



laboratory capability statement

frc environmental has the expertise and experience to deliver insight across the full range of aquatic environments, from freshwater and estuarine to marine ecosystems. Our wide-ranging capabilities in survey, assessment, management, monitoring and reporting enable us to give you absolute clarity and the confidence for action.

If it involves water, it involves frc environmental.

Laboratory Capability Statement

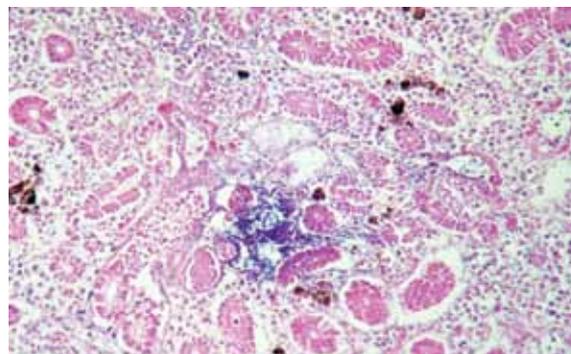
frc environmental's purpose built bio-laboratory enables us to offer a comprehensive range of services, with rapid turn-around and full quality assurance / quality control services. Our specialists can transform samples into meaningful, clearly articulated results that add value to our clients' reporting and provide them with information that can directly support confident environmental management.

Key Skills Summary:

Freshwater, Estuarine and Marine Macroinvertebrates

Aquatic macroinvertebrates are often used in biological monitoring as they are widespread; occupy many different niches and are an integral part of the food web; are sensitive to the effects of surrounding land uses such as turbidity, eutrophication, increased salinity and high toxicant levels; and have relatively long life-cycles. The effects of changes on populations can be long lasting; and impacts can therefore be detected for some time after they occur.

frc environmental has a broad range of experience in using macroinvertebrates as indicators of ecosystem health. In particular, our ecologists are AusRivAS accredited and highly experienced in freshwater, estuarine, and marine macroinvertebrate identifications to species level. The scientific team at **frc environmental** can collect, store, sort, identify, calculate indices, carry out AusRivAS modelling and interpret macroinvertebrate community structure. Our proven expertise and efficiency in this area has encouraged both local and interstate consultancies to subcontract their macroinvertebrate work to us. We enjoy these ongoing partnerships.



frc environmental's in-depth knowledge makes us experts at fish autopsy and pathology for the investigation of fish kills



Sorted macroinvertebrates ready for identification by our laboratory professionals

"frc environmental continues to provide us with quality data which is presented in such a format that makes analysis very quick and convenient at our end. It has been such a pleasure dealing with a team who can do the job so well and so efficiently..."

Sarah Bloggs,
Sinclair Knight Merz

Ecotoxicology Bioassay Experiments

frc environmental's laboratory conducts ecotoxicology bioassay experiments (or Direct Toxicity Assessments) using standard and site-relevant taxa to assess toxicity, provide clear evidence of the likely impact (or lack of impact) of pollutants on key elements of a potentially impacted ecosystem.

Combined with *in situ* bioassays and surveys, this provides the most rigorous assessment of actual environmental harm. We offer a full range of services from laboratory and *in situ* ecotoxicology bioassay experiments using a variety of flora and fauna, interpretation of results and reporting.

Laboratory Capabilities

Our in-house services include:

- Identification of:
 - freshwater, estuarine and marine macro- and microinvertebrates (our staff are AusRivAS accredited)
 - fish (including life history stage, sex and condition)
 - phytoplankton and zooplankton
 - diatoms and periphyton
 - cyanobacteria (blue-green algae)
 - stygofauna (ground water / hyporheic fauna)
 - seagrasses, mangroves and saltmarsh plants
 - macroalgae, freshwater macrophytes and wetland plants, filamentous microalgae
 - corals and associated epi-benthos (including photo identification and enumeration using Coral Point Count)
- ecotoxicology bioassay experiments (Direct Toxicity Assessments, including *in situ* experiments)
- stable isotope preparation and analysis
- sediment testing, interpretation and analysis
- fish autopsy and pathology for investigation of fish kills
- analysis of ecological data including SIGNAL2, PET, Richness, trophic structure, ANOVA, MANOVA, SIMPER, non-metric multidimensional scaling (nMDS), ANOSIM, SIMPER, BIOENV, RELATE, CLUSTER etc.
- comparison of data to standards and guidelines including ANZECC & ARMCANZ, Queensland Water Quality Guidelines, Local and Regional Evs and WQOs (under the EPP Water), National Assessment Guidelines for Dredging, QASSIT Acid Sulfate Soil Guidelines and Publications, NEPC Guidelines for soil, Queensland Contaminated Land Guidelines
- Database searches to locate regionally-relevant information including CHRIS web, Protected Matters Search Tool (EPBC Act), Wildlife Online (NC Act), IUCN Redlist, Queensland Museum database, Springs of Queensland database, DERM WetlandMaps, DERM and EHMP biological monitoring data etc.), and
- intelligent interpretation of data and clear reporting of results

Stable Isotope Analyses

Plants and animals contain two atomic forms of the element nitrogen; ^{14}N and to a lesser extent the heavier form ^{15}N . The ratio of ^{15}N to ^{14}N in aquatic plants and animals (e.g. oysters) can be used to infer the relative uptake of nutrients derived from sewage and stormwater. We offer a comprehensive sample preparation and analysis service to determine stable isotope ratios in plant or animal tissue.

Data entry, analysis and interpretation

An integral component of the services **frc environmental** offers is data analysis and interpretation, which is carried out by our experienced ecologists while adhering to rigorous quality assurance / quality control protocols.

Project Profile:

Mt. Cuthbert Copper Mine Ecosystem Recovery Monitoring Program, Parsons Brinkerhoff on behalf of Matrix Metals

frc environmental was commissioned to assess aquatic ecosystem health downstream of several unintentional flood-related discharges from a copper mine. We completed *in situ* ecotoxicology bioassay experiments on site-relevant fauna and laboratory experiments on standard flora and fauna in accordance with the ANZECC & ARMCANZ guidelines to evaluate the potential impacts of the discharge on local receiving waters. The results were intelligently interpreted to effectively support remediation negotiations with the Department of Environment and Resource Management.

industry experience

- Ports & Maritime Operations
- Mining, Oil & Gas
- Linear Infrastructure
- Power Generation & Distribution
- Waste Management
- Water Infrastructure
- Effluent Infrastructure
- Urban, Industrial & Agricultural Development
- Government
- International Development & Aid
- Fisheries & Aquaculture
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