

Capability funding

Capability funding is provided to Crown Research Institutes (CRIs) through the Ministry of Research, Science & Technology to support and enhance long-term research capability. Each CRI's capability funding is based on its proportion of the total government research investment. In 2006–07, NIWA received \$9.09 million (excluding GST) in capability funding and used it to support over 147 scientific projects.

Better paua culture

Paua is one of the new high value New Zealand aquaculture species NIWA is developing to help build a billion dollar industry. We have used capability funding to investigate a range of key water quality and husbandry issues and improve the performance of paua culture systems.

Carbon dioxide build-up in recirculation systems is a problem because it makes the water more acid, eroding paua shells. We measured and modelled various degassing techniques in order to design systems that will meet the very high water quality demands of paua.

Plentiful supplies of cheap seed are essential to support the paua industry. To maximise production of seed, NIWA scientists isolated a range of naturally-occurring algae to provide a settlement surface and first feed for paua. The new algae provided higher settlement and growth rates of paua larvae than algae previously used by the industry. We've also made significant improvements in growth and feed consumption of young paua by defining and applying appropriate rearing regimes.

Selective breeding offers significant potential for improving growth rates and product quality in paua. We have developed a selective breeding strategy for paua that will provide industry with a higher performing stock.

	\$'000 (excl GST)	Percentage
Support core skill bases that are at or below critical mass	352	4
Advance new areas of science and innovation	3,745	41
Increase the transfer of science to end-users	1,141	13
Build future research capacity in areas of high national need	2,045	22
Bridge the gap between research and commercialisation of new products	1,811	20



Alan Blacklock, NIWA



Jordy Hendriks, NIWA

The NIWA snow model

Capability funding is helping NIWA develop the first physically realistic snow model for New Zealand.

The model will improve our predictions of stream flow in snowmelt-dominated basins – especially important for irrigation and hydro-power. It will also provide more detail on how climate change could affect water resources.

New Zealand has unusual snow conditions, with a maritime rather than continental climate. So, for example, a typical overseas snow model works adequately by assuming that temperature drives snowmelt, but here weather patterns like northwest storms are also important. This year we used capability funding to bring snow expert Dr Andrew Slater of the University of Colorado to New Zealand. Dr Slater worked with NIWA to develop an 'energy balance' approach which simulates the snowmelt processes in New Zealand.

The NIWA snow model is now being tested for two New Zealand basins (Camp Stream in the Craigieburn Range, and the Jollie Basin near Aoraki Mt Cook).

Additional funding came from the Foundation for Research, Science & Technology, NOAA, and NASA.

Hayden McDermott and Martyn Clark making snow measurements in Pinnacle Stream in the Upper Jollie River basin.

Capabilities maintained, enhanced, or developed with Capability Fund in 2006–07 include:

Areas of nationally recognised expertise	Forecast	Achievements
<i>Sustainability of freshwater environments & resources</i>	<ul style="list-style-type: none"> ■ maintain national capabilities in lake and wastewater sciences ■ support seven postdoctoral fellows in key areas of increasing stakeholder need (water allocation, water-borne pathogens, contaminant modelling) ■ further develop freshwater modelling capabilities and user-friendly decision support systems ■ develop new tools for real-time environmental data capture, transfer, and forecasting systems 	<ul style="list-style-type: none"> ■ research on development of lake processes models and faecal contamination of streams ■ postdoctoral fellows supported to study catchment modelling, nutrient processing, snow and ice dynamics, effects of irrigation, aquatic communities of river floodplains, freshwater fisheries, and water extraction ■ research on development of next generation sediment and solute transport models ■ projects initiated to develop new flow metering and environmental monitoring instrumentation
<i>Sustainability of nearshore marine environments & resources</i>	<ul style="list-style-type: none"> ■ maintain critical mass in key areas of coastal hydrodynamics and nearshore ecology through support of two postdoctoral staff ■ strengthen understanding of interactions between coastal aquaculture and land-derived contamination ■ develop shellfish rehabilitation techniques 	<ul style="list-style-type: none"> ■ postdoctoral fellows supported to improve coastal hydrodynamic models and study human impacts on rocky reef communities ■ researched microbial contamination of shellfish in relation to water quality for harvest criteria ■ determined the effectiveness of estuarine remediation measures
<i>Sustainability of oceanic environments & resources</i>	<ul style="list-style-type: none"> ■ support cross-agency initiative for Ocean Survey 20/20 to proceed and inform ocean policy ■ maintain national capability in ocean geology ■ maintain strong links with international science programmes in ocean ecosystem and biogeochemical research 	<ul style="list-style-type: none"> ■ co-funded with government agencies Ocean Survey 20/20 voyage to the Challenger Plateau ■ identified earthquake sources in submarine fault zones, and quantified geomorphic processes along the active continental margin ■ supported the IMBER (Integrated Marine Biogeochemistry & Ecosystems Research) programme
<i>Fisheries</i>	<ul style="list-style-type: none"> ■ strengthen capability in key areas of demand, especially fisheries population modelling and ecological impacts modelling ■ re-develop our software systems for gathering, storing, and interrogating our fisheries data ■ develop training courses to enable stakeholders to better participate in fishery management and research planning 	<ul style="list-style-type: none"> ■ analysed population dynamics of toheroa and reviewed techniques for studying fish behaviour ■ software enhanced for catch/effort and trawl survey age/length data acquisition, storage, and processing, including CASAL model modules ■ held industry workshops and participated in research planning meetings of the Ministry of Fisheries
<i>Māori development</i>	<ul style="list-style-type: none"> ■ promote value of new web-based tools for resource management and new species aquaculture opportunities relevant to Māori ■ strengthen capability of staff to interact effectively with Māori ■ enhance capability of Māori staff by supporting visiting experts in the use of traditional knowledge ■ enhance capability in assessing customary fisheries resources and kaimoana 	<ul style="list-style-type: none"> ■ promoted web-based eel support tool for customary fisheries management ■ staff participated in four noho marae ■ hosted management experts from the Hawaiian Papahānaumokuākea Marine National Monument ■ reviewed the utility of a kaimoana monitoring kit and ran a national customary fisheries workshop
<i>Mitigating human impacts on the atmosphere</i>	<ul style="list-style-type: none"> ■ develop novel technologies to quantify and source greenhouse gas emissions ■ support a postdoctoral fellow to attain critical mass in atmospheric chemistry and modelling ■ re-build capability in air quality modelling and real-time display 	<ul style="list-style-type: none"> ■ evaluated new technologies for validating farm-scale greenhouse gas emissions ■ supported postdoctoral fellow to model the role of atmospheric chemistry in climate change ■ mobile vehicle-mounted particulate monitors evaluated
<i>Natural hazards</i>	<ul style="list-style-type: none"> ■ strengthen capabilities in coastal hazard modelling and risk assessment ■ strengthen capability in the use of satellite remote sensed data and the supply of near real-time products 	<ul style="list-style-type: none"> ■ enhanced the RiCOM model for real-time sea state forecasting ■ new X-band reception facility implemented for receiving satellite remote sensed data for atmospheric and marine environments
<i>Climate variability & change</i>	<ul style="list-style-type: none"> ■ enhance capability in assessing climate extremes ■ build short-term climate outlooks and create new products with strong user orientation ■ produce monthly climate summaries and outlooks and disseminate via television, radio, internet, public presentations, and <i>The Climate Update</i> 	<ul style="list-style-type: none"> ■ recruited expertise to research extreme climate events and quantify extreme occurrences in regional climate model outputs ■ new Climate Explorer products developed and promoted ■ monthly climate summaries and outlooks disseminated in over 100 media interactions, publications, and presentations
<i>Aquaculture & natural products</i>	<ul style="list-style-type: none"> ■ develop commercial-scale trials on a new species with partners ■ recruit new staff to enhance capability in added-value product development ■ conduct proof-of-concept studies on an added-value product opportunity 	<ul style="list-style-type: none"> ■ improved the efficiency and volume of large-scale kingfish fingerling rearing from eggs ■ recruited postdoctoral fellow to research aqua-feed additives and feed products ■ proof-of-concept study conducted for a novel probiotic for finfish disease control
<i>Aquatic biodiversity & biosecurity</i>	<ul style="list-style-type: none"> ■ maintain core skills in marine and freshwater taxonomy and freshwater biosecurity ■ increase staff skills in taxonomy through training courses ■ build capability associated with predicting future biodiversity and bio-invasion spread 	<ul style="list-style-type: none"> ■ completed studies on freshwater fish biosystematics and biogeography ■ four staff trained offshore in invertebrate parataxonomy (amphipods, echinoids, algae, asteroids) ■ study initiated on ecological methods for the control of <i>Didymosphenia geminata</i>