SUMMARY PROPOSAL BUDGET YEAR 1

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION: **Western Oregon University**

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR: **Sarah M Boomer**

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Sarah M Boomer - Associate Professor**	0.00	0.25	0.00	$ 4,000	$
2.					
3.					
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.25	0.00	4,000	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00	0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0	
3. (0) GRADUATE STUDENTS				0	
4. (0) UNDERGRADUATE STUDENTS				0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				4,000	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				1,748	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				5,748	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
Computers (7) and Projection System, Teaching Lab $ 17,500					
Desktop Centrifuges (4), Teaching Lab 4,000					
DGGE Running and Hybridization Equipment, Teaching Lab 15,000					
Others (See Budget Comments Page…) 22,000					
TOTAL EQUIPMENT				58,500	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				0	
2. FOREIGN				0	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ 0					
2. TRAVEL 0					
3. SUBSISTENCE 0					
4. OTHER 0					
TOTAL NUMBER OF PARTICIPANTS (0) TOTAL PARTICIPANT COSTS				0	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				5,000	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				0	
3. CONSULTANT SERVICES				0	
4. COMPUTER SERVICES				4,000	
5. SUBAWARDS				0	
6. OTHER				0	
TOTAL OTHER DIRECT COSTS				9,000	
H. TOTAL DIRECT COSTS (A THROUGH G)				73,248	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **Salary (Rate: 59.0000, Base: 4000)**					
TOTAL INDIRECT COSTS (F&A)				2,360	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				75,608	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)				0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				$ 75,608	$

M. COST SHARING PROPOSED LEVEL $ 0 AGREED LEVEL IF DIFFERENT $

PI/PD NAME: **Sarah M Boomer**

ORG. REP. NAME*: **Philip morris**

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 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET COMMENTS - Year 1

**** D- Equipment**
Li-Cor DNA Sequencer Upgrade (Amount: $ 8000)
Thermal Cycler and Slide Adaptor (Amount: $ 8000)
Water Analysis Test Kits (2,teaching lab) (Amount: $ 6000)

SUMMARY PROPOSAL BUDGET

YEAR 2

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION: **Western Oregon University**

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR: **Sarah M Boomer**

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Sarah M Boomer - Associate Professor**	0.25	0.25	0.25	$ 16,000	$
2.					
3.					
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.25	0.25	0.25	16,000	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00	0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	1.00	1.00	1.00	27,000	
3. (0) GRADUATE STUDENTS				0	
4. (0) UNDERGRADUATE STUDENTS				0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				43,000	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				18,791	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				61,791	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				1,000	
2. FOREIGN				0	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ 6,000					
2. TRAVEL 2,000					
3. SUBSISTENCE 0					
4. OTHER 0					
TOTAL NUMBER OF PARTICIPANTS (6) TOTAL PARTICIPANT COSTS				8,000	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				10,000	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				1,000	
3. CONSULTANT SERVICES				0	
4. COMPUTER SERVICES				4,000	
5. SUBAWARDS				0	
6. OTHER				0	
TOTAL OTHER DIRECT COSTS				15,000	
H. TOTAL DIRECT COSTS (A THROUGH G)				85,791	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **% Salary (Rate: 59.0000, Base: 43000)**					
TOTAL INDIRECT COSTS (F&A)				25,370	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				111,161	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)				0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				$ 111,161	$

M. COST SHARING PROPOSED LEVEL $ 0 AGREED LEVEL IF DIFFERENT $

PI/PD NAME: **Sarah M Boomer**

ORG. REP. NAME*: **Philip morris**

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 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET YEAR 3

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION: **Western Oregon University**

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR: **Sarah M Boomer**

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Sarah M Boomer - Associate Professor**	0.25	0.25	0.25	$ 16,500	$
2.					
3.					
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.25	0.25	0.25	16,500	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00	0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	1.00	1.00	1.00	27,500	
3. (0) GRADUATE STUDENTS				0	
4. (0) UNDERGRADUATE STUDENTS				0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				44,000	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				19,228	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				63,228	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				1,000	
2. FOREIGN				0	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ 6,000					
2. TRAVEL 2,000					
3. SUBSISTENCE 0					
4. OTHER 0					
TOTAL NUMBER OF PARTICIPANTS (6) TOTAL PARTICIPANT COSTS				8,000	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				10,000	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				1,000	
3. CONSULTANT SERVICES				0	
4. COMPUTER SERVICES				4,000	
5. SUBAWARDS				0	
6. OTHER				0	
TOTAL OTHER DIRECT COSTS				15,000	
H. TOTAL DIRECT COSTS (A THROUGH G)				87,228	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **% Salary (Rate: 59.0000, Base: 44000)**					
TOTAL INDIRECT COSTS (F&A)				25,960	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				113,188	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)				0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				$ 113,188	$

M. COST SHARING PROPOSED LEVEL $ 0 AGREED LEVEL IF DIFFERENT $

PI/PD NAME: **Sarah M Boomer**

ORG. REP. NAME*: **Philip morris**

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 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

YEAR 4

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PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION: **Western Oregon University**

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR: **Sarah M Boomer**

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Sarah M Boomer - Associate Professor**	0.25	0.25	0.25	$ 17,000	$
2.					
3.					
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.25	0.25	0.25	17,000	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00	0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	1.00	1.00	1.00	28,000	
3. (0) GRADUATE STUDENTS				0	
4. (0) UNDERGRADUATE STUDENTS				0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				45,000	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				19,665	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				64,665	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				1,000	
2. FOREIGN				0	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ 6,000					
2. TRAVEL 2,000					
3. SUBSISTENCE 0					
4. OTHER 0					
TOTAL NUMBER OF PARTICIPANTS (6) TOTAL PARTICIPANT COSTS				8,000	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				10,000	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				1,000	
3. CONSULTANT SERVICES				0	
4. COMPUTER SERVICES				4,000	
5. SUBAWARDS				0	
6. OTHER				0	
TOTAL OTHER DIRECT COSTS				15,000	
H. TOTAL DIRECT COSTS (A THROUGH G)				88,665	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **% Salary (Rate: 59.0000, Base: 45000)**					
TOTAL INDIRECT COSTS (F&A)				26,550	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				115,215	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)				0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				$ 115,215	$

M. COST SHARING PROPOSED LEVEL $ 0 AGREED LEVEL IF DIFFERENT $

PI/PD NAME: **Sarah M Boomer**

ORG. REP. NAME*: **Philip morris**

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 ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

SUMMARY PROPOSAL BUDGET

YEAR 5

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION: **Western Oregon University**

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR: **Sarah M Boomer**

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Sarah M Boomer - Associate Professor**	0.25	0.25	0.25	$ 17,500	$
2.					
3.					
4.					
5.					
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	0.25	0.25	0.25	17,500	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00	0	
2. (1) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	1.00	1.00	1.00	28,500	
3. (0) GRADUATE STUDENTS				0	
4. (0) UNDERGRADUATE STUDENTS				0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				46,000	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				20,102	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				66,102	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.)					
TOTAL EQUIPMENT				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				1,000	
2. FOREIGN				0	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ 6,000					
2. TRAVEL 2,000					
3. SUBSISTENCE 0					
4. OTHER 0					
TOTAL NUMBER OF PARTICIPANTS (6) TOTAL PARTICIPANT COSTS				8,000	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				10,000	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				1,000	
3. CONSULTANT SERVICES				0	
4. COMPUTER SERVICES				4,000	
5. SUBAWARDS				0	
6. OTHER				0	
TOTAL OTHER DIRECT COSTS				15,000	
H. TOTAL DIRECT COSTS (A THROUGH G)				90,102	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) **% Salary (Rate: 59.0000, Base: 46000)**					
TOTAL INDIRECT COSTS (F&A)				27,140	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				117,242	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)				0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				$ 117,242	$

M. COST SHARING PROPOSED LEVEL $ 0 AGREED LEVEL IF DIFFERENT $

PI/PD NAME: **Sarah M Boomer**

ORG. REP. NAME*: **Philip morris**

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 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY PROPOSAL BUDGET

Cumulative

FOR NSF USE ONLY		
PROPOSAL NO.	DURATION (months) Proposed	Granted
AWARD NO.		

ORGANIZATION
Western Oregon University

PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR
Sarah M Boomer

A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)	NSF Funded Person-months CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. **Sarah M Boomer - Associate Professor**	1.00	1.25	1.00	$ 71,000	$
2.					
3.					
4.					
5.					
6. ( ) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0	
7. (1) TOTAL SENIOR PERSONNEL (1 - 6)	1.00	1.25	1.00	71,000	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00	0	
2. (4) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	4.00	4.00	4.00	111,000	
3. (0) GRADUATE STUDENTS				0	
4. (0) UNDERGRADUATE STUDENTS				0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				182,000	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				79,534	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				261,534	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING $5,000.) $ 58,500					
TOTAL EQUIPMENT				58,500	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				4,000	
2. FOREIGN				0	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS $ 24,000					
2. TRAVEL 8,000					
3. SUBSISTENCE 0					
4. OTHER 0					
TOTAL NUMBER OF PARTICIPANTS (24) TOTAL PARTICIPANT COSTS				32,000	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				45,000	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				4,000	
3. CONSULTANT SERVICES				0	
4. COMPUTER SERVICES				20,000	
5. SUBAWARDS				0	
6. OTHER				0	
TOTAL OTHER DIRECT COSTS				69,000	
H. TOTAL DIRECT COSTS (A THROUGH G)				425,034	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)					
TOTAL INDIRECT COSTS (F&A)				107,380	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				532,414	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)				0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				$ 532,414	$

M. COST SHARING PROPOSED LEVEL $ **0** AGREED LEVEL IF DIFFERENT $

PI/PD NAME
Sarah M Boomer

ORG. REP. NAME*
Philip morris

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C ***ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET**

Budget Justification

I am requesting five years of MO-RUI funding for this project. Year one support (December 2002-3), part of which overlaps with the final year of funding for my existing grant, funds the acquisition of major equipment that will facilitate the implementation of all new project objectives. During years 2-5 (December 2004-7), I am requesting primarily salary and supply funding that will allow me to execute and maintain new research and teaching objectives.

Major Equipment - Year One

Between December 2002-3, I am requesting funds primarily for equipment and supplies, all dedicated to my microbiology/molecular biology teaching lab. All cited costs contain educational discounts (5-20%) that I have already gathered. I am requesting these funds during this specific time because I will, as part of the final year of current RUI-MO support, still have a full-time research assistant working with me who has proven invaluable for troubleshooting new methods and equipment for incorporation into classroom curricula. If this renewal is funded, a key revised objective for my final year of MO-RUI funding will be to troubleshoot all new equipment and methods and develop concordant new curricula in preparation for immediate inclusion in new lab curricula and research experiences described in this proposal (years 2-5). Given that new curricula will be implemented in fall term (2003), I have requested 0.25 FTE release time, outlined in the Research/Teaching Objective section of this budget justification.

<u>DGGE-Related Equipment</u> (15K total)

Two DGGE systems (Biorad, 8.6K total), two DGGE-specific power supplies (Biorad, 2K total,) two gel-dryers (Biorad, 3.4K total), and one UV cross-linker (Biorad, 1K) are requested. None of this equipment exists on campus. These methods are integral to longitudinal diversity studies and will be employed in the new summer research course and integrated into new Molecular Biology curriculum. The UV-crosslinker is especially important for in-class use because it

eliminates the two-hour blot baking step, a key step that has not been easy to work into time-constrained teaching labs.

In situ PCR-Related Equipment (8K total)

While invaluable, the current thermal cycler on campus (notably, the original Perkin Elmer model) is space-limited (48 tubes) for class use and cannot be combined with slide-adapters for new applications, such as *in situ* PCR. Thus, we are requesting a new PCR machine with expanded capacity (72 tubes) and a slide-adapter (Eppendorf, 6.7K). We are also requesting four heating blocks (Fisher, 1.3K total), required for slide preparation. Increasing the numbers of thermal cyclers and capacity are both necessary for new culture-independent curriculum series in Microbiology. The slide block adapter and related heating blocks are integral to longitudinal diversity studies and will be employed in the new summer research course. With the exception of the existing thermal cycler, none of this equipment exists on campus.

Field Chemical Testing Survey Units (6K total)

Two field survey units (Hach, 6K total) are requested for specific use during summer field research. Using the battery of chemical test kits described in Objective One of this proposal, these portable testing units will allow students to store data directly to laptop computers (requested and described shortly) in the field. Currently, one non-portable UV-VIS spectrophotometer exists in our Chemistry Department. Additionally, the Biology Department owns a limited battery of simple colorimetric test kits employed in environmental science water analysis labs.

DNA Sequencer Upgrade (8K total)

Four years ago, NSF-ILI funds allowed me to purchase a low-end, small-scale Li-Cor DNA sequencer (38K) that has outstandingly served my teaching and research programs. Unfortunately, the operating system (OS2) that runs the sequencer is obsolete, cannot be

networked, and will not serve larger classes given the need to individually edit and download sequence information from the single machine that runs the sequencer. Two years ago, Li-Cor developed universal operating system hardware and software; I am requesting funds (8K total) to upgrade accordingly - not only to serve larger courses like Microbiology but also to increase efficiency with smaller summer research teams and new education outreach modules. In combination with the requested dedicated computer workstations (described next), students will be able to download, edit, and analyze raw DNA sequence information simultaneously and four at a time, both significant improvements from the current situation.

Microbiology and Molecular Biology Teaching Lab Computers (17.5K total)

Seven computer workstations plus one overhead projection system are requested (Dell, 17.5K total): 4 lab-dedicated workstations, one for each of the 4 team benches in the Microbiology/Molecular Biology teaching lab (1.5K each); 2 portable field-hardened lab laptops (3.5K each); and 1 projection system and portable labtop workstation for the presentation bench (4.5K total). The four dedicated workstations will be networked and linked to the upgraded DNA sequencer. Portable laptops are requested for use in summer course field data collection, off-campus outreach/presentations, and - when not in use for these purposes - will supplement in-class computational abilities. All computers will be utilized year-round, during every session of majors labs (Biology 390, 391, and 475) for data analysis and documentation, on-line database searching, phylogenetic analysis, and web-based portfolio construction. They will be employed to generate images using existing digital UV-microscope and digital camera/video technology. One overhead projection system is requested for in-class presentations and assessment, and for portable outreach presentations. It should be stressed that I currently require web-based portfolios (some individual and some team-based) for all my majors course labs; webpages are housed on-line so students can cite them in career portfolios. Both I and the students consider these web-based projects an relevant and successful component of the lab experience. However, increased use of campus computer labs (our science division

houses one computer lab that seats 20 students) in combination with small space allotments have proven extremely limiting and frustrating during the last year as I have broadened web-based assignments in line with new digital technology capabilities. Requested computer equipment will permit students to analyze and document more data, securely save more materials (with back-up to CD), and generate web-based portfolios that reflect not only what they did in the lab but also the available technology in the field. Additional annual computer service funds (4K per year) have been requested to support this extensive technology; these are described in more detail in the Research/Teaching Objective section of this budget justification.

Desktop Centrifuges for Microbiology/Molecular Biology Teaching Lab (4K total)

Four variable-speed desktop centrifuges (ISC Bioscience, 4K total) are requested for dedicated use in the Microbiology/Molecular Biology teaching lab. The division/department currently owns two shared-use desktop centrifuges but class and research demands by me and others has grown substantially in the past two years. The addition of four new centrifuges to my lab will provide the cell biology teaching/research program with existing centrifuges and significantly improve both our schedules and goals. In terms of this proposal, additional centrifuges are necessary for proposed new culture-independent lab units for Microbiology and will also greatly improve Molecular Biology, summer research programs, and education outreach capacity.

Research/Teaching Objectives - Years 2-5

During years 2-5, research objectives are focused on a longitudinal survey of four RLMO communities, single time-point surveys of four "red negative" sites, and single time-point surveys for potential new RLMO in Yellowstone. Samples from these studies will be directly employed in a new summer research course, improved curricula for Molecular Biology and the Microbiology core and increased education outreach projects. To facilitate these research and education goals, funding during years 2-5 will support and maintain six annual student summer

course stipends and travel, release time, salary for a full-time education outreach coordinator, and supply money that supports all aspects of this project.

Summer Stipends and Travel

Each summer, six students will be supported during a five-week field and course research experience, all based on the proposed longitudinal studies of four RLMO. Travel costs for these students (2K annually) will support 7-9 days in the park, including van rental, hotel accommodations, and food. The students will each receive an additional $1000 with which they can pay for 3 units of advanced research credit and room/board in the campus dorms for six weeks (total request = 6K annually). Students will be contractually obligated to complete both the course and a web-based summary of their data. An additional 1.0K funding is requested to support meeting travel, including annual MO attendance.

Salary

I am requesting annual salary for release time (0.25 FTE each academic term plus summer research salary, approximately 16-18K annually) and a full-time education coordinator (1.0 FTE each term, 27-28.5K annually). My current 9 month salary base (1.0 FTE per term) requires 12 hours of teaching time per term (while every hour of lecture is recognized, only 60% of every lab hour is recognized). Of these hours, about two thirds are directly related to Microbiology or Molecular Biology and one third are other majors electives and non-majors, 100-level labs. Given the severe demands of preparing lab materials for research-driven courses, I am requesting release time (3 hours/0.25 FTE reduction per term) that will enable me to become more involved in research-based majors courses, education outreach, and maintaining long-term, on-line databases. Notably, in re-structuring my Microbiology core course, I will drop two of my majors electives (Emerging Diseases and Molecular Virology) because of my new course in Medical Microbiology (Biology 391) – all diminishing the impact of requested release time on general departmental teaching loads. My commitments during release time will be equally divided

between research/teaching activities, education outreach assistance, and databasing/publishing activities. An annual budget of 1.0K has been requested to support dissemination costs in the form of meetings posters, publications, and hard-copy advertising materials for outreach.

To significantly enhance education outreach and educator training based on this research, I seek funding to hire a full-time education coordinator (27-28.5K annually). This individual will be selected from our large pool of biology education majors (who may be senior level undergraduates in our program) or recent graduates (either Biology Education or MAT students). The education coordinator will have mastered molecular techniques and his/her position will entail the following responsibilities: (1) developing, delivering, assessing, and documenting RLMO-based education outreach activity for secondary level students 2-3 times per term; (2) serving as liason with the campus Upward Bound program coordinator, six local high school science programs, and interested campus science faculty to develop a fully-operational outreach program on campus; (3) developing and maintaining advertising materials, including on-line presentations and assessment, for all outreach activities; and (4) assisting with the materials preparation and lab maintenance for research-based undergraduate curricula. In contrast with my current research assistant position (70% research and 30% education and lab maintenance duties), the new position description will be 80% education and 20% lab maintenance.

Supplies and Services

The estimated annual supply budget requested is 10K, increased from 7K not only because many methods involve more costly reagents but also because more students will be using supplies through enhanced research-based course experiences. The supply budget will cover perishable DNA-related kits (sequencing, PCR, and hybridization) and chemical testing arrays. Finally, I am requesting 4K in annual computer services to cover monthly networking fees (1K annually), software upgrades and license fees for in-class and databasing project efforts (approximately 1K

annually), and database/programming services (2K annually), the latter provided by undergraduate assistants as described in Objective Four.