techniques and recovery; a key member of the company Health & Safety team (including chief fire warden for the building); and responsibilities for managing the company lockup and laboratory facilities.

**From:** 1995 to: 1998  
**Employer:** Browne & Pawley (Ecological/Statistical Consultants)  
**Position Held:** Director/Consultant

**Description of Duties:**

Most of *Browne & Pawley's* work involved surveying communities inhabiting the intertidal zone. This involved survey design and implementation, data collection, statistical analysis, and report writing.

We successfully completed the 1994 - 1995 Auckland intertidal shellfish survey for the Ministry of Agriculture and Fisheries which included a report submitted to MAF indicating trends in shellfish populations that have occurred over time.

Following this we were engaged by NIWA for the 1995 - 1997 intertidal shellfish surveys in charge of design and implementation. This was very similar to work carried out for MAF in previous years. Reports generated were sent through to MoF. *Browne & Pawley's* 1995-1996 survey team carried out an unprecedented 16 beach surveys for this report, a first for MoF.

A number of intertidal surveys were also carried out for the ARC at Umupuia Peninsula, Okoromai Beach (Shakespeare Regional Park) and at Okura River inlet.

**EXPERIENCE (*Chronological by subject matter*):****BIOSECURITY**

**Design an off-shore Sea Container Hygiene System for quarantine against ants, Giant African snail, and general contaminants for Port Moresby, Motukea, Lihir Island, Kimbe, and Lae (PNG), and Honiara (Solomon Islands) for New Zealand's MPI, Australia's DAWR, and Swire shipping.**

Date: 2009 - **current** Position: Biosecurity specialist, Project manager

Provide MAF Biosecurity (now MPI), AQIS (now DAWR), and Swire shipping with specialist biosecurity and quarantine services relating to surveillance and control operations for unwanted ants, Giant African snails, general contamination in PNG and Honiara. Establish a washing and treatment regime, provide training for safe chemical applications and storage, establish robust processes for ongoing Codes of Practise. For Swire shipping.

**Design an off-shore Sea Container Hygiene System for quarantine against ants, Giant African snail, and general contaminants for Apia (Samoa) for MAF Biosecurity, AQIS, and a shipping consortium.**

Date: 2009 - **current** Position: Biosecurity specialist, Project manager

Provide MAF Biosecurity (now MPI), AQIS (now DAWR), and a consortium of shipping companies with specialist biosecurity and quarantine services relating to surveillance and control operations for unwanted ants, Giant African snails, general contamination in Samoa. Establish a washing and treatment regime, provide training for safe chemical applications and storage, establish robust processes for ongoing Codes of Practise. For various shipping consortium.

**Design an off-shore Sea Container Hygiene System for quarantine against ants, Giant African snail, and general contaminants for Suva and Lautoka (Fiji) for MPI, DAWR, and various shipping agencies.**

Date: 2009 - **current** Position: Biosecurity specialist, Project manager

Provide MPI, DAWR, and various shipping companies with specialist biosecurity and quarantine services relating to surveillance and control operations for unwanted ants, Giant African snails, general contamination in Suva and Lautoka. Establish a washing and treatment regime, provide training for safe chemical applications and storage, establish robust processes for ongoing Codes of Practise. For CRS/Transam and UCL in Suva, and CRS Neptune in Lautoka.

**Design an off-shore Sea Container Hygiene System for quarantine against ants, Giant African snail, and general contaminants for Nukualofa for MPI, DAWR, and various shipping agencies.**

Date: 2009 - **current** Position: Biosecurity specialist, Project manager

Provide MPI, DAWR, and various shipping companies with specialist biosecurity and quarantine services relating to surveillance and control operations for unwanted ants, Giant African snails, general contamination in Nukualofa. Establish a washing and treatment regime, provide training for safe chemical applications and storage, establish robust processes for ongoing Codes of Practise. For CRS/Transam and S.F.Oceania in Tonga.

**Design an off-shore Sea Container Hygiene System for quarantine against ants, Giant African snail, and general contaminants for Port Vila and Espirito Santo (Vanuatu) for MPI, DAWR, and various shipping agencies.**

Date: 2017 - current      Position: Biosecurity specialist, Project manager

Provide MPI, DAWR, and various shipping companies with specialist biosecurity and quarantine services relating to surveillance and control operations for unwanted ants, Giant African snails, general contamination in Port Vila and Espirito Santo. Establish a washing and treatment regime, provide training for safe chemical applications and storage, establish robust processes for ongoing Codes of Practice. For NISCOL Luganville and IPDS Port Vila.

**Principal consultant for FBA Consulting.**

Date: 2006 - 2012      Position: Principal consultant /Biosecurity Operations Manager

Company biosecurity operations manager offering expert advice, surveillance and delimiting designs, experimental research designs, literature reviews, technical reviews and database options for MAF Biosecurity, Norfolk Administration, The US Nature Conservancy, Commercial shipping agencies. Numerous projects (see Technical reports sections).

**Strategic Planning and review for ants surveillance and management in the Hawkes Bay Region.**

Date: 2011- 2012      Position: Principal consultant , Project manager

Provide Hawkes bay regional Council with strategic planning advice, risk matrixes and operational reviews for their surveillance and control against Argentine ants (*Linepithema humile*). For Hawke Bay Regional Council.

**Strategic Plan for eradication of Argentine ants on Norfolk Island.**

Date: 2011- 2012      Position: Principal consultant , Project manager

Provide Norfolk Island Administration with a strategic plan for their eradication attempt against Argentine ants (*Linepithema humile*). For Norfolk Island Administration.

**Delimiting surveillance for Argentine ants on Kawau Island.**

Date: 2011      Position: Biosecurity delimiting surveillance specialist, Project manager

Provide Auckland Council with specialist delimiting services at eight high risk sites on Kawau Island, for Argentine ants (*Linepithema humile*). For The Auckland Council.

**Specialist Xstinguish bait application against Argentine ants In Northland .**

Date: 2011      Position: Biosecurity eradication specialist, Project manager

Provide Northland Regional Council with specialist biosecurity eradication services at Whangarei heads against Argentine ants (*Linepithema humile*) on 12.9 ha. For The Northland Regional Council.

**Evaluation on Aquatain AMF**

Date: 2011      Position: Project management/Entomologist

Consultation and experimentation of Aquatain AMF for the control against mosquitoes. For the Royal New Zealand Airforce.

**Delimiting surveillance specialist providing technical advice for US Nature Conservancy.**

Date: 2010 – 2011      Position: Biosecurity delimiting surveillance specialist, Project manager

Provide The Nature Conservancy with specialist advice on how to delimit Santa Cruz Island, California, for Argentine ants (*Linepithema humile*). Leading deployment for delimiting surveillance on Santa Cruz Island. For The Nature Conservancy, California.

**Independent expert review of high risk surveillance programmes in New Zealand.**

Date: 2010                      Position: Biosecurity eradication specialist, Consultant

Provide AsureQuality with independent expert advice and reviewing services for nationally significant surveillance programmes against Gypsy moth and Fruit fly. For AsureQuality and MAF Biosecurity.

**Review of the use of methoprene for the control of nuisance midges at the Auckland international Airport**

Date: 2010                      Position: Project Manager/Statistician/Entomologist

Project management, researcher, report writing, consultation for client. For Auckland International Airport Ltd..

**Tropical fire ant surveillance in Christchurch and Porirua.**

Date: 2010                      Position: Biosecurity eradication specialist, Project manager

Project manage the surveillance for exotic ants in two suspect areas of New Zealand. For MAF Biosecurity.

**Eradication of *Aedes camptorhynchus* from New Zealand**

Date: 2007 - 2009                      Position: Project manager, technical expert, statistician, taxonomist, TAG member, control/eradication specialist.

Provide MAF BNZ with specialist advice on how to eradicate the southern Australian saltmarsh mosquito *Aedes camptorhynchus* from Kaipara, Coromandel, Blenheim. Key member of the eradication team leading the team in surveillance, analyses, eradication methods, strategic and tactical decisions, and taxonomy. For MAF Biosecurity.

**Provide incursion response for unwanted ants in New Zealand for MAF Biosecurity.**

Date: 2006 - 2012                      Position: Biosecurity surveillance specialist, Project manager, Control specialist

Provide MAF Biosecurity (now MPI) with specialist services relating to surveillance and control operations for unwanted ant incursions in New Zealand. For MAF Biosecurity.

**Evaluate heat treatment facility and provide advice on potential improvements.**

Date: 2009 - 2011                      Position: Biosecurity entomologist

Review, audit and experimentally test BioVapor facility for ant mortality. For BioVapor Ltd, and MAF BNZ.

**Eradication specialist providing technical advice for US Nature Conservancy.**

Date: 2009                      Position: Biosecurity eradication specialist

Review processes and issues for Argentine ants on Santa Cruz Island, Californian Channel Islands. Provide expert advice re eradication methods and tools. For The Nature Conservancy, California.

**Management of 'Aquila' Ghost ant and Carpenter ant incursion response, West Haven.**

Date: 2009                      Position: Biosecurity entomologist

Undertaking surveys for both the ghost ant and carpenter ant (*Camponotus*), liaising with ship's crew, wharf surveillance, undertaking eradication treatments. For MAF Biosecurity New Zealand.

**Provide training on mosquito surveillance and control measures for RNZAF deployment teams.**

Date: 2008 - current

Position: Mosquito specialist

Entomological and operational advise for medical and environmental troops on operational deployment/rotation. For the Royal New Zealand Airforce.

**Management of Red Imported Fire Ant treatments at Whirinaki.**

Date: 2006

Position: Project manager/consultant

Managing the aerial treatment and undertaking ground applications of a RIFA infected site. For MAF Biosecurity New Zealand.

**Market research for Biosecurity options for the use of Robocan products.**

Date: 2006

Position: Project manager/consultant

Assessment of market openings for ROBOCAN automated insecticide dispensers. For Environmental Air Care Pty Ltd.

**Experimentation on the native swimming crab *Ovalipes* as a means for control against the invasive swimming crab *Charybdis japonica*.**

Date: 2006

Position: Project Manager/Biosecurity Consultant

Project management, experimental design, report writing, consultation for client. For Biosecurity New Zealand.

**Review of methods for the control of the invasive swimming crab *Charybdis japonica* in New Zealand**

Date: 2006

Position: Project Manager/Biosecurity Consultant

Successful tendering and acquisition of this marine biosecurity programme aimed at developing methodology for control and/or eradication of non-indigenous crustaceans entering New Zealand waters. Project management, report writing, consultation for client. For Biosecurity New Zealand.

**Survey of *Charybdis japonica* populations in Orewa, Weiti, Okura, Whitford and Waitemata harbour estuaries**

Date: 2006

Position: Project Manager/Marine biologist

Project management, consultation for client, operational logistics, report writing.. For Biosecurity New Zealand.

**Assessment of MAF/ERMA approvals for Robocan.**

Date: 2004

Position: Project manager/consultant

Assessment of MAF/ERMA approvals for ROBOCAN automated insecticide dispensers. For Environmental Air Care Pty Ltd.

**Advise on anti-mosquito measures for the RNZAF on deployment to East Timor.**

Date: 2001

Position: Mosquito specialist

Entomological and operational advise for medical and environmental troops on deployment to East Timor. For the Royal New Zealand Airforce.

***Ochlerotatus camptorhynchus* delimiting survey**

Date: 2001

Position: Entomologist/Consultant

Design and implementation of delimiting survey for the Australian southern saltmarsh mosquito in the Kaipara. Taxonomy and interpretation of results. For A+ (Auckland District Health Board) and Ministry of Health

**Evaluation on Agnique MMF**

Date: 2001 - 2004      Position: Project management/Entomologist

Consultation and experimentation of Agnique MMF for the control against mosquitoes and midges. For Cognis/Henkel New Zealand Ltd.

***Ochlerotatus camptorhynchus* delimiting survey**

Date: 2000      Position: Entomologist/Consultant

Design and implementation of delimiting survey for the Australian southern saltmarsh mosquito *Ochlerotatus camptorhynchus* in Gisborne. Taxonomy and interpretation of results. For Gisborne District Health Board and Ministry of Health

**Review of A+ mosquito manual**

Date: 2000      Position: Entomologist/Consultant

The review of the Auckland District Health Boards (A+) mosquito manual, including expert advice. For Auckland District Health Board and Ministry of Health

**EXPERIENCE (*Chronological by subject matter*):****STATISTICAL / DATABASE****Company statistician for Flybusters Insect Control Ltd.**

Date: 2006 - 2012      Position: Statistician/Principal consultant

Company statistician offering analytical services, sampling designs, experimental designs, research review and database options internally for the company and for all external clients. Numerous projects (see Technical reports sections).

**Biostatistician for Kingett Mitchell Ltd.**

Date: 2000 – 2006      Position: Full time Biostatistician/consultant

Company biostatistician offering analytical services, sampling designs, experimental designs, and database options for the company. A major focus was helping environmental staff with research and analyses.

**Statistical analysis.**

Date: 2010 - **current**      Position: Statistician

Field sampling and statistical analyses of various ecological data.  
For Gwilym Environmental Services Ltd.

**Statistical analysis.**

Date: 2010 - 2017      Position: Statistician

Statistical analyses of various ecological data.  
For Freshwater Solutions Ltd.

**GIS database.**

Date: 2005 – 2006      Position: Project manager/consultant

Development of a GIS database for invertebrate for the lower North Island. Role Plan and execute the design and development of the database, team leadership, data collation, client contacts, and project management. For Department of Conservation.

**Statistical analysis.**

Date: 2005      Position: Statistician

Statistical analyses of ecological data.  
For SKM.

**Design of sampling strategy and analysis for Ngatitoa Domain.**

Date: 2005

Position: Statistician

Design of stratified sampling program and analytical design for project.  
For Porirua City Council.

**Boron analysis.**

Date: 2004

Position: Statistician

Biostatistician for project. Role included both univariate and multivariate analyses  
For Solid Energy.

**Risk assessment of impact of occasional releases to air from ChemWaste Industries Limited Auckland facility.**

Date: 2003

Position: Statistician

Collecting and analysing client data and undertaking risk assessment.  
For ChemWaste Industries Ltd.

**Sludge and DAF Application Database.**

Date: 2003 – 2005

Position: Database programmer/ Analyst

Data analyses and design of database for client.  
For NZMP Sterling.

**Sludge and DAF Application Database.**

Date: 2003 – 2005

Position: Database programmer/ Analyst

Data analyses and design of database for client.  
For NZMP Edendale.

**Irrigation and Whey Application Risk Database.**

Date: 2003 – 2005

Position: Database programmer/ Analyst

Data analyses and design of database for client.  
For NZMP Takaka.

**Investigation into the effects of the Alliance Mataura discharge on river water quality and biological resources in the 2002 – 2003 season**

Date: 2003

Position: Statistical consultant

Multivariate statistical evaluation on biological data collected for report.  
For Alliance Group Ltd.

**Ministry of Fisheries Boat Ramp Surveys**

Date: 2001 – 2002

Position: Biostatistician

Database design, data analyses, graphics, and report preparation for Ministry of Fisheries report. For Ministry of Fisheries

**Snapshot 2: Review of existing data on the state of the Auckland Urban Coastal Marine Environment.**

Date: 2001-2002

Position: GIS Database designer

GIS Database design, data analyses, graphics, and report preparation.  
For the Auckland Regional Council

**Statistical data evaluation**

Date: 2001-2002

Position: Statistician.

Data analyses, graphics, and report preparation.  
For Gwilym Environmental Services

**Assessment of Snapper fishing trends within SNA8**

Date: 2001

Position: Biostatistician consultant

Sampling design, data analyses, graphics, and report preparation for Ministry of Fisheries report.

For Ministry of Fisheries

**FRO 2000/01: Age & Growth of Frostfish**

Date: 2001

Position: Biostatistician/ Fisheries consultant

Data analyses, graphics, GIS databasing and report preparation. Characterisation of the frostfish fishery with particular emphasis on the change before and after the introduction of the species into the QMS. For Ministry of Fisheries

**Assessment of fishing trends at Motunau**

Date: 2001

Position: Biostatistician

Data analyses, graphics, and report preparation for Ministry of Fisheries report.

For Ministry of Fisheries

**Project Rosedale, baseline monitoring programme**

Date: 2001

Position: Consultant/ Biostatistician

Sampling officer, data analyst, and report preparation for report.

For North Shore City Council

**Resource compliance database**

Date: 2001

Position: Database programmer \Consultant

Design and preparation of a compliance database. For MetroWater

**Biological Assessment of the Major River Environmental Classification Types in the Wellington Region.**

Date: 2001

Position: Consultant Biostatistician

Field sampling, multivariate data analyses, and report preparation of environmental data.

For Wellington regional Council

**Evaluation of DDT in the Environment at Jellicoe Wharf in the Ports of Auckland.**

Date: 2001

Position: Biostatistician

Data analyses, and report preparation of environmental data. For Ports of Auckland

**Striped Marlin Catch Rates in the New Zealand Fishery**

Date: 2001

Position: Biostatistician/co-author

Data analysis and GLM modelling for time series fisheries data, report writing for publication.

For Blue Water Marine Research.

**Assessment of Effects on Groundwater and Surface water from Dairy Wastewater Irrigation on Buxton Farm**

Date: 2001

Position: Biostatistician

Data analyses and chemical signature development for consultants.

For Anchor Products Ltd- Hautapu.

**Sludge Application to Land Annual Monitoring Report.**

Date: 2001

Position: Database programmer/ Analyst

Data analyses and design of database for client.

For Anchor Products Ltd.

**Tamaki Estuary Monitoring. Post commissioning survey.**

Date: 2001

Position: Biostatistician

Data analyses. For Contact Energy.

**Assessment and Monitoring of Commercial Eel Fisheries**

Date: 2000

Position: Biostatistician

Data analyses, graphics, and report preparation for Ministry of Fisheries report.  
For Ministry of Fisheries (Project EEL9801).

**Environmental Services Related to Puketutu Quarry Consents.**

Date: 2001

Position: Biostatistician

Data analyses.  
For Winstone Aggregates.

**GRD Macraes Globe Hill Project: Geochemistry and Water Management.**

Date: 2000

Position: Data Analyst

Data analyses.  
For GRD Macraes Ltd.

**Macroinvertebrate survey of the Matarua River**

Date: 2000

Position: Data Analyst

Data analyses.  
For Alliance Group Ltd

**EXPERIENCE (*Chronological by subject matter*):****ECOLOGY****Principal consultant for FBA Consulting.**

Date: 2006 - 2012

Position: Principal consultant /Environmental Manager

Company technical environmental manager offering expert ecological advice, surveillance designs, experimental research designs, literature reviews, technical reviews and database options for a range of clients. Numerous projects (see Technical reports sections).

**Terrestrial invertebrate survey**

Date: 2006

Position: Entomologist

Entomologic surveys, report writing. For Meridian Energy.

**Terrestrial invertebrate survey**

Date: 2006

Position: Entomologist

Entomologic surveys, report writing. For Trustpower.

**Providing expert evidence on nuisance insects matters at proposed greenwaste facility**

Date: 2005- 2006

Position: Entomologist/Consultant

Providing expert advice for environmental court. For Watercare Services Ltd.

**Surveillance and control of Nuisance Mosquitoes at FDC Wastewater Treatment Wetland including hydrology report**

Date: 2006

Position: Project Manager/Entomologist

Project managing staff, mosquito surveillance and consultation for nuisance mosquitoes, treatment applications, undertaking hydrology evaluation. For Franklin District Council.

**Review of the use of methoprene for the control of nuisance midges versus environmental issues at the Mangere wastewater treatment plant**

Date: 2005-2006

Position: Project Manager/Entomologist

Project management, ecological researcher, operational logistics, report writing, consultation for client. For Watercare Services Ltd..

**Review nuisance fly monitoring and control strategies for the Bolivar Wastewater Treatment Plant, Adelaide, Australia.**

Date: 2005

Position: Project Consultant/Entomologist

The review of current (and past) monitoring and control methods as used by senior scientists at Adelaide's largest wastewater treatment plant. Role also included running a workshop based on findings from report. For United Water Ltd, and South Australia Water.

**AEE for proposed Kawakawa Bay wastewater treatment plant.**

Date: 2005

Position: Project Consultant/Entomologist

Provision of specialist advice regarding nuisance flies and their control for proposed wastewater treatment plant. For Manukau Water, and Earth Consult Ltd.

**Mosquito control advice.**

Date: 2005

Position: Mosquito specialist.

Advice to prevent mosquito nuisance at a new development, Katikati. For Duffill Watts & King Ltd.

**Intertidal shellfish assessment at Pios Shores Beach, Waihi.**

Date: 2005

Position: Project Manager/Biologist

Undertaking intertidal survey and managing team. For Duffill Watts & King Ltd.

**Member of the midge Technical specialist group for the Auckland Regional Council and Watercare Services Ltd.**Date: 2004 - **current**

Position: Entomologist/Control Specialist

Review of midge biology and possible control mechanisms (ecological and chemical) to provide expert advice on the abatement of nuisance midge at the Mangere WWTP.

For the Auckland Regional Council and Watercare Services Ltd.

**Assessment of food webs in Geothermal areas.**

Date: 2004-2005

Position: Entomologist/ Field team leader

Assessment of food webs across the geothermal – terrestrial gradient.

For *Institute of Geological and Nuclear Science*.

**ARC –AIAL Perennial Stream Audit**

Date: 2004

Position: Fresh water biologist

Assessment of fresh water ecosystems, data analysis, report writing.

For Mitchell Partnership..

**Assessment of nuisance mosquitoes around the Otorohanga District Council wetlands.**

Date: 2004

Position: Project Manager/Entomologist

Assessment of the source of nuisance mosquitoes and control options for the Otorohanga District Council. For Otorohanga District Council.

**Survey and control of nuisance midges from the Mangere Wastewater Treatment Plant, adjacent residential sites and the Greater Auckland area.**

Date: 2004

Position: Project manager/Entomologist

Project managing field teams and sub contractors, survey design and analysis of collected data, entomological consultation with client and Auckland Regional Council, treatment applications. For Watercare Services Ltd.

**Surveillance and control of Nuisance Mosquitoes at Pukekohe-Tuakau Wastewater Treatment Wetland**

Date: 2004

Position: Project Manager/Entomologist

Project managing sub contractors, surveillance and consultation for nuisance mosquitoes, treatment applications. Treatment of problem areas and public consultation. For Fulton Hogan Ltd and Franklin District Council.

**Development of a Midge Management Plan.**

Date: 2003

Position: Project manager/Entomologist

The development of a nuisance midge development plan describing nuisance midges, assessing nuisance potential and providing operational control options. For Waimakariri District Council.

**Experimental evaluation of Robocan products.**

Date: 2003

Position: Project manager/entomologist

Assessment of ROBOCAN automated insecticide dispensers. For Environmental Air Care Pty Ltd.

**Survey of nuisance flies from the Mangere Wastewater treatment plant and surrounding areas**

Date: 2003

Position: Project manager/Entomologist

Project managing field teams and sub contractors, survey design and analysis of collected data, entomological consultation for client. For Watercare Services Ltd.

**Evaluation of nuisance fly potential at Kaipoi and Woodend Wastewater ponds and at the potential Lees Road Wetland site.**

Date: 2003

Position: Project manager Entomologist

Entomological consultant for WDC in describing nuisance flies, site evaluation and assessing nuisance potential and control options. For Waimakariri District Council.

**Desktop review of midge control methods for the Christchurch City Council.**

Date: 2003

Position: Project manager Entomologist

Entomological consultant for CCC reviewing midge biology, sampling methods undertaken on site, review of malathion toxicity and alternate options for midge control. For Christchurch City Council.

**Tamaki estuary pipebridge site examination**

Date: 2003

Position: Marine biology consultant

Site evaluation of intertidal habitat and sediments prior to pipe-bridge reconstruction. For Metrowater Ltd.

**A biological assessment of stream habitat condition in relationship to the Rotowaro coal mining operation**

Date: 2003

Position: Field biology and statistical consultant

Site evaluation of habitat sites and statistical evaluation of data collected for report. For Solid Energy NZ Ltd.

**Control of nuisance midges at North Shore City Council Waste Water Treatment Ponds, Rosedale**

Date: 2002

Position: Project manager Entomologist

Entomological and operational consultant for NSCC in selecting and applying treatment products for the control of nuisance midges. For North Shore City Council.

**Evaluation of BTI against nuisance midges at Mangere WWTP**

Date: 2002

Position: Project manager/Entomologist

Design and analysis of experimental research data obtained to evaluate effectiveness of BTI against nuisance midges. For Watercare Services Ltd.

**Evaluation of salt water against nuisance midges at Mangere WWTP**

Date: 2002 – 2003

Position: Project manager/Entomologist

Design and analysis of experimental research data obtained to evaluate effectiveness of salt water against nuisance midges. For Watercare Services Ltd.

**Ports of Auckland Limited - Sediment Quality in the Port of Auckland - 2000**

Date: 2002

Position: Researcher

Characterisation of sediment samples collected from the Port of Auckland during 2002 as part of the maintenance dredging programme.

**Control of nuisance midges at Watercare's Waste Water Treatment Ponds, Mangere**

Date: 2002

Position: Project manager Entomologist

Entomological and operational consultant for Watercare in selecting and applying treatment products for the control of nuisance midges. For Watercare Services Ltd.

**Moana Pacific Fisheries Limited - Establishment of a Kingfish Aquaculture Facility at Whangarei Heads**

Date: 2001

Position: Researcher

Assessment of effects of a proposed finfish aquaculture farming development off Whangarei Heads. Benthic video survey, natural and physical environment investigations.

**North Shore City Council - Rosedale Road Sewage Outfall Benthic Monitoring**

Date: 2001

Position: Researcher

Collection of benthic samples from the area around the proposed Rosedale Road sewage outfall.

**Taimoana Marine Farms Ltd - Mussel farming in the Firth of Thames Aquaculture Assessment of Effects**

Date: 2001

Position: Researcher

Assessment of effects of a proposed mussel farming development associated with the Wilsons Bay Group A mussel farming area in the Firth of Thames.

**Surveillance and Treatment of Nuisance Mosquitoes at Pukekohe-Tuakau Wastewater Treatment Wetland**

Date: 2001

Position: Entomologist

Surveillance and consultation for nuisance mosquitoes. Treatment of problem areas and public consultation.

For Franklin District Council.

**Rangitoto Channel – Proposed Deepening of Commercial Shipping Lane: Effects of dredging on biological resources**

Date: 2001

Position: Fisheries consultant

Background fisheries and benthic biology research, report preparation for Ministry of Fisheries report. For Ports of Auckland Ltd.

**Assessment of Environmental Effects for the proposed Mussel Farm in Wilsons Bay, Firth of Thames**

Date: 2001

Position: Environmental consultant

Environmental consultancy and report preparation. For Hauraki Marine Development Trust

**Marlborough Mussels Company Limited - An investigative study of a proposed extension to a spat catching farm in Aotea Harbour**

Date: 2001

Position: Researcher

Intertidal and subtidal benthic resources in the vicinity of the proposed spat farm.

**An Examination of the Physical and Natural Environment and Resources in the Firth of Thames in Relation to Issues of the Sustainability of Marine Farming in the Firth of Thames: Response to a Request for further information from the Auckland Regional Council**

Date: 2001

Position: Environmental consultant

Environmental consultancy and report preparation. For Thames Mussels Ltd

**Response to Auckland Regional Council Section 92 Request: Proposal for Spat Catching from Kaiaua, Firth of Thames.**

Date: 2001

Position: Consultant

Consulting and report preparation. For Thames Mussels Ltd.

**Assessment of Environmental Effects for the Taimoana Joint Venture mussel licence of Wilsons Bay, Firth of Thames.**

Date: 2001

Position: Consultant

Consulting and report preparation. For Taimoana and Wilson Bay Mussel Farm.

**Ports of Auckland Limited - Assessment of Effects of the Rangitoto Channel Shipping Lane Deepening Project on Natural Resources**

Date: 2001-2002

Position: Researcher

Assessment of the intertidal and subtidal biological resources in and around the approaches to the Ports of Auckland. Assessment of the effects of underwater blasting on marine organisms in the Rangitoto Channel.

**PUBLICATIONS & TECHNICAL REPORTS:**

Boothroyd I. K. G; **Browne G. N.** 2006: Invertebrates of geothermally influenced aquatic and terrestrial ecosystems, longitudinal and lateral linkages. *Proceedings of the 28<sup>th</sup> NZ Geothermal Workshop*

Boothroyd, I.K.G., Fitzpatrick, M., **Browne, G.N.**, Corlis, N., Goldstone, A., Speed, S., Mills, R., Fergusson, R. 2006: *Coal ash disposal at Rotowaro Minesite: A reference condition approach to setting boron criteria and assessing environmental effects.* Australasian Institute of Mining and Metallurgy New Zealand Branch 39th Annual Conference, Waihi New Zealand, August 2006.

**Browne G** 2011. *Sideswipe from a mozzie expert.* PMANZ newsletter Jan – Apr 2011. 4(1): 6-9

**Browne G** 2011. Biovapor Giant African Snail heat treatment evaluation. For BioVapor Ltd.

**Browne G** 2011. Strategic plan for the eradication attempt of Argentine ants on Norfolk Island. For the Administration of Norfolk Island. March 2011

**Browne G** 2011. SCHS Code of practice for cleaning and treating shipping containers for Honiara, Solomon Islands. For Swire Shipping. February 2011

**Browne G** 2011. SCHS Code of practice for cleaning and treating shipping containers for Lae, Papua New Guinea. For Swire Shipping. February 2011

**Browne G** 2011. SCHS Code of practice for cleaning and treating shipping containers for Port Moresby, Papua New Guinea. For Swire Shipping. February 2011

**Browne G** 2011. Sea container hygiene systems for containers imported into Australia and New Zealand from PNG and Honiara: Quality Manual. For Swire Shipping. February 2011

**Browne G** 2011 Audit of SCHS Apia operational area. For SCHS Apia consortium. January 2011

**Browne G.** 2011. Sea container hygiene system (SCHS) for containers imported into New Zealand from Apia, Samoa . Quality Manual. For SCHS Apia consortium. January 2011

**Browne G** 2011. SCHS Code of practice for cleaning and treating shipping containers for the Pacific Forum line. For SCHS Apia consortium. January 2011

**Browne G** 2011. SCHS Code of practice Pacific Forum line SCHS Liaison. For SCHS Apia consortium. January 2011

**Browne G** 2011. Code of practice for maintaining the Port of Apia fit for purpose for the SCHS. For SCHS Apia consortium. January 2011

**Browne G** 2011. SCHS Code of practice for cleaning and treating shipping containers for Samoa Maritime Service. For SCHS Apia consortium. January 2011

**Browne G** 2011. SCHS Code of practice Samoa Maritime Service SCHS Liaison. For SCHS Apia consortium. January 2011

**Browne G** 2011. SCHS Code of practice Sofrana Unilines Ltd SCHS Liaison. For SCHS Apia consortium. January 2011

**Browne G** 2011. SCHS Code of practice Transam SCHS Liaison. For SCHS Apia consortium. January 2011

**Browne G** 2011 Various operational work schedules for SCHS consortium members in Apia. For SCHS Apia consortium. January 2011

**Browne G** 2011. Internal audit of the sea container hygiene system in Port Moresby, Lae and Honiara. For Swire Shipping. February 2011

**Browne G** 2010. Internal audit of the sea container hygiene system in Port Moresby, Lae and Honiara. For Swire Shipping. May 2010

**Browne G** 2010. Evaluation of LWS Container wash system, Western Australia. For Lotus Wash Systems International Ltd. June 2010

**Browne G** 2009. Exotic ant incursion Ports of Auckland. For MAF Biosecurity New Zealand. April 2009

**Browne G** 2009. Exotic ant incursion secondary find Ports of Auckland. For MAF Biosecurity New Zealand. May 2009

**Browne G** 2009. Spray plan for controlling nuisance chironomid midge at Watercare Services wastewater treatment plant : Mangere. For Watercare Services Ltd. July 2009

**Browne G** 2009. Review of the midge nuisance and the use of Methoprene at the Mangere Wastewater Treatment plant. For Watercare Services Ltd. August 2009

**Browne G** 2009 Audit of SCHS Apia operational area. For SCHS Apia consortium. December 2009

**Browne G** 2009. Inspection of the super yacht Aquilla for exotic ants. For MAF Biosecurity New Zealand.

**Browne G** 2008. Whirinaki Red Imported Fire Ant treatments at Omaranui Landfill and Redclyffe transfer station. For MAF Biosecurity New Zealand.

**Browne G.N** 2008. Proposed WWTP vegetation report. For Franklin District Council.

**Browne G** 2008. Initial actions in the eradication attempt of Argentine ants (*Linepithema humile*) on Norfolk Island. For Norfolk Island Administration. December 2010

**Browne G** 2008. 'Double blind' data analyses of chemical and biological factors across time. For Argo Ltd. March 2008

**Browne G** 2008. Puketutu Island rehabilitation: Entomological assessment. For Watercare Services Ltd. February 2008

**Browne G** 2008. Interim report. Laboratory evaluation of the concentration –response relationships for *Chironomus zealandicus* (Diptera: Chironomidae) larvae to s-Methoprene and Pyriproxyfen. For Watercare Services Ltd. May 2008

**Browne G** 2008. Determination of methoprene concentrations in water. Method validation report. For Watercare Services Ltd. November 2008

**Browne G** 2008. Laboratory and field evaluation of the knockdown and residual effectiveness of Bifenthrin 80SC foliage treatments for Adult *Chironomus zealandicus* (Diptera Chironomidae) management. For Watercare Services Ltd. February 2008

**Browne G** 2007. Eradication of nuisance fly problems at the Auckland Baptist Tabernacle. Report to the Auckland Baptist Tabernacle. October 2007

**Browne G** 2007. Effects of discharge of residue malathion into the Manukau Harbour. For Watercare Services Ltd. December 2007

**Browne G** 2007. Report on calibration of Maxforce for treatment of *Solenopsis invicta*, the red imported fire ant. For AsureQuality and MAF Biosecurity New Zealand. April 2007

**Browne G** 2007. Baseline and first post treatment environmental monitoring results, Panpac RIFA. For MAF Biosecurity New Zealand. April 2007

**Browne G** 2007. Post treatment environmental monitoring results following second treatment, Panpac RIFA. For MAF Biosecurity New Zealand. June 2007

**Browne G** 2007. Perfumed Robocan trials. For Environmental Air Care Ltd. November 2007

**Browne G** 2007. Eradication of nuisance fly problems at the Auckland Baptist Tabernacle For the Auckland Baptist Tabernacle.

**Browne G** 2007. Robocan research summary report. For Environmental Air Care Ltd. [dust mite control research, alternative propellant research, non flammable propellant research, insect repellency, larval mosquito control in tyres, packed and semi-packed shipping containers, pyganic hand sprayer trials against spiders, flies and ants]. For Environmental Air Care Ltd. October 2007

**Browne G** 2007. Non flammable propellant in Robocan products for potential use in electrical boxes. For Environmental Air Care Ltd. November 2007

**Browne G** 2007. Environmentally friendly alternative for PBO in Robocan products. For Environmental Air Care Ltd. November 2007

**Browne G** 2007. Efficacy of Robocan products in packed and semi-packed shipping containers. For Environmental Air Care Ltd. November 2007

**Browne G** 2007. Alternative solvents to ShelloIT in Robocan products . For Environmental Air Care Ltd. November 2007

**Browne G** 2007. Blackfly insect control on Prince Caspian film set. For Film FX.

**Browne G** 2006. Calibration of aerial baiting operations for Whirinaki Red Imported Fire ant eradication. For MAF Biosecurity New Zealand

**Browne, G.N.** 2006: The development of an invertebrate database for the lower North Island. DoC Internal Series. Department of Conservation, Wellington. Pp: 19

**Browne G**, 2004: Is the eradication of *Ochlerotatus camptorhynchus* failing in New Zealand? *Proceedings of the 9th Arbovirus Research in Australia/6th National Conference of the Mosquito Control Association of Australia. Australis Noosa Lakes Resort, Noosa, Australia . 22 – 27 August 2004.*

**Browne G**, 2003: Controlling nuisance flies: an old problem with recent solutions.. *Proceedings of the Annual conference of the New Zealand Waste Water Association. EnviroNZ03. 17 – 19 September, Aotea Centre, Auckland.* [[Hynds Gold Award for Paper of the Year](#)]

**Browne G.N.** 2002. Nuisance fly management in wastewater treatment systems. *Water & Wastes in New Zealand.* July/August 2002. P 16.

**Browne G.N.** 2002: An evaluation of Agnique MMF against nuisance mosquitoes (Diptera: Culicidae) and effects on non target organisms in field applications in South Auckland. *Proceedings of the 5th Conference of the Mosquito Control Association of Australia. South Stradbroke Island, 2002*

**Browne G.** 2001. Report on 2000 Mosquito Surveillance: National surveillance from September through December. Report to the Ministry of Health.

**Browne G.** 2001. Report on 2001 Mosquito Surveillance: National surveillance from January through March. Report to the Ministry of Health.

**Browne G.** 2000. Report on 2000 Mosquito Surveillance: National surveillance from January through March. Report to the Ministry of Health.

**Browne G.** 2000. Report on 2000 Mosquito Surveillance: National surveillance from April through July. Report to the Ministry of Health.

**Browne G.** 1997. Report of mosquito vector control services for 1996 -1997. Report to Flight Lieutenant Tim Hopkins, RNZAF, Whenuapai.

**Browne G.** 1997. Report to the Ministry of Health on Gisborne's 199-1997 mosquito spot check. Ministry of Health.

**Browne G.** 1997. Report on the work undertaken on the mosquito problem at the Te Maunga wetlands (Tauranga). Tauranga District Council.

**Browne G.** 1996. Initial report for mosquito vector control services. Report to Flight Lieutenant Tim Hopkins, RNZAF, Whenuapai.

**Browne G.** 1996. Report on the New Zealand 1995 - 1996 Mosquito Survey in Waikato and Taranaki. Ministry of Health.

**Browne G**, 1996. Report on Auckland's 1996 mosquito spot checks at local ports. Auckland Health Group.

**Browne G.** 1995. Report to the Ministry of Health on New Zealand's mosquito check 1994-1995. Ministry of Health.

**Browne, G; Calvert, R** 2011: National arbovirus surveillance 2010 – 2011. Statement of work 15049. *MAF Technical Publication.*

**Browne G**, Craddock P 2011. Delimiting survey for Argentine ants on Kawau Island. For the Auckland Council. March 2011.

**Browne G., Craddock P., Hammond D., Yard D., Sarty M.,** 2008: Eradicating *Aedes camptorhynchus* from New Zealand: Where are the kiwis at? *Proceedings from the Mosquito Control Association of Australia conference. 2008*

**Browne G**, Craddock P, Rawnsley B 2011: [in press]. Survey for Argentine ants *Linepithema humile* (Mayr)(Hymenoptera:Formicidae), at high risk sites on Kawau Island. *New Zealand Entomologist*.

**Browne G**, Craddock P, Van Dyk V 2011: Notes on the heat tolerance of Argentine ants (*Linepithema humile*). *WETA*. 41(1):38-40

**Browne G**, Craddock P, Van Dyk V 2010. Argentine ant (*Linepithema humile*) delimitation survey on Santa Cruz Island for the Nature Conservancy. For the US Nature Conservancy. December 2010

**Browne G.N**, Cryer M, & Pawley M.D.M, 1995. Trends in Auckland intertidal shellfish surveys, 1992 and 1996. *N.Z. Fisheries Technical Report 76 P*.

**Browne, G**; Fraser, A; Kane, W; Calvert, R; Bulman, L; Bradbury, P 2011: High risk site surveillance: Annual report 2010 – 2011. Statement of work 12055. *MAF Technical Publication*.

**Browne G**. Garner S. 2001. .Kiwis thump Aussies: A salt marsh mosquito eradication attempt in New Zealand. *Technical Bulletin of the Florida Mosquito Control Association*. Vol 3.

**Browne G**, Jessop R 2009. Strategic vegetation management Mangere wastewater treatment plant. For Watercare Services Ltd. January 2009

**Browne G. N.**, Jones, E. J. 2006: Experimental trials of control methods for the invasive swimming crab *Charybdis japonica* in New Zealand. Research report prepared by Kingett Mitchell Ltd for Biosecurity New Zealand. September 2006.

**Browne G. N.**, Jones, E. J. 2006: Review of methods for the control of the invasive swimming crab *Charybdis japonica* in New Zealand. Report prepared by Kingett Mitchell Ltd for Biosecurity New Zealand. March 2006.

**Browne, G**; King, K 2011: National gypsy moth surveillance. Statement of work 12057. *MAF Technical Publication*.

**Browne, G**; King, K; Green, O; Muir, C 2011: National fruit fly surveillance. Statement of work 12045. *MAF Technical Publication*.

**Browne G**, Larcombe M, Craddock P 2007. Effects of discharge of residue methoprene into the Manukau Harbour. For Watercare Services Ltd. March 2007

**Browne G.N**. Pawley M.D.M. 1997. Trends in Auckland Intertidal Shellfish Surveys: 1992-1997. *F.A.R.D. NIWA*

**Browne G.N**, Pawley M.D.M, 1997. Trends in Auckland intertidal shellfish surveys, 1993-1995. *Unpublished Northern Fisheries Region Internal Report*.

**Browne G.N**. Pawley M.D.M. 1996. Pilot survey of Okoromai Beach for the Auckland Regional Council. Auckland Regional Council.

**Browne G.N**. Pawley M.D.M. 1995. Trends in Auckland Intertidal Shellfish Surveys: 1993-1995. *MAF Fisheries Auckland* 64 pp.

**Browne G.N**, Pawley M.D.M, 1995. Trends in Auckland intertidal shellfish surveys, 1992-1995. *Unpublished Northern Fisheries Technical Report*. 79 p.

**Browne G**, Rawnsley B, Speed S 2010. Review of the Sea container hygiene system in Port Vila. For Ifira ports development & Services Company Ltd. March 2010

**Browne G**, Rawnsley B, Speed S 2010: Laptop ant invaders. *Biosecurity magazine*. Publication of MAF Biosecurity New Zealand. 97: 32.

**Browne G**, Speed S 2010. Use of chlorine for midge control. For Watercare Services Ltd.

**Browne G**, Speed S 2007. Evaluation of Sodium sulphite for the control of nuisance midges at Watercare Service's WWTP, Mangere. For Watercare Services Ltd. November 2007

**Browne G**, Van Dyk V 2010. Report on the eradication attempt of Argentine ants (*Linepithema humile*) on Norfolk Island. For Norfolk Island Administration. February 2010

Craddock P, **Browne G** 2008. Technical Review of the National Invasive Ant Surveillance Programme (NIAS) 2001 - 2008. Unpublished report prepared by FBA Consulting for MAF Biosecurity New Zealand. 56 p

Craddock P, **Browne G** 2008. Technical review of the national invasive ant surveillance programme (NIAS) 2007 – 2008. For MAF Biosecurity New Zealand June 2008

Craddock P, **Browne G**, Brown M 2009. Knockdown efficacy of three Bifenthrin insecticide formulations against *Chironomus zealandicus*. For Watercare Services Ltd. February 2009

Craddock, P; **Browne, G**; Wilkins, P 2011: National invasive ant surveillance, Programme annual report 2010 – 2011. Statement of work 11488. *MAF Technical Publication*

Disbury M. Garner S. and **Browne G**. 2000. *Chemical mosquito control agents : A report for the MOH*. Ministry of Health Publication.

FBA Consulting 2010. Tropical fire ant surveillance at Christchurch and Porirua MAF Case # 2009 473. For MAF Biosecurity New Zealand.

FBA Consulting 2009. Tarahiwhati stream annual biomonitoring. For Gwilym Environmental Services. February 2009

FBA Consulting 2009. Ants of concern in the Hawkes Bay. For Hawkes Bay Regional Council. August 2009

FBA Consulting 2009. Ant incursion response; Personal effects of Mr Pedro Armijo MAF job# 2010 007. For MAF Biosecurity New Zealand. January 2009

FBA Consulting 2009. EQ3 audit of Apia operational area April 2009. For EQ3 Apia consortium. May 2009

FBA Consulting 2007. Argentine ant control Mangaiti Bay, Whananaki. For Northland Regional Council. February 2007

FBA Consulting 2007. National Invasive Ant Survey 2006 Technical Report. Unpublished report prepared by FBA Consulting for MAF Biosecurity New Zealand. 12 p.

Garner S. and **Browne G.** 2001. "Kiwis thump Aussies"- A salt marsh mosquito eradication attempt in New Zealand. *Arbovirus Research in Australia*. Vol. 8: 168 – 170.

Holder, P; **Browne, G**; Bullians, M. 1999: The mosquitoes of New Zealand and their animal disease significance. *Surveillance*. 26(4): 12 - 15

Holdsworth, J.; Saul, P.; **Browne, G.** 2003: Factors affecting striped marlin catch rate in the New Zealand recreational fishery. *Journal of Marine and Freshwater Research*, 54: 1 - 9.

Jones, E. J., and **Browne G. N.** 2006: Survey of *Charybdis japonica* populations in Orewa, Weiti, Okura, Whitford and Waitemata harbour estuaries. Report prepared by Kingett Mitchell Ltd for Biosecurity New Zealand. February 2006.

Kingett Mitchell Ltd 2006. The use of Methoprene at Watercare Service's Mangere wastewater treatment plant. For Watercare Services Ltd

Kingett Mitchell Ltd 2006. Mosquito management plan for the Franklin District Council treatment wetlands, Tuakau. For Franklin District Council.

Kingett Mitchell Ltd 2006. Mosquito survey of the FDC wetlands and surrounding areas including a hydrology report. For Franklin District Council.

Kingett Mitchell Ltd 2006. Survey of potential mosquito habitats surrounding the FDC wetlands, Tuakau. For Franklin District Council.

Kingett Mitchell Ltd 2005. Assessment of effects for the use of methoprene to control nuisance midges at the Mangere WWTP. For Watercare Services Ltd.

Kingett Mitchell Ltd 2005. Results of a trial of Methoprene to control nuisance midges with the effluent return channel and intertidal storage basin at the Mangere WWTP. For Watercare Services Ltd.

Kingett Mitchell 2005. Intertidal shellfish survey of Pios Shore Beach, Waihi. Report prepared for Duffill Watts & King Ltd. September 2005.

Kingett Mitchell 2005. Review of midge control options for the Bolivar Wastewater treatment lagoons. Report prepared for United Water Ltd. March 2005.

Kingett Mitchell 2004. Bloodworm survey of the Mangere wastewater treatment plant and surrounding areas at the start of the 2004-2005 summer season. Report prepared for Watercare Services Ltd. October 2004.

Kingett Mitchell 2004. Methods of control against nuisance non biting midges (Chironomidae): A review of options for Watercare Services Manger Watsewater Treatment Plant.. Report prepared for Watercare Services Ltd. December 2004.

Kingett Mitchell 2004. Mosquito management plan for the Franklin District Council treatment wetlands, Tuakau. Report prepared for Franklin District Council. July 2004.

Kingett Mitchell Ltd 2004. Methods of control against nuisance non biting midges (Chironomidae): A review of options for Watercare services Mangere wastewater treatment plant. For Watercare Services Ltd.

Kingett Mitchell 2003. Tamaki estuary pipe-bridge site examination. Report prepared for Metrowater Ltd. June 2003.

Kingett Mitchell 2003. Desktop review of midge control methods for the Christchurch City Council. Report prepared for Christchurch City Council. April 2003.

Kingett Mitchell 2003. Evaluation of Nuisance fly potential at Kaipoi and Woodend Wastewater Ponds and at the potential Lees Road wetland site. Report prepared for Waimakariri District Council. May 2003.

Kingett Mitchell 2003. Survey of nuisance flies from the Mangere Wastewater Treatment Plant and surrounding areas. Report prepared for Watercare Services Ltd. August 2003.

Kingett Mitchell 2002. Evaluation of Bti and seawater to control nuisance midges at the Mangere Waste Water Treatment Plant. Report prepared for Watercare Services Ltd. December 2002.

Kingett Mitchell 2002. Post breach nuisance midge survey at Mangere WTP. Report prepared for Watercare Services Ltd. September 2002.

Kingett Mitchell 2002. A Review of the nuisance midge problem at the Mangere Wastewater Treatment Plant with options for controls. Report prepared for Watercare Services Ltd.

Kingett Mitchell 2002. Evaluation of Agnique MMF Application at Mangere WWTP Ponds for the Control of Nuisance Midges. Report prepared for Watercare Services Ltd. April 2002.

Kingett Mitchell 2002. A Review of the midge population at the North Shore City Council Wastewater Treatment Plants associated Pond 2. Report prepared for the North Shore City Council. September 2002.

Kingett Mitchell 2002. Agnique MMF trial at the North Shore City Council Wastewater Treatment Plants. Report prepared for the North Shore City Council. December 2002.

Kingett Mitchell 2002. Assessment of environmental issues for using Agnique MMF for control of midge at the NSCC WTP Pond 2. Report prepared for North Shore City Council. September 2002.

Morrison M.A. and **Browne G.N.** 1999. Intertidal shellfish population surveys in the Auckland region, 1998 – 99, and associated yield estimates. *New Zealand Fisheries Assessment Research Document 99/43*. Ministry of Fisheries, Wellington. 21 pp.

Morrison M.A. Pawley M.D.M. and **Browne G.N.** 1999. Intertidal surveys of shellfish population in the Auckland region, 1997 – 98, and associated yield estimates. *New Zealand Fisheries Assessment Research Document 99/25*. Ministry of Fisheries, Wellington. 25 pp.

Pawley M.D.M. and **Browne G.N.** 1997. Sampling methodologies employed in surveys of Auckland's intertidal shellfish populations. Including results from 1997. NZ Fisheries Technical report. NIWA internal report 53 pp.

Pawley M.D.M. and **Browne G.N.** 1996. Trends in Auckland Intertidal Shellfish Surveys: 1993-1996. NIWA internal report 127 pp.

Pawley M.D.M. and **Browne G.N.** 1996. Pilot survey of Okura River Region for the Auckland Regional Council. Auckland Regional Council.

Pawley M.D.M. and **Browne G.N.** 1995. ARC report on the shellfish beds in Umupuia Peninsula. Auckland Regional Council.

Pawley M.D.M. and **Browne G.N.** 1995. Pilot survey of Umupuia Peninsula for the Auckland Regional Council. Auckland Regional Council.

Pawley M.D.M, **Browne G.N.**, & Cryer M.N, 1996. Trends in Auckland Intertidal Shellfish Surveys:1993-1996. NIWA Internal Report.

Pawley M.D.M, **Browne G.N.**, & Morrison M, 1997. Survey of intertidal shellfish populations in the Auckland metropolitan area (1996/97) with a summary of previous sampling methodologies and results (1992-1996). *NZ Fisheries Technical report*.

Speed S, **Browne G** 2010. Taiharuru dam hornwort control trial environmental assessment Impact report. For Northland Regional Council. April 2010

Speed S.R. **Browne G.N.** and Boyd R.O. 2000. Assessment and Monitoring of commercial eel fisheries. Research report for the Ministry of Fisheries. Project 9801.

Speed S, **Browne G**, Rawnsley B 2010. Evaluation of honey as a carbohydrate bait for ant surveillance. For MAF Biosecurity New Zealand. June 2010

Speed S, Craddock P, **Browne G** 2010: Assessment of environmental effects for methoprene use at the Auckland International Airport. For Auckland International Airport Ltd. May 2010

Taylor, B; Wilkins, P; **Browne, G** 2011: Proof of freedom for Israeli acute paralysis virus in honey bees. Statement of work 12100. *MAF Technical Publication*

Weinstein P. Laird M. and **Browne G.** 1997. *Exotic and endemic mosquitoes in New Zealand as potential arbovirus vectors*. Occasional paper, Ministry of Health, Wellington.

**EXPERT EVIDENCE**

*In the matter of Resource Management Act 1991 and application to Auckland Regional Council and Manukau City Council to build a wastewater storage wetland at Kawakawa Bay.* On behalf of Manukau Water Ltd. Hearing before the Environmental Court. December 2006.

*In the matter of Resource Management Act 1991 and application to Auckland Regional Council and Manukau City Council to establish a Composting Operation at Puketutu Island, Mangere by Living Earth Ltd.* On behalf of Watercare Services Ltd. Hearing before the Environmental Court. July 2006.

*In the matter of Resource Management Act 1991 and application to Auckland Regional Council and Manukau City Council to establish a Composting Operation at Puketutu Island, Mangere by Living Earth Ltd.* On behalf of Watercare Services Ltd. Hearing before Manukau City Council. August 2005.

*In the matter of Resource Consent Applications by the Waimakariri District Council for resource consents to make changes to the Kaiapoi wetlands and the potential effects on nuisance midge.* On behalf of Waimakariri District Council. Hearing before Waimakariri District Council. March 2004.

*In the matter of surveillance procedures and mosquito biology at the Auckland International Airport.* On behalf of the Auckland District Health Board. Technical evidence presented at a Biosecurity group meeting. 1995.

- 2.2 Throughout my career I have specialised in mosquito and chironomid taxonomy, biology, and control and as such I work in various aquatic habitats. For large Ministry of Health and Ministry of Primary Industries' funded eradication programs I have had to assess potential ecological contamination from use of eradication products. I still conduct such work on behalf of the Ministry of Primary Industries and the Australian Department of Water and Agricultural Resources in Pacific Island nations in conjunction with their various government departments.
- 2.3 Since starting my own company (Bioscientific Solutions Ltd), I have pulled back from smaller ecological consultancy projects but keep my hand in with various other consultancy companies that require my services. Two of these are Gwilym Environmental Services, and Speed Environmental. I have worked with both principal consultants of these companies for several years and know the quality of work that they undertake.
- 2.4 I have complied with the Environment Court's Expert Witness Code of Conduct in the preparation of this evidence. Except where I state that I am relying on the evidence of another person, this written statement of evidence is within my area of expertise. To be best of my knowledge, I have not omitted material facts known to me that might alter or detract from the opinions expressed in this evidence

### **3 Scope of Evidence**

- 3.1 I have reviewed reports and other associated correspondence forwarded to me that are written by Gwilym Environmental Services and Speed Environmental for Pukepine in respect of this application. My evidence relates to the aquatic habitat assessments undertaken by Speed Environmental, and the actual and potential effects of the proposed stormwater discharge on the receiving stream environment.

### **4 Evidence**

- 4.1 Speed Environmental's reports on the aquatic habitat assessments indicate that at the time of testing (2011 and 2016) the Pukepine timber treatment and storage operation contributed to a localised contamination loading in the receiving downgradient drain. Based on the information within those reports, it is my opinion that this drain is typical of any agricultural drain in the area and has no extraordinary biological significance.
- 4.2 The key findings in the Speed Environmental reports were that:
- (a) the Pukepine site appeared to have some localised impact on aquatic habitats immediately below the site;

- (b) this impact was evidenced by a proliferation of surface biofilms and emergent aquatic macrophytes;
- (c) the likely cause of the proliferation of surface biofilms was likely to be organic material associated with timber processing including dissolved and particulate material; and
- (d) stormwater runoff from uncovered timber treatment areas were likely to be the source of CCAB contaminants.

4.3 It is my understanding that the Speed Environmental reports (drafted in May 2011 and March 2016) pre-date modifications undertaken to Pukepine's stormwater management system and changes to the on-site operations. Based on additional water quality test results and communications provided to me by Pukepine and GES, I am confident the improvements made by Pukepine has improved the quality of the stormwater exiting the sawmill site and entering the receiving drain.

4.4 In my experience, if an aquatic habitat assessment of the downgradient drain were completed now (following the completion of the stormwater management system improvements) the results are likely to show a reduction in localised biofilms near the discharge point and a general improvement in the aquatic ecology.

**Gene Norman Browne**

9 August 2019