

Grant Year	Institution	Project Title	Description	Researcher	Abstract Link
2017-2018	The University of Newcastle	Fungi: friend or foe? An investigation into species of the genus <i>Chalciporus</i> in Australia, with particular focus on the east coast of New South Wales	Recently, four unknown species of fungi, tentatively placed in the genus <i>Chalciporus</i> based on external morphology, were discovered in native Australian bushland, three along the east coast of NSW and one in the Northern Territory. This study aimed to determine the identity of the <i>Chalciporus</i> specimens found in Australia, to test if they are conspecific with northern hemisphere species of <i>Chalciporus</i> and to conduct predictive distribution mapping of the genus to determine if the Australian <i>Chalciporus</i> specimens occupy the same ecological niche as <i>Chalciporus piperatus</i> . Phylogenetic analysis, based on DNA sequencing of the 28S RNA gene, nrLSU, confirmed the identity of the three specimens found in Australia (including two from LMCC) as <i>Chalciporus</i> , and delineated their relationships with other species of <i>Chalciporus</i> . Predictive mapping showed that the Australian <i>Chalciporus</i> specimens fit within, but are not limited to, the ecological niche of <i>C. piperatus</i> .	Heidi Prichard	<a href="https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=8714&amp;ftype=False">https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=8714&amp;ftype=False</a>
2015-2016	The University of Newcastle	Persistent organic pollutants in water, sediment and biota	Persistent organic pollutants (POPs) are generated either naturally or by human activities, and due to their extreme physico-chemical properties these compounds once discharged, persist in the environment. It is essential to conduct a preliminary screening on our environment for the presence of these chemicals to make sure that our environment is free of these persistent pollutants. If toxic persistent organic pollutants are identified, it is important to identify the source in order to manage their entry. Once the source is identified, it will be easy for us to devise management strategies for these pollutants. In this study, few PFAS class chemicals have been identified in water and sediments. Moreover, these chemicals are accumulating in seagrass. Although the concentrations are in microgram per litre and microgram per kilogram levels, the accumulation in plant could reach higher than water and sediment concentrations. Trace of pesticides and PAHs are found, but not as much as PFAS chemicals.	Dr Kannan Krishnan	<a href="https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=8712&amp;ftype=False">https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=8712&amp;ftype=False</a>
2015-2016	University of Wollongong	Determining seed viability of endangered coastal saltmarsh plants in Lake Macquarie under climate change	Coastal saltmarsh is recognised in Australia and globally as an important ecological community, providing habitat and food for ecologically and economically important species (e.g. fish, shellfish), acting as a natural buffer and pollution filter, and storing carbon. Despite recognition of the ecological importance of coastal saltmarsh, only little is known about the resilience of the plant species that constitute the community, including their potential for natural regeneration through the production of viable seed following disturbance under varying environmental and climatic conditions. The overall objective of this research was to redress this deficiency of knowledge by examining the natural reproductive capacity, seed viability, and seed germination requirements for some of the dominant plants that constitute coastal saltmarsh communities in Lake Macquarie and New South Wales, Australia. An important and novel feature of this project was the examination of how variable salinity and temperature regimes, including extreme heat events, influence germination of these plant species.	Assoc Prof Todd Minchinton	<a href="https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=8713&amp;ftype=False">https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=8713&amp;ftype=False</a>
2015-2016	University of Technology Sydney	Impacts of lantana invasion on habitat use by native and exotic animals in Lake Macquarie bushland	Invasion of lantana in bushland habitats in Lake Macquarie presents a serious challenge to biodiversity management. The complex array of potential ecological impacts from lantana highlights the urgent need to determine whether there are either consistent or idiosyncratic responses of coexisting native faunal groups to lantana invasion. This project compared habitat use by mammals, birds, reptiles, amphibians, and invertebrates along a lantana-invasion gradient, and assessed the role of lantana in the spread of feral pest animals in Lake Macquarie bushland. The study recorded totals of 11 mammal species, 31 bird species, six reptile species, two amphibian species, and 30 invertebrate orders and across the lantana-invasion gradient. These animal groups responded in different ways to lantana invasion in Lake Macquarie. There were three different patterns of response in richness across the groups, including (1) a bimodal response in mammals and invertebrates, which were found in comparatively high numbers at contrasting ends of the invasion gradient (sites with no lantana and sites with high lantana cover), but in lower numbers in the middle of the gradient at sites with moderate lantana cover; (2) a negative response in reptiles, with a decline in species richness from sites with no lantana to all other sites exposed to lantana invasion; and (3) a neutral response in birds, with no apparent major disruption to their community structures along the lantana-invasion gradient. The three patterns of response indicate that lantana invasion can lead to reduced native biodiversity in the short term (mammals, invertebrates, reptiles) and in the long term (reptiles). Importantly, the introduced Red Fox was only recorded at sites with lantana present.	Dr Brad Murray	<a href="https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=8237&amp;ftype=False">https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=8237&amp;ftype=False</a>
2015-2016	The University of Newcastle	Survey of emerging contaminants in the Lake Macquarie	The project has aimed to provide a preliminary survey of emerging contaminants in the lake macquarie. Total 20 water samples were collected around the lake. The collected samples were analysed for selected emerging contaminants, including pharmaceuticals, artificial sweeteners, pesticides, metal(loid)s and per- and poly fluorinated substances using Inductively coupled plasma mass spectrometry (ICP-MS) and Liquid Chromatograph Triple Quadrupole Mass Spectrometer (LC-MS/MS). The results indicated no pharmaceuticals, artificial sweeteners, pesticides were identified for the selected samples, while two samples were detected with PFOA (Perfluorooctanoic acid). However, the concentration detected was around 9 times lower than the PFAS National Environmental Management Plan 2017 for drinking water. There were detectable metals including V, Mn, Co, Cu, As, Se, Mo, Ag, Cd, Pb while most of them were below the guideline values for NEPM for groundwater investigation levels for marine water and all samples were below NHMRC screening guideline values for recreational water. Four samples for Cd exceeded the investigation levels for marine water (NEPM GILs). Apart from the chemicals analysed, the water samples were high in electrical conductivity indicating high levels of salts.	Dr Yanju Liu	<a href="https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=8238&amp;ftype=False">https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=8238&amp;ftype=False</a>

2015-2016	The University of Newcastle	Microplastics in Lake Macquarie: Distribution, characteristics and chemical loading and the implications for human health	The weathering of plastic debris generates a new size class of synthetic particles termed microplastics (plastic particles <5mm in size) which have now been reported in oceans around the globe. Lake Macquarie has previously been a strategic location for several industries and the presence of heavy metals is well documented in both the sediments and marine biota. To date, no studies have reported the occurrence or distribution of microplastics in the lake system, which may have significant consequences for the bioavailability of legacy contaminants. Surface waters and lake sediments were sampled by boat in July, 2017, in the first attempt to develop baseline information on the occurrence, distribution and chemical loading of microplastics in an Australian estuary. Microplastics were unable to be detected in field-collected samples. Following this finding, two additional samples were collected from the banks of Cockle (1) and Dora Creeks (1), for inclusion in a national survey of shoreline microplastics and associated chemical contaminants. Field observations and discussion with collaborative researchers from Macquarie University have confirmed the presence of both macroplastic and microplastic debris on the shorelines of Lake Macquarie, particularly in mangrove areas. We therefore recommend a more comprehensive survey of surface water and sediments using advanced sampling tools, as well as a shoreline survey to determine the occurrence and distribution of microplastics in Lake Macquarie, and the risks associated with contaminant transport throughout the lake system.	Dr Thava Palanisami	<a href="https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=7947&amp;ftype=False">https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=7947&amp;ftype=False</a>
2016-2017	University of Tasmania	Identifying Lake Macquarie City's climate history for improved future planning	This project addressed two key interests of Lake Macquarie City Council (LMCC) and its sponsors – adaptable building and infrastructure design; and environmental impact of extreme weather events (bushfire, storms, etc.). These interests are linked in that in order to design adaptable buildings and infrastructure, we need to understand the magnitude, frequency, duration and impact of extreme weather events. Our current understanding of climate variability (and therefore our understanding of the risk of extreme wet/dry events in our catchments) is primarily based on gauged climate records, which are generally less than 100 years long (i.e. only the post-1900 period). It is now well documented, however, that gauged climate records are too short to fully capture the range of climate variability possible in Australia, which limits our understanding of the 'true' risk of climate extremes in our catchments. One option is to use palaeoclimate proxy data to look beyond the gauged period. Here we investigate past climate variability relevant to the Lake Macquarie City Council by assessing a 1013 year rainfall reconstruction (covering the 1000-2013 period) that had been produced for the Hunter region. This record provides an improved understanding of the risk of wet and dry periods in the region and can assist in improving infrastructure, planning or management strategies, and therefore, water security and drought management in the LMCC region. The project found that although the recent 100 year period (i.e. the gauged period) was relatively dry, there were longer dry periods in pre-gauged period. Also of note were the very long wet periods evident in the pre-gauged period that we have not experienced in the recent 100 years. Additionally, each century over the 1013 year rainfall record has a different distribution of wet and dry periods. For example, some centuries are marked by long wet periods while others are drier. This means that by only using data from the last ~100 years, the risk of floods and droughts in the LMCC region are likely to be underestimated.	Dr Carly Tozer	<a href="https://www.lakemac.com.au/downloads/C105A2347625AC2592FC721B1C9E4DE195C07210.pdf">https://www.lakemac.com.au/downloads/C105A2347625AC2592FC721B1C9E4DE195C07210.pdf</a>
2015-2016	University of Technology Sydney	Can endemic Lake Macquarie plant species fix heavy metal-contaminated soils?	A wide variety of plant species endemic to the Lake Macquarie region were studied to evaluate their potential to tolerate and absorb soil-borne lead. Species were chosen based on 1) their presence and 2) relative abundance in natural Lake Macquarie bushland sites, as well as 3) the species' commercial availability in local area plant nurseries. These species were considered the most likely to tolerate soil-borne lead and form a viable part of a phytoremediation initiative, if any were found to be effective at absorbing lead. Lead was more readily absorbed into herbaceous native species, including Dianella and Kangaroo Grass, although a few individual Sydney Golden Wattles showed high lead concentrations in the root zone. Species with lower concentrations of lead in tissues included the Forest Red Gum Eucalypt species, and Lomandra. For the most part, Sydney Golden Wattle did not reveal lead stored in above-ground tissues. These latter species are likely excluding lead from their roots as part of a contamination survival strategy. Overall, there is compelling evidence that selected native species, including Dianella, may offer potential as future cost-effective longer-term phytoremediator species, which is a novel discovery for lead management research in Australia.	Dr Megan Phillips	<a href="https://www.lakemac.com.au/downloads/9126669CBB584D62CCE356EDE13093AE8603783E.pdf">https://www.lakemac.com.au/downloads/9126669CBB584D62CCE356EDE13093AE8603783E.pdf</a>
2014-2015	The University of Newcastle	Identifying Squirrel Glider Habitat and Corridors in the Glenrock-Awabakal-Belmont Metahabitat System	The squirrel glider ( <i>Petaurus norfolcensis</i> ) is a threatened species of arboreal marsupial that occupies flowering eucalyptus forests of eastern NSW where it feeds primarily on nectar, pollen and sap from flowering eucalypts, banksia and wattle species, and occupies hollows within eucalypt trees. It is threatened by loss and fragmentation of habitat, including within the eastern Lake Macquarie population occurring on the eastern side of the Pacific Highway that stretches from Glenrock SCA along the Fernleigh Track and associated forest to the Awabakal Reserve system. The squirrel glider is recognised by LMCC as a species of high conservation significance within the LM LGA. In this project, squirrel gliders were surveyed by trapping and utilisation of nest boxes placed throughout the northern areas of the system to the east of the Pacific Highway, primarily in the Glenrock SCA, Awabakal Reserve, and parts of the Fernleigh Track and urban bushland of Whitebridge, Dudley and Dudley Bluff, in the period from June – August, 2015. These areas are under pressure from fragmentation of bushland and squirrel glider corridors through urbanisation, and lack baseline data of the distribution of the glider to inform management actions.	Dr John Clulow	<a href="https://www.lakemac.com.au/downloads/A24CFF0FFEECOB154920D4FD0E568CCCB3D14C6B.pdf">https://www.lakemac.com.au/downloads/A24CFF0FFEECOB154920D4FD0E568CCCB3D14C6B.pdf</a>

2014-2015	University of Wollongong	The use of conservation genetics to determine the level of dispersal and genetic diversity in the Squirrel Glider <i>Petaurus norfolcensis</i> , across varying bushland patch sizes in the Lake Macquarie local government area	The aims of this study were to determine the population density across a range of patch sizes and compare if these have changed compared to the published densities from over 10 years ago in the Lake Macquarie local government area (in Smith and Murray 2003) and collect genetic samples (buccal swabs) from up to 50 individuals from at least 20 survey locations, in order to compare levels of genetic similarity (population genetic structure) and estimates of gene flow (movement of individuals between populations). The research conducted under these aims occurred in two phases. The first aim was elaborated upon in 2016 to assess the effects of habitat fragmentation and vegetation type on elements involved in forest structuring as well as on arboreal marsupial populations, with particular focus on the squirrel glider ( <i>Petaurus norfolcensis</i> Kerr) due to its important, but possibly declining, populations. The study took place in an urban landscape within the Lake Macquarie Local Government Area (LGA). The study investigated four arboreal marsupial species, two disturbance intolerant species, the squirrel glider and sugar glider ( <i>Petaurus breviceps</i> Waterhouse) and two urban tolerant species, the common brushtail possum ( <i>Trichosurus vulpecula</i> Kerr) and common ringtail possum ( <i>Pseudocheirus peregrinus</i> Boddaert). The second aim was undertaken in 2017 and used the squirrel glider DNA samples collected in 2016 (under aim 1) and resampled in places in 2017 combined with DNA samples collected by Dr John Clulow (University of Newcastle) in 2015 for a squirrel glider project funded by Lake Macquarie City Council under this grant scheme. The collected DNA was analysed to understand the genetic diversity and movement patterns (dispersal/gene flow) of squirrel gliders in the LM-LGA. This was conducted to shed light on their population genetic structure across the LM-LGA and to highlight populations that are isolated and would benefit from management interventions assisting with their re-connectivity via revegetation strategies or engineered solutions (ie. glider poles).	Dr Katarina Mikac	<a href="https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=7010&amp;ftype=False">https://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=7010&amp;ftype=False</a>
2014-2015	The University of Newcastle	Mapping immaterial social values associated with Lake Macquarie estuary	This study aimed to facilitate a greater understanding of immaterial values relating to cultural ecosystem services (CES) obtained from Lake Macquarie estuary through the identification and mapping of CES-related values by members of the community. These included: aesthetic, recreational, spiritual/religious, inspirational, educational, social relations, therapeutic, nature, cultural heritage, sense of place/identity, and existence/future values. Mapping these values helps to enhance their visibility and the benefits associated with CES, and resultant maps can be used to help integrate CES into estuary management, as well as planning and development considerations	Ms Carol Martin	<a href="https://www.lakemac.com.au/downloads/55184D373AD76A3435978839B862D40893295872.pdf">https://www.lakemac.com.au/downloads/55184D373AD76A3435978839B862D40893295872.pdf</a>
2014-2015	University of Wollongong	Effective dune restoration to create diverse, functional ecosystems	Dune systems are increasingly threatened by urbanisation on the landward side, and a changing climate on their seaward side. Human pressures include introduced weeds, feral animals, fire, and vegetation damage from trampling by foot-traffic and off-road vehicles. Along Nine Mile Beach historical and current disturbance from sand mining, off-road vehicles (ORVs), pedestrians, fires and weed infestation have reduced biodiversity. This project assessed changes in the stability and the biodiversity of the Nine Mile Beach dune system following nourishment. Ecological monitoring was designed to explore the relationships between disturbance, plant species and invertebrate communities. The study examined the role of coastal vegetation in shaping the morphology and ecology of dune ecosystems, to inform management strategies aimed at preserving dune function.	Dr Belinda Cooke	<a href="http://lakemac.com.au//page.aspx?pid=109&amp;vid=25&amp;fid=6666&amp;ftype=False">http://lakemac.com.au//page.aspx?pid=109&amp;vid=25&amp;fid=6666&amp;ftype=False</a>
2013-2014	The University of Newcastle (Ourimbah)	Spatial and temporal variability of seagrass stable isotope ratios	Estuaries form a link between catchments and the coast and provide numerous ecosystem services. These services include providing nursery habitat and food for recreational or commercial species. Seagrasses are one of the most important habitats in an estuary, however, they are susceptible to nutrient loading. Given the prominence of nitrogen as a nutrient driver of lagoon and estuarine systems, the monitoring of nutrient loads and linking nitrogen inputs to land use patterns in the catchment has become a progressively more focused goal of coastal management. Stable isotopes provide managers with a tool to investigate the incorporation of anthropogenic sources of nitrogen from developed catchments and the major sources of food supporting food webs. This project used stable isotopes of carbon and nitrogen to determine the dominant nutrient inputs to Lake Macquarie, including the seasonal variability and effect of rainfall on nutrient sources. Seagrass from 13 sites in Lake Macquarie were sampled twice per season, and sites near stormwater and sewage overflows were sampled 4, 8, 12 and 20 days post rainfall (>40mm in 24 hours).	Dr Troy Gaston	<a href="https://www.lakemac.com.au/downloads/DC988C079513D498503E8F85EB12C279045565D5.PDF">https://www.lakemac.com.au/downloads/DC988C079513D498503E8F85EB12C279045565D5.PDF</a>
2013-2014	The University of Newcastle	Assessment of the pollination services for the threatened species <i>Grevillea parviflora</i> subspecies <i>parviflora</i> by the native social stingless bees <i>Tetragonula carbonaria</i>	The potential role of the Australian social stingless bee <i>Tetragonula carbonaria</i> in the pollination services of the threatened species <i>Grevillea parviflora</i> subsp. <i>parviflora</i> was examined using palynology techniques and field observations in bushland locations of west Lake Macquarie, New South Wales	Dani Lloyd-Prichard	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5727&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5727&amp;ftype=False</a>
2012-2013	The University of Newcastle	Epifaunal community composition and trophic structure in seagrass beds along a metal contamination gradient in Lake Macquarie	This study characterised the relationship between metal contamination and selected community metrics for benthic epifauna in seagrass beds of Lake Macquarie, NSW. While the effects of metals on sediment dwelling organisms in the lake have been investigated, little is known about how these contaminants impact community structure and ecological function of seagrass beds.	A/Prof Natalie Moltschanivskyj	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5828&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5828&amp;ftype=False</a>
2012-2013	University of Wollongong	A remote camera survey of the Lake Macquarie Local Government Area, targeting the Spotted-Tail Quoll and other mammalian fauna	A project to assess the occurrence and distribution of the Spotted-tailed Quoll and other mammalian fauna throughout the Lake Macquarie Local Government Area, using remote cameras.	Mr Chris McLean Dr Katarina Mikac	<a href="http://lakemac.com.au//page.aspx?pid=109&amp;vid=25&amp;fid=6665&amp;ftype=False">http://lakemac.com.au//page.aspx?pid=109&amp;vid=25&amp;fid=6665&amp;ftype=False</a>

2011-2012	University of Tehnology Sydney	Razor Clams Lake Macquarie: Friend or Foe?	<i>Pinna</i> clams – also known as ‘razor clams’ or ‘razor fish’ – are habitat-forming bivalves that occur within seagrass meadows in many of the world’s oceans. In Lake Macquarie, local residents and recreational users of the Lake have called for removal of <i>Pinna</i> clams from popular swimming areas due to the hazard they pose to water users. Their broad posterior margins are razor-sharp - hence the name ‘razor’. The goal of this study was to: (1) provide baseline data to determine if the distribution and abundance of razor clams in Lake Macquarie increasing, decreasing, or static; and (2) determine whether razor clams offer the Lake Macquarie and its users benefits (specifically improved biodiversity and bioindicator value) that outweigh the safety risks they pose.	Dr Peter Macreadie	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5105&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5105&amp;ftype=False</a>
2011-2012	The University of Newcastle	The movement ecology of Indian Mynas ( <i>Acridotheres tristis</i> ) in Lake Macquarie Council: Assessing Myna Movement Patterns and their Implications for Control Measures	Movement ecology research is not only central to understanding how invasive species persist and spread, it is also of paramount importance to determining when and where control measures should be implemented. The common myna is an introduced avian species that has shown a dramatic increase in population numbers on the East coast of Australia in the past two decades, so much so that it is now the most common species in many coastal cities (Sol et al. 2012) and the target of substantial government and community population control effort. The extent to which it poses a real threat to native wildlife, and other secondary cavity-nesting bird species in particular, is still a matter of a debate. Geographical mapping of mynas has revealed that myna distributions are restricted primarily to urbanized habitats, while many natives appear unable to invade our cities (Sol et al. 2012). These distinct habitat preferences reduce the spatial overlap between common mynas and native avian species, potentially reducing competition. Nevertheless, in pockets of urban development surrounded by bush and open habitat where mynas live in close vicinity to habitats occupied by native avian species, spatial overlap between mynas and natives might be higher and competition greater. Transect data might underestimate the extent to which mynas utilize nearby native bush land. A finer scale analysis of myna spatial movements is needed in these areas to ascertain to what extent mynas consistently spatially segregate from habitats occupied by natives.	Dr Andrea Griffin	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5827&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5827&amp;ftype=False</a>
2010-2011	University of New South Wales	Seagrass trophic interactions in a changing ocean	Seagrass beds in Myuna Bay in Lake Macquarie have been exposed to warming from the Eraring Power Station thermal effluent since 1982, with logged temperatures being consistently 1–3°C higher than background levels from nearby sites since the early 1980s. The temperature increase experienced at Myuna Bay is therefore similar to that predicted to occur globally by 2050. This system thus provides an opportunity to measure the effects of a prolonged, persistent increase in temperature of an ecologically relevant magnitude on the seagrass communities that have adapted to their new conditions, a more realistic representation of climate change impacts on species interactions than short-term thermal stress studies.	Dr Adriana Vergés A/Prof Alistair Poore	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5563&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5563&amp;ftype=False</a>
2010-2011	The University of Newcastle	Assessment of the bioaccumulation of heavy metals in chicken eggs from residential backyards in the Lower Hunter	Soil in urban areas contains the residues of past land-use and practices. Some contaminants can be long lasting and toxic. Urban farming (keeping chickens, vegetable gardening) leads to soil disturbance which can increase exposure of residents to soil contaminants. The main objective of this study was to determine whether keeping chickens on contaminated soil results in contamination of eggs. In particular, we tested for lead, arsenic, cadmium, copper and zinc in soil and eggs from residential chicken coops. There are no Australian guidelines for maximum levels of soil contaminants to safely keep poultry, and no health guidelines in Australia for safe levels of contaminants in eggs. Therefore, the level of contaminants in home-grown eggs was compared to the level in commercial eggs.	Dr Emily Grace Dr Geoff McFarlane	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5104&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5104&amp;ftype=False</a>
2010-2011	The University of Newcastle	Indian Mynah ( <i>Acridotheres tristis</i> ) Population Expansion in the Hunter Region: Underlying Mechanisms and Management Solutions	This study aimed to determine: 1) How Indian mynahs compete for nesting resources, including level of aggression displayed relative to natives, and how successful this aggression is in securing a nesting site. 2) What characteristics of nest sites are preferred by Indian mynahs, including size of nestbox, orientation, level of cover, and height from ground. 3) Whether Indian mynahs will active select nesting sites that appear to be in use by other birds, including removing nesting material and fake eggs in order to use these sites themselves. The main source of data for examining these questions was cameras mounted near artificial nest boxes to capture interactions that occurred.	Miss Kathryn M Haythorpe	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5711&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5711&amp;ftype=False</a>
2010-2011	The University of Newcastle	Determining population sizes of the threatened subshrub, <i>Tetratheca juncea</i> , by genetic profiling	The primary aim of this project was to determine the number of individuals in a study group of <i>Tetratheca juncea</i> by identifying genetically distinct plants (as opposed to clones) based on their DNA. This number was compared to the number of individuals visually estimated for the same study group, to gauge the accuracy of the ‘30cm separation’ rule. The secondary aim of this project was to determine the relative contributions of sexual and asexual recruitment in the study group. This information is needed to assist land managers in providing the right habitat requirements for populations to maintain and replenish themselves.	Dr Carmen Castor Dr Emily Grace	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=4104&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=4104&amp;ftype=False</a>
2008-2009	University of New England NSW Dept of Primary Industries National Marine Science Centre	A Study of Razor Fish in Lake Macquarie	Razor fish are large, filter-feeding bivalves characterised by a thin, wedge-shaped shell, which in its normal living position, can range from partial to almost complete burial in sediment (Fig. 1). In recent years, the occurrence of razor fish in Lake Macquarie has become a topical issue within the local community with a number of concerns continually raised in relation to a perceived increase in their numbers within the Lake and the potential dangers that the sharp-edged posterior margins present to Lake users when walking in the shallows, especially as many of the razor fish are well camouflaged amongst the blades of seagrass.	Mr Jamie Burns	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2775&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2775&amp;ftype=False</a>
2008-2009	Australian Museum	The importance of Lake Macquarie to the conservation of the White-fronted Chat: A saltmarsh bird at risk	The main objective of this project was to determine the distribution and population size of White-fronted Chats in the Lake Macquarie area and the degree to which the extensive saltmarshes associated with the Lake provide habitat continuity sufficient to prevent genetic isolation between populations to the north and south.	Dr Richard Major Dr Rebecca Johnson	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=3389&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=3389&amp;ftype=False</a>

2007-2008	Avondale College	The Importance of a Rocky Reef as a habitat for Fish Assemblages in the Lake Macquarie Estuary	This study investigated the fish assemblages associated with rocky reef habitat throughout the Lake Macquarie estuary. The specific aims of the study were to: (1) determine the importance of rocky reef as a habitat for fishes of Lake Macquarie, (2) investigate changes in rocky reef fish assemblages at increasing distances from the Lake Macquarie inlet, and (3) employ a repeatable monitoring technique to establish comprehensive baseline data for future monitoring of these rocky reef fish assemblages.	Dr Jason Morton Dr William Gladstone	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;id=25&amp;fid=2774&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;id=25&amp;fid=2774&amp;ftype=False</a>
2007-2008	The University of Newcastle	Bell Miner associated dieback in eucalypt forests.	This study was interested in the role of Bell Miners ( <i>Manorina melanophrys</i> ) in Bell Miner Associated Dieback (BMAD), their relationships with tree dieback and psyllids (insects that parasitise eucalypts), and tested the hypothesis that Bell Miners cause eucalypt dieback by protecting or 'farming' sap sucking insects.	Prof Michael Mahony Kathryn Haythorpe	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;id=25&amp;fid=2773&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;id=25&amp;fid=2773&amp;ftype=False</a>
2007-2008	University of Sydney	Determination of the Chronology of Contamination in Lake Macquarie	The current study used a novel technique to provide information on temporal change in the environmental condition of Lake Macquarie on an estuary-wide basis. Surficial sediment metal distributions in the lake, derived from surficial sediment metal surveys undertaken in 1975 and 2003, were combined with <sup>210</sup> Pb activity core profiles to provide historical change and to predict relaxation rates (natural clean up) for the entire water body and not just for the core location.	A/Prof Gavin Birch	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;id=25&amp;fid=5238&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;id=25&amp;fid=5238&amp;ftype=False</a>
2006-2007	Macquarie University Prof Brian Gulson	Chemistry and Morphology of Smelter Slag from the Pasminco Smelter Lake Macquarie	A base metal smelter operated intermittently at Cockle Creek near Boolaroo at the northern end of Lake Macquarie, NSW, Australia, from 1897 until 2003. The smelter ceased operation in September 2003. Smelter process changes introduced in 1961 resulted in the production of a finely granulated slag. Although it contained significant amounts of residual lead (Pb) and zinc (Zn), it was believed that because of its glassy nature this slag was environmentally benign. As a result of this belief and the size and physical properties of the slag, it was freely given away by the smelter operators and was used extensively by both members of the public and municipal authorities. The subsequent realisation that the toxic elements in the slag were environmentally available led to action to restrict its further distribution and to minimise risks to the public and workers. In this current study slag samples were collected from three sites selected to represent known slag deposits in public open spaces and accessible to the community. Samples were collected at 100 mm increments through the slag profile from the surface to the level of the underlying soil.	Anthony Morrison	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;id=25&amp;fid=5818&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;id=25&amp;fid=5818&amp;ftype=False</a>
2006-2007	The University of Newcastle	Mammalian hair as an accumulative bioindicator of metal bioavailability in Australian terrestrial environments	A preliminary assessment of mammalian taxa as bioindicators of heavy metal contaminant availability in areas adjacent to a disused lead and zinc smelter, Lake Macquarie.	Chris McLean	<a href="http://www.lakemac.com.au/downloads/A766C776F6F9FF3C4EE728EBFA383BA5F0FDCD8.pdf">http://www.lakemac.com.au/downloads/A766C776F6F9FF3C4EE728EBFA383BA5F0FDCD8.pdf</a>
2004-2005	East Coast Flora Survey Environmental Consultant, KOTARA NSW 2289	An Assessment of the Vegetation occurring on Coastal Sands at Pelican Flats	Pelican Flats occurs on an area of mainly Holocene sands (old beach landscapes) between Belmont and Swansea. The vegetation in this area has been over-simplified in all regional and sub-regional classifications, yet it supports a diverse range of vegetation communities. This research aimed to classify and map the vegetation of Pelican Flats, with particular regard to assessing the significance of areas characterised by Bangalay ( <i>Eucalyptus botryoides</i> ). This conspicuous canopy species is rare in the region, and occupies highly restricted habitats. In the Gosford and southern Sydney districts, vegetation communities dominated by this species are protected through endangered ecological community listings on the NSW Threatened Species Conservation Act 1995, and it is expected that Lake Macquarie vegetation supporting this species is equally threatened.	Dr Stephen Bell	<a href="http://lakemac.com.au/downloads/73BAF0ADD76032252930B725E138F2F5A9EC4F0.pdf">http://lakemac.com.au/downloads/73BAF0ADD76032252930B725E138F2F5A9EC4F0.pdf</a>
2004-2005	WBM Oceanics and The University of Queensland	Remote Determination of Sediment Transport Rates within Swansea Channel Using a Multi Beam Echo Sounder	The bed of Swansea Channel is constantly changing in response to the flow of water caused by the tides. For more than a century, since the training of the ocean entrance to the Lake, there has been ongoing upstream movement of sand. This sand ultimately comes to rest on the 'Dropover', at the upstream end of Swansea Channel, where it flows into Lake Macquarie	David Wainwright Dean Patterson	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;id=25&amp;fid=5237&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;id=25&amp;fid=5237&amp;ftype=False</a>
2004-2005	The University of Newcastle	Bacteriological Investigations into Lakeshore Water Quality adjacent to Stormwater Quality Improvement Devices (SQIDs)	Bacteriological investigations associated with stormwater quality improvement devices (SQIDs) 1 Bacteriological Studies in Urban Surface Wetlands for Stormwater Treatment around Lake Macquarie NSW (Paper by H Mendez, P Geary and H Dunstan) presented at the 9th Annual Environmental Postgrad Conference 29 Nov to 2nd Dec 2005 Hobart Tasmania 2 Faecal Contaminatin and Bacterial Source Tracking in Stormwater quality Improvement Devices (SQIDS) around Lake Macquarie NSW. (Paper by H Mendez nd P Geary - submitted March 2005) 3. Surface Wetland for Treatment of Pathogens in Stormwater (Paper by H Mendez, P Geary and H Dunstan) paper presented at 10th Annual SIA NSW Conference on Urban Stormwater Management Paramatta 27-30 June 2006. 4. Die off rates studes of faecal indicator bacteria in storm and estuarine waters (Paper by H Mendez, P Geary and H Dunstan) paper presented at Water 2006 International Water Conference, Auckland, New Zealand 2006 5. Surface Wetlands for the Treatment of Pathogens in Stormwater. Three Case Studies at Lake Macquarie NSW Australia (Paper by H Mendez, P Geary and H Dunstan) presented at the 11th International Conference on Wetland Systems for Water Pollution Control, Indore India November 1-7 2008	Dr Phillip Geary Hisbeth Mendez	<a href="http://www.lakemac.com.au/downloads/Bacteriological_investigations_Studies.pdf">http://www.lakemac.com.au/downloads/Bacteriological_investigations_Studies.pdf</a>
2003-2004	University of Canberra	Establishing biological effects in benthic organisms resulting from exposure to sediment contaminants	Copper (Cu), Zinc (Zn), Arsenic (As), Selenium (Se), Cadmium (Cd) and Lead (Pb) concentrations were measured in surficial sediments and the tissues of the Goby ( <i>Arenigobius frenatus</i> ) collected along a trace metal contamination gradient in Lake Macquarie, NSW. The health of <i>A. frenatus</i> was to be analysed using the neutral red retention assay, an indicator of membrane and lysosomal damage caused by cellular stress. However, time constraints imposed on the study only allowed the technique to be developed and applied to a test species, the freshwater Murray Cod ( <i>Maccullochella peelii peelii</i> ).	Professor William Maher	<a href="http://lakemac.com.au/downloads/83F28D175E34D16E72C7EE1795CF5D0EEBF63C82.pdf">http://lakemac.com.au/downloads/83F28D175E34D16E72C7EE1795CF5D0EEBF63C82.pdf</a>

2002-2003	The University of Newcastle	The Impacts of Jetties on Seagrass in Lake Macquarie	Seagrasses are important to estuary ecosystems because they fulfil some very important ecological functions. Public and privately owned jetties are a common factor of our estuaries. People use them to gain access to deeper water, to tie up boats, and for general relaxation. The impacts of jetties on seagrasses are not well understood because a lack of research in Lake Macquarie or elsewhere in Australia. However, it would be expected that, due to shading seagrass directly below the jetties may be damaged.	Dr William Gladstone	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2769&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2769&amp;ftype=False</a>
2002-2003	The University of Newcastle	Status of the Black Swan ( <i>Cygnus atratus</i> ) and other Waterfowl in Lake Macquarie	The study documented the relative importance for Waterfowl (Anatidae) in Lake Macquarie through: <ul style="list-style-type: none"> <li>• Establishing the historical population status of six common species of waterfowl within the Lake Macquarie catchment.</li> <li>• Determining the current species distribution and relative abundance of six common species within the Lake Macquarie catchment</li> <li>• identifying important habitat variables, which may predict the abundance of common species of waterfowl within Lake Macquarie.</li> </ul>	Dr Geoff MacFarlane Dr Liz Huxtable	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2768&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2768&amp;ftype=False</a>
2002-2003	Australian National University	A Palaeontological Analysis and a Palaeoenvironmental Synthesis of the Upper Permian Insect Beds at Belmont NSW	The Belmont insect beds are the only significant occurrence of fossil insects from the Palaeozoic Era found in Australia. There is one older known Australian fossil insect from the Carboniferous of northern Tasmania. The Belmont insect beds have yielded in excess of 140 species of fossil insects, and the new research and collecting has identified a number of new species of beetles, hoppers and possibly a cricket.	Robert Beattie	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2767&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2767&amp;ftype=False</a>
2001-2002	The University of Newcastle	Diffuse Pollutant Loadings from on-site Wastewater Treatment Systems and other Landuses in the Stony Creek Catchment	Many local waterways are experiencing excessive nutrient and sediment loads, which in a number of cases have caused water management problems including algal blooms, nuisance growth of aquatic plants and decreased water clarity. This project aims to identify the major sources of diffuse pollutants within the Stony creek catchment and determine the relevant contributions of the different land uses to the pollutant loads to the creek and lake itself.	Dr Phillip Geary Kirsty Davies	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2766&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2766&amp;ftype=False</a>
2001-2002	The University of Newcastle	Biomarkers of Heavy Metal Stress in the Red-Fingered Marsh Crab, <i>Sesarma erythroactyla</i> , in Lake Macquarie	The current research aimed to explore development of a biomarker of heavy metal pollution in a saltmarsh crab, the red fingered marsh crab, <i>Sesarma erythroactyla</i> within Lake Macquarie. This project aimed to investigate whether changes in stress enzymes occur in response to environmental heavy metal contamination in this species of crab from locations of Lake Macquarie.	Dr Geoff MacFarlane Prof Robert Toia Dr Maria Schrieder	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2765&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2765&amp;ftype=False</a>
2001-2002	The University of Newcastle	The Powerful Owl — <i>Ninox strenua</i> in Disturbed Environments	The powerful owl is Australia's largest forest owl and is listed as vulnerable in New South Wales. The behavioural pattern of two powerful owl pairs in habitats fragmented and disturbed by human activity have been analysed with particular attention placed on the owls diet, home range, roosting and breeding patterns.	Mr Adam Blundell	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2780&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2780&amp;ftype=False</a>
2000-2001	Key Centre for Biodiversity	Using biodiversity to monitor coastal Landcare management practices	Coastal dunes are a vital part of our coastal environment, providing a barrier against high seas, establishing the movement of sand and are great places to visit. Dunes are sensitive habitats that are easily disturbed and invaded by exotic plants, especially bitou bush and consequently many sites have become degraded. Over many years the city of lake macquarie has provided restoration efforts and supported volunteer groups in efforts to stabilise and restore dune habitats. The research project was designed to assess the value of the restoration effort by using biodiversity to monitor dune habitats.	Dr J Mark Dangerfield	<a href="http://lakemac.com.au/downloads/960A4C6A3D43C3F29F46860ED4E29768D56B81D2.pdf">http://lakemac.com.au/downloads/960A4C6A3D43C3F29F46860ED4E29768D56B81D2.pdf</a>
2000-2001	Eastcoast Flora Survey Environmental Consultan Kotara NSW	Demography and Conservation Status of Selected <i>Acacia bynoeana</i> Populations within the Lake Macquarie LGA	Lake Macquarie Local Government Area was discovered to support nearly 3000 plants of tiny wattle, with one location in Lake Macquarie state reservation area supporting over 1600 plants, clearly exceeding previous estimate of the entire State. Several populations each exceeding 200 plants occur in the undeveloped land between Morisset and Wyee, with this area representing nearly 90% of the entire population on the central coast.	Dr Stephen Bell Colin Driscoll	<a href="http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2763&amp;ftype=False">http://lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=2763&amp;ftype=False</a>
1999-2000	Eastcoast Flora Survey Environmental Consultant Kotara NSW	Distribution, habitat and conservation status of <i>Macrozamia flexuosa</i> in Lake Macquarie Local Government Area and the lower Hunter Valley of New South Wales	<i>Macrozamia flexuosa</i> (Zamiaceae) is a rare cycad endemic to the Hunter Region of New South Wales. Several populations are known from Lake Macquarie local government area, although little other information is available on the species. This project assessed the distribution and habitat of <i>Macrozamia flexuosa</i> within Lake Macquarie (principally the eastern portions under most development pressure), and for contextual analysis also examined the available data across the species' entire distributional range (Bulahdelah to Wyong).	Dr Stephen Bell	<a href="http://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5874&amp;ftype=False">http://www.lakemac.com.au/page.aspx?pid=109&amp;vid=25&amp;fid=5874&amp;ftype=False</a>