



Overview and Summary of Recent Initiatives

In 2005 several organizations collaborated on a **Hawaii Life Sciences Roadmap**. The exercise was funded primarily by the **Kamehameha Schools**, a private K-12 school system endowed by the former royal family of Hawaii. The Kamehameha Schools system has extensive land holdings, some of which in Honolulu are being developed for commercial bioscience use. The schools' investment endowment has also become active in venture capital, complementing capital-formation initiatives already managed by the **Hawaii Strategic Development Corporation**.

The Life Sciences Roadmap was co-sponsored by the Hawaii Life Sciences Council, which this year merged with the Hawaii Technology Trade Association to form a new, multisector **Hawaii Science and Technology Council**. Additional partners included **Enterprise Honolulu**; the Strategic Industries Division of the **Department of Business, Economic Development and Tourism (DBEDT)**; and the **University of Hawaii** system. The Roadmap builds on bioscience sectors previously targeted by Enterprise Honolulu and proposes that Hawaii exploit its geographic position and ethnic diversity to target particularly Pan-Pacific infectious diseases, chronic diseases, and health outcomes. It makes separate recommendations on digital medical arts and bioproducts including renewable biofuels, related to existing strengths in plant-based science and aquaculture.

Hawaii is a leading state in the United States for plant biotechnology research. All major biotechnology seed companies maintain seed research and production facilities among the Hawaiian Islands. In March 2006, the U.S. Department of Agriculture's Animal and Plant Health Information Service noted that, over the course of the past decade, Hawaii leads the country in number of permitted agricultural biotech field tests. Only major agricultural output states such as California, Iowa, and Illinois start to approach that number of experiments; but, all of those states have far greater open land for agricultural purposes.

Since the last BIO report, Hawaii has also enacted Act 215 of 2004, which extended Hawaii's 100 percent venture-investment tax credits to 2010 and focuses them more tightly on **Qualified High Technology Businesses (QHTBs)** including biotechnology. Act 215 also extends many of the aggressive benefits provided under the predecessor Act 221, including the refundable R&D tax credit and the ability to sell up to \$500,000 in unused net operating loss (NOL).

Building Bioscience R&D Capacity

Recent state investments in facilities

In 2005, the University of Hawaii John A. Burns School of Medicine completed the first research building on its new, 10-acre campus at Honolulu's Kaka'ako waterfront district, which is being redeveloped by a state-chartered authority. The new campus has spurred strong interest in commercial bioscience development (see below under "Bioscience research parks"), not only in the redevelopment district, but in nearby industrial and commercial properties as well. The university campus relocation was financed by \$150 million in revenue bonds backed by 28 percent of the state's tobacco settlement and matched by private donations. On an adjoining 5½-acre site, a newly designated comprehensive cancer center is constructing 360,000 square feet of research and clinical space. Hawaii has also been awarded one of four recent NIH regional biocontainment laboratories, a 62,000-square-foot facility to be constructed at a site to be determined in Oahu.

Encouraging Academic/Industrial Interaction

The University of Hawaii offers **Accelerated Research Commercialization (ARC)** grants to in-state companies that partner with university researchers on research with near-commercial potential. The ARC provides up to \$75,000, and half the company match can be in-kind. Biotechnology is one of seven fields supported by the ARC grant program, which is managed by **UH Connections**, a business outreach arm of the university.

Moving Technology into the Marketplace

Commercializing university technology

The University of Hawaii College of Business Administration hosts a \$45,000 annual business plan competition, and the university's Office of Technology Transfer and Economic Development provides a supplemental award of \$20,000 for those winners that base their plans on licensable university technology and identify a source of funding. The state DBEDT is targeting EPSCoR funds to technology transfer and workforce initiatives at the University of Hawaii.

Supporting bioscience entrepreneurs and emerging companies

The **Hawaii Business and Entrepreneurs Associated Mentors (HiBEAM)** functions as a multisector commercialization center.

Acts 221/215 make R&D expenditures as defined under federal law fully refundable through tax credits, provided the research is conducted by a QHTB as defined in statute.

Making Capital Available

Pre-seed and seed capital

Additional funds for commercialization of certain technologies are available from **Hawaii Technology Development Venture**, a project funded by the Office of Naval Research and administered by the Pacific

International Center for High Technology Research. Medical and bioinformatics technologies are among six sectors targeted by this program. The pool is \$3 million and awards may be up to \$400,000.

The **High Technology Development Corporation (HTDC)** will provide up to \$25,000 in state match for federal SBIR awards to Hawaii companies, across multiple fields.

Pre-seed investments from \$25,000 to \$100,000 will be available from a formal fund being organized by the **University of Hawaii Angels**. The fund will match investments in which at least four members have invested and will make follow-on investments in these and other companies. It is aiming to raise \$3 million to \$10 million.

Act 215 provides 100 percent return over 5 years of investments up to \$2 million per year in QHTBs. Under the tightened standards, “qualified research” including biotechnology must comprise more than half company activity, and more than three-quarters must be conducted in Hawaii. Additionally, Act 215 authorizes QHTBs to sell \$500,000 of unused NOLs for at least 75 percent of their value, and a refundable 20 percent tax credit on the full volume of R&D conducted in Hawaii. Capital gains for those who qualify for the QHTB investment credit are also exempt from state income tax.

Venture capital

The state’s **Hawaii Strategic Development Corporation** has committed \$16 million to nine venture-capital funds investing in Hawaii companies. Currently active early-stage funds include the following:

- **HMS Hawaii I and III**
- **International Venture Fund I** (California based)
- **PacifiCap Ventures Hawaii**
- **Technology Gateway Partnership II** (California based)
- **UPSIDE Fund** (targeted to University of Hawaii spin-offs).

Similarly, a \$30 million fund of funds has been established by the charitable endowment supporting the **Kamehameha Schools**. It will invest in venture partnerships that will consider Hawaii deals, whether or not the fund is Hawaii based.

Providing Space for Bioscience Companies

Bioscience research parks

The **Natural Energy Laboratory of Hawaii Authority** is a state-owned facility attached to the DBEDT that consists of 870 acres with deep-ocean access near Kailua-Kona on the Island of Hawaii. NELHA hosts tenants in ocean science, aquaculture, marine biotechnology, and development of products from deep-sea water.

The **Kamehameha Schools** endowment is also developing land it holds in the Kaka’ako district. Recently, it announced that it had selected KUD International and Phase 3 Properties of San Diego as co-developers of a 400,000-square-foot, \$200 million **Life Science Research Complex**.

Addressing Talent Needs

Recruiting management talent

The **Kama'aina** “come home” program sponsored by the Maui Economic Development Board seeks to attract Hawaii natives back to technology-based opportunities.

Specialized postsecondary programs

The University of Hawaii College of Tropical Agriculture and Human Resources offers degrees at multiple levels in molecular biosciences and bioengineering, many developed during the course of a previous NSF-sponsored Marine Bioproducts Engineering Center.

Pending Proposals

Two elements of Governor Linda Lingle’s legislative program were carried forward into the 2006 legislative session:

- Allocation of tax credits (bill drafts have ranged up to \$120 million) for a State Private Investment Fund (tax-credit-backed fund of funds) authorized by Act 215; and
- A 20 percent business-research institute tax credit to encourage partnership between business and the University of Hawaii, to be leveraged by EPSCoR and state funding.

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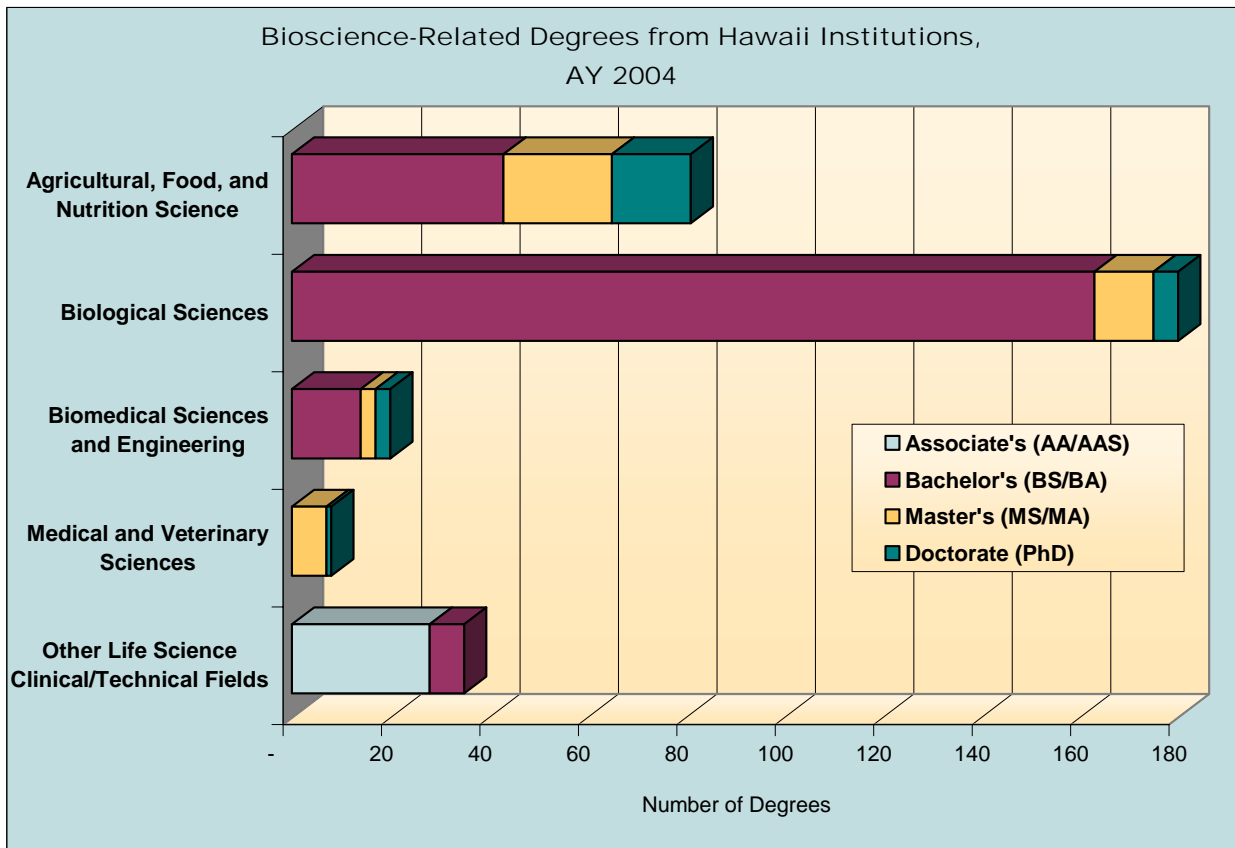
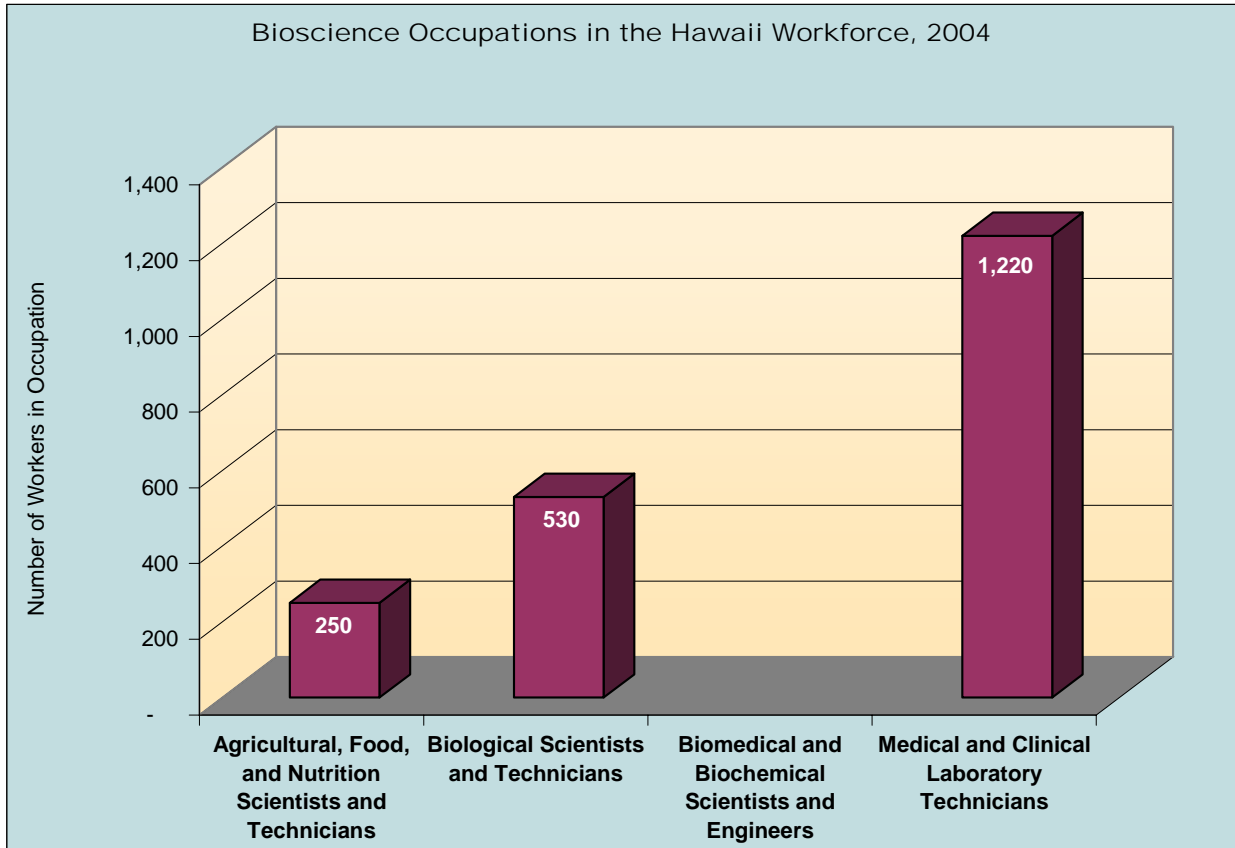
The Hawaii Science and Technology Council is the result of the consolidation of the Hawaii Life Sciences Council with the Hawaii Technology Trade Association into a single industry association whose mission is the acceleration of Hawaii’s science and technology economy.

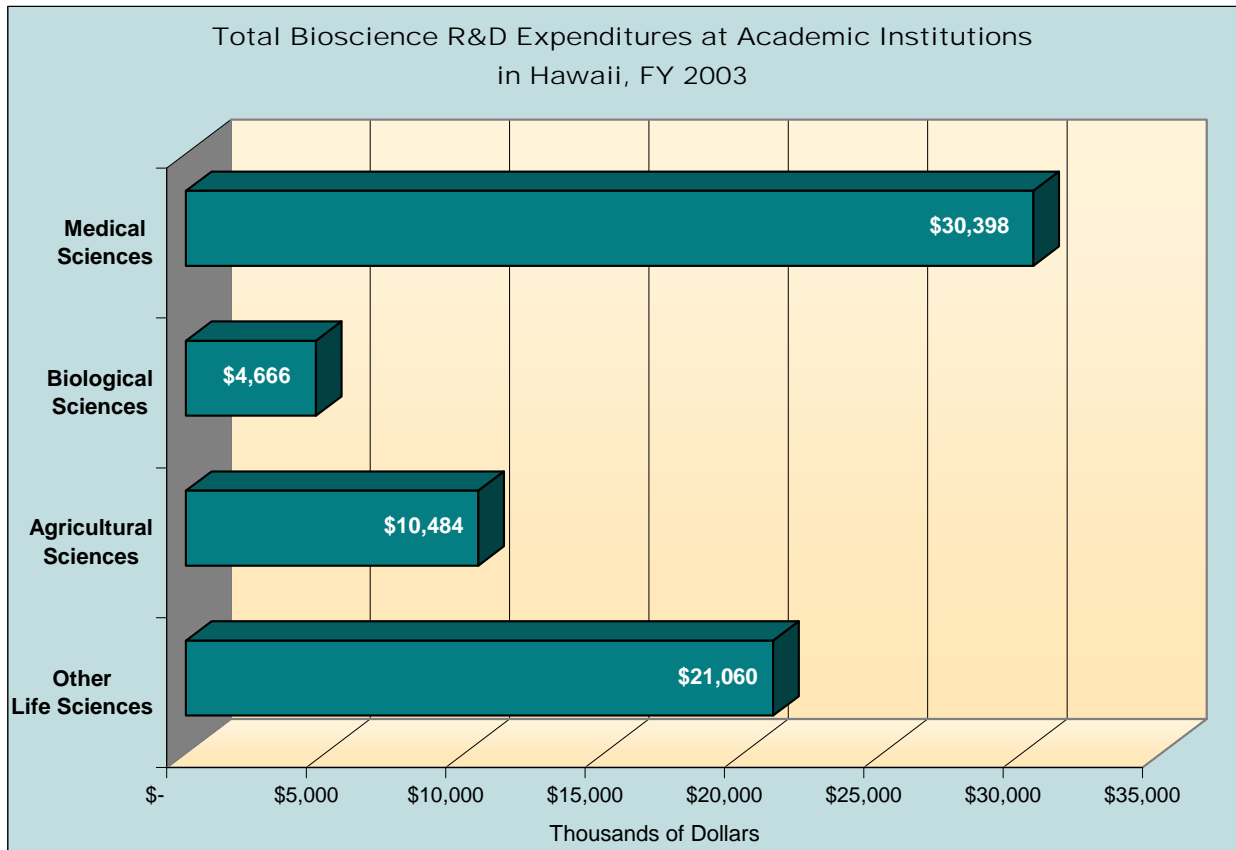
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Industry Subsector	Hawaii	United States
Agricultural Feedstock & Chemicals		
Establishments 2004	6	2,111
2001-2004 Establishment % Change	-47.3%	0.4%
Employment 2004	67	104,893
2001-2004 Employment % Change	-80.0%	-6.9%
Share of U.S. Employment	0.1%	100.0%
Location Quotient	0.15	n.a.
Average Annual Wage 2004	\$33,052	\$63,383
Direct-Effect Employment Multiplier	3.07	10.91
Total Employment Impact	204	1,212,094
Drugs & Pharmaceuticals		
Establishments 2004	3	2,589
2001-2004 Establishment % Change	-40.0%	-0.6%
Employment 2004	46	313,207
2001-2004 Employment % Change	-42.5%	2.7%
Share of U.S. Employment	0.0%	100.0%
Location Quotient	0.03	n.a.
Average Annual Wage 2004	\$41,535	\$79,303
Direct-Effect Employment Multiplier	3.53	9.51
Total Employment Impact	162	2,731,321
Medical Devices & Equipment		
Establishments 2004	49	15,190
2001-2004 Establishment % Change	-0.2%	0.2%
Employment 2004	226	411,460
2001-2004 Employment % Change	-55.7%	-3.6%
Share of U.S. Employment	0.1%	100.0%
Location Quotient	0.13	n.a.
Average Annual Wage 2004	\$33,088	\$56,449
Direct-Effect Employment Multiplier	1.75	4.56
Total Employment Impact	396	1,817,705
Research, Testing, & Medical Laboratories		
Establishments 2004	78	20,565
2001-2004 Establishment % Change	10.1%	19.4%
Employment 2004	2,306	413,550
2001-2004 Employment % Change	25.2%	8.2%
Share of U.S. Employment	0.6%	100.0%
Location Quotient	1.30	n.a.
Average Annual Wage 2004	\$51,003	\$65,414
Direct-Effect Employment Multiplier	2.19	3.15
Total Employment Impact	5,061	1,272,936
TOTAL PRIVATE SECTOR		
Establishments 2004	33,796	8,156,137
2001-2004 Establishment % Change	-0.7%	4.8%
Employment 2004	468,628	109,249,195
2001-2004 Employment % Change	5.1%	-0.7%
Share of U.S. Employment	0.4%	100.0%
Location Quotient	n.a.	n.a.
Average Annual Wage 2004	\$33,584	\$39,003

Source: Battelle calculations -- based on Bureau of Labor Statistics QCEW data from the Minnesota Implan Group, RIMS II Employment Multipliers from the Bureau of Economic Analysis, and the Census Bureau's Economic Census.

Note: n.a. = metric is not applicable.





	Hawaii	United States	Rank
University R&D Expenditures, FY 2003			
Total (\$ thousands)	\$184,602	\$40,104,621	39
Life Science R&D (\$ thousands)	\$66,608	\$24,062,088	43
Percent of Total R&D	36.1%	60.0%	
Life Sciences Per Capita	\$52.96	\$82.74	
Change in Life Sciences FY 1999–2003	6.6%	52.7%	
NIH Support to Institutions, FY 2004			
Total (\$ thousands)	\$73,056	\$22,556,459	38
Per Capita Expenditures	\$58.09	\$77.56	
Change in Expenditures FY 2000–2004	107.1%	53.2%	
Higher Education Degrees in Bioscience Fields, AY 2004			
	324	111,329	50
Bioscience Occupations in the Workforce, 2004			
	2,000	616,140	42