OBJECTIVES

- to communicate and promote the value of research to the community, champion our leadership role and benchmark our activities against the highest international standards
- to collaborate with government, business and international bodies, increase funding from all sources and boost postgraduate numbers to 25 percent of all students

KEY RESULTS

- second nationally in the Research Quantum
- new biotech companies and multi-million-dollar deals allied to the IMB
- ARC Special Research Centres in genomics and quantum computing
- highest proportion of major grant-winning projects headed by women
- equal top nationally for PhD completions

OUTLOOK

- increasing focus on internationalism as a status indicator for Australian universities
- more commercialisation of intellectual property and research outcomes
- targeted partnerships with industry, commerce and the professions
- postgraduate courses tailored to industry, community and professional needs

THE YEAR AHEAD

- new facilities including two CRCs, for Coal in Sustainable Development and for Chronic Inflammatory Disease
- more collaborations with business and industry

The recently-published mapping of the human genome launched a voyage of discovery – and the Institute for Molecular Bioscience (IMB), our $105 million joint initiative with the CSIRO, will be Australia’s main navigation tool.

The map is the key to understanding the genetic basis of life. It will boost knowledge of evolution and biodiversity on this planet, and help unravel the role of genetics in health, disease, intellectual potential and behaviour.

The IMB comprises our Centre for Molecular and Cellular Biology, our Centre for Drug Design and Development, and elements from our Centre for Microscopy and Microanalysis, Advanced Computational Modelling Centre and various other laboratories.

The Institute was launched officially on January 1, 2000. By 2002, it will house about 700 scientists and supporting staff in a state-of-the-art 35,000sqm complex now being built on our St Lucia campus (see page 43). The CSIRO will have a $50 million research centre there, and other organisations and businesses with stakes in advanced biological research and biotechnology are also expected to move in.

This year, our Vice-Chancellor accepted $3.75 million from the Queensland Government as the first instalment of its decade-long commitment to the Institute’s operational costs, and we launched the first spin-off companies (see page 29).

The IMB will generate significant economic returns with many new jobs in biotechnology. In the USA, more than 150,000 people work in the industry with more than US$10 billion a year invested in research and development.

Spin-off companies will also lead to high-export growth-oriented industries. The international pharmaceutical market for new products alone is worth an estimated $US25 billion per year.
LEADING THE FIELD

We again placed second nationally (behind the University of Melbourne) in the 2000 Research Quantum, the Federal Government’s annual funds allocation based on overall research performance. This, plus our continuing success in national grants rounds, confirmed our role as a leading research institution among the nation’s 39 universities.

Our researchers topped the nation in the Australian Research Council’s (ARC’s) Research Infrastructure Equipment and Facilities (RIEF) scheme with seven grants valued at $2.77 million.

RIEF encourages large-scale collaborations between universities and the private and public sectors and this year funded 70 projects worth $21.7 million. Our share was nearly 13 percent of this total, and 55 percent of all awards to Queensland projects.

FIVE-STAR PERFORMANCE

We won the highest five-star rating for research performance (Research Quantum) and the best overall rating in Queensland in the 2001 Good Universities Guide to Universities, TAFEs and Private Providers published this year (see page 11). The Guide notes our internationally-significant IMB, our role as one of Australia’s biggest producers of PhDs and our high ranking on all research indicators.

We play a major role in the Cooperative Research Centre (CRC) program, with core or supporting partner status in 17 of the national total of 42 CRCs. Our core partnerships include the CRC for Alloy and Solidification Technology and the CRC for International Food Manufacture and Packaging Service.

ARC ENDORSEMENT

Overall ARC results for 2000 showed that the “Big Four” universities (the Universities of Melbourne, Sydney, New South Wales and Queensland) continued to dominate all schemes.

We shared in more than $7 million funding for Special Research Centres (SRCs).

We are the only participant in the SRC for Functional and Applied Genomics (the study of the total genetic content of living organisms), with $3.6 million confirmed for the first three years of a nine-year term. The SRC will focus on computational biology, gene discovery, functional analysis, structural biology and biological chemistry, with the aim of understanding complex vertebrate biology and developing new industries.

We also joined the $3.48 million funding for SRC for Quantum Computer Technology, likely to position Australia internationally in developing quantum computers. These will enable complex calculations in seconds, rather than weeks. The University of New South Wales heads the Centre and the University of Melbourne is also a partner.

Our other ARC coups included the following:

- third place nationally in the Strategic Partnerships with Industry – Research and Training (SPIRT) scheme with 28 new grants valued at $1.3 million over three years (total funding $3.7 million);
- fourth nationally in the ARC Large Grants scheme with 48 new grants valued at $2.5 million (total funding $7.2 million over three years);
- fourth nationally in the ARC Small Grants scheme with 135 grants worth $2.365 million; and
- one ARC Senior Research Fellowship (see page 26), five Australian Research Fellowships/Queen Elizabeth II Fellowships/Australian Postdoctoral Research Fellowships, and five reserve fellowships.

LION’S SHARE OF RIEF GRANTS INCLUDED:

- $600,000 for two items of magnetic resonance gear (Centre for Magnetic Resonance);
- $750,000 for an Australian Solid Earth Simulator (Earth Sciences, see page 26); and
- $600,000 for a high-performance screening facility (Chemistry, in conjunction with Griffith University).

NHMRC NEW GRANTS 2000

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RESEARCH QUANTUM ALLOCATIONS 1996 - 2000 ($millions)

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2000 RIEF GRANTS

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HAIL NEW FELLOWS

Only 15 ARC Senior Research Fellowships were awarded Australia-wide in 2000. We received one five-year $400,000 award in biomedical engineering, to develop Magnetic Resonance Imaging (MRI) scanners. The project, in our Centre for MRI, is creating faster and more accurate scanners for clinical settings.

Our two largest National Health and Medical Research Council (NHMRC) awards were five-year fellowship project grants for:

- a $1 million study of the function of a muscle-specific cavolar protein, to advance knowledge of muscular dystrophy (IMB/Centre for Microscopy and Microanalysis/Department of Physiology and Pharmacology).
- a $767,000 study investigating the structural basis of direction selectivity in the retina (Vision, Touch and Hearing Research Centre/Department of Physiology and Pharmacology).

NEW VENTURES WITH PARTNERS

Our Centre for Immunology and Cancer Research, which has patented a way to make non-infectious papillomavirus particles as a step towards a vaccine against cervical cancer, received $1 million from the Australian Cancer Research Foundation. The State Government will match our grant of $500,000 to make a total of $2 million to create a state-of-the-art cancer research laboratory at Princess Alexandra hospital.

We joined Silicon Graphics Pty Ltd (SGI) as partners in the Australian Solid Earth Simulator, a multi-million dollar national supercomputer facility for earthquake research. It will be funded by the Federal Government, this University and the University of Western Australia, CSIRO and SGI. The main supercomputer will be in Brisbane.

We celebrated openings of a $1.4 million postharvest office and laboratory complex at the Queensland Department of Primary Industries (QDPI) Gatton Research Station plus renovations to UQ Gatton’s postharvest facilities. This partnership of leading scientists, already the largest of its kind in the State, positions Queensland as a world leader in postharvest technology.

We opened our $2.6 million Moreton Bay Research Station and Study Centre (see page 17), gateway to a huge range of marine flora and fauna in one of the world’s largest estuarine bays. The project was funded by the University, Port of Brisbane Corporation, Consolidated Rutile Limited, the Federal Department of Education, Training and Youth Affairs and Royal Queensland Yacht Squadron.

We established a cryo-EM laboratory for government, industry and University use through our Centre for Microscopy and Microanalysis, with the commissioning of two sensitive instruments worth a total of $2 million. Cryo-EM microscopy determines the high-resolution structure of large macromolecular complexes, and the new laboratory is destined for the IMB complex due for completion in 2002.

ON THE DRAWING BOARD

An Institute for Sustainable Mining was announced with $10 million support from the Queensland Government. The Institute will resemble a Collaborative Research Centre, drawing on our world-class expertise in mining and minerals education and research (see page 30) to conduct projects for Australia’s mining sector.

A centre of excellence in rangeland management, education, training and research will be established at UQ Gatton as part of a projected $9.5 million partnership with Rangelands Australia. The initiative involves pastoralists and Aborigines; mining, tourism, defence and community groups; government agencies; research and teaching institutions.

The UQ Gatton centre will support a national network of up to 25 rangeland centres at other universities and training institutions. The network will deliver on-and-off-line education...
and training and provide urgently-needed specialist skills. We are funding the venture initially in partnership with Meta and Livestock Australia Ltd.

COLLABORATIVE R&D
Research and development partnerships flourished, with results such as:

- a finding that the brain’s computational power involves not only myriad connections between nerve cells but also processing capacity within each cell (our Vision, Touch and Hearing Research Centre, John Curtin School of Medical Research and the Australian National University – published in Science);
- a boost for Australia’s $12 million waxflower industry with delivery to a Brisbane nursery of the world’s first fungus-resistant waxflowers (UQ Gatton, Queensland Department of Primary Industries, Ebonybrook Pty Ltd and Redlands Nursery Pty Ltd);
- a world-first for veterinary science via a drug delivery system involving a single annual injection. This places organic polymer microspheres just under the skin, to release slowly a heartworm preventive in dogs – and the method could prove useful for human drug delivery systems as well (our School of Veterinary Science, American Home Products subsidiary Fort Dodge Australia Pty Ltd, and Manly Road Veterinary Hospital in Brisbane);
- conducting the world’s first trials of a new DNA “fingerprint” test, developed at the University of Leeds, using single cells (such as dandruff or tongue cells on the backs of licked stamps) on samples up to 50 years old. This could bring culprits to justice for long-unsolved crimes (Australian Genome Research Facility and the John Tonge Centre); and
- the discovery that in all animals, the same gene, let-7, triggers growth – knowledge which could ultimately help unravel the causes of human conditions including genetic disorders and cancer (our Zoology and Entomology Department, the Australian National University, Harvard Medical School, University of California Berkeley, California Institute of Technology, Yale University and the University of Basel).

EQUAL OPPORTUNITY
The proportion of women as chief investigators for University of Queensland projects skyrocketed with best-ever gains for NHMRC, SPERT and ARC large grants. Overall, 27.5 percent of our chief investigators this year were women – an increase from 21.6 percent in 1999 and 16.3 percent in 1998. The proportion of women awarded Early Career Researcher Awards also increased from 42.9 percent in 1998 to 55 percent in 2000.

Five of the six (83.3 percent) winners of our own Promoting Women Fellowships have since been promoted within our University and all report significant research progress. We have made 20 awards since 1997 to give women time off from teaching and administrative duties to complete research or special projects.

The Vice-Chancellor’s Strategic Initiative Fund provided $50,000 for three Short PhD Fellowships. Our Re-entry Scholarships and Postdoctoral Re-entry Research Fellowships for Women also helped women whose work and/or family commitments had delayed their postgraduate studies, academic or research careers.

Career horizons, a career-advancement program for women, and the mentoring program also facilitated positive outcomes. For example, two past Career horizons participants are now completing PhDs and mentoring participants say their publications represent tangible outcomes of the process.

ENCOURAGING EXCELLENCE
The Office of Research and Postgraduate Studies launched a database promoting our research capacity and achievements to industry, commerce, government, the media and prospective students. A University first, the yet-to-be-named database includes details of University researchers, centres, facilities, collaborations and consultancies.

Seven early-career researchers received $470,000 in the second round of our UQ Foundation Research Excellence Awards – the first of their kind in Australia. Jointly funded by The University of Queensland Foundation, the Vice-Chancellor’s Strategic Initiative Fund and the Deputy Vice-Chancellor (Research), they reward outstanding performance and leadership potential. Winners were from our Departments of Biochemistry, Human Movement Studies, English, Zoology and Entomology, Mathematics, Geographical Sciences and Planning, and Chemical Engineering.

Faculty research committees allocated $654,520 in Early Career Researcher Grants to launch 38 new projects and boost their chances for external funding. This amount comprised $300,000 from the University’s Research Only Budget (20 grants) and $354,520 from the ARC Small Grants scheme (18 grants).
World Firsts for Science
Research outcomes of global significance included:
- developing a genetic test for determining an individual’s susceptibility to skin cancer (IMB – published in American Journal of Human Genetics);
- discovering the world’s deepest mantle rocks on Solomon Island, Malaita. Originating from 400-670km beneath Earth’s surface, they indicate the nature and origin of the transition zone between upper and lower mantles – information previously accessible only through seismic imaging (our Earth Sciences Department and the Earth Sciences Department at the University of California Santa Cruz – published in Science);
- applying linear optics to quantum computation – a leap forward in the quest to build computers at the level of single atoms and single electrons (our Centre for Quantum Computer Technology and Los Alamos National Laborator, USA); and
- patenting a technique for more effective, less-invasive heart bypass surgery, using artificial arteries “grown” inside patients’ bodies prior to surgery – relevant to more than 17,000 patients in Australia each year (Centre for Research in Vascular Biology, Anatomical Sciences Department).

Protecting Global Environments
Our researchers worked with colleagues on ways to meet the world’s needs while preserving its natural resources. Their efforts achieved:
- patents for an environmentally-friendly melt protection system for molten magnesium, likely to eliminate greenhouse gas emissions equivalent to more than five million tonnes of carbon dioxide per annum (Cooperative Research Centre for Cast Metals Manufacturing, Australian Magnesium Corporation and CSIRO); and
- a boost for forests in the Philippines (and eventually in Australia) with a package of nursery techniques for achieving hardy stock, weed control, fire-resistant species and better plant nutrition. This redresses environmental harm following logging which has reduced forest coverage in the Philippines to 18 percent from the 57 percent in 1934 (our scientists, working with Queensland Forestry Research Institute, Australian Tree Seed Centre, Philippines Council for Agriculture and Forestry Research and Research Development, Visayas State College of Agriculture at Leyte, University of the Philippines at Los Banos, National Institute of Molecular Biology and Biotechnology and five plantation companies - Bukidnon Forests Incorporated (BFI), Provident Tree Farm Incorporated (PTFI), C.Alcantara and Sons (CASI), Paper Industries Corporation of the Philippines (PICOP) and Aqua Industries)

Departmental research projects also addressed environmental concerns such as the following.
- Two projects seeking solutions to world-wide agricultural problems each attracted $5 million R&D funding from venture capital company BioScience Australia to commercialise the results of their work. One involves a study of stresses imposed by climate and soil (School of Land and Food Sciences, St Lucia), and the other a study of botanical pesticides (School of Agriculture and Horticulture, UQ Gatton).
- A team of chemical engineers devised a catalyst for small-scale conversion of greenhouse gases to methanol – and received the first $5000 of a $100,000 allocation from the Queensland Sustainable Innovation Fund.

Countering the Threat of Noxious Weeds... PhD Student Bertie Hennecke,
A Biological Control Officer for the N.T. Department of Primary Industry and Fisheries in Darwin, studies the efficacy of biological controls in combating Mimosa pigra the American shrub, introduced in 1870, is choking 800SQ KM of N.T.’s wetlands and conservation areas.
RELEVANT RESEARCH – COMMERCIAL RETURNS

Commercial income is becoming increasingly important to us, and this year UniQuest Pty Limited, our technology commercialisation and consulting company, generated more than $30 million in revenue. Activities included commercialising and patenting research outcomes and managing projects for international agencies such as AusAID, the Asian Development Bank, World Bank and the United Nations.

UniQuest payments and provisions for payments to the University, staff and students totalled about $18 million. This included income from intellectual property commercialisation, research contracts and consulting.

The year’s highlights included:

- the spin-off of NanoChem, a company to develop and commercialise a suite of products from UniQuest’s former Advanced Ceramics Development Division;
- completion of the Xenome and Promics start-ups;
- capital-raising on behalf of the IMB-in-formation;
- major research contracts with CSL, Sigma, SmithKline Beecham, Colgate, and General Electric; and
- management of the Comquest group (see page 5), which is operating profitably and will donate $1.5 million to the University in 2001.

UniQuest joined forces with Melbourne Enterprises International (MEI), the commercialisation arm for the University of Melbourne, to establish UniSeed Pty Ltd, an early stage seed venture capital fund. The company will invest in promising technologies, projects and ventures from the two universities.

Areas of interest include IT&T, the Internet, multi-media, biotechnology, health sciences, medical instruments and equipment, new materials, engineering, agriculture, mining and other technology sectors.

CITR Pty Ltd, formed in 1986 to create and commercialise intellectual property, is wholly owned by the University. Based in Brisbane, it is a world-class software development and products company for the telecommunications, Internet and government markets and its revenue this year was $10.2 million.

CITR’s new DECADE AccessPoint portal product was very successful during 2000 in the emerging eGovernment market, winning key clients such as Department of Industry Science and Resources, Department of Finance and Administration, CentreLink, and Queensland State Government.

In the telecommunications sector, CITR delivered innovative online services in Australia (such as Telstra’s Call Preview service and RequestDSL’s Online Business service) and developed new network and element management products for U.S.-based network equipment vendors NEC, HP and Tantivy.

IMB COMPANIES TAKE THE STAGE

We worked with the Queensland Government to launch a cluster of new biotechnology companies and multi-million-dollar deals associated with the IMB (see page 24). The key commercialisation company, IMBcom, will help commercialise research outcomes and foster more spin-off companies like the following, which were launched this year.

- Promics Pty Ltd, established with a $3 million investment from venture capitalists Start-up Australia of Sydney and Rothschilds Bioscience Managers, will commercialise novel technology developed within a key IMB research group targeting a range of inflammatory disorders.
- Xenome Ltd drew $2 million from publicly-listed company Medica Holdings Limited to find new pain-relievers. Xenome is a pharmaceutical research and development company developing novel bioactive peptides from the venoms of Australian animals, particularly marine cone shells and spiders.
- Genset Pacific Pty Ltd represents a merger of Pacific Oligos Pty Ltd, an earlier UniQuest spin-off company from

RECOGNITION FOR RESEARCHERS INCLUDED...

- Fellow, Australian Society of Animal Production (Professor John Ternouth)
- Honorary Life Membership, Down Syndrome Association of Queensland Inc (Dr Anne Jabling)
- Honorary Fellow, American Ornithologists’ Union (Emeritus Professor Jiro Kikkawa)
- Fellow, Academy of the Social Sciences in Australia (Professor Cindy Gallois and Emeritus Professor John Holmes)
- Member, International Communication Association (Professor Cindy Gallois, first Australian member in its 50-year history)
- Inaugural Chief Executive Officer, NHMRC (Professor Alan Pettigrew)
- Life Membership, Manipulative-Physiotherapists Association of Australia (Associate Professor Gwen Jull)
- Chair, Board of Secondary School Studies (Associate Professor Richard Fotheringham)

DR RAVI SOCKALINGAM (THE FIRST PERSON IN THE WORLD KNOWN TO APPLY OTODACOUSTIC EMISSIONS TO DETECT CHANGES IN THE INNER EAR AS EARLY AS FOUR DAYS AFTER CHEMOTHERAPY) TESTS SECOND-YEAR SPEECH PATHOLOGY STUDENT SEONENI LESOLE, FROM BOTSWANA.
the University, with Genset, a French company specialising in genomics and manufacture and distribution of synthetic DNA material.

Alchemia Pty Ltd, a specialist in carbohydrate compounds, was founded in 1995 by researchers including key scientists from the IMB. More than $8 million has been raised from the Australian Technology Group, Medica Holdings, Brisbane venture capitalists Coates-Myer and Co and others. Alchemia scientists have invented an enabling technology related to overcoming infections and diseases such as cancer.

JKMRC BREAKS $10 MILLION MARK

Julius Krutttschnitt Mineral Research Centre (JKMRC) annual revenue for 2000 exceeded $10 million. External industry funding has long been a cornerstone of JKMRC’s success and this year, 81 percent of its research funding came from private industry. Of this, 41 per cent was derived from overseas. The Centre’s commercial division, JKTech, generated significant income from international sources. More than $5 million, half of it from overseas, came from consulting, software and instrument sales. Most overseas revenue came from Chile (23.3 per cent), Papua New Guinea (8.3 per cent) and South Africa (5.8 per cent).

Highlights included the following.

- JKMRC earned $885,000 from commercialisation of the flotation, froth-monitoring system, JKFrothcam. Clients included BHP Minera Escondida in Chile, BHP Coal at Saraji in central Queensland, and the Porgera Joint Venture in PNG.
- The JKMRC P9 project – the world’s longest-running mineral processing research project – won the Business and Higher Education Round Table award for Outstanding Achievement in International Collaborative R&D. Partners include the Mineral Processing Research Unit, University of Cape Town; McGill University, Canada; and AMIRA International.
- More than 350 mining professionals considered 102 papers at the JKMRC-hosted MassMin 2000 Conference in Brisbane.

POSTGRADUATE STUDENTS

Postgraduate numbers (see page 17), were still among the highest for any Australian university, and high employment rates reinforced our reputation for excellent postgraduate training. We awarded 107 research masters and 333 PhD degrees (compared with 104 and 340 respectively the previous year) and continued to be the most efficient (according to the supervisor/student ratio) Australian university in graduating PhD students.

The Graduate School Board, an executive group whose members decide our directions in graduate studies (see page 18), met three times this year and the School welcomed the first Doctoral Development Program students from Danang University (see page 17-18). They took intensive language classes, conducted research under supervision and participated in a choice of transferable skills seminars and workshops.

The School coordinated an activities week and a dedicated workshop involving various University units and hundreds of graduate students, and boosted communications with four editions of Grad Post while increasing the newsletter’s circulation.

The inaugural UQ Excellence in Supervision Awards (see page 16) made our university the first in Australia to encourage supervision excellence with significant grants.

In response to DETYA reports, Emeritus Professor Trevor Heath is compiling a graduate student attrition study for the Graduate School, to discover how many of our PhD students withdraw each year and the reasons why.
POSTGRAD TRAINING OPPORTUNITIES

National performance indices showed a strong postgraduate research position. We won

► the second-highest number (10 percent) of the 300 International Postgraduate Research Scholarships, and
► the third-highest number (more than nine percent) of the 1550 Australian Postgraduate Awards (APA) with stipend.

We supported our postgraduates with initiatives such as:

► HECS exemptions for all (3115) research higher degree students;
► Graduate School scholarships, all at APA rates;
► 14 University of the Year Early Start Scholarships encouraging students to begin research degrees here, before other universities’ scholarship offer rounds;
► 29 Postgraduate Research Scholarships (UQPRS);
► 51 Graduate School Awards to help high-achieving students not eligible for APA/UQPRS;
► almost 80 Graduate School Research Travel awards to facilitate research nationally and overseas; and
► funding assistance for graduate student conferences including the Theoretical Physics Summer School, Brisbane Postgraduate Medical Research Student Conference, Australia-Korea Theological Society Conference, and multidisciplinary Work-in-Progress Conference.

THE YEAR 2001

► We will launch a multi-million-dollar mineral liberation analysis (MLA) facility as a joint initiative of JKMRC, JKTech and FEI (formerly Philips Electron Optics). The MLA, a sophisticated electron beam instrument, assesses the potential loss of valuable mineral particles during mining and mineral processing.

► A new CRC for Coal in Sustainable Development at our University will nurture research in the areas of sustainable impacts, lifecycle assessment, process-technology-systems analysis and waste utilisation.

► The IMB will gain a CRC for Chronic Inflammatory Disease aimed at finding better ways to treat degenerative diseases such as rheumatoid arthritis, chronic obstructive pulmonary disease, inflammatory bowel disease, atherosclerosis and psoriasis.

► We will extend a major consultancy contract between UniQuest and the Australian Defence Department to continue the DefSafe Project, to boost efficiency in procuring defence systems.

► We will take a leading role in Australia’s first Pharmaceutical Centre of Excellence, to be set up in Brisbane as a joint initiative with the State Government.

PHD STUDIES INVESTIGATED TOPICS SUCH AS...

► attitudes to childhood in 19th Century Britain (History);
► migrant students’ acquisition of English (English);
► parental favouritism as an influence on sibling interaction (Psychology);
► knee injuries in netball (Human Movement Studies); and
► Ross River Virus (Tropical Health Program).

RESEARCH INCOME BY SOURCE

(DETYA FINANCIAL & PUBLICATIONS RESEARCH DATA COLLECTION)

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DR INGO ERNST (LEFT), WHO EARNED A PHD THIS YEAR FOR A STUDY OF PARASITES, WORKS WITH DR IAN WHITTINGTON ON REDUCING MORTALITY IN FARMED JAPANESE TABLE FISH – A $150,000 PROJECT BACKED BY COMMERCIAL PARTNER NETRECO AQUACULTURE JAPAN AND FOCUSING ON THE YELLOWTAIL AQUACULTURE INDUSTRY IN SHIKOKU AND KYUSHU.