MAINE STATE LEGISLATURE

ANNUAL REPORT ON UTILIZATION OF

STATE RESEARCH & DEVELOPMENT APPROPRIATIONS FOR OPERATIONS,

STATE RESEARCH CAPITAL BONDS,

AND

UNIVERSITY R&D REVENUE BONDS WITH DEBT SERVICE PAYMENTS FUNDED BY STATE APPROPRIATION

FISCAL YEAR ENDING JUNE 30, 2001 (FY2001)

University of Maine System

Office of Finance and Treasurer

December 17, 2001
Z63(384)

UNIVERSITY OF MAINE SYSTEM

ANNUAL REPORT ON R&D

FISCAL YEAR ENDING JUNE 30, 2001 (FY2001)

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INTRODUCTION

The University of Maine System is required to submit in January of each year an annual report on the utilization of state research appropriations for operations, state research capital bonds, and University R&D revenue bonds with debt service funded by a state appropriation. This report is to cover the most recently completed fiscal year. The following is the report for fiscal year 2001 (FY2001) that covers the period from July 1, 2000 to June 30, 2001.

Because this report includes only activity for fiscal year 2001, excluded from this annual report is the additional appropriation of $2,000,000 for research and development (R&D) that will be made available beginning in fiscal year 2003.

EXECUTIVE SUMMARY

I. State Research Appropriation for Operations

The University of Maine System received an appropriation of $500,000 in FY1998, an additional $4,000,000 in FY1999, an additional $5,550,000 in FY2000, and an additional $50,000 in FY2001 bringing the total available for research in FY2001 to $10,100,000. The FY2001 appropriation of $10,100,000 was distributed between the University of Maine (UM - $8,080,000) and the University of Southern Maine (USM - $2,020,000).

Of the FY2001 allocation of $10.1 million and $0.7 million carried forward from FY2000, UM and USM (1) expended a total of $6.9 million, (2) matched external grants & contacts with $3.7 million, and (3) carried forward $0.2 million in unspent funds to FY2002 for R&D use for a total of $10.8 million.

These state research dollars resulted in the UMS attracting $41.2 million in external grant & contract funding (primarily federal), a ratio of 3.8 to 1. The State's FY2001 $10.8 million thus resulted in a total of $52.0 million being made available for research & development and supported 374.9 FTE positions.

The following is a summary of the utilization of the state research appropriation for operations during FY2001.

Summary of Utilization of FY2001 State Research Appropriation for Operations

	FY2001 Expenditures	Used To Match Grants & Contracts	Unused Funds Carried Forward to FY2002	Total Funds Utilized
E&G Funds Utilized				
UM	$5,317,330	$3,289,185	$176,081	$8,782,596
USM	1,533,841	446,925	45,239	2,026,005
Total E&G Funds	$6,851,171	$3,736,110	$221,320	$10,808,601
Grants & Contracts Generated				41,234,167
Total Funds				$52,042,768

The research and development funding provided by the State of Maine was used to support (1) salaries for faculty and staff, (2) direct equipment purchases, (3) matching funds for grants and/or contracts, (4) research space, and (5) research in such areas as computer software & engineering, advanced materials engineering, advanced technologies for forestry & agriculture, aquaculture & marine sciences, biotechnology, technology transfer, information technology, and biosciences. The unused funds have been or will be distributed to research units or principal investigators.

II. State Appropriation for the Maine Patent Program

The University of Maine System received an appropriation of $300,000 in FY2001 for the Maine Patent Program. The Maine Patent Program is a key component of the state's initiative to foster economic development by providing resources and improving opportunities for high tech businesses in Maine. The program provides Maine innovators with information, education, training, advice, and assistance with patent, trademark, copyright, and trade secret protection, commercialization, and licensing. The unused funds have been or will be distributed to the program for use in future years.

The following is a summary of the utilization of the state appropriation for the Maine Patent Program during FY2001.

Summary of Utilization of FY2001 State Appropriation for Maine Patent Program

	FY2001 Expenditures	Used To Match Grants & Contracts	Unused Funds Carried Forward to FY2002	Total Funds Utilized
E&G Funds Utilized				
USM	$66,282	$0	$236,418	$302,700

III. State Research Capital Bonds

On November 3, 1998, the voters of Maine approved a $20.0 million bond issue to improve the Maine economy by supporting innovative research and development. The University of Maine System received $13.5 million from this bond issue to be used for capital improvements and equipment purchases to support research and development. The bond proceeds were distributed between the University of Maine ($10,800,000) and the University of Southern Maine ($2,700,000).

A summary of the utilization of state research capital bonds during FY2001 is shown on the next page.

IV. State Appropriation for Debt Service on University R&D Revenue Bond

On June 4, 1999, the Governor signed into law the Part II Supplemental Appropriation budget (Chapter 401) that appropriated $2,500,000 in 2000/01 to the University of Maine System on a "base budget" basis to pay the debt service on a $25 million university research & development revenue bond. The university issued the revenue bond on August 15, 2000 that provides $25 million for the following R&D projects.

Allocation of Bond Proceeds

UM - Engineering & Science Research Facility	$20,000,000
USM - Science Building Addition/Renovation	5,000,000
TOTAL	$25,000,000

A summary of the utilization of the UMS R&D revenue capital bonds during FY2001 is shown on the next page.

Summary of Utilization of FY2001 Research Capital Funds

	Bond Portion	Other Funds	Total Project Budget	Expenditures to Date	Funds Carried Forward To FY2002
FY1999 State Bonds					
UM	$10,800,000	$25,064	$10,825,064	$2,930,129	$7,894,935
USM	2,700,000	125,000	2,825,000	1,232,584	1,592,416
Total	$13,500,000	$150,064	$13,650,064	$4,162,713	$9,487,351
University R&D Revenue Bonds					
UM	$20,000,000	$0	$20,000,000	$215,075	$19,784,925
USM	5,000,000	0	5,000,000	680	4,999,320
Total	$25,000,000	$0	$25,000,000	$215,755	$24,784,245

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APPENDIX A

LEGISLATIVE HISTORY OF R&D APPROPRIATIONS

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LEGISLATIVE HISTORY OF STATE RESEARCH APPROPRIATION FOR OPERATIONS

The following is a summary of the actions of the 118th, 119th, and 120th Maine Legislatures with regard to appropriating research funds for operations to the University of Maine System.

118TH LEGISLATURE

□ On March 26, 1997, the Governor signed into law the Economic Improvement Strategy (Chapter 24) that appropriated $500,000 to the University of Maine System for research.

□ On April 1, 1998, the Governor signed into law the Economic Improvement Strategy (Chapter 643, Part LL, Section S-3) that appropriated $4,000,000 to the University of Maine System for research. These funds were allocated from the FY98 year-end state surplus for use in FY99.

119TH LEGISLATURE

□ On March 15, 1999, the Governor signed into law the Part I Current Services budget (Chapter 16) that appropriated $4,000,000 in 1999/00 and 2000/01 to the University of Maine System on a "base budget" basis for research. This extends the one-time FY99 $4,000,000 research appropriation that was funded from the FY98 year-end state surplus.

□ On June 4, 1999, the Governor signed into law the Part II Supplemental Appropriation budget (Chapter 401) that appropriated an additional $5,550,000 in 1999/00 and an additional $50,000 in 2000/01 to the University of Maine System on a "base budget" basis for research.

□ On April 25, 2000, the Governor signed into law the Part II Supplemental Appropriation budget (Chapter 731) that appropriated $300,000 in 2000/01 to the University of Maine System on a "base budget" basis for the Maine Patent Program.

120TH LEGISLATURE

□ On June 21, 2001, the Governor signed into law the Part II Supplemental Appropriation budget (Chapter 439) that appropriated an additional $2,000,000 in 2002/2003 to the University of Maine System on a "base budget" basis for research.

Summary of the Allocation of Operating Research Funds to UM and USM.

118th Legislature

	FY98 New Appropriation	FY99 New Appropriation	Total New Two-Year Appropriation
UM	$400,000	$3,200,000	$3,600,000
USM	100,000	800,000	900,000
TOTAL	$500,000	$4,000,000	$4,500,000

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LEGISLATIVE HISTORY OF STATE RESEARCH APPROPRIATION FOR OPERATIONS

Summary of the Allocation of Operating Research Funds to UM and USM.
(Continued)

119th Legislature

	FY2000 New Appropriation	FY2001 New Appropriation	Total New Two-Year Appropriation
UM	$4,440,000	$40,000	$4,480,000
USM	1,110,000	10,000	1,120,000
TOTAL	$5,550,000	$50,000	$5,600,000

120th Legislature

	FY2002 New Appropriation	FY2003 New Appropriation	Total New Two-Year Appropriation
UM	$0	$1,600,000	$1,600,000
USM	0	400,000	400,000
TOTAL	$0	$2,000,000	$2,000,000

Total Research Appropriation for 2000/01 - 2002/03

	FY2001 Appropriation	FY2002 Appropriation	FY2003 Appropriation
UM	$8,080,000	$8,080,000	$9,680,000
USM	2,020,000	2,020,000	2,420,000
TOTAL	$10,100,000	$10,100,000	$12,100,000

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LEGISLATIVE HISTORY OF STATE RESEARCH CAPITAL FUNDING

VOTER APPROVAL OF STATE RESEARCH CAPITAL BONDS

On November 3, 1998, the voters of Maine approved a $20,000,000 bond issue to improve the Maine economy by supporting innovative research and development by businesses and non-profit and educational institutions in the fields of biotechnology, computers and other information technology, aquaculture and marine technology, forestry and agriculture, and advanced materials. It is anticipated that the proceeds from this bond issue will provide the following benefits:

- will create new jobs, new products, new business and industries;
- will attract millions of dollars in federal funds to support Maine -based Research and Development;
- will help strengthen Maine's economy and improve its quality of life; and
- will help make Maine more competitive with other states.

The University will be receiving $13,500,000 from the $20.0 million bond issue to be used for capital improvements and equipment purchases to support research and development in marine biotechnology, software engineering and development, advanced technologies for forestry and agriculture, biotechnology and advanced materials engineering and development.

Allocation of Bond Proceeds

UM	$10,800,000
USM	2,700,000
TOTAL	$13,500,000

STATE APPROPRIATION FOR DEBT SERVICE ON UNIVERSITY R&D REVENUE BOND

On June 4, 1999, the Governor signed into law the Part II Supplemental Appropriation budget (Chapter 401) that appropriated $2,500,000 in 2000/01 to the University of Maine System on a "base budget" basis to pay the debt service on a $25 million university research & development revenue bond. The university issued the revenue bond on August 15, 2000 that provides $25 million for the following R&D projects.

Allocation of Bond Proceeds

UM - Engineering & Science Research Facility	$20,000,000
USM - Science Building Addition/Renovation	5,000,000
TOTAL	$25,000,000

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APPENDIX B

SUMMARY TABLES SHOWING UTILIZATION OF R&D APPROPRIATION FOR OPERATIONS

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UTILIZATION OF FY2001 OPERATING RESEARCH APPROPRIATION

ACCOUNTING PERIOD: 7/1/2000 - 6/30/2001

UM/USM COMBINED

	Source of E&G Funds			Utilization of E&G Funds					
Major Research Area	FY2001 E&G R&D Base Budget (a)	Total Unused E&G Funds from Prior Years (b)	Total E&G Funds Available (a)+(b)	FY2001 E&G Expenditures (c)	Used To Match Grants & Contracts (d)	Unused Funds Carried Forward To FY2002 (e)	Total E&G Funds Utilized (c)+(d)+(e)	Grants & Contracts Generated	Total FTE Positions Supported All Funds
UM	$8,153,982	$708,073	$8,862,055	$5,317,330	$3,289,185	$176,081	$8,782,596	$39,487,515	358.7
USM	2,026,005	0	2,026,005	1,533,841	446,925	45,239	2,026,005	1,746,652	16.2
TOTAL	$10,179,987	$708,073	$10,888,060	$6,851,171	$3,736,110	$221,320	$10,808,601	$41,234,167	374.9

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UTILIZATION OF FY2001 OPERATING RESEARCH APPROPRIATION

ACCOUNTING PERIOD: 7/1/2000 - 6/30/2001

UM

	Source of E&G Funds			Utilization of E&G Funds					
Major Research Area	FY2001 E&G R&D Base Budget (a)	Total Unused E&G Funds from Prior Years (b)	Total E&G Funds Available (a)+(b)	FY2001 E&G Expenditures (c)	Used To Match Grants & Contracts (d)	Unused Funds Carried Forward To FY2002 (e)	Total E&G Funds Utilized (c)+(d)+(e)	Grants & Contracts Generated	Total FTE Positions Supported All Funds
Computer Software & Engineering	$1,057,875	$77,306	$1,135,181	$345,191	$159,696	$2,313	$507,200	$4,142,220	20.2
Advanced Materials Engineering	2,457,350	298,458	2,755,808	1,813,139	435,237	45,674	2,294,050	11,352,021	204.0
Advanced Technologies for Forestry & Agriculture	1,751,315	28,912	1,780,227	1,448,049	1,406,471	68,377	2,922,897	9,468,196	65.5
Aquaculture & Marine Science	1,308,979	77,642	1,386,621	1,088,180	755,534	6,165	1,849,879	9,404,733	33.2
Biotechnology/Technology Transfer	1,578,463	225,755	1,804,218	622,771	532,247	53,552	1,208,570	5,120,345	35.8
Total	$8,153,982	$708,073	$8,862,055	$5,317,330	$3,289,185	$176,081	$8,782,596	$39,487,515	358.7

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UTILIZATION OF FY2001 OPERATING RESEARCH APPROPRIATION AND MAINE PATENT PROGRAM APPROPRIATION

ACCOUNTING PERIOD: 7/1/2000 - 6/30/2001

USM

	Source of E&G Funds			Utilization of E&G Funds					
Major Research Area	FY2001 E&G R&D Base Budget (a)	Total Unused E&G Funds from Prior Years (b)	Total E&G Funds Available (a)+(b)	FY2001 E&G Expenditures (c)	Used To Match Grants & Contracts (d)	Unused Funds Carried Forward To FY2002 (e)	Total E&G Funds Utilized (c)+(d)+(e)	Grants & Contracts Generated	Total FTE Positions Supported All Funds
Research & Development									
College of Arts & Sciences	$104,069	$0	$104,069	$70,017	$28,298	$5,754	$104,069	$60,000	1.0
Information Technology Institute	314,433	0	314,433	242,050	20,800	51,583	314,433	0	3.3
Research Development	131,677	0	131,677	88,233	4,884	38,560	131,677	385,152	2.0
Bioscience Institute	602,718	0	602,718	309,837	309,393	(16,512)	602,718	1,055,530	7.7
John Roberts Road Research Space Rental	147,500	0	147,500	153,162	0	(5,662)	147,500	0	0.0
Opportunity Programs	450,608	0	450,608	384,023	83,550	(16,965)	450,608	245,970	1.6
Library Research Upgrades	95,000	0	95,000	95,097	0	(97)	95,000	0	0.6
Research Facilities & Equipment	180,000	0	180,000	191,422	0	(11,422)	180,000	0	0.0
Total	$2,026,005	$0	$2,026,005	$1,533,841	$446,925	$45,239	$2,026,005	$1,746,652	16.2
Maine Patent Program	$300,000	$0	$300,000	$66,282	$0	$236,418	$302,700	$0	0.3

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APPENDIX C

NARRATIVE SUMMARIES DESCRIBING UTILIZATION OF R&D APPROPRIATION FOR OPERATIONS

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University of Maine

Computer Software & Engineering

Geographic Information Systems (GIS)

Purpose: Geographic Information Systems allow individuals, businesses, government and industry to better accomplish daily tasks that depend on location, such as managing information about the environment, transportation and other utility systems, **managing an emergency response system,** or **planning and locating new businesses and facilities.** Objectives of GIS research at UMaine include developing the underlying science used in the broad range of GIS technological applications—from digital libraries to chemical and biological micro sensors, **serving Maine industry,** and training graduate students for placement in academia and industry.

Description of Select Grants and Contracts:

Principal Investigator: Kate Beard/Max Egenhofer *Project Title:* Intelligent Spatial Technologies
Sponsor & amount: DOD/NIMA: $594,600/$1,387,400

A technology that supports the delivery of geospatial information in the form of *intelligent*, *interactive*, and *Internet-connected maps* is called *iMaps*. iMaps differ from traditional, static geospatial products, because they are spatially aware, offer natural modes of interaction, and augment reality. iMaps integrate location sensors (GPS, gyroscope, laser) with geospatial information to **provide users faster and more accurate information**. Key features of iMaps are intelligent zooming and panning, adaptive orientation, task-oriented thematic display, interaction with voice and pen, real-time updates, and flexible use in terrain, vehicles, etc. This form of intelligent spatial technology requires **significant advancements in information management,** database technologies, and human-computer interaction. Through this linkage, we ensure that information systems get developed that **respond to the needs of users and society, and that are easy to use.**

Principal Investigator: Max Egenhofer *Sponsor & amount:* NSF: $223,299; $18,750
Project Title: "University of Maine Research Infrastructure to Enhance Maine's High Technology Industries, *Intelligent Spatial Technologies* portion, Year 1"

The goal of this project is to provide significant research support for an **emerging cluster of high-technology industry in Maine**. The *Intelligent Spatial Technologies* initiative is providing spatial information in ways that meet user choices of concepts, language, and style of interaction. UMaine is forming an Intelligent Spatial Technologies Institute (ISTI), which will provide a focal point for **research and advanced education in intelligent spatial technologies,** bringing together multidisciplinary experts who collaborate to solve core scientific, engineering, and legal problems involving intelligent spatial information systems. The ISTI will build upon UMaine's existing research strength in Geographic Information Science.

Potential Outcomes / Economic Impact:

- **Three new faculty members were hired, and collaborators included: The Jackson Laboratory, the Brazilian Institute for Space Research, VA Commonwealth University, UC Santa Barbara, SUNY Buffalo, and Hong Kong University of Science and Technology.**
- **Significant research and educational opportunities are being provided for students at various levels.**
- **Investment in the development of new GIS-based computer software products and systems, for technology transfer to existing Maine companies, and the recruitment of GIS companies or divisions of companies to Maine, is being accomplished.**
- **Investment in new technology—such as advanced field surveying technologies, global positioning systems, digital photography, remote sensing, and easy-to-use spatial data management tools for use by all levels of Maine government, Maine's surveying companies, and the military—is taking place.**

University of Maine

ADVANCED MATERIALS ENGINEERING

Advanced Wood Composites for Housing

Purpose:

The Advanced Structures and Composites (ASW) Laboratory/Advanced Engineered Wood Composite (AEWC) Center is dedicated to research, development and education focused on the material science and structural applications of wood-nonwood hybrid composites. The objectives of this UMaine research unit are: (1) to develop the underlying science needed to produce low-cost, high-performance structural composites—such as **disaster-resistant housing**, and (2) to **support current and emerging Maine industries** as well as government agencies that produce or use these products by providing testing, engineering and consulting services.

Description of Select Grants and Contracts:

Principal Investigator: Bill Davids *Sponsor & amount:* NIST: $824,006
Project Title: " Feasibility of Advanced OSB for Disaster-Resistant Housing"

The focus of this research is to provide the science-based performance measurements that will enable early industry adoption of an innovative, strong, flexible, and energy-dissipating lateral force-resisting system. This type of system is crucial for **improved housing performance in extreme seismic or wind events**. The most important element of this system is being designed by integrating synthetic fibers into oriented-strand board (OSB) panels, creating an Innovative OSB panel. The **synthetic reinforcement is being optimized to control cost** and restricted to the regions of the panel that have been observed to fail under hurricane or earthquake loadings.

Principal Investigator: Habib Dagher/Bill Davids *Sponsor & amount*: DOT: $210,000/140,000
Project Title: "FRP-Glulam with Concrete Composite Deck"

This research focuses on the development and implementation of an efficient and accurate method for numerically predicting the flexibility response of glulam (glued laminated timber) reinforced with FRP (fiber-reinforced polymer) beams with partially composite concrete decks. The behavior of such beams is of great interest because of the **large strength and stiffness gains that can be achieved through the development of composite action**. The major contribution of the work is the development of a rigorous numerical method for predicting the structural response of partially composite FRP-reinforced glulam-concrete beams. Most of the work involved in this project is structural engineering/mechanics; however, the study represents a strong mechanics contribution to the field of timber engineering.

Potential Outcomes / Economic Impact:

- **Providing educational and advanced training opportunities for undergraduate and graduate students, postdoctoral fellows, visiting scientists, and industrial partners**
- **Providing the channel through which the basic and applied research developments in structural and composite technology reach the state, federal, and industrial sectors**
- **Developing state-of-the-art, patented products, such as the innovative OSB panels and composite deck beams—patents are pending for both of these materials, and overall eight patents are planned**
- **Generating new hi-tech industries in Maine, and creating profitable Maine products and exports—these will be products with highly competitive manufacturing costs, and extremely valued strength and safety attributes**
    - **With a business plan already written, UMaine is currently in negotiations with a Maine company to manufacture innovative OSB panels**

University of Maine

ADVANCED MATERIALS ENGINEERING

Advanced Shipbuilding Technologies

Purpose:

The objectives of this UMaine research program are: (1) to develop **high-speed vessel components for the marine, transport, and aerospace industries,** and (2) to **support current and emerging Maine industries** as well as government agencies that produce or use these products by providing testing, engineering and consulting services.

Description of Select Grants and Contracts:

Principal Investigator: Vincent Caccese
Sponsor & amount: DOD/Navy: $741,719
Project Title: "Modular Advanced Composite Hull-form (MACH) Technology"

The University of Maine has organized a **coalition of university, industry and Navy partners** to develop innovative modular hull construction techniques for Navy and civilian applications. The coalition involves the University of Maine, Applied Thermal Sciences Inc. of Sanford, ME, an engineering research and development company with extensive experience in innovative DoD projects, Bath Iron Works, a leading company in the design and building of complex, technologically advanced naval ships, and Pacific Marine & Supply Co. of Honolulu, a pioneer in advanced ship hull form development.

The overall objective of this program is to develop and demonstrate hybrid composite/metallic structure joining concepts for **Naval ship hull applications.** Conventional hull construction techniques have limited the ability to build and maintain the complex shapes required for high-speed vessels in a cost-effective manner. Conventional single-hull construction techniques have also restricted submarines to cylindrical shapes that are difficult and costly to reconfigure for new roles. The central motivation of the MACH effort is a desire to **break out of the restrictions of conventional hull construction techniques and conventional hull forms.**

Potential Outcomes / Economic Impact:

Advanced shipbuilding technology research at UMaine is:

- **Creating solutions to cost and shape restrictions in advanced hull form design**
- **Strengthening UMaine's connection with two important private sector entities in Maine's economy: Applied Thermal Sciences and Bath Iron Works**
- **Establishing Maine as a center for advanced hull form design with direct commercial applications to the manufacturing of high-speed ferries and Navy vessels**
- **Helping Maine's economy by keeping Maine competitive in the shipbuilding business through design of innovative, cost-effective, high-speed vessel components for use in the marine, transport and aerospace industries**

ADVANCED TECHNOLOGIES FOR FORESTRY AND AGRICULTURE

Maine Agricultural and Forest Experiment Station (MAFES)

Purpose:

The research activity at MAFES is based in the following fundamental objectives:

1) Develop disease and pest prevention strategies for crops,
2) Develop new crop varieties,
3) Develop improved harvesting management techniques,
4) Invent new value-added products, and
5) Investigate potential new markets.

Description of Select Grants and Contracts:

Project Funds: Hatch Match
Sponsor and amount: USDA: $2,334,554

The year's accomplishments at MAFES include a variety of projects. A selection of these accomplishments follows:

- As part of a multi-state research project, the evaluation of apple cultivars continues. Varietal differences in tree growth, fruit coloring, and eating quality have been demonstrated. **Consistently high yielding varieties** are beginning to become apparent. Information from this project is useful to growers who are looking for new varieties to plant and market.
- Infertility in horses is a significant problem **in Maine, where horses are a multi-million dollar industry**. Failure to conceive or carry a foal leads to great economic losses. MAFES scientists are attempting to **improve our knowledge of equine infertility**. Early results indicate that certain strain of *Streptococcus* the horse is infected with may affect the horse's fertility.
- Aquaculture and fisheries businesses in Maine rarely have the resources to provide in-house engineering services or hire consulting engineers, and frequently approach the University for assistance. This year MAFES scientists continued work on **whale-friendly lobster-gear**, and development of filter foam material for recirculating aquaculture systems.

Potential Outcomes / Economic Impact:

MAFES is working for the people of Maine by:

- **Achieving a highly competitive agricultural system in Maine by producing high-quality crops and products**
- **Developing better disease and pest prevention strategies**
- **Developing new crop varieties, new harvesting management techniques, new value-added products, and access to new markets**

University of Maine

AQUACULTURE AND MARINE SCIENCES

Gulf of Maine Ocean Observing System – GoMOOS

Purpose: The Gulf of Maine Ocean Observing System (GoMOOS) itself is not a research project; its principal mission is *not* to conduct (or fund) research. Rather, GoMOOS is more accurately described as a ***utility***: an entity that will build, deploy, operate, transmit/process/archive data, and maintain the infrastructure required to do this. The overarching goal of GoMOOS is to provide data and data products that serve public and private sector needs for: (1) **solving practical problems**—such as selecting the best sites for aquaculture, (2) predicting events—from major storms to changes in water temperature, and (3) **further understanding natural systems in the Gulf of Maine**—systems vitally important for such industries such as lobster fishing and finfishing, and for the overall environmental health of the Gulf of Maine.

Description of Select Grants and Projects:

Principal Investigator: Neal Pettigrew; *Sponsor and Amount:* DOD/Navy: $2,976,737 *Project Title:* "Shelf and Shallow Buoys, CODAR and Ship Time"

The focus of this research program is the study of coastal circulation features and processes in the Gulf of Maine (GOM). A typical field program involves collecting data on water temperature, salt content, and velocity from **highly sophisticated sensor systems on GoMOOS buoys,** then **transmitting the data** back to the laboratory **via satellite**. Additional data are provided from shipboard surveys, satellite-tracked devices drifting on open water, and satellite-derived images of sea-surface temperature. Many of the components that make up the Ocean Data Acquisition Systems buoys are **designed, fabricated, and integrated by UMaine engineers, research assistants, students and technicians** within the physical oceanography research group.

Principal Investigator: Kate Beard; *Sponsor and Amount:* DOD/Navy: $315,018 *Project Title:* "A Proposal to Implement the GoMOOS–Data Management"

The **Gulf of Maine Information Management System** (GoMIMS) is being designed to serve both the immediate and future missions of ocean observing systems. As the first operational observing system, special efforts are being expended by GoMOOS participants to assure that a flexible design structure is developed that is compatible with current systems, and amenable to change as information technology changes. The system is providing users with search and discovery capabilities and providing seamless **access to any information** within the system. GoMIMS will be capable of integrating with other ocean observing systems, with **historical data archives for the Gulf of Maine**, and a range of varied sources. The majority of the data and data products produced by the GoMOOS are being made available in real time via a GoMOOS website (www.gomoos.org). In addition, mariners and others without ready Internet access can access, via telephone, the **latest meterological, wave, current and other buoy data.**

Potential Outcomes / Economic Impact: GoMOOS has numerous applications and will have valuable and wide-spread economic impacts. This ocean observing system has the capability to allow the state of Maine to provide many improved services and opportunities for its citizens, its natural resources, the environment, and for the country as a whole. For example, among other services, GoMOOS will deliver dramatic improvements in:

- **Safety & efficiency in the shipping industry,**
- **Site selection & water quality in the aquaculture industry,**
- **Spill response for the petroleum industry,**
- **Safety and rescue for mariners,**
- **Educational opportunities,**
- **Stock assessments in finfishing,**
- **Recruitment prediction for lobster fishing**
- **Endangered species assessment for marine mammals, and**
- **National security.**

University of Maine

AQUACULTURE AND MARINE SCIENCES

Shellfish and Finfish Aquaculture

Purpose: The objectives of current aquaculture research activities include: (1) understand the biology of **commercially produced fish species**, concentrating on nutrition, disease control, and reproduction, (2) provide industry with improved broodstock, and new culturing and disease control techniques, (3) **develop new aquaculture industries**, and (3) understand the impacts of aquaculture on **Maine's environment**.

Description of Select Grants and Projects:

Project: The Darling Marine Center's **Flowing Seawater Laboratory**

The Darling Center (DMC) is located on the Damariscotta River Estuary; this estuary is the base of Maine's oyster industry. The DMC's new Flowing Seawater Laboratory is a **state-of-the-art facility** containing offices and laboratories for scientists, a classroom for students, a **modern wet lab** for culturing marine organisms, environmental chambers and an **electron microscopy center**. The focus of the new lab's research **is shellfish aquaculture,** with special attention to the study and **resolution of juvenile oyster disease** (JOD). Researchers at the lab are also working to combat oyster parasites. Both JOD and oyster parasites have a significant negative impact on the oyster aquaculture industry in Maine.

Principal Investigator: Bruce Barber; *Sponsor and amount:* MSTF: $244,995
Project Title: "Development and Demonstration of Marine Aquaculture Based on Halibut and Haddock"

Halibut is a **highly valued groundfish—priced higher than salmon**, and was a staple of the New England fishing industry for many years before declining harvests led to severe fishing restrictions in the Gulf of Maine and Georges Bank areas. Three Maine fishermen working with the University of Maine have landed a small number of live Atlantic halibut that could become **the start of a new aquaculture industry** in the state. The fish were caught under a special permit from the National Marine Fisheries Service and are being kept at UMaine's Center for Cooperative Aquaculture Research in Franklin, Maine. The potential of these fish for aquaculture is being assessed. As researchers learn to domesticate the halibut with **proper feeding and culturing techniques**, these fish could provide an egg supply for the future. This project is an excellent example of **cooperation among industry, the university, and state and federal governments**. Atlantic halibut aquaculture is currently the subject of research in Canada and Europe; however, Maine's program is unique in the United States.

Potential Outcomes/Economic Impact:

- **Identification of pathogens and development of mitigation techniques for combating juvenile oyster disease, saving Maine millions of dollars**
- **Development of a new halibut industry in Maine**

Current aquaculture research is focused on supporting Maine's **$100 million per year aquaculture industry,** a leading economy in Downeast Maine. UMaine researchers are focusing on finding cures for several common diseases that afflict commercially important fish. This research translates into **direct benefits for Maine's economy**. Understanding juvenile oyster disease will prove extremely valuable and will save Maine millions of dollars. Last year, certain Maine oyster farms on the Damariscotta River lost up to 70% of their oyster harvest to JOD. Developing a new halibut industry in Maine will offer diversification options within the finfish aquaculture industry. For the aquaculture industry in Maine, a new **highly valued marketable product like halibut** will provide an economic buffer. Such diversification will provide security from the threat of species-specific diseases such as the potentially devastating infectious salmon anemia, and from certain wild fish conservation issues such as genetic infusion from escaped domesticated salmon to populations of endangered Wild Atlantic salmon.

University of Maine

BIOTECHNOLOGY

Biosensor Research

Purpose: The overall objectives of Biological Sensor research at UMaine are four-fold:

- Address national and international needs in the area of sensor technology including **detection of chemical and biological agents**; monitoring of air, soil and water quality; industrial process control and **medical diagnostics.**
- **Maintain a comprehensive research and development program** addressing the theory, design and fabrication of sensor elements, and the characterization and testing of prototype sensors.
- **Contribute to human resource development** in the broad area of sensor technology by providing advanced training for undergraduate and graduate students, postdoctoral fellows, and visiting scientists.
- **Transfer the products of basic and applied research to the government and industrial sector** by emphasizing the integration of new types of sensor technologies into end-product instruments and systems.

Description of Select Grants and Contracts:

Principal Investigator: Robert Lad *Sponsor and amount:* NSF: $893,199
Project Title: "University of Maine Research Infrastructure to Enhance Maine's High Technology Industries-**BioSensor** portion, Year 1"

This research initiative is establishing new research expertise and infrastructure at UMaine in the area of Biosensor Technology. The initiative is **addressing the nation's critical need for the development of small, sensitive, and selective biosensor devices and detection systems** that can reliably operate in real time and in extreme and diverse physical environments. Biosensors are used in many applications such as **food-safety diagnostics, medical monitors**, and **detection systems for biological-warfare agents**. Fundamentally, this research project is working toward overcoming several significant scientific and engineering barriers currently preventing commercial realization of biosensors.

Potential Outcomes / Economic Impacts:

Accomplishments of the Biosensor program include the following:

- **More than a dozen research collaborations were created with chemists, physicists, microbiologists, food scientists, and electrical engineers at UMaine and its industry partners: The Jackson Laboratory, and the design firm Andrew Bodkin Associates of Wellsley, Massachusetts.**
- **Significant research and educational opportunities are being provided for students at various levels.**
- **New research programs were developed from collaborations and have been recently funded by, or are pending with, research granting agencies such as USDA and NIH.**
- **New Biosensor-related products were created, including several data collection computer programs that will be useful to researchers beyond UMaine.**
- **Several new technologies will be commercialized for applications in areas such as health care, environmental protection, food safety, and the safeguarding of our military, generating new high technology jobs for Maine.**
- **Three new chemical sensor patents were filed, with numerous more expected.**
- **Three new post-docs positions were filled.**
- **The hiring and investment in three new highly skilled researchers, providing Maine with technological expertise unavailable until now.**

University of Maine

BIOTECHNOLOGY

Immunogenetics Research

Purpose:

Throughout history infectious diseases have played a major role in the human condition worldwide. **Pathogens also have tremendous environmental and economic impact** in agriculture and aquaculture. To counter these agents, vaccines, antibiotics, and new intervention strategies are continually being developed. Although these methods have largely proven to be effective, we continually struggle to keep pace with the adaptation and environment-triggered emergence of new diseases. Accordingly, investigation into alternative methods for **controlling infectious disease** is clearly warranted.

Description of Select Grants and Projects:

Principal Investigator: Carol Kim *Sponsor and amount:* HHS/NIH: $147,000
Title of Project: " Characterization of the Toll Signaling Pathway in Zebra Fish Knockdowns"

Recent recognition of the fundamental importance of the natural immune response, in addition to its regulatory role in adaptive immunity, suggests that **this system plays a crucial role in protection against agents of infectious disease**. Our goal is to better understand the natural immune response through the "Toll signal transduction pathway." Evidence suggests the existence of Toll receptors, described as "pattern recognition receptors," that possess the ability to detect a variety of indicators of infectious organisms, and which feed into a common pathway. Through molecular dissection of this pathway in the zebrafish, a vertebrate with a less complex immune system than that of mammals, we seek to identify factors that influence regulation of the innate immune response as well as its role in regulating the adaptive immune response.

Potential Outcomes/Economic Impact:

- **Develop a research tool available to biomedical researchers in the study of immunogenetics**
- **Increase the competitiveness of Maine researchers to leverage more NIH funding—slated for major increases—thus bringing additional biomedical research jobs to Maine**

Through our disease studies with zebrafish, we hope to better understand the many factors that control the immune response to infection. In order to develop more effective vaccines and to understand host response to pathogens, an infectious disease model is essential. Through molecular study of the zebrafish, a species with a less complex immune system than that of mammals, we seek to identify factors that influence regulation of the immune response. Ultimately, we hope to learn enough to begin to **develop methods for immune system intervention that can be applied to mammals.**

Knowledge and procedures developed from this research will have valuable economic impacts on **disease control in populations of livestock and commercial fish**. Moreover, the possibilities of this research for **fighting human disease** are far-reaching. Understanding the elemental functioning of our immune system is critical to alleviate and overcome disease. The potential for saving and extending lives is tremendous. Efficiently and successfully battling disease will also greatly **decrease health care costs.**

UNIVERSITY OF MAINE SYSTEM

UTILIZATION OF FY2001 OPERATING RESEARCH APPROPRIATION

ACCOUNTING PERIOD: 7/1/2000 – 6/30/2001

NARRATIVE SUMMARY BY MAJOR RESEARCH AREA

USM

MAJOR RESEARCH AREA: CAS R&D 6-2-11267

Purpose of Research Area:

The account supports research and development activities in College of Arts and Science science departments, with the overall goal of enhancing research productivity and proposal development.

Description of Grant & Contract Funds Generated:

$10,000	Nancy Gordon	Phytoplankton Response to Heavy Metal Stress
7/1/00 – 6/30/02		Maine Science & Technology Foundation
$50,000	Thomas Knight	Nitrogen Use Efficiency
6/1/01 – 11/30/01		Los Alamos National Laboratory

Total $60,000

Potential Outcomes/Economic Benefits:

The Heavy Metal proposal has considerable significance for the Maine environment and the reduction/elimination of heavy metals in the environment.

The Nitrogen Use project is an extension of research that has demonstrated dramatically increased growth of plants, which has considerable implications for forestry in Maine.

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UTILIZATION OF FY2001 OPERATING RESEARCH APPROPRIATION

ACCOUNTING PERIOD: 7/1/2000 – 6/30/2001

NARRATIVE SUMMARY BY MAJOR RESEARCH AREA

USM

MAJOR RESEARCH AREA: Information Tech Institute 6-2-11415

Purpose of Research Area:

The purpose of this account is to support research and development of information science and technology research at USM and to develop and operate the Southern Maine Information Science Research Institute. The purposes of the Institute are: (1) to serve as a focal point for attracting external funding for R&D in the information sciences and (2) to facilitate the participation by USM and affiliated faculty in delivering the U. Maine Computer Science Ph.D. program.

Description of Grant & Contract Funds Generated:

Four projects that started prior to FY01 were continued during the year, a computer program bidirectional debugger, digital survey instrumentation, and graphical user interfaces. Proposals have been submitted. One has been funded in FY02. Funds were expended for internal development for future return, including investment in existing faculty and recruitment of two new faculty in Computer Science.

Potential Outcomes/Economic Benefits:

The bidirectional debugger software will enhance the ability of programmers to identify programming errors leading to greater efficiency in programming and could in itself become a software product. Digital survey instrumentation will enhance the capabilities of Geoscience research. Graphical user interfaces enhance the human-computer interface. Relationships have been built with area information technology companies. Capabilities have been developed at USM that will lead to return in succeeding years.

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UTILIZATION OF FY2001 OPERATING RESEARCH APPROPRIATION

ACCOUNTING PERIOD: 7/1/2000 – 6/30/2001

NARRATIVE SUMMARY BY MAJOR RESEARCH AREA

USM

MAJOR RESEARCH AREA: Research Development 6-2-21001

Purpose of Research Area:

The account provides general support for increasing capabilities to generate funded research; e.g. Office of Sponsored Programs, salary for a person to assist others in developing successful grants, and funds for Deans in Applied Science, Engineering, and Technology to enhance research capabilities in their areas.

Description of Grant & Contract Funds Generated:

$385,152 3/1/01 - 2/25/02	Sharon Locke	Earth Systems Science Works National Science Foundation

Total $385,152

Potential Outcomes/Economic Benefits:

Increased capability of USM faculty to generate successful proposals.
Increased understanding of earth science systems.

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UTILIZATION OF FY2001 OPERATING RESEARCH APPROPRIATION

ACCOUNTING PERIOD: 7/1/2000 – 6/30/2001

NARRATIVE SUMMARY BY MAJOR RESEARCH AREA

USM

MAJOR RESEARCH AREA: Bioscience Institute 6-2-21004

Purpose of Research Area:

The purpose of this account is to support research and development of biological sciences research at USM and to develop and operate the Southern Maine Bioscience Research Institute. The purposes of the Institute are: (1) to serve as a focal point for attracting external funding for R&D in the biosciences, and (2) to facilitate the participation by USM and affiliated faculty in delivering the U. Maine Ph.D. collaborative program in Molecular Genetics and Cell Biology.

Description of Grant & Contract Funds Generated:

$145,000 4/1/01 – 3/31/03	Monroe Duboise	Gammaherpesvirus 68 Genes National Institutes of Health
$177,180 3/15/01 - 2/28/02	Monroe Duboise	Maine Science Corps National Science Foundation
$683,350 3/1/01 - 2/28/06	Monroe Duboise	CAREER:MHV68 and Chemokine National Science Foundation
$3000 7/1/00 – 11/1/00	Stephen Pelsue	FSN Proliferation American Lung Association of Maine
$47,000 3/1/01 – 12/31/02	Brian Hodgkin	Maine Biomedical Research Maine Department of Economic & Community Development

Total $1,055,530

Potential Outcomes/Economic Benefits:

The first four grants advance biomedical knowledge leading to human health benefits. The Maine Biomedical Research funding provided for the purchase of a flow cytometer, greatly increasing the range of research that can be done, so future proposals will be more successful.

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UTILIZATION OF FY2001 OPERATING RESEARCH APPROPRIATION

ACCOUNTING PERIOD: 7/1/2000 – 6/30/2001

NARRATIVE SUMMARY BY MAJOR RESEARCH AREA

USM

MAJOR RESEARCH AREA: John Roberts Road 6-2-21005

Purpose of Research Area:

The University of Southern Maine is renting research facilities formerly occupied by the Maine Medical Center Research Institute so that bioscience and information science research can be conducted for which there is not space on campus. We can thus advance the research productivity in the interim before the new research wing is built on the Portland campus. The account is primarily for rent, utilities and other operations.

Description of Grant & Contract Funds Generated:

None

Potential Outcomes/Economic Benefits:

Provides space that would not otherwise be available to conduct research and development.

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UNIVERSITY OF MAINE SYSTEM

UTILIZATION OF FY2001 OPERATING RESEARCH APPROPRIATION

ACCOUNTING PERIOD: 7/1/2000 – 6/30/2001

NARRATIVE SUMMARY BY MAJOR RESEARCH AREA

USM

MAJOR RESEARCH AREA: Opportunity Programs 6-2-21081

Purpose of Research Area:

The purpose of this account is to invest funds to enhance the capabilities of USM faculty to become more competitive in receiving external funding for R&D. One mechanism is internal competitions for funding to do pilot research, purchase essential but expensive equipment, and to create opportunities for collaboration locally and nationally. A second mechanism is provision of matching funds to enhance proposals and increase their competitiveness for external funding.

Description of Grant & Contract Funds Generated:

$50,000 8/15/00 – 7/31/02	Christine Maher	Sociality in Marmots National Science Foundation
$9461 10/1/00 – 12/31/01	Caryn Prudente	Design and Synthesis Center for Innovation in Biotechnology
$90,000 7/1/00 – 6/30/02	John Duff	Marine Connectivity Maine Science and Technology Foundation
$96,509 4/1/01 – 12/31/02	Jeffrey Walker	Precision Maneuvering Office of Naval Research

Total $245,970

Potential Outcomes/Economic Benefits:

The first two projects are the first external funding received by the two investigators and represent the funded research outcome of Opportunity Program investments. The Marine Connectivity project links several marine science entities together for enhanced communication and collaboration. Since some are for-profit, economic benefits from aquaculture, for example could result. The precision maneuvering project aims to relate fish maneuverability to submarine design.

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UTILIZATION OF FY2001 OPERATING RESEARCH APPROPRIATION

ACCOUNTING PERIOD: 7/1/2000 – 6/30/2001

NARRATIVE SUMMARY BY MAJOR RESEARCH AREA

USM

MAJOR RESEARCH AREA: Library Research Upgrades 6-2-41607

Purpose of Research Area:

This account supports the purchase of new research materials, to continue subscriptions to research materials in scientific areas of importance to USM's R&D efforts, and to pay part of the salary of a science bibliographer.

Description of Grant & Contract Funds Generated:

None

Potential Outcomes/Economic Benefits:

Provides needed infrastructure for R&D at USM.

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UNIVERSITY OF MAINE SYSTEM

UTILIZATION OF FY2001 OPERATING RESEARCH APPROPRIATION

ACCOUNTING PERIOD: 7/1/2000 – 6/30/2001

NARRATIVE SUMMARY BY MAJOR RESEARCH AREA

USM

MAJOR RESEARCH AREA: Facilities Equipment 6-2-45260

Purpose of Research Area:

This account provides for facilities renovation, such as creation of laboratories, and purchase of core scientific equipment.

Description of Grant & Contract Funds Generated:

None

Potential Outcomes/Economic Benefits:

Provides facilities and equipment that make competitive research possible.

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UNIVERSITY OF MAINE SYSTEM

UTILIZATION OF FY2001 MAINE PATENT PROGRAM APPROPRIATION

ACCOUNTING PERIOD: 7/1/2000 – 6/30/2001

NARRATIVE SUMMARY BY MAJOR PROGRAM AREA

USM

MAJOR PROGRAM AREA: _____

Purpose of Program Area:

The Maine Patent Program is a key component of the state's initiative to foster economic development by providing resources and improving opportunities for high-tech businesses in Maine. Intellectual property advice and protection is often critical to a business's success, particularly for start-ups in the high technology arena. Through its experienced staff of intellectual property attorneys and partnerships with other state agencies and the private bar, the Program provides Maine innovators with information, education, training, advice and assistance with patent, trademark, copyright and trade secret protection, commercialization and licensing. We hold seminars and workshops, provide one-on-one counseling and referrals, and in appropriate circumstances provide cash awards to assist inventors with the cost of obtaining a patent. These awards are repaid upon the invention's successful commercialization.

Description of Grant & Contract Funds Generated:

The Maine Patent Program has hosted six public seminars so far in calendar year 2001; two more are planned before the year's end. Our first general workshop on patent law and product commercialization, held in Portland, drew nearly 80 registrants. Two other Portland seminars drew approximately 30 attendees each, while workshops held in Augusta, Orono and Caribou attracted 30, 10 and 5 attendees, respectively. We have assisted nearly 40 clients, ranging from independent inventors to small businesses. The Program has provided advice and counseling on invention patentability, trademark registration and copyright protection, performed prior art searches on several inventions, and provided awards to cover the costs of patent preparation. The Program has also taken the lead on re-establishing the monthly meetings of the Maine Inventors' Forum as a gathering place for Maine's most creative minds and the service industries that support them.

In FY 2001, the Maine Patent Program did not receive any grants or generate contract funds. The Program did present three of its mandatory workshops in cooperation with the Maine Technology Institute and with the Maine Manufacturing Extension Partnership, which fully funded the publicity and travel expenses for those workshops with an EPSCOR grant.

Much of FY 2001 and the first quarter of FY 2002 were devoted to performing a necessary, nation-wide search for an appropriately qualified patent attorney to serve as the program's full-time director. Funds expended in FY 2001 included the partial salary of the Program's acting director, the lease and some equipment for the new Program's offices, and development of the Program's informative website. The remaining funds in the Program's FY 2001 budget were preserved for disbursement upon further development of the Program's policies, procedures, and services. Now that the Program recently welcomed the arrival of its Director -- a patent attorney with over 35 years experience drafting and prosecuting patent applications, and negotiating technology licenses -- the funds will be appropriately and efficiently applied toward helping Maine inventors and entrepreneurs protect and enhance their innovative technology assets.

The Patent Program is working on funding projects and strategic partnerships to supplement and leverage its budget for FY 2002 and beyond. Program partners include the Maine Small Business Development Centers, the Maine Technology Institute, the Maine Manufacturing Extension Partnership, and the University of Maine. Through these cooperative relationships and through some fee-based services, the Program will be able to reach a broader segment of Maine's technology sector; to better serve clients by providing referrals and joint seminars; and to generate additional revenue for the Program's administration.

Potential Outcomes/Economic Benefits:

The Maine Patent Program provides economic benefits to Maine in several ways.

First, the Program saves entrepreneurs precious start-up dollars by providing useful, low- or no-cost legal information and services. Many inventors, entrepreneurs and small businesses either fail to seek out advice on intellectual property -- thereby missing critical opportunities to properly protect their assets -- or pay costly attorneys' fees for simple counseling services that may or may not lead to a useful patent or trademark registration. Some inventors spend thousands of dollars on dishonest invention development companies that promise patent protection and licensing opportunities but rarely deliver. The Program addresses these issues with:

- helpful seminars on patent law basics that provide entrepreneurs with useful information and problem-solving tools, allowing them to get simple questions answered and to streamline their legal services needs at little or no cost;
- one-on-one counseling with an experienced patent attorney for basic information, innovation screening, prior art searching, intellectual property protection advice, and technology licensing, at no cost to the client; and
- referrals to and cooperation with business counselors, manufacturing advisors and granting agencies to promote inventors' commercialization plans and efforts.

Second, the Program benefits Maine-based entrepreneurs and small businesses by increasing their knowledge and sophistication of patent and other intellectual property protection. Such increased knowledge allows Program clients to make more intelligent decisions about protecting their intellectual property and to avoid forfeiting their rights. The Program also helps Maine entrepreneurs and small businesses compete more effectively in their markets by building strong intellectual property portfolios.

Third, the Program provides a direct economic benefit to Maine-based entrepreneurs and businesses who demonstrate a likelihood for commercial success by providing cash awards to cover attorneys' fees for preparing and filing patent applications. Award recipients will repay the award upon successful commercialization of their patented technologies. By giving preference to inventions that will be manufactured in Maine, the Program encourages the creation of skilled, high-paying jobs in the state. The patent awards also help support Maine entrepreneurs with early-stage capital at a critical time in their businesses' development.

Finally, the Program has already created jobs for its two experienced intellectual property professionals and an administrative assistant. It also fosters relationships between Maine businesses and the state's private patent attorneys and agents, encouraging additional job growth among the patent professional community in Maine. The improved ability of Maine's legal services sector to serve technology-driven clients will further support Maine's efforts to attract high-tech businesses to the state.

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UNIVERSITY OF MAINE SYSTEM

ANNUAL REPORT ON R&D

FISCAL YEAR ENDING JUNE 30, 2001 (FY2001)

APPENDIX D

SUMMARY TABLES SHOWING UTILIZATION OF R&D CAPITAL FUNDS

OFT: 12/18/2001 Z63(384)

UNIVERSITY OF MAINE SYSTEM

FY2001 SUMMARY OF RESEARCH CAPITAL BONDS

UM/USM COMBINED

Project Name	Referendum Bond Portion	Other Funds	Total Project Budget	Expenditures to Date	Funds Carried Forward To FY2002
FY1999 State Bond Issue					
UM	$10,800,000	$25,064	$10,825,064	$2,930,129	$7,894,935
USM	2,700,000	125,000	2,825,000	1,232,584	1,592,416
TOTAL	$13,500,000	$150,064	$13,650,064	$4,162,713	$9,487,351
FY2001 University R&D Revenue Bonds (Debt Service Paid by $2,500,000 State Appropriation)					
UM	$20,000,000	$0	$20,000,000	$215,075	$19,784,925
USM	5,000,000	0	5,000,000	680	4,999,320
TOTAL	$25,000,000	$0	$25,000,000	$215,755	$24,784,245

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UNIVERSITY OF MAINE SYSTEM

FY2001 SUMMARY OF RESEARCH CAPITAL BONDS BY ACCOUNT/PROJECT

UM

Project Name	Referendum Bond Portion	Other Funds	Total Project Budget	Expenditures to Date	Funds Carried Forward To FY2002
FY1999 State Bond Issue					
Hitchner Expansion & Renovation and Food Science Building	$8,900,000	$0	$8,900,000	$1,592,274	$7,307,726
Hitchner Connector Bridge	500,000	0	500,000	0	500,000
Aquaculture Renovation & Expansion	200,000	0	200,000	115,222	84,778
CRW Lab Related Work	250,000	64	250,064	250,064	0
Barrows Lab Renovation	30,000	0	30,000	71,584	(41,584)
Software Eng & Adv Materials Labs	920,000	25,000	945,000	900,985	44,015
	$10,800,000	$25,064	$10,825,064	$2,930,129	$7,894,935
FY2001 University R&D Revenue Bonds (Debt Service Paid by $2,500,000 State Appropriation)					
Engineering & Science Research Facility	$20,000,000	$0	$20,000,000	$215,075	$19,784,925

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UNIVERSITY OF MAINE SYSTEM

FY2001 SUMMARY OF RESEARCH CAPITAL BONDS BY ACCOUNT/PROJECT

USM

Project Name	Referendum Bond Portion	Other Funds	Total Project Budget	Expenditures to Date	Funds Carried Forward To FY2002
FY1999 State Bond Issue					
Portland Science Building Lab Renovation	$1,920,856	$0	$1,920,856	$728,440	$1,192,416
Portland R&D Parking	400,000	0	400,000	0	400,000
Subtotal Science Building	2,320,856	0	2,320,856	728,440	1,592,416
Mitchell Center R&D Renovations	379,144	125,000	504,144	504,144	0
	$2,700,000	$125,000	$2,825,000	$1,232,584	$1,592,416
FY2001 University R&D Revenue Bonds (Debt Service Paid by $2,500,000 State Appropriation)					
Science Building Addition/Renovation	$5,000,000	$0	$5,000,000	$680	$4,999,320

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UNIVERSITY OF MAINE SYSTEM

ANNUAL REPORT ON R&D

FISCAL YEAR ENDING JUNE 30, 2001 (FY2001)

APPENDIX E

NARRATIVE SUMMARIES DESCRIBING UTILIZATION OF R&D CAPITAL FUNDS

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University of Maine System

Utilization of FY99 Capital State Bonds

Accounting Period: 07/01/2000 - 6/30/2001

UMaine Campus

Account Number:	5-7-75163	
Project Name:	Hitchner Expan & Renov	
Bond Fund Amount:	$ 8,900,000.00	
Other Funds:	n/a	
Construction Start:	4/1/2001	
Construction End:	n/a	
Campus Contact:	Name	David Trefethen
	Department	Facilities Management
	Phone/fax/e-mail	581-2675

Purpose of Project/Program(s) Involved:
Construct state of the art biology labs and food science facilities, including both research and teaching spaces

Description of Construction Work:
Steel frame, brick facing.

University of Maine System

Utilization of FY99 Capital State Bonds

Accounting Period: 07/01/2000 - 6/30/2001

UMaine Campus

Account Number:	5-7-75164	
Project Name:	Hitchner Connector Bridge	
Bond Fund Amount:	$ 500,000.00	
Other Funds:	n/a	
Construction Start:	9/10/2001	
Construction End:	3/22/2002	
Campus Contact:	Name	Fred Stoddard
	Department	Facilities Management
	Phone/fax/e-mail	581-2634

Purpose of Project/Program(s) Involved:
Provide direct connection between the North and South wings containing research laboratories.

Description of Construction Work:
Construct a 10'w x 14'h x 50'l glass and steel connection at the second floor elevation. Included is a brick masonry anchor/connector tower at the South end connection to the 1987 Hitchner wing.

University of Maine System

Utilization of FY99 Capital State Bonds

Accounting Period: 07/01/2000 - 6/30/2001

UMaine Campus

Account Number:	5-7-75473	
Project Name:	Aquaculture Renov & Expansion	
Bond Fund Amount:	$ 200,000.00	
Other Funds:	n/a	
Construction Start:	6/1/2001	
Construction End:	10/31/2001	
Campus Contact:	Name	Stewart Harvey
	Department	Facilities Management
	Phone/fax/e-mail	581-2668

Purpose of Project/Program(s) Involved:
To renovate laboratories for research.

Description of Construction Work:
Install new doors, floors, HVAC, and other utilities to support research.

University of Maine System

Utilization of FY99 Capital State Bonds

Accounting Period: 07/01/2000 - 6/30/2001

UMaine Campus

Account Number:	8-7-75159	
Project Name:	CRW Lab Related Work	
Bond Fund Amount:	$ 250,000.00	
Other Funds:	n/a	
Construction Start:	7/12/1998	
Construction End:	6/15/1999	
Campus Contact:	Name	David Trefethen
	Department	Facilities Management
	Phone/fax/e-mail	581-2675

Purpose of Project/Program(s) Involved:
Provided partial funding for the construction of the Composite Reinforced Wood Building, later renamed Advanced Engineering and Wood Composites Laboratory.

Description of Construction Work:
This funding went towards utilities line interface as well as equipment and services contracts.

University of Maine System

Utilization of FY99 Capital State Bonds

Accounting Period: 07/01/2000 - 6/30/2001

UMaine Campus

Account Number:	5-7-75741	
Project Name:	Barrows Lab Renovation	
Bond Fund Amount:	$ 30,000.00	
Other Funds:	n/a	
Construction Start:	1/8/2001	
Construction End:	5/10/2001	
Campus Contact:	Name	David Trefethen
	Department	Facilities Management
	Phone/fax/e-mail	581-2675

Purpose of Project/Program(s) Involved:
Modernize existing lab stations with the installation of state-of-the-art control equipment to allow students the opportunity to use technology currently incorporated in modern industrial facilities.

Description of Construction Work:
Installation and wiring of modern motor and equipment controls.
Connect to building power through new transformer.

University of Maine System

Utilization of FY99 Capital State Bonds

Accounting Period: 07/01/2000 - 6/30/2001

UMaine Campus

Account Number:	5-7-75755	
Project Name:	Eng. & Adv. Materials Lab Renovations	
Bond Fund Amount:	$ 920,000.00	
Other Funds:	$ 25,000.00	
Construction Start:	3/1/1999	
Construction End:	10/25/2000	
Campus Contact:	Name	David Trefethen
	Department	Facilities Management
	Phone/fax/e-mail	581-2675

Purpose of Project/Program(s) Involved:
Renovation of lab space to provide state-of-the-art engineering research facilities for researchers and students at the University of Maine.

Description of Construction Work:
Renovation of existing lab space in Boardman Hall and Crosby Lab, additional renovation work in Machine Tool Lab and Barrows Hall.

University of Maine System

Utilization of FY99 Capital State Bonds

Accounting Period: 07/01/2000 - 6/30/2001

UMaine Campus

Account Number:	5-7-75110	
Project Name:	Eng & Sci Research Facil	
Bond Fund Amount:	$ 20,000,000.00	
Other Funds:	$ -	
Construction Start:	7/1/2002	
Construction End:	7/1/2004	
Campus Contact:	Name	Fred Stoddard
	Department	Facilities Management
	Phone/fax/e-mail	581-2634

Purpose of Project/Program(s) Involved:
New building for LASST and Electrical Engineering Programs

Description of Construction Work:
Addition of steel and masonry is expected to be constructed on Barrows hall the design has just started.

UNIVERSITY OF MAINE SYSTEM

FY2001 NARRATIVE SUMMARY OF RESEARCH CAPITAL

BONDS BY ACCOUNT/PROJECT

USM

Account Number: 6-7-76440, 6-7-76441 and 6-7-76110

Project Name: Portland Science Building Lab Renovation and Biosciences Addition

State Bond Amount: $2,320,856
University R&D Bonds: $5,000,000
$1,000,000
Other Funds: $2,000,000

Description: $1.0 from carry-over R&D Operating funds; $2.0 from University bonds

Construction Start January, 2001

Construction End: September, 2003

Campus Contact:

Name: Dr. Brian Hodgkin
Director, Biosciences Research Institute
780-5582 FAX 780-5129
E-mail HODGKIN@usm.maine.edu

Purpose of Project/Program(s) Involved:
To improve facilities for Bioscience Research Institute and Information Technology Institute through addition of research laboratory space to the Portland Campus Science Building and renovation of existing space for Information Technology. Project will include construction of three floor addition to Portland Science Building to house bioscience research laboratories, animal handling area and other Bioscience Research Institute activities. As of 6/30/01, $729,120 had been spent for actual construction work on the existing building and design work on the Bioscience Research Institute addition.

Description of Construction Work:
In February of 2000, the architectural firm of Symmes, Maini, McKee Associates (SMMA) was hired as the project designer. Preliminary programming and diligent studies of the existing Science Building facilities built in 1967 and 1974 resulted in the decision to build a new facility for the Biosciences Institute, the more utility intensive of the two Institutes, and to renovate existing space for the Information Sciences Institute. The design of the new facility for the Biosciences Institute has about 8,500 square feet per floor with the current budget allowing for construction of two floors plus the basement. The design will allow a second phase which would add four floors of laboratories and research space, realizing a full building program of six floors plus a basement. Permitting of the project from State and local agencies began in September of 2000 with Planning Board workshop hearings in January of 2001. The final Portland Planning Board hearing is scheduled for November 13, 2001 with construction documents ready for bidding. Work on the existing Science Building for the Information Sciences Institute has been completed at a cost of over $1.0 million to date.

UNIVERSITY OF MAINE SYSTEM

FY2001 NARRATIVE SUMMARY OF RESEARCH CAPITAL

BONDS BY ACCOUNT/PROJECT

USM

Account Number: 6-7-76442

Project Name: Mitchell Center R&D Renovations

Bond Fund Amount: $379,144

Other Funds: $125,000 Description: Carry-over of R&D Operating funds from previous years.

Construction Start July, 2000

Construction End: November, 2000

Campus Contact: Name: Dr. Julie Ellis
Director, Information Sciences Institute
780-5166 FAX 780-5129
E-mail JELLIS@usm.maine. Edu

Purpose of Project/Program(s) Involved:

To improve and expand the research areas in the John Mitchell Technology Center on the Gorham campus of the University of Southern Maine in the targeted Research & Development (R&D) of Information Sciences/Technology. The area will include efforts in computer science which focuses on software, computer engineering which focuses on the design of computers, and information/communication technology.

Description of Construction Work:

The project involved gutting an area of the Mitchell Center with the construction of eight new offices and three new laboratories. One of the labs is a large open area where researchers/faculty are able to share special equipment with other labs including robotics and computer technology. In order to provide an area conducive to year-round operation, temperature control equipment was installed. The project has been completed, and as indicated in the attached announcement, an open house was held on November 17, 2000 to celebrate the completion.