UNIVERSITY OF ALBERTA

Strategic Research Plan
for
Canada Foundation for Innovation and
Canada Research Chairs Program

May, 2001
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1. Context for the Plan

As evidenced by front-page coverage in the national press and editorials in major journals, research at the University of Alberta is focused and exciting. Advances are being made in important areas, including the treatment of diseases such as cancer, diabetes, hepatitis B, and multiple sclerosis. Developments in plant and animal genomics and proteomics contribute to healthier populations and economic growth. Non-renewable and renewable resources are utilized more effectively and, where possible, renewed. We are gaining a better understanding of the short-run and longer-run effects of human behaviour on our environment, and of our responsibilities to current and future generations. Communications technologies enable information to be gathered and utilized in new and exciting ways. Through all of these advances run challenges to our values and culture, to our quality of life, and to the structure of our society and its governance. These challenges must be addressed in step with advances in all areas of research. This plan recognizes opportunities and addresses challenges.

The strategic research plan at the University of Alberta incorporates a number of important elements:

- It provides leadership in dynamic research areas involving the life sciences, information and communications, new materials, natural resources, nanosciences, and the environment;
- It builds on an understanding of Canada’s, and Alberta’s natural, economic, social, and cultural resources;
- It recognizes areas of identified research strength at the University of Alberta;
- It fosters innovative partnerships with industry, governments (for example, the Greater Edmonton Competitiveness Strategy), other universities and non-government organizations;
- It focuses on priority areas identified by the Province, such as the information and communication technologies and life sciences initiatives of Alberta Innovation and Science, and areas of basic and applied research supported by the Alberta Heritage Foundation for Medical Research (AHFMR), the Alberta Heritage Foundation for Science and Engineering Research (AHFSER) and other agencies;
- It actively engages the priority areas supported by Federal initiatives such as the Canada Foundation for Innovation, Genome Canada, Canadian Institutes of Health Research (CIHR), NSERC, SSHRC, CANARIE, Canadian Light Source, TRIUMF, Networks of Centres of Excellence, and Climate Change; and
- It stimulates a knowledge-intensive society through the education of highly qualified personnel for tomorrow’s global marketplace.
- It relies heavily on the excellence of a library ranked nationally only behind that of the University of Toronto, on one of Canada’s finest research computing infrastructures, and on the continued development of such essential facilities.
This plan is designed to maximize participation by the University in new research developments through multi-disciplinary approaches and linkages in novel projects. For example, the Sustainable Forest Management Network, an NCE headquartered at the University of Alberta, coordinates research in areas as diverse as tree genetics, forest economics, aboriginal impact, climate effects, and water quality engineering both within the University, with other universities across the country, and with the forest industry. The CyberCell initiative of Genome Prairie links strengths in protein structure and function with those in computational sciences. A major nanoscience initiative, working with the National Research Council, crosses areas of engineering, physics and chemistry with research and applications in the medical and pharmaceutical sciences.

The University’s Plan is, and will continue to be, linked to opportunities and successes as they occur. Examples include:

- Commitments by Alberta’s universities (Alberta, Calgary, and Lethbridge) and the province to work together on research programs such as genomics and proteomics, nanoscience, functional foods, information and communication technologies, petroleum and oil sands technologies, and health economics;
- Success in recruiting 500 promising researchers since 1996, and the intellectual leadership they bring to new areas such as genomics, nanoscience, and e-commerce;
- Success in partnerships such as the University of Alberta Campaign (~$200 million raised) and industry/government collaborative programs such as NSERC Industrial Chairs, NCEs and iCORE;
- Success in federal granting programs of CFI, CRCs, and the granting councils.

The introduction of CIHR and Genome Canada as national programs for support of the life sciences and health research, and of AHFSER for provincial support of science and engineering research, provide particularly exciting new opportunities for creative combinations of research expertise that extend into the humanities and social sciences. With the foregoing, as well as the global picture in mind, the University recognizes the need to focus on excellence in selected strategic areas.

2. Core Objectives of the University’s Strategic Plan

The University of Alberta Strategic Plan focuses on seven core objectives:

- building on existing research strengths;
- partnering in innovative ways with the Provincial and Federal governments, industry, and others in developing a knowledge-based economy, thereby maximizing benefits from our natural and human resources;
- expanding interdisciplinary links within the University, and with researchers outside the University;
- maintaining the flexibility to respond to new opportunities;
- maximizing the benefits through effective technology transfer;
• linking research activity and outcomes to the global human context; and
• expanding graduate and undergraduate programs consistent with research strengths.

a) Building on Recognized Strengths. The University will facilitate research initiatives that reinforce and strengthen publicly identified areas of excellence. We are about to conclude, for the third time, a process of identifying research areas at the University of Alberta that are of national and international excellence. Such areas include structural biology (including proteomics and genomics); drug discovery and design; nutrition and metabolism; membrane molecular biology/transport/lipids; neuroscience; islet transplantation; infection/immunity (including viral hepatitis); cardiovascular research; catalytic, interfacial and transport engineering; geotechnical and geoenvironmental engineering; ecosystems management; nanoscience and technology; professional service firm management; and intelligent systems and control. We also have identified international excellence in literary histories and technologies, printmaking, social policy, and transforming research in education. In addition, we will build on existing and emerging strengths in music in performance, health law and policy, plasma science, central and east European studies, past human biology and behaviour, and comparative experimental linguistics. Combining certain of these areas permits initiatives such as CyberCell and the establishment of research clusters in nanoscience and nanotechnology.

b) Partnering Toward a Knowledge-Based Economy. We will work in partnership with governments, industry, and with other universities in Canada and elsewhere on initiatives designed to: (a) increase our knowledge base, (b) encourage the development of knowledge-based industries, (c) improve the productivity and technology of existing and knowledge-intensive resource-based industries, and (d) enhance sustainability and the quality of life. Activity in this area is apparent in the matching funding provided by the Province of Alberta for CFI and NCE proposals, in the level of Canadian and international private support attracted by our researchers and through the University of Alberta Campaign, and in our collaboration with the National Research Council and other agencies and institutions in nanoscience and genomics research.

Increased diversification of the economy includes utilization of knowledge to gain maximum benefit from our natural resources. The ten NSERC Industrial Chairs established since 1996 reflect existing relationships in support of this activity. We will build on these partnerships.

The University is partnering with other universities and research institutions in areas such as proteomics and genomics, functional foods, interfacial and material sciences, information and communications, and environmental research. Several of these areas are part of the nanoscience initiative with NRC. We continually incorporate into these areas the related social, cultural, economic, political, educational and ethical components which need the attention of keen minds.

Industry and inter-institutional partnering is fostered through an Industry Liaison Office that assists researchers in the commercial development of newly-created technologies and other intellectual property. These efforts are significantly increasing the capabilities of established Canadian and international firms and helping to create new ones.
Our collaborative approach has already led to a successful joint Alberta initiative in ICT through the formation of the Multimedia Advanced Computational Infrastructure (MACI) program, and to national initiatives such as the National High Field NMR Centre (NANUC) at the University of Alberta, the Alberta Synchrotron Institute (ASI) as part of the National Synchrotron Facility (Canadian Light Source – CLS), and the National High Energy Physics Facility (TRIUMF) at the University of British Columbia. Each of these provides critical support to identified areas of excellence at the University of Alberta. We will aggressively pursue international as well as national partners.

c) Expanding Interdisciplinary Links. We will foster interdisciplinary research, paying particular attention to innovative initiatives that cross conventional discipline borders. The Health Sciences Council brings together six Faculties with research activities in various disciplines relating to the health and life sciences. Other examples include, health law and health ethics (Faculties of Arts, Law and the Health Sciences Council), mathematical biology (Departments of Mathematical Sciences and Biological Sciences), bio-medical engineering (Faculties of Medicine and Dentistry, Rehabilitation Medicine, and Engineering), knowledge utilization and policy development (Faculties of Nursing and Business), and nanoscience (Faculties of Engineering, Science, and Medicine and Dentistry). A new interdisciplinary science building will facilitate the increased interaction between forefront areas of science. Additional broader interdisciplinary connections are being developed between medical researchers and their colleagues in the social sciences, humanities and fine arts. Research on the North will continue to be pursued across a number of disciplines. These linkages as well as others will grow as we encourage exploration of the social, cultural, economic, educational and political effects of new insights and discoveries in all areas of knowledge.

d) Keeping Flexible. Research fields and the research environment change rapidly, as is shown by the current emphasis on nanoscience, genomic and proteomic research, and ICT. Talented researchers continually develop new areas of enquiry. As we foster excellence we must, and will, position ourselves to take advantage of emerging opportunities. An example is the creation, with the assistance of the provincial and federal governments, of the Institute for Biomolecular Design (IBD), and the development of research in humanities computing. The IBD brings together researchers from several Faculties in a structure that features collaborative research projects using centralized equipment. And humanities computing links our Faculty of Arts with our Faculty of Science.

e) Maximizing Benefits from Technology Transfer. Linking research to economic health and a better quality of life for Canada and the world is an important part of our plan. We continue to expand the NSERC Industrial Chair program and work on similar linkages with governments, the private sector, and other organizations. We will continue to encourage involvement with NCEs and their industrial partners, and with the Canada Research Chairs and University resources to create critical mass in identified areas. Simultaneously, we will commit University resources to, and work to attract additional provincial and federal support for, programs that strengthen our technology transfer capabilities. As part of this focus, the University of Alberta will continue to invest in partnerships with governments and key industries, especially in the life sciences, ICT, material sciences, natural resources, and environmental sectors. We continue to support degree and internship programs that enhance
technology management, high quality personnel (HQP), and an understanding of the social, cultural, economic, and political elements of technological change that affect the human condition.

f) Maintaining Support of Excellence in Humanities, Fine Arts and Social Science Research. Excellence in research/creative activity in the humanities, fine arts, and social sciences is an important institutional goal in itself. We will make strategic decisions to add strength to areas of recognized excellence in the humanities, social sciences, and fine arts, as well as to a number of emerging areas of excellence in these fields. We will also continue to recognize our responsibility to stimulate and support scholarly activities in traditional fields in the humanities, social sciences, and fine arts that are important to society. Furthermore, research in these areas increases understanding of the social, cultural, historical, economic, political, educational, legal, and organizational context in which new scientific knowledge is discovered and applied. Technological advances in the absence of appropriate institutional structures and values contribute far less to greater productivity growth and an improved quality of life. This understanding must also extend to other cultures and nations.

g) Expanding Graduate and Undergraduate Programs Consistent with Research Strengths. Canada must develop highly qualified personnel with the capacity to understand, utilize, and further develop research results that flow from universities. We are committed to expanding our graduate and undergraduate programs in line with the researchers who will serve as effective instructors and mentors for an increased number of highly qualified students.

3. Applying the Core Objectives in Selected Areas

In line with these core objectives, the University will further develop innovative research in the areas of life sciences, information and communication technologies, environmental research, materials sciences and engineering, natural resources, the social sciences, humanities, fine arts, and basic science. We explicitly stress that interaction between these areas, and others, is expected and encouraged. Nanoscience, for example, is a key area that cuts across many disciplines. We are currently working with the National Research Council and the Government of Alberta to establish a Nanosystems Research Institute at the University of Alberta. This Institute will, for example, bring together identified strengths from our Faculties of Science, Engineering, Medicine and Dentistry, Law, and Arts.

Life Sciences. One major area of focus in the life sciences links molecular research to health. A number of established and emerging initiatives provide opportunities to elucidate life at the molecular level and to apply resulting research advances to specific health challenges. Contributing entities include the Institute for Biomolecular Design, Project CyberCell of Genome Prairie/Canada, the Alberta Network for Proteomics Innovation, the Alberta Cancer Board proteomics project, the Institute of Drug Discovery, Development and Assessment, the technology development chemists, the Integrated Nano-Systems Institute, and the computational and bioinformatics platform. Activities in these areas are collaborative and complementary, and also have links to the Institute of Health Economics, small and large “Pharma”, the Northern Alberta Clinical Trials and Research Centre, the Alberta Technology Commercialization
Network, and the Genomics Ethical, Environmental, Legal and Socio-Economic (GELS) research team. A cornerstone of this research focus is the construction of the Health Research Innovation Facility (HRIF) which will house and nurture these multi-disciplinary research approaches.

A second core focus in life sciences is on translational clinical research. This component includes, among others, islet transplantation, viral hepatitis, immunology, structural biology, membrane molecular biology/transport/lipids, neuroscience/neurobiology, cardiovascular studies, pulmonary medicine, rehabilitation, and oncology. These areas each incorporate strong, dynamic groups of basic and clinical scientists involved in research on new treatments for patients with a range of diseases. From the days of JB Collip in the 1920s and his involvement in diabetes research, the University of Alberta has a history of building links that move from basic research to clinical practice. We are committed to maintaining this focus. We have given priority to providing adequate facilities, including a clinical trials center, space in the HRIF, support for CFI applications in coordination with the Alberta Cancer Board and the Capital Health Authority, and in the allocation of Canada Research Chairs. Other prominent areas of life science research focus include health promotion, health law and policy, health economics, health ethics and health issues encountered by special populations and specifically, persons with physical disabilities.

An important complementary health-related area of focus is functional foods and nutriceuticals. This area, centered in the Department of Agricultural, Food & Nutritional Science, includes some proteomics research and complements other work on diabetes. As part of a larger “Food for Health” initiative, it combines researchers from the Faculties of Medicine and Dentistry, Pharmacy and Pharmaceutical Sciences, and Physical Education and Recreation. The University has worked with Alberta Innovation and Science, the Alberta Value-Added Corporation, and industry in establishing research positions and major research facilities in the past two years.

Environmental Research. A close relationship exists between our strengths in life sciences and in environmental research areas such as water quality, natural resource utilization, climate change, agricultural practices, and the protection of species. Environmental, geotechnical and geoenvironmental engineering, along with environmental biology, are established areas of strength at the University of Alberta. Complementary strength is found in the Departments of Renewable Resources, Public Health Sciences and Earth and Atmospheric Sciences. We will maintain and enhance our expertise in water quality, land reclamation and restoration, waste management, sustainable development, and related fields. Major investments have been made to upgrade space for our environmental engineering group. A new Natural Resources Engineering Facility will enable new initiatives of an interdisciplinary nature.

In the Sustainable Forest Management NCE, anthropology, sociology and economics all provide valuable complements to the environmental science and engineering components. Each of these areas is closely linked to key sectors of Alberta’s economy: forestry, oil sands development, and agriculture. The University has made significant investments in this area through the Sustainable Forest Management NCE. Two recent NSERC Industrial Research Chairs have attracted significant industry support, one of two prestigious Killam Memorial Research Chairs is allocated to environmental biology, and a $3 million endowed chair in wildlife biology has been
established. The University will continue to invest and build on its strengths in environmental biology.

**Information and Communications Technologies (ICT).** The University of Alberta is placing major emphasis on establishing and maintaining internationally recognized programs in information and communications research. In conjunction with the Province’s ICT strategy to increase graduate and undergraduate programs and to attract outstanding researchers through the iCORE (Informatics Circle of Research Excellence) initiative, investments are being made and will increase in ICT-related fields such as computing science, electrical engineering, computer engineering, physics, and mathematics. To this end, the University will continue to invest in a state-of-the-art environment to attract and retain the best-qualified scientists to work on fundamental and applied problems in ICT. This initiative is an integral part of several research programs utilizing massive databases in proteomics, bioinformatics, climate change, resource evaluation and utilization, and industrial design. It also builds on linkages with companies that have strong, long-established ties with the University such as TRLabs, Biotools, Syncrude, and Micralyne Inc. An integrated environment is particularly important for the application of ICT in natural resources, health, and related areas. For example, the University is a leader in the development of ICT to allow collaborative health assessment and treatment monitoring through distance linkages incorporating real-time transfer of voice, data, and video information over a single system.

**Materials and Interfaces.** The University has major research strengths in materials and interfacial science and engineering, ranging from expertise in the nature and behavior of substances as diverse as catalysts, soils, construction materials, and biomaterials to the synthesis of new molecules for improved plastics, alloys, electronic components, and fuel cells. Materials and interfacial processes are important to support Canada’s natural resource industries. To develop this base, the University is providing new and continuing faculty with upgraded facilities and instrumentation, especially in science, engineering, and medicine. Interdisciplinary activity in this area is demonstrated by Whitaker Foundation support of programs in biomedical engineering involving researchers from the Faculties of Medicine and Dentistry, Engineering, and Rehabilitation Medicine, and linked with researchers in complementary areas at the University of Calgary. Another is the collaborative work with the University of Calgary to establish joint chairs and programs, with support from Westaim Corporation, in areas of advanced materials and increased support for our Advanced Engineered Materials Centre. These programs will, like others in this plan, produce trained, highly qualified people with specialized knowledge, who are important to the future of Canada.

An important tool for materials research will be the Canadian Light Source, now under construction in Saskatoon. Access to this facility will allow studies of materials as diverse as proteins and alloys; the University has been a leading supporter of this initiative and will use it extensively through the recently established Alberta Synchrotron Institute (ASI).

**Natural Resource Research.** University research assists in the wise use of Canada’s and the world’s renewable and nonrenewable resources. Development of the oil sands depends on efficient creation of synthetic crude from bitumen, the reduction, sequestration, and/or effective use of carbon dioxide, improved land restoration
processes, and understanding the impact of oil sands development on animal and plant life. Similar issues apply in the development of Canada’s vast coal and conventional oil and gas resources. Clean water and clean air are amongst the most valued assets in Alberta and Canada; each will continue as a research focus at this University. Advances in materials and ICT research contribute to effective use of natural resources, whether through improved global information systems or understanding of the physical, chemical, or biological surface properties of materials.

Research in the humanities and social sciences addresses the social, cultural, ethical, economic and political aspects of natural resource development in Canada. The Sustainable Forest Management NCE has focused interdisciplinary teams of researchers on our boreal forests. Similar teams are required to understand and anticipate the impact of oil and gas, mining, agricultural, and other resource developments.

We will develop facilities in Science and Engineering that make possible interdisciplinary work in resource geo-sciences, integrated landscape management, chemical biology, and will strengthen interaction between areas such as geotechnical, geoenvironmental, mining, and water resources engineering.

**Humanities and Social Science Research, and Creative Activity in the Fine Arts.** Social and cultural analysis by social sciences and humanities researchers are essential for a broader understanding of our society and societal consequences of research in the other sciences. The performing and creative arts add enormous wealth to nearly all societies. Furthermore, research and creative activity in the fine arts, humanities, and social sciences directly contribute to improvements in quality of life. In working to further develop the humanities, social sciences, and fine arts, we use the same principles of focus on excellence, selectivity, and partnerships that run throughout the University. We plan to strengthen linkages between the fine arts, humanities, and the social sciences and the strong computing infrastructure that has been established on campus. A new program in humanities computing is one example.

Identified areas of excellence in the humanities, social sciences, and fine arts such as literary histories and technologies, social policy, printmaking, comparative experimental linguistics, and transforming research in education will be further strengthened. Through our Centre for Austrian and Central European Studies and the strengthening of Eastern European and Latin American studies we are developing a major initiative in selected regions of the globe. The University has, through its Orlando project, invested significantly in developing excellence in 18th and 19th century literature and computing for the humanities.

**Pure Science.** In some areas of intellectual endeavor, the University of Alberta has developed and consistently supported strengths that do not fit easily into the above categories. These centre on fundamental, curiosity-driven or insight-inspired topics that do not have obvious applications in life. One such field is pure mathematics. We are actively pursuing, with the University of Calgary and the Pacific Institute for Mathematical Sciences, the establishment of an international center for mathematical research to be located at the Banff Centre; other areas include sub-atomic and space physics. This is not to say that the work done in these fields may not lead to useful discoveries; it has often done so. The applications, however, cannot be predicted.
Examples of exceptional basic research areas include mathematics and black hole physics. Universities have a unique role in supporting such areas because of the development of creative thinking and the training of personnel who will contribute to society in new and unknown ways. We will continue to selectively support such areas of excellence jointly with the Canadian Institute for Advanced Research and other interested parties.

4. Assessing Progress and Success

We will continue our regular process of identifying and publishing our areas of research excellence every three years (the current process will be completed in June, 2001.) As part of this process, we identify those factors by which excellence can be measured in each area. The measures may differ between basic and applied research and between disciplinary research (e.g., in biochemistry and in English). Our assessment will include factors such as: (1) recruitment and retention of outstanding faculty; (2) applications by highly qualified graduate and undergraduate students for admission to programs; (3) awards and recognition to professors and graduate students by their peers; (4) publications and other communications of research results; (5) successful placement of graduates from programs; (6) research funding attracted on a competitive basis; (7) technology transfer and economic benefits through spin-off companies, licensing activities, and links with partners; and, (8) success in all of the foregoing relative to our competitors. The five-year cycle of reviews of our graduate programs and related research, which includes external reviewers, provides a further means of assessing progress.

5. Planning and Approval Process

This plan, like the one submitted in 2000, is based on commitments made by the University, through a series of planning exercises, (1) to a strategic focus on selected research areas, (2) on the application of the research outcomes, and (3) for the provision of highly trained personnel. The planning process has involved a request by the Vice-President (Academic) and Provost for strategic plans from Deans of the Faculties. This research plan, drawing on Faculty plans and University priorities, was initially drafted by the Office of the Vice-President (Research). It was then reviewed by the University Research Policy Committee, chaired by the Vice-President (Research). The revised plan was circulated to the Deans for comment, and was approved by the University’s Academic Planning Committee.
### Appendix A

#### UNIVERSITY OF ALBERTA ALLOCATION
CRC PLAN FOR YEARS 1 TO 3 BY GRANTING COUNCIL
(68 POSITIONS OVER 3 YEARS)
RETENTION IN PARENTHESES

<table>
<thead>
<tr>
<th>Granting Agency</th>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Total CRC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year 1</td>
<td>Year 2</td>
<td>Year 3</td>
</tr>
<tr>
<td>CIHR/MRC</td>
<td>4 (4)</td>
<td>4 (4)</td>
<td>5 (1)</td>
</tr>
<tr>
<td>NSERC</td>
<td>5 (4)</td>
<td>5 (4)</td>
<td>6 (3)</td>
</tr>
<tr>
<td>SSHRC</td>
<td>2 (2)</td>
<td>2 (1)</td>
<td>1 (1)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>11 (10)</td>
<td>11 (9)</td>
<td>12 (5)</td>
</tr>
</tbody>
</table>

| Retention       | 10    | 9     | 5     | 6     | 1     | 1     | 32         |
| Recruitment     | 1     | 2     | 7     | 4     | 10    | 12    | 36         |

Tier 1 (24) of 34 Tier 2 (8) of 34

Note: Year 3 retentions / recruitments are projected

Note: Appendix A and B include the positions allocated over the first three years of the CRC program to support areas identified in this document. This involves 68 of the 126 positions to be allocated to the University of Alberta over five years. Of the 68 allocated to date, 32 have been for purposes of retention and 36 for recruitment.
### UNIVERSITY OF ALBERTA ALLOCATION
CRC PLAN FOR YEARS 1 TO 3 BY AREAS OF FOCUS
(68 POSITIONS OVER 3 YEARS)
RETENTION IN PARENTHESES

<table>
<thead>
<tr>
<th>Areas of Focus *</th>
<th>Tier 1</th>
<th>Tier 2</th>
<th>Total CRC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year 1</td>
<td>Year 2</td>
<td>Year 3</td>
</tr>
<tr>
<td>Life Sciences</td>
<td>5 (5)</td>
<td>5 (5)</td>
<td>4 (1)</td>
</tr>
<tr>
<td>Information Communications Technology (ICT)</td>
<td>2 (1)</td>
<td>0</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Environmental Research</td>
<td>0</td>
<td>2 (1)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Materials and Interfaces</td>
<td>1 (1)</td>
<td>2 (2)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Natural Resources Research</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Humanities and Social Sciences Research and Creative Activity in the Fine Arts</td>
<td>2 (2)</td>
<td>1</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Pure Science</td>
<td>1 (1)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>To be assigned</td>
<td>0</td>
<td>1 (1)</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>11 (10)</td>
<td>11 (9)</td>
<td>12 (5)</td>
</tr>
</tbody>
</table>

**Retention**
10 9 5 6 1 1 = 32

**Recruitment**
1 2 7 4 10 12 = 36

Tier 1 (24) of 34 Tier 2 (8) of 34

* There is overlap in some areas