PBRC Response to Ostrander Letter of 10/08/08

Response to Letter from Vice Chancellor for Research and Graduate Education Gary K. Ostrander to Senate Executive Committee Chair, Dr. Klaus Keil, Concerning the Reorganization of the Activities of the Pacific Biosciences Research Center

Executive Summary

The Pacific Biosciences Research Center (PBRC) is an Organized Research Unit (ORU) that has been targeted for dissolution by the UHM administration. PBRC implements BOR-mandated ORU purposes through its programs in interdisciplinary research and research-based training: the Kewalo Marine Laboratory, the Center for Conservation Research and Training, the Békésy Laboratory of Neurobiology, the Molecular Endocrinology group and the Native Hawaiian Health Research group. The faculty and staff of PBRC oppose the unit’s dissolution. We seek the support of the Mānoa Faculty Senate for our continued productive existence, and at very least for a fair assessment of the Administration’s plan and the following of due process for ORU dissolution. Our response is summarized below.

I. University of Hawaii Policies on Reorganization -- Absence of a Formal Reorganization Proposal

UH General Policy A3.101 mandates preparation of a detailed reorganization proposal with specific components. This has not been provided. These include analysis of need, effectiveness of plan, impacts, derived savings, and supporting attachments. We do not believe that the Administration’s proposal can be fairly assessed without these detailed documents. Authority for dissolution of an ORU rests with the BOR and cannot be delegated (UH Executive Policy E5.213).

II. Response to Ostrander’s Letter of October 8, 2008 to SEC

In his letter to the SEC, Dr. Gary Ostrander presents a misleading view of PBRC, which we dispute in our point-by-point response. He gave little justification for and no assessment of the impact dissolution will have on the research and training capabilities of PBRC faculty as well as on the rest of the University. PBRC can repair its facilities and continue to grow and fulfill its mission with no more University funds than what have already been promised.

III. Contributions and Productivity of PBRC

PBRC is not the moribund unit depicted in Dr. Ostrander’s letter. It conducts internationally-recognized research. It supports core facilities serving both PBRC and the University of Hawaii community. PBRC faculty participate in undergraduate and graduate courses, train graduate students and post-docs, and sponsor unique opportunities for research-based training of undergraduates, primary and secondary school students and minorities. Its contributions go beyond departmentally-confined scientific endeavors, in keeping with its mandate as an ORU.

IV. PBRC’s Vision for the Future

PBRC has presented the Administration with a forward-looking plan for its future contributions to UH and the State. This involves a focus in integrative biodiversity research as a critical area for the future interests of Hawaii. The proposal included appointing a permanent director and filling vacant positions with biodiversity-oriented researchers selected to bridge the areas represented by the three main PBRC units. Without discussing it with PBRC, the plan was dismissed in Ostrander’s letter based on the cost of a useful but non-essential new building.
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PBRC Response

The faculty and staff of the Pacific Biosciences Research Center (PBRC) have prepared this document in response to the letter dated October 8, 2008 from Dr. Gary K. Ostrander, Vice Chancellor for Research and Graduate Education, to Dr. Klaus Keil, Chair of the Senate Executive Committee of the Manoa Faculty Senate, concerning the University of Hawaii at Manoa's decision to dissolve PBRC and transfer its programs to other units.

We believe that PBRC, an organized research unit (ORU) of the University of Hawai‘i at Mānoa (UHM), has continued to fulfill the expectation of an ORU to “foster and support interdisciplinary faculty research activities, and ... assist undergraduate, graduate and postgraduate students by giving them access to research opportunities, facilities and equipment.” We disagree with Dr. Ostrander and Chancellor Hinshaw that dissolving the unit and dispersing its research and training programs, core research support facilities and grants management staff to other units will provide a cost-effective and successful support of research and training at UHM.

I. University of Hawaii Policies on Reorganization—Absence of a Formal Reorganization Proposal

The letter from Vice Chancellor Ostrander to the Chair of the Senate Executive Committee, Dr. Klaus Keil, clearly is not a reorganization proposal under the UH policies delineated below. The PBRC Executive Committee views the letter as an attempt to fulfill the requirement to provide a rationale for reorganization but the letter is by no means a “thorough description of the rationale” as stated in the policy. Furthermore, the other elements and attachments required by these policies have not been provided.

The following are key elements related to the reorganization process for an Organized Research Unit.

UH Executive Policy E5.213 (prepared by the Vice President for Research and Graduate Education, April 1991) clearly states:

“Authority for the establishment and termination of Organized Research Units (ORU) is vested solely in the Board of Regents of the University of Hawai‘i.

UH General Policy A3.101 (prepared by the Office of Vice President for Information Technology and Chief Information Officer, March 2008) states:

“A delegated reorganization may not revoke or pre-empt actions previously or normally taken by the Board, such as creation or abolishment of an Organized Research Unit (ORU) or University Center.”

A section in the UH General Policy A3.101.5 lists clearly the elements required of a reorganization proposal. That section is reproduced in its entirety in Appendix 1 for convenience and ease of reference. Briefly, a reorganization proposal must include the following elements: detailed rationale for the reorganization, description of resource requirements or savings; discussion of programmatic and budgetary impacts; current and proposed organization charts and functional statements; and lists of all permanent and temporary positions affected by the organization.

II. RESPONSE TO OSTRANDER LETTER OF OCTOBER 8, 2008 TO SEC

The following response to the letter from Vice Chancellor Ostrander to Faculty Senate Executive Committee Chair Klaus Keil has been organized by the topics that Dr. Ostrander discusses in his letter. The PBRC Executive Committee notes that many of Dr. Ostrander's statements are misleading and do not accurately reflect the facts. The most significant of those statements are quoted below and then followed by the relevant statements of fact.
PBRC Response to Ostrander Letter of 10/08/08

Faculty Membership:

1. "...significant migration of faculty from PBRC to the Medical School. ... PBRC suffers from having faculty with active research migrate to JABSOM."

   Only one tenured investigator migrated to the Medical School and PBRC received a replacement position in return.
   - PBRC’s biomedical grants had to be transferred to JABSOM by order of then Chancellor Englert to bolster JABSOM’s accreditation and solidify the move to Kakaako.
   - During 2002-2003, $12 million in grants were transferred to JABSOM by the chancellor’s office, not at the request of the PIs.
   - There was no migration of PBRC faculty corresponding to the death of former director Fred Greenwood in August 2000.
   - Several "soft-money" PBRC faculty were subsequently recruited into tenure-track positions in JABSOM.

2. "PBRC has very senior faculty...indicated to me plans to retire in the next 2-5 years."

   There are many retirements expected at UHM within the next five years, and PBRC’s expected rate is no higher than the rest of the campus.

Facilities and Finances:

1. "Facilities and finances have and continue to present strong challenges to PBRC. ... poor and decaying state of the Kewalo Marine Laboratory ..."

   No other facilities or additional funds beyond those already promised are currently required for PBRC to continue.
   - A full report prepared by High Arch, LLC in August 2008 for the University found the Kewalo Marine Lab is sound and can be restored for about $350,000.
   - Dr. Ostrander committed $400,000 for the repairs of the Kewalo building in April 2007 which would be enough to restore the facility. Through September 2008, he had only provided $100,000. He recently released an additional $150,000.
   - The cost of repairing Kewalo is modest. Other buildings at UH are in worse shape, yet there is no talk of dismantling the programs housed in them.

2. "Returning to PBRC’s prior level will require additional new resources."

   Vacant positions and money are available, including carry-over RTRF funds, which would not add any additional financial burden to the University.

3. "...plan does not address the reality of fiscal restraints"

   The proposed Biodiversity plan can commence without a new building or additional funds at this time.
   - Funds are still budgeted and available for the six vacant tenure-track positions PBRC has not been allowed to fill
   - New facilities suggested in PBRC’s Biodiversity plan are desirable but not essential.
   - It will be difficult to start new programs to replace the value PBRC has provided and prepare new facilities for the displaced Kewalo group; it is fiscally more feasible to leave PBRC intact and the Kewalo facility operational.
   - Ostrander has not demonstrated that dissolving PBRC will save money.
   - The Biodiversity Plan is already underway with an all PBRC symposium held in May 2008 and a monthly seminar series initiated in October 2008. The Biodiversity focus can expand through measured steps given effective leadership.

4. "...the land that is currently occupied by the KML is under lease and will revert back to the State"
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Twenty-three years remain on the current lease for the Kawalo Marine Lab (KML) site at Point Panic. Ostrander has undertaken negotiations with the Hawaii Community Development Authority to reduce this lease to 5 more years in exchange for the authority to build the Cancer Research Center in Kaka‘ako.
- There was no discussion or consultation with PBRC or any other UH program.
- This was done without Board of Regents action.

Research Productivity:

1. "The primary, if not sole expectation of PBRC faculty is research productivity."

According to Executive Policy E5.213, an ORU "provides a locus for faculty, staff and students to engage in focused, collaborative research and training activities.
- PBRC has excelled in training-through-research at all levels. Our GK-12 funding for putting graduate students into primary and secondary school classrooms received an unprecedented accomplishment-based renewal from NSF.

2. "It is noteworthy that in 2007 the PBRC faculty generated 54 publications compared with 190 by the CRCH. Though PBRC has about 25% more faculty ...

According to the CRCH webpage (10/15/08), 168 CRCH publications were authored in 2007 by 45, not 18, persons identified by CRCH as associated with the unit. CRCH counts publications of their affiliate and associate members who hold FTE in other units. PBRC researchers authored 59 publications in 2007, but with only less than one half (21) of the Cancer Center's 45 authors.

3. "As a point of comparison, the Cancer Research Center ... generated $32 million in core research grants in FY08 with nearly the same allocation of G & S-Funds."

According to the ORS website, the CRCH was awarded $16.5 million in core research and training grants in FY2008.

The nature and sources of PBRC and CRCH grants are very different. Most of CRCH funds are from NIH; the majority of PBRC grants are from NSF. NIH tends to fund larger amounts (approximately double) for biomedical research.

In FY2002, with nearly the same allocation of G & S Funds, PBRC received approximately $1 million more in extramural funds than the CRCH. During that year, PBRC received more funds from NIH than from NSF. Tied in with his arrival in late 2004, the four year period (2004-2008) of extramural funding covered by Ostrander's letter does not take into account the previous four years (2000-2004) when PBRC was more equal in size to the CRCH and Institute for Astronomy.
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PBRC’s funding has been NEGATIVELY influenced by:
- Chancellor Peter Englert’s decision to transfer grants ($12 million) from PBRC to JABSOM in 2002.
- Ostrander’s decision to leave vacant six (6) tenure track faculty researcher positions since 2004.
- The lack of a dedicated and dynamic leader for the past eight years.
- Ostrander’s unwillingness to provide partial support for faculty paid on “soft” money.
- A lack of leadership under Dr. Ostrander’s tenure.

Communications:

1. “...plan was considered and discussed over the summer of 2008.”

No discussions, meetings or negotiations have taken place between PBRC and the Chancellor or Vice Chancellor since PBRC presented its plan for a Biodiversity focus to the Chancellor in March 2008.
- During the March presentation the Chancellor did not engage in discussion or ask any questions regarding PBRC’s plans.
- The next communication from the Chancellor was on August 26, 2008 when she appeared (unexpectedly) at a monthly PBRC Executive Committee meeting to announce her decision to “dissolve PBRC in the best interest of the University”.
- Dr. Ostrander did not attend the PBRC Symposium held in May 2008 on present research and future development of the biodiversity focus.

3. “Chancellor’s Office has considered many aspects for the betterment of the PBRC”

No options were considered, offered or discussed with PBRC by the Interim Director/Vice Chancellor or Chancellor, the only option being to dissovle PBRC. PBRC has always been willing to discuss other options.

4. “...PBRC faculty have entered discussion with my office or with other units...”

Ostrander has encouraged selected faculty to transfer their programs to other units. Some faculty members have initiated discussions with other units as part of due diligence. However, the PBRC faculty has expressed a strong interest in staying together.
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It is very clear that Dr. Ostrander has not submitted a reorganization proposal for PBRC. Not only does PBRC Executive Committee take strong exception to the misleading characterization of the unit in Dr. Ostrander's letter, the Executive Committee is even more disturbed by the glaring omissions. These include:

1. PBRC is an ORU whose research and training programs include R and I faculty as well as Specialist faculty. The S faculty primarily manage/direct core facilities and training programs and have a much lower publication output than the R and I faculty.

2. PBRC maintains several core research support facilities whose clients, from numerous colleges and academic units, number in the hundreds. These employ a number of highly-skilled individuals in APT positions and produce training for numerous faculty, students and staff.

3. PBRC has invested heavily in federally-funded research training programs, serving hundreds of undergraduates and dozens of graduate students, community college faculty, and junior researchers. The training programs reach well beyond the unit to other colleges and academic units in the UH system, and, in some cases, beyond the state to islands throughout the Pacific.

4. In the service of the research programs, core facilities, and training programs, PBRC has grown a fiscal and administrative infrastructure the most notable characteristics of which are efficiency and flexibility. It was the visionary leadership of the past that created this supportive culture of PBRC; what is remarkable is how that culture has prevailed and how long the staff have been with PBRC, averaging 15+ years.

5. There is no attempt in Dr. Ostrander's letter to address the situation of the employees of PBRC other than the tenured faculty. Statements like 'no jobs will be lost' have no credibility without a true reorganization plan, and the faculty (both G-funded and "soft-money") and staff (again both G-funded and "soft-money") deserve more consideration of their skills, their history of service, their contributions, and their future possibilities.

In reality, the dissolution of a unit of the size and complexity of PBRC is akin to dissolving a college. There are currently approximately 125 personnel employed in the unit. There are multiple programs with program staff (secretaries, specialists, technicians), core facilities (with attendant staffing), training programs with staffing and complex funding arrangements. Dr. Ostrander's letter includes no organizational chart, no roster of positions, and absolutely no plan for the various functional units and components of PBRC.

In the following section we highlight just a few of the contributions of PBRC to UH-M and the communities it serves as well as indicators of the current level of research activity in PBRC.

III. CONTRIBUTIONS AND PRODUCTIVITY OF PBRC

As background information, a description of current PBRC research and training programs and core facilities is included in Appendix 2. Appendix 3 provides a timeline that briefly summarizes PBRC's history as an ORU.

PBRC is anything but the moribund unit depicted in the letter written by Dr. Ostrander. The faculty are publishing, submitting grant proposals, teaching, actively involved in research training, collaborating with researchers in dozens of private and government entities, and engaged in service activities in the community, on the Manoa campus, and in PBRC. The faculty specialists and staff of the core facilities continue to serve hundreds of clients across the campus, and some of the training programs are currently held up as models in the national arena.

Research Productivity: Despite the vacant faculty positions that PBRC has not been permitted to fill, the research profile of PBRC is still competitive. In 2006 and 2007 there were 54 and 59 publications, respectively, resulting from PBRC research projects. In 2007, 45 grants totaling $6.5 million were funded. PBRC still maintains an approximately 2:1 ratio of extramural funds to its state general and tuition funds. In FY 2008, more than 70 grant proposals were submitted by PBRC faculty requesting more than $11.5 million in extramural funding. The pace has not slowed in FY 2009.
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PBRC faculty members are active participants in peer review activities. Almost all the faculty members review manuscripts for journals in their areas of research expertise. A number of the faculty are on journal editorial boards. PBRC faculty members have served on review panels for NSF, NIH and other funding agencies as well as ad hoc reviewers for individual proposals for a variety of funding agencies.

PBRC researchers have received numerous invitations to participate as keynote speakers of national and scientific meetings and symposia.

Teaching and Research Training: All of the researchers in PBRC are involved in research training of undergraduate and graduate students and/or postdoctoral fellows/junior researchers. More than half of the faculty members also provide formal teaching of courses in academic units or provides lectures in their areas of expertise. In addition, there are currently 5 extramurally-funded research training programs in PBRC. All of them partner students and/or teachers with researchers in units throughout the campus and beyond. Included in PBRC's mission from the outset has been a commitment to research training, particularly the training of minority scientists in Hawaii, and more recently, in the Pacific. The reason why such programs thrive in PBRC is, again, because as an ORU, PBRC has more flexibility than many academic departments and colleges. Partly, this is due to the more expanded mission of a research unit, and partly to the expertise in grants administration that facilitates the complex contracts, funding arrangements, and accounts management required in these programs to accommodate internships, travel, conference attendance, per diem, off-site expenditures, training, etc.

NSF -- ATE (Advanced Technology Education) -- training for students and faculty from colleges throughout the Pacific (with ties to the US) including American Samoa Community College, Palau Community College, College of the Marshall Islands, Northern Mariana College, and the College of Micronesia. The program has served more than 250 Pacific Island students.

NSF -- UMEB (Undergraduate Mentoring in Environmental Biology) -- training for Pacific Islands student interns in environmental sciences. The program has supported the training of 64 students in the laboratories of 20 research scientists at UHM and UH Hilo. This program was recently renewed for five more years under the NSF Undergraduate Research Mentoring initiative.

NIH -- MARC (Minority Access to Research Careers) -- the longest-running (30 years) research training program in PBRC, it has served more than 145 honors undergraduates from Hawaii, primarily Hawaiians, Filipinos, and Pacific Islanders in two-year internships as preparation for entering Ph.D. programs in the biosciences.

NSF -- GK-12 -- is a program for pairing graduate students with teachers in K-12 classrooms in Hawaii public schools for the improvement of curriculum in ecology, evolution and conservation biology. 35 Graduate Fellows from 4 UHM colleges and 12 academic departments have participated. To date, 264 K-12 teachers and 6790 K-12 students have been involved in the program.

NSF -- IGERT (Interdisciplinary Graduate Education and Research Traineeship Program) -- the newest of the training programs has involved 23 graduate students in ecology, conservation and pathogen biology research, including field research in Hawaii and Southeast Asia. The Hawaii program is considered to be one of the top IGERT programs nationally.

Core Facilities: These are shared resources developed in PBRC to benefit the biosciences community. They are in PBRC because it is uniquely positioned as an ORU to build infrastructure to insure competitiveness for funding in state-of-the-art science, not just for PBRC but for the entire campus, other research institutions and local industry. The annual average users of these facilities are:

Molecular Biology Facility -- 250+ clients
Biological Electron Microscope Facility -- 100+ clients
Computer Network Support Facility -- 200+ clients
Carpentry/Machine/Electronics Shops -- 100+ clients

These clients include research faculty, postdocs, technicians, graduate and undergraduate students in the Colleges of Natural Sciences, Tropical Agriculture and Human Resources, Social Sciences, Engineering, and Education as well as the Lyon Arboretum, the Cancer Research Center of Hawaii and the School of Ocean and Earth Science and Technology including its Hawaii Institute of Marine Biology (Coconut Island), and the School of Medicine.
PBRC successfully attracted extramural funds (NIH Research Centers in Minority Institutions) to support the development of each of these facilities. That fact, coupled with the high numbers of users, attests to the value they add to the biosciences research environment at UH and in the state.

**Summary:** The highlights above can leave no question that PBRC is a vibrant, active research unit that continues to garner national and international attention as well as recognition by scientific peers. Furthermore, PBRC continues to act on its mission to promote research in the biosciences and to provide research training at all levels. PBRC's accomplishments are all the more noteworthy given the fact that the unit has been without permanent leadership for eight years. The arrangement begun by Chancellor Englert to have the VCRGE serve as the interim director has not resulted in the kind of leadership that leads to growth and innovation in an institute. No suggestions for new research initiatives or for extramural funding opportunities were forthcoming. Given the workload of Dr. Ostrander, including a recent stint as the Interim Dean of JABSOM, the lack of leadership in PBRC may not be too surprising. Nonetheless, PBRC faculty and staff should be commended for their perseverance and accomplishments despite this lack of leadership.

It is our assessment that PBRC is more than the sum of its separate parts and that dissolving the unit and transferring its programs and facilities will cause serious harm to the ongoing programs and defeat the plan to develop a world class reputation in biodiversity research.

**IV. PBRC's Vision for the Future: Integrative Biodiversity Research and Training**

PBRC presented a proposal for its future direction to Chancellor Virginia Hinshaw on March 6, 2008 and to Dr. Ostrander on March 28, 2008. We proposed an increased focus on integrative biodiversity research and training as a critical area for future interest in Hawaii, especially with the anticipated effects of global warming. The plan is carefully aligned with the University of Hawaii system and UHM strategic plans. To implement the plan we proposed that a permanent director be appointed to lead this development. We proposed that the vacant positions currently on PBRC books be filled by recruiting collaboration-minded interdisciplinary researchers in the broad area of biodiversity, specifically targeted to bridging the areas presented by the three main PBRC programs, and thus leading to a more unified program. We proposed that this vision would ideally include a new building with marine access to replace the current Kewalo Marine Laboratory if the facility was closed. Dr. Ostrander's main criticism of the plan focused on the cost of a new building which is not the only way of meeting space needs. The plan received no comments, feedback or discussion with PBRC until it was dismissed in the October 8 letter.
PBRC Response to Ostrander Letter of 10/06/08

**PBRC's Request of the Mānoa Faculty Senate**

PBRC requests that the Mānoa Faculty Senate support its efforts to:

1. Continue PBRC as an independent ORU with a focus on Biodiversity. An alternative would be to merge the unit as a whole, maintaining its integrity, including its administrative support personnel, into an existing unit.
2. Appoint a permanent Director (there is an internal candidate) to lead us forward and advocate for us.
3. Obtain permission to fill PBRC's vacant faculty and staff positions on a phased basis.
4. Maintain operations of the Kewalo Marine Laboratory

In addition, we specifically request that the Manoa Faculty Senate:

1. Require a complete reorganization plan from the UHM administration
2. Support a fair review of PBRC
3. Conduct its own independent review of PBRC and the Administration's "proposal" to determine impact
4. Transmit findings to all appropriate parties
Appendix 1

University of Hawai'i Organizational and Functional Changes

"5. Reorganization Proposals

A proposal must be prepared for any proposed reorganization. This includes reorganizations to be approved by the BOR as well as those eligible to be approved under delegated authority.

The proposal shall consist of a narrative sections and attachments.

a. The body of the proposal shall contain the following elements:

1) Thorough description of the rationale for the proposed reorganization. Normally this shall include: (a) description of the conditions or factors prompting the proposed reorganization, e.g., new program requirements, changes in the environment, new legal or policy considerations; (b) explanation of how the proposed reorganization will address these conditions or factors; (c) description of how the organization's operational, organizational, functional and programmatic relationships will be affected, including impact on services to students, other target groups and relationships with other segments of the university; (d) discussion of the efficiencies, service improvements or other benefits that will be achieved as a result of the reorganization.

2) Complete description of the resource requirements or savings associated with the reorganization, including funding, positions, space, equipment and other resources.

3) Explanation of the source of the resources needed to implement the reorganization, e.g., reallocation from within the program or major unit, or new revenue.

4) Discussion of the programmatic impacts of the proposed reorganization on the University.

b. The proposal shall also contain the following attachments:

1) Current organization charts (with position detail)

2) Proposed organization charts

3) Current Functional statements

4) Proposed Functional statements if any changes

5) List of all permanent and temporary positions that will be affected by the reorganization including each position number, whether it is vacant or occupied, and the impact of the reorganization on the position.

Reorganization proposals and all organization charts shall show all budgeted permanent and temporary positions on appropriated funds.

The University Budget Office and System Office of Human Resources are available to assist with issues relating to proposed reorganizations. “
PBRC Response to Ostrander Letter of 10/08/08

Appendix 2. Major Programs and Facilities of the Pacific Biosciences Research Center (PBRC)

PBRC supports interdisciplinary biological and biomedical research and training in basic, clinical and applied areas with particular relevance to Hawaii. PBRC also provides expert personnel and facilities for research support of molecular and cellular biology. The programs and facilities, located in various buildings on the Mānoa campus and at off-campus locations, are summarized below.

- Research at the Kewalo Marine Laboratory, located on the waterfront about 5 miles from the UHM campus, focuses on cellular, developmental and molecular marine biology, using the rich diversity of animals, plants and microorganisms present in the Hawaiian marine environment, to support research programs investigating: the biochemical and molecular mechanisms of larval settlement and metamorphic induction; the evolution and genetic determinants of developmental mechanisms and patterns across animal phyla; and the reproduction, larval biology, ecotoxicology, evolution and conservation biology of coral reefs.

- The Center for Conservation Research and Training aims to address Hawaii's extinction crisis through enhanced research and training in the field of conservation biology. Hawaii offers an ideal site for long-term research within an incredibly wide range of environmental conditions and habitats including terrestrial, aquatic (freshwater), and marine ecosystems. Hawaii is a place where the global challenge of extinction can be carefully studied and met head-on with practical solutions. Current research programs are addressing: the origins and determinants of Hawaiian and Pacific island non-marine biodiversity, both native and alien; the role of sexual selection in the evolution of biodiversity; the use of cyberinfrastructure in ecological research and environmental monitoring; the role of seed banks in conservation of endangered plants; the impacts of alien species on Pacific island agriculture and ecosystems; and the role of captive breeding on conservation of endangered species.

- The Békésy Laboratory of Neurobiology conducts research in a broad range of neuroscience disciplines including: biophysics and chemistry of ionic channels in excitable membranes; cellular electrophysiological, morphological and biochemical studies of neurosecretion; analysis and modeling of small neuronal systems and their integrative functioning; neuroecological aspects of mechanoreception; biology and natural product development of jellyfish neurotoxins; neural and pharmacological control of fear and aggression; and comparative studies and theoretical modeling of learning processes.

- The Molecular Endocrinology group focuses on the clinical problem of preterm birth. Researchers utilize cellular and molecular techniques to examine both infectious and non-infectious pathways leading to preterm birth.

- Native Hawaiian/Multi-ethnic Health Research program conducts epidemiological studies of the risks for cardiovascular disease, diabetes, and insulin resistance syndrome among Hawaii's ethnic minority groups.

- PBRC Core Research Support Facilities:
  - The Biological Electron Microscope Facility (BEMF) provides instrumentation, training and services for fluorescent, confocal and electron microscopy to UH, other research institutions and local industry in the state on a recharge basis.
  - The Greenwood Molecular Biology Core Facility (MBCF) provides instrumentation, training and services for the synthesis, characterization and analysis of biomacromolecules for all UH and other researchers on a recharge basis.
  - The PBRC Machine/Carpentry shop provides services for the design, manufacture, modification and repair of scientific apparatus in wood, metal or plexiglas; fine milling and machining; and
refurbishing and retrofitting of research laboratories. The Electronics shop provides services to design and fabricate electronic circuitry, repair commercial scientific apparatus, retrofit older apparatus with digital technology and repair monitors, processors and printers.

-The **Computer Network Support Facility** provides desktop computer, audio-visual, teleconferencing, poster printing and network services to PBRC and other biological researchers.

- Minority Biomedical Research Training programs:
  - **Minority Access to Research Careers (MARC U*STAR) Honors** Program (NIH-NIGMS) – provides rigorous training for honors undergraduate students and prepares them to successfully gain entrance into competitive doctoral degree programs in the biosciences;
  - **Pacific Region Diabetes Education (PRIDE) Program** (NIH-NIDDK) – provides a summer research experience for undergraduates in the areas of diabetes, obesity and metabolic disorders.

- The NSF **Undergraduate Research Mentoring** (URM, formerly UMEB) in environmental biology program focuses on training undergraduate students from Hawai’i, American Samoa, Guam and the Compact-of-Free-Association states in Micronesia. This program was recently renewed for five years.

- The NSF **ATE Partnership for Advanced Marine and Environmental Science Training for Pacific Islanders** aims to improve technological education at the undergraduate and secondary school levels through the community colleges of the Pacific Islands and to serve as a feeder program to the NSF-URM program.

- The NSF **GK-12 training program** supports graduate students who mentor and partner with GK-12 science teachers to help them incorporate cutting edge concepts from ecology, evolution, and conservation biology into their classroom instruction.

- The NSF **Integrative Graduate Education and Research Traineeship program** (in collaboration with the UHM School of Medicine) in **Ecology, Conservation and Pathogen Biology** (NSF IGERT ECPB) awards graduate fellowships to study ecology and evolution of emergent infectious diseases in Hawaii and throughout the Asia Pacific region.
Appendix 3. Brief Timeline of the Pacific Biomedical (now Biosciences) Research Center

1961 Institute of Health Research established by the Board of Regents as an Organized Research Unit; unit renamed Pacific Biomedical Research Center by BOR in 1963

1965 Two-year medical school becomes a separate program

1972 Kewalo Marine Laboratory is completed and the cell and development biology of marine organisms group moves in

1973 Initiated an interdisciplinary program in cancer research that led to a new research institute, the Cancer Research Center of Hawaii, in 1981

1974 Obtained federal (MBRS) funds to train minority undergraduate students in biomedical research, Haumana Biomedical Program; MARC honors program funded in 1978

1974 Incorporated the Békésy Laboratory of Neurobiology, formerly the Sensory Science Institute developed by Nobel Laureate Georg von Békésy in 1966

1984 Initiated the Hawaiian Evolutionary Biology Program with State and extramural funding

1986 Obtained funding from NIH Research Centers in Minority Institutions (RCMI) program supporting cellular, neuro-behavioral and molecular biology research programs and core facilities for electron microscopy and molecular biology

1989 Awarded supplemental RCMI funds for a clinical AIDS research program

1991 PBRC faculty spearheaded interdisciplinary graduate programs: Cell, Molecular and Neuro Sciences (CMNS) and Ecology, Evolution and Conservation Biology (EECB)

1993 Expanded the Hawaiian Evolutionary Biology Program to the Center for Conservation Research and Training (CCRT) with linkage to state, federal and private agencies through a Secretariat (Hawaii Conservation Alliance)

1995 Awarded NIH funding to develop the RCMI Clinical Research Center

1999 NIH funding obtained for Center of Clinical Research Excellence (CCRE) and Specialized Neuroscience Research Program (SNRP)

1999 NSF funds awarded for the Undergraduate Mentoring in Environmental Biology (UMEB) focusing on students from Hawaii and other Pacific Islands; and for a training program in which graduate students mentor GK-12 teachers to help incorporate concepts from ecology, evolution and conservation biology into their classroom instruction

2000 Dr. Frederick C. Greenwood, PBRC Director since 1973, passed away

2001 NIH funding for new COBRE Center for Cardiovascular Research, Biomedical Research Infrastructure Network (BRIN) and NeuroAIDS SNRP programs.

2003 PBRC’s standing as an independent Organized Research Unit reaffirmed; some clinical programs and center grants initiated in PBRC moved to the John A. Burns School of Medicine

2004 Gary K. Ostrander, VCRGE, named Interim Director of PBRC

2004 Negotiations with first top candidate for PBRC Director were unsuccessful

2005 Formally changed name of unit to Pacific Biosciences Research Center

2006 Became administrative home for the statewide NSF-funded EPSCoR program and NSF-funded IGERT graduate program for the ecology of infectious diseases

2007 Negotiations with second top candidate for PBRC Director were unsuccessful

2008 March - Plans for Biodiversity Focus presented to Chancellor Hinshaw and Vice Chancellor Ostrander

August - UH Manoa decision to dissolve PBRC conveyed to PBRC Executive Committee by Chancellor Hinshaw and to PBRC faculty and staff by Interim Director Ostrander