

ALASKA STATE LEGISLATURE

LEGISLATIVE BUDGET AND AUDIT COMMITTEE Division of Legislative Finance



P.O. Box 113200
Juneau, AK 99811-3200
(907) 465-3795
FAX (907) 465-1327
www.legfin.state.ak.us

MEMORANDUM

DATE: May 11, 2010

TO: Legislative Budget and Audit Committee

FROM: David Teal
Director

SUBJECT: Preparation for the May 14, 2010 LB&A Meeting

OMB submitted the following RPLs for consideration at the May 14, 2010 Legislative Budget and Audit Committee meeting. These RPLs, along with Legislative Finance comments, are posted on our web site at <http://www.legfin.state.ak.us/>

RPL#	Agency	Appropriation/Allocation	Amount	Fund Source
06-0-0471	Health and Social Services	Health Care Services/Medical Assistance Administration	\$252,200	ARRA funds
45-0-1144	University of Alaska	UA Community Campuses/College of Rural & Community Development	\$3,000,000	University Receipts
45-0-1145 <i>Capital</i>	University of Alaska	Request for ARRA Funding	\$699,998	ARRA funds - <i>Capital</i>

cc: Senator Meyer
Representative Dahlstrom
Representative Hawker
Representative Neuman
Representative Thomas
Representative Doogan
Representative Stoltze
Representative Tuck

Senator Hoffman
Senator Huggins
Senator Menard
Senator Stedman
Senator Olson
Josh Applebee
Tim Grussendorf
Miles Baker

Linda Hay
Paulyn Swanson
James Armstrong
Pat Davidson
John Bitney

**Department of Health and Social Services
Health Care Services, Medical Assistance Administration**

Subject of RPL: Electronic Health Information Exchange System (SB133)- Fund Source Correction	ADN/RPL #: 06-0-0471
Amount requested: \$252,200	Appropriation Authority: Sec 2, Ch12 SLA 2009 pg 47 ln 7-9
Funding source: Federal Economic Stimulus - Operating	Statutory Authority: AS 47.07 and 47.25

PURPOSE

The Department of Health and Social Services is requesting a fund source correction for the fiscal note for SB133 from federal receipts to federal economic stimulus funds for FY2010. When the fiscal note was prepared, the new fiscal note template with the new fund source code for federal economic stimulus funding was not used. This fund source change will allow the department to receive federal economic stimulus funds to pay for electronic health information exchange system costs.

PREVIOUS LEGISLATIVE CONSIDERATION

SB 133 was an enrolled bill and fiscal note during the 2009 Legislative Session. The original fiscal note used the federal receipts fund code (1002) instead of the federal economic stimulus fund code (1212); however, the analysis section of the fiscal note indicated that these funds would be federal economic stimulus funding.

TIMING ISSUES

Currently, there are expenditures for this project, but the department does not have the correct federal receipt authority to receive the federal economic stimulus revenue. Authorization for the FY2010 operating costs will lapse June 30, 2010; and FY2011 through FY2015 expenditures will not be possible unless the revenue authority is corrected. Failure to correct this error will result in lost federal economic stimulus funding and the project will not be able to move forward.

BUDGETARY ISSUES

SB133 includes both an operating and a capital appropriation. The capital appropriation funding source was correctly identified as federal economic stimulus receipts in the language section of SB75. It is only the operating revenue authorization that needs to be corrected. This appropriation pays for personal services, travel, contractual supplies and equipment for two full time positions (Project manager and Accountant III).

There is no general fund impact; future funding for this project will be requested in FY2012 as outlined in the original fiscal note. Attached are the original enrolled fiscal note and the FY2010 change records for the operating portion of this project.

If the fund source is not corrected, this project will not be able to move toward completion without the proper personnel in place to coordinate and monitor the project.

Legislative Fiscal Analyst Comment: Regular and ARRA federal fund sources are not interchangeable, so the department needs authorization from the Committee to correct the fund source error for FY10. RPL 06-0-0471 makes that request. There are no technical problems with the RPL, which has been modified by Legislative Finance to remove references to FY11. The funding issue persists in FY11. A request to correct the fund source for FY11 will be submitted after the FY11 operating bill has been signed.

Agency Contact: Alison Elgee, (907) 465-1630
Legislative Finance Contact: Gary Zepp, (907) 465-5410

1		Appropriation	General	Other
2		Items	Funds	Funds
3	SB 89 RETIREMENT BENEFITS:	83,500	83,500	
4	TERRITORIAL GUARD appropriated to			
5	Department of Military and Veterans			
6	Affairs			
7	SB 133 ELECTRONIC HEALTH INFO	280,200	28,000	252,200
8	EXCHANGE SYSTEM appropriated to			
9	Department of Health and Social Services			
10	(SECTION 3 OF THIS ACT BEGINS ON PAGE 48)			

FISCAL NOTE

STATE OF ALASKA
2009 LEGISLATIVE SESSION

Fiscal Note Number: 2
Bill Version: CSSB 133(FIN)
(S) Publish Date: 4/13/09

Identifier (file name): SB133CS(FIN)-DHSS-MAA-04-10-09 Dept. Affected: Health & Social Services
Title: Electronic Health Info Exchange System RDU: Health Care Services
Component: Medical Assistance Administration
Sponsor: Paskvan, Davis
Requester: Senate FIN Component Number: 2660

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

OPERATING EXPENDITURES	Appropriation Required	Information					
	FY 2010	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
Personal Services	232.2		232.2	232.2	232.2	232.2	232.2
Travel	10.0		10.0	3.0	3.0	3.0	3.0
Contractual	18.8		18.8	2,118.8	2,118.8	2,118.8	2,118.8
Supplies	9.2		4.0	4.0	4.0	4.0	4.0
Equipment	10.0						
Land & Structures							
Grants & Claims							
Miscellaneous							
TOTAL OPERATING	280.2	0.0	265.0	2,358.0	2,358.0	2,358.0	2,358.0

CAPITAL EXPENDITURES	27,275.0						
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CHANGE IN REVENUES (
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FUND SOURCE (Thousands of Dollars)

1002 Federal Receipts	24,799.7		238.5	1,281.3	1,281.3	1,281.3	1,281.3
1003 GF Match	2,755.5		26.5	1,076.7	1,076.7	1,076.7	1,076.7
1004 GF							
1005 GF/Program Receipts							
1037 GF/Mental Health							
Other Interagency Receipts							
TOTAL	27,555.2	0.0	265.0	2,358.0	2,358.0	2,358.0	2,358.0

Estimate of any current year (FY2009) cost: _____

POSITIONS

Full-time	2.0		2.0	2.0	2.0	2.0	2.0
Part-time							
Temporary							

ANALYSIS: (Attach a separate page if necessary)

SB 133 proposes to oversee creation of a secure statewide electronic health information exchange system. It would mandate the department oversee 1) infrastructure planning by a qualified nonprofit or for-profit entity; 2) implementation measures that include installation and training, a plan to encourage use of the system, support to providers, and compliance with federal and state health information policies. The fiscal note assumes federal stimulus funding is available for the first five years of the project; it assumes those funds will create a number of new private sector jobs with those funds, and that the project promotes cost efficiencies across the public and private health delivery systems. The project assumes that when federal stimulus funds are gone, the electronic exchange system will be self-sustaining afterward from a combination of public and private sources that utilize the system.
(continued on next page)

Prepared by: William J. Streur, Deputy Commissioner
Division: Health Care Services

Phone 334-2520
Date/Time 4/10/09 12:00 AM

Approved by: Alison Elgee, Assistant Commissioner
DHSS Finance & Management Services

Date 4/10/2009

FISCAL NOTE #2

STATE OF ALASKA

BILL NO. CSSB 133(FIN)

2009 LEGISLATIVE SESSION

ANALYSIS CONTINUATION

Given the size and complexity of the task, the department has chosen to pursue funding in both the operating and capital budgets. The department believes that this approach enhances the overall success of the project.

The Division of Health Care Services estimates that it will need a total of 2 FTE's for the planning and administration of the electronic health information exchange system.

Operating Budget :

Administrative costs

1 Project Manager, \$150.0, 1 Accountant III \$82.2, All personal services costs include benefits. Assumes \$9.4 per FTE annually for office space, phones, and other contractual costs. Assumes \$2.6 one time costs per FTE for computers and software. Assumes \$5.0 one time costs per FTE for Office equipment. Assumes \$2.0 per FTE annually for supplies. Assumes \$10.0 for travel for first 2 years and \$3.0 for remaining years.

Maintenance

Assumes \$1,800.0 per year for hosted service maintenance costs beginning in FY2012.

Assumes \$300.0 annual maintenance costs for broadband support beginning in FY2012.

Capital Budget:

Planning

Assumes approximately \$1,500.0 will be needed for infrastructure planning, Statewide Technical planning, policy and standard planning, training and workforce development planning, and health information policy compliance.

Implementation

Assumes \$13,000.0 one time costs will be needed for contractual services to upgrade broadband support statewide for the electronic health information exchange system to be interactive, responsive, and less subject to frequent breakdowns especially in rural parts of the state. Assumes \$7,000.0 one time costs will be needed for hardware and software updates for the system. Assumes \$5,775.0 one time costs will be needed for Health Electronic Records repository, patient and provider portals.

Fund Source

Assumes 90% federal for FY2010 and FY2011

Assumes 54.34% federal for 2012 and beyond

Change Record Detail with Description

Department of Health and Social Services

Scenario: FY2010 Authorized (7487)

Component: Medical Assistance Administration (242)

RDU: Health Care Services (485)

Title: ADN 06-0-0060 Electronic Health Info Exchange System, Ch 24 SLA2009 (SB 133)(Sec 2, Ch12, SLA2009, P 47 L 7)

Short Title:

Brief Description:

New GF Revenue:

New Other Revenue:

Priority

Scenario: X Comp: X

Dept: X Cat: X

RDU: X Sub: X

Trans Type	Totals	Personal Services	Travel	Services	Commodities	Capital Outlay	Grants, Benefits	Miscellaneous	Positions		
									PFT	PPT	NP
FisNot	280.2	232.2	10.0	18.8	9.2	10.0	0.0	0.0	2	0	0
1002 Fed Rcpts	252.2										
1003 G/F Match	28.0										

Implementation of the fiscal note for Ch 24 SLA2009 - Electronic Health Info Exchange System (SB 133), which proposes to oversee creation of a secure statewide electronic health information exchange system. It would mandate the department oversee 1) infrastructure planning by a qualified nonprofit or for-profit entity; 2) implementation measures that include installation and training, a plan to encourage use of the system, support to providers, and compliance with federal and state health information policies. The fiscal note assumes federal stimulus funding is available for the first five years of the project, a number of new private sector jobs will be created, that the project promotes cost efficiencies across the public and private health delivery systems, and that when federal stimulus funds are gone, the electronic exchange system will be self-sustaining from a combination of public and private sources that utilize the system. The fiscal note includes two positions: one Project Manager (\$150.0) and one Accountant III (\$82.2).

Change Record Detail with Description

Department of Health and Social Services

Scenario: FY2011 Governor (7749)

Component: Medical Assistance Administration (242)

RDU: Health Care Services (485)

Title: 2nd Year FN ADN 06-0-0060 Elect Health Info Exchange System, Ch 24 SLA2009 (SB 133)(Sec 2, Ch12, SLA2009, P 47 L 7)

Short Title:

Brief Description:

New GF Revenue:

New Other Revenue:

Priority

Scenario: X Comp: X

Dept: 80 Cat: X

RDU: X Sub: X

Trans Type	Totals	Personal Services	Travel	Services	Commodities	Capital Outlay	Grants, Benefits	Miscellaneous			Positions		
								PFT	NP	PPT	PFT	PPT	NP
OTI	-15.2	0.0	0.0	-5.2	0.0	-10.0	0.0	0.0	0	0	0	0	0
1002 Fed Rcpts	-13.7												
1003 G/F Match	-1.5												

Second year of the fiscal note for Ch 24 SLA2009 - Electronic Health Info Exchange System (SB 133), which proposes to oversee creation of a secure statewide electronic health information exchange system. It would mandate the department oversee 1) infrastructure planning by a qualified nonprofit or for-profit entity; 2) implementation measures that include installation and training, a plan to encourage use of the system, support to providers, and compliance with federal and state health information policies. The fiscal note assumes federal stimulus funding is available for the first five years of the project, a number of new private sector jobs will be created, that the project promotes cost efficiencies across the public and private health delivery systems, and that when federal stimulus funds are gone, the electronic exchange system will be self-sustaining from a combination of public and private sources that utilize the system. The fiscal note includes two positions: one Project Manager (\$150.0) and one Accountant III (\$82.2).

University of Alaska

Subject of RPL: College of Rural and Community Development Increased Receipts	ADN/RPL #: 45-0-1144
Amount Requested: \$3,000,000	Appropriation Authority: Sec. 1, Ch. 12, SLA 2009, Page 43, Line 27
Funding Source: University Receipts 2010 – Operating	Statutory Authority: AS 14.40.40

PURPOSE

Several factors are contributing to the need for additional university receipts for the University of Alaska Community Campuses. Factors include: a five percent tuition rate increase in FY2010; greater enrollment than originally anticipated; increases in auxiliary receipts related to the Rural College Bookstore; and increases in indirect cost recoveries. The requested university receipts will allow the University of Alaska College of Rural and Community Development (CRCD) to accept additional university receipts 07/01/2009 through 06/30/2010.

PREVIOUS LEGISLATIVE CONSIDERATION

This is a new request for FY2010 and was not considered by the Finance committees during previous legislative sessions. This request is the estimate amount of additional university receipts authority the University of Alaska CRCD expects to receive during the current fiscal year.

TIMING ISSUES

With separate appropriations for the University of Alaska Fairbanks and the University of Alaska Community Campuses it is not possible to move authority across appropriations, thus the necessity to increase the authority for CRCD.

BUDGETARY ISSUES

No State General Funds will be used, nor is any match required. This request adds \$3,000,000 to the University's operating budget in university receipts authority.

Legislative Fiscal Analyst Comment: The FY2010 existing University Receipts authority is \$5,492,900. It is anticipated that funding authority from this RPL will be transferred to the other seven allocations within the University of Alaska Community Campuses appropriation as needed.

Agency Contact: Michelle Rizk, (907) 450-8187

Legislative Finance Contact: Danith Watts, (907) 465-5435

University of Alaska

Subject of RPL: Science Masters Program: Ecosystem Approaches to Fishery Management	ADN/RPL #: 45-0-1145
Amount Requested: \$699,998	Appropriation Authority: Sec. 4, Ch. 17, SLA 2009, Page 9, Lines 12-16
Funding Source: Federal Stimulus: ARRA 2009 – Capital	Statutory Authority: AS 14.40.40

PURPOSE

The requested federal stimulus receipt authority will allow the University of Alaska to accept the following award:

NSF: Science Master's Program: Ecosystem Approaches to Fishery Management in the amount of \$699,998 for the period 07/01/2010 through 06/30/2013, award DGE-1011707.

PREVIOUS LEGISLATIVE CONSIDERATION

The project was not previously considered. It is a new multi-year federal award received after April 30, 2010 and has not been requested as part of the University's budget.

TIMING ISSUES

On February 17, 2009, President Obama signed into law the American Recovery and Reinvestment Act of 2009, which authorized short-term federal spending, designed to stimulate the American economy. Federal stimulus receipt authority was not included in the FY10 budget because ARRA funding was not available for application until February 17, 2009.

BUDGETARY ISSUES

This project is directly aligned with the University of Alaska's long term plans and missions for the University of Alaska Fairbanks: "The University of Alaska Fairbanks, the nation's northernmost Land, Sea and Space Grant University and international research center, advances and disseminates knowledge through teaching, research and public service with an emphasis on Alaska, the circumpolar North and their diverse peoples. UAF – America's Arctic University – promotes academic excellence, student success and lifelong learning".

No State General Funds will be used, nor is any match required. The federal stimulus funds will be expended during the period FY11 through FY13. This request adds an additional \$699,998 to the University's existing federal economic stimulus authority for competitive, discretionary, and incentive grants capital project appropriation contained within Sec. 4, Ch. 17, SLA 2009.

Agency Contact: Michelle Rizk, (907) 450-8187

Legislative Finance Contact: Danith Watts, (907) 465-5435

Copies of the award documents are attached.

***Legislative Fiscal Analyst Comment:* This RPL requests approval to spend additional stimulus funds received through a competitive process; no stimulus funds will be diverted from other Alaska projects and no general funds are required. As of May 1, 2010, the University of Alaska has been awarded and the Legislative Budget & Audit Committee has approved 64 grants totaling \$188.4 million in stimulus funds for capital, plus \$5.2 million for operating related to Federal College Work Study and Federal Pell Grants. There are also 37 proposals pending totaling \$59.4 million for federal ARRA funds.**

**ARRA
Stimulus Funds**

Subject: Award Id : 1011707, PI: Criddle

From: pahawkin@nsf.gov

Date: 7 May 2010 11:03:10 -0400

To: fygrcon@uaf.edu

CC: dgaawd@nsf.gov

Award Date:

May 7, 2010

Award No.

DGE-1011707

Proposal No.

DGE-1011707

Ms. Maggie Griscavage
Director, Office of Grants and Contracts
University of Alaska Fairbanks
Administrative Services Center
3295 College Road
Room 109
Fairbanks, AK 99709-3705

Dear Ms. Griscavage:

The National Science Foundation hereby awards a grant of \$699,998 to University of Alaska Fairbanks Administrative Services Center for support of the project described in the proposal referenced above.

This project, entitled "Science Master's Program: Ecosystem Approaches to Fishery Management," is under the direction of Keith R. Criddle, Courtney L. Carothers, Franz Mueter, Ginny L. Eckert, Gordon H. Kruse.

This award is effective July 1, 2010 and expires June 30, 2013.

This award is funded under the American Recovery and Reinvestment Act of 2009 (ARRA) (Public Law 111-5) and is subject to the ARRA Terms and Conditions, dated May, 2009, available on the NSF website at:
<http://www.nsf.gov/publications/pubsumm.jsp?odskey=arra0509>

This grant is awarded pursuant to the authority of the National Science Foundation Act of 1950, as amended (42 U.S.C. 1861-75) and is also subject to Research Terms and Conditions (RTC, dated July 2008) and the NSF RTC Agency-Specific Requirements (dated January 2010) are available at <http://www.nsf.gov/awards/managing/rtc.jsp>. This institution is a signatory to the Federal Demonstration Partnership (FDP) Phase V Agreement which requires active institutional participation in new or ongoing FDP demonstrations and pilots..

This award is subject to the provisions of NSF 09-607, Science Master's Program (SMP).

Funds provided for participant support may not be diverted by the awardee to other categories of expense without the prior written approval of the cognizant NSF Program Officer. Since participant support cost is not a normal account classification, the awardee organization must be able to separately identify participant support costs. It is highly recommended that separate accounts, sub-accounts, sub-task, or sub-ledgers be established to accumulate these costs. The awardee should have written policies and procedures to segregate participant support costs.

The attached budget indicates the amounts, by categories, on which NSF has based its support.

Please view the project reporting requirements for this award at the following web .

address [<https://www.fastlane.nsf.gov/researchadmin/prsLoginHome.do?awdID=1011707>].

The cognizant NSF program official for this grant is Carol F. Stoel, (703) 292-8624.

The cognizant NSF grants official contact is Angela A. Turner, (703) 292-7524.

Sincerely,

Pamela A. Hawkins
Grants and Agreements OfficerCFDA No. 47.082
fygrcon@uaf.edu

DGE-1011707

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SUMMARY PROPOSAL BUDGET

Person MOS	cal	acad	sumr	Funds granted By NSF
A. (15.00) Total Senior personnel	2.80	0.00	0.00	\$44,362
B. Other Personnel				
1. (0.00) Post Doctoral associates	0.00	0.00	0.00	\$0
2. (3.00) Other professionals	10.50	0.00	0.00	\$47,027
3. (0.00) Graduate students				\$0
4. (0.00) Secretarial-clerical				\$0
5. (0.00) Undergraduate students				\$0
6. (0.00) Other				\$0
Total salaries and wages (A+B)				\$91,389
C. Fringe benefits (if charged as direct cost)				\$40,957
Total salaries wages and fringes (A+B+C)				\$132,346
D. Total permanent equipment				\$0
E. Travel				
1. Domestic				\$1,458
2. Foreign				\$0
F. Total participant support costs				\$532,000
G. Other direct costs				
1. Materials and supplies				\$6,750
2. Publication costs/page charges				\$0
3. Consultant services				\$15,000
4. Computer (ADPE) services				\$0
5. Subcontracts				\$0
6. Other				\$0
Total other direct costs				\$21,750
H. Total direct costs (A through G)				\$687,554
I. Total indirect costs				\$12,444
J. Total direct and indirect costs (H+I)				\$699,998
K. Residual funds / Small business fee				
1. Residual funds (if for further support of current projects AAG I.D.2 and I.D.3)				\$0
2. Small business fee				\$0
L. Amount of this request (J) or (J-K1+K2)				\$699,998
M. Cost sharing				\$0

Project Summary: Science Master's Program (SMP) in Sustainable Ecosystem-Based Management of Living Marine Resources (UAF), Keith R Criddle, PI

Intellectual Merit Our nation's living marine resources are threatened by fishing pressure, habitat loss, pollution, and climate change. Sustainable ecosystem-based management of these resources is emerging as a paradigm that draws on principles of both natural and socio-economic sciences. Recent Federal law governing the conservation and management of fisheries mandates incorporation of an ecosystem-based perspective into the design and objectives that govern sustainable management of living marine resources. However, progress in developing an ecosystem approach has been hampered by a lack of agreement on reference criteria for judging the ecological or social sustainability of alternative management strategies, a lack of understanding of fundamental relationships among species and between species and their environment, a lack of understanding of the impacts of ecological and regulatory changes on resource dependent communities, and by a lack of personnel trained to prepare regulatory analyses to help resource managers, resource users, and the public better understand the socio-economic and ecological sustainability of alternative management measures. Our SMP will ground students in biological, social, and bioeconomic concepts of sustainability in the context of ecosystem-based strategies for the conservation and management of living marine resources under changing environmental conditions and competing local, national, and international interests. We will offer interdisciplinary training in the fundamental principals and analytical tools of fisheries science, oceanography, ecology, economics, management, marine policy, and anthropology. We will engage students in case studies, courses, and seminars to highlight limitations of traditional management paradigms and challenge students to consider innovative approaches to real-world problems. We will couple classroom instruction with research opportunities. The University of Alaska Fairbanks (UAF) School of Fisheries and Ocean Science (SFOS) is uniquely positioned to develop an outstanding SMP in Sustainable Ecosystem-Based Management of Living Marine Resources (SELMR) as a consequence of the diverse expertise of its faculty and their involvement in fisheries management. Moreover, the UAF Marine Ecosystem Sustainability in the Arctic and Subarctic (MESAS) IGERT and its terrestrial counterpart, the Resilience and Adaptation (RAP) IGERT, offer courses and seminars that will help support this SMP and provide a community of like-minded PhD graduate students. More than half of the U.S. coastline, continental shelf, exclusive economic zone (EEZ), and domestic fish landings are in waters off Alaska. Here, as elsewhere, anthropogenic and naturally-forced changes will have broad consequences; therefore, training professionals in Alaska will be excellent preparation for challenges that may be faced in the design and implementation of sustainable ecosystem-based conservation and management of living marine resources in other ecosystems around the world.

Broader Impacts The primary purpose of SELMR is to train the next generation of MS-level professionals to understand the broad ecological, biological, and social dimensions of living marine resource management. Graduates will be well-prepared with the analytic tools needed to contribute to ecosystem-based analyses of ecological and socioeconomic characteristics of alternative conservation and management measures for living marine resources. We expect to recruit, retain and confer MS degrees to at least 10 trainees over the course of the grant and to broaden participation of underrepresented groups, especially Alaskan Natives. Although Alaska Natives comprise 16% of the state population, fewer than 4% of faculty and professionals in marine resource management agencies (Alaska Department of Fish and Game, Alaska Region of NOAA) are Alaska Natives. Our recruiting goal is for at least 20% of the SMP supported students to be Alaska Natives or other under-represented minorities. We will form partnerships with government agencies and stakeholder organizations to provide career development opportunities. Results of research projects undertaken by SELMR students will be disseminated broadly through presentations at local, regional, and national forums.

Keywords: Geoscience, Environmental Science, Social Science, Living Marine Resources, Ecosystem-based Management

Project Description: Science Master's Program (SMP) in Sustainable Ecosystem-Based Management of Living Marine Resources (SELMR)

1. List of Participants

1. Keith Criddle¹ (PI) – marine policy and fishery bioeconomics, program director, course instructor, advisor of students, steering and admission committees
2. Ginny Eckert¹ (Co-PI) – marine ecology, course instructor, advisor of students, steering and admission committees
3. Gordon Kruse¹ (Co-PI) – fisheries ecology and management, course instructor, advisor of students, steering and admission committees
4. Courtney Carothers¹ (Co-PI) – fisheries anthropology, course instructor, advisor of students, steering and admission committees
5. Franz Mueter¹ (Co-PI) – fisheries ecology and biometrics, course instructor, advisor of students, steering and admission committees
6. Shannon Atkinson¹ – marine mammal physiology, course instructor, advisor of students, steering and admission committees
7. Tom Weingartner² – physical oceanography, course instructor, advisor of students, steering and admission committees
8. Brenda Norcross² – fisheries oceanography, course instructor, advisor of students, steering and admission committees

¹ Fisheries Division, School of Fisheries and Ocean Sciences (SFOS), UAF

² Institute of Marine Science, SFOS, UAF

2. Vision, Goals, and Thematic Basis:

This SMP will help prepare the next generation of MS-level professionals who will help develop, analyze, and implement sustainable ecosystem-based conservation and management of living marine resources. Graduates will be prepared to serve as analysts for state and federal resource management agencies and stakeholders interested in management of living marine resources. Students will be exposed to a broad background in fishery science, ecology, marine science, marine policy, economics, and anthropology to complement a depth of specialized expertise gained through thesis research. Graduates will possess a working command of analytic tools needed to assess the efficacy and biological, ecological, economic, and social consequences of alternative management actions. Traditional graduate programs do not provide students with the breadth of background to address questions that transcend disciplinary boundaries, particularly boundaries between the natural and social sciences. For example, questions such as: should scientific information be used to the exclusion of local, traditional knowledge or vice-versa?; how does one distinguish the effects of climate change or fishing and other anthropogenic pressures on biological community regime shifts?; and how does one prioritize allocations of natural resources among competing uses? Resolution of conflicts between alternative management objectives, and policies and approaches for achieving those objectives requires a multidisciplinary perspective and an interest in fostering collaboration among diverse stakeholders. Alaska is an ideal location to develop an ecosystem-based approach to the sustainable management of living marine resources. Here, as elsewhere in the circumpolar north, anthropogenic and naturally-forced changes in climate, oceanography, marine communities and ecosystems, fisheries and maritime human communities are dramatic and have broad ecological, economic, and social consequences. For instance, Arctic air temperatures have increased at nearly double the global average rate in the past 100 years (IPCC 2007). While climate change and other factors are particularly pronounced in Arctic and Subarctic regions, similar pressures exist to a greater or lesser degree in marine ecosystems throughout the world, therefore training professionals in Alaska is excellent preparation for studying and managing a diverse range of marine ecosystems.

Needs Analysis: Recent reports (Ocean Policy Commission, 2004; Pew Oceans Commission, 2003; National Research Council, 2000) cite a need for graduate programs, such as this, to ensure sound stewardship of living marine resources. The particular need for fisheries scientists and managers with post-baccalaureate training is further detailed in a joint report by the Department of Commerce and the Department of Education (DOC 2008). The report estimates that, over the next decade, there will be a nationwide demand for 178 to 344 more quantitative fisheries scientists and analysts just to meet present requirements of the Magnuson Stevens Fishery Conservation and Management Act. SFOS is one of three programs, nationwide, recognized for providing the comprehensive curriculum necessary for preparing the next generation of quantitative fisheries scientists. In Alaska alone, public agencies (e.g., Alaska Department of Fish and Game (ADFG), National Marine Fisheries Service (NMFS), US Geological Society (USGS), US Fish and Wildlife Service (USFWS)) and non-governmental organizations (e.g., conservation groups and tribal organizations who are developing capacities for co-management of resources) annually recruit 10-12 MS-level fisheries analysts.

Addressing These Needs: Our goal is to prepare students to understand the broad ecological, biological, and social dimensions of living marine resource management and to contribute to ecosystem-based analyses of ecological and socioeconomic characteristics of alternative conservation and management measures to better manage, and mitigate threats to our nation's oceans and coastal communities. This training will necessarily transcend traditional boundaries and sub-disciplines of natural and social sciences. SELMR complements the existing UAF Marine Ecosystem Sustainability in the Arctic and Subarctic (MESAS) IGERT, but is unique because it focuses on preparing MS-level professionals to work in government agencies and the private sector on development and implementation of public policy related to sustainable ecosystem-based management of living marine resources. SELMR will:

- Stimulate new approaches and solutions to fisheries that simultaneously serve local/subsistence needs and large commercial interests.
- Prepare graduate students to lead future management of marine ecosystems by guiding them through policy formulation and implementation early in their academic careers.
- Foster collaborative research and training across natural and social science disciplines, thereby broadening perspectives of University of Alaska faculty and their professional colleagues.

Thematic Basis

Marine ecosystem sustainability is an emerging theme in marine and fishery science, politics, policy, economics, and socio-economics (Browman and Stergiou 2004, Criddle 2004, Pikitch et al. 2004, Browman and Stergiou 2005, Beddington and Kirkwood 2005, Daan et al. 2005, Hughes et al. 2005, Schumacher and Kruse 2005, Marasco et al. 2007). In the northeast Pacific Ocean, as elsewhere, the challenge of implementing an ecosystem-based approach is to identify meaningful objectives, concrete management strategies, and explicit performance measures (Arkema et al. 2006, Francis et al. 2007, Leslie and McLeod 2007, Murawski 2007, McLeod and Leslie 2009). Historically, fisheries management has compared the status of an exploited fish stock to the wellbeing of users of that resource but, since the 1990s, new requirements demand a broader scope (FAO 2003) because: (1) the generally poor performance of fishery management worldwide; (2) the heightened awareness of interactions among fisheries and ecosystems; (3) a better understanding of the intrinsic value of ecosystems to humans; and (4) a recognition of the wide range of social objectives associated with marine fishery resources and ecosystems. The wellbeing of resource-dependent communities needs to be considered in the context of sustainability, and here traditional and local knowledge, practice, and belief systems can play an important role (Ommer 2007, Berkes 2008). There is a growing awareness that commercial fish catches are just one of a broad suite of ecosystem services (Schumacher and Kruse 2005). Fisheries management has been moving slowly toward multispecies and ecosystem approaches, now termed ecosystem-based fisheries management (EBFM). An appreciation of diverse societal objectives recognizes that benefits arising from fish harvests form just one of the services that humans derive from marine ecosystems.

"Ecosystem-based fishery management recognizes the physical, biological, economic, and social

interactions among the affected components of the ecosystem and attempts to manage fisheries to achieve a stipulated spectrum of societal goals, some of which may be in competition" (Marasco et al. 2007). In addition to providing criteria and reference points needed for fisheries management, EBFM will require new research and new frameworks for evaluating the likely effects of alternative management actions and policies as diverse as the approval and location of mariculture and ocean ranching facilities, monitoring and controlling invasive species, preserving cultural heritage zones, planning coastal development, and coping with pollution and the effects of climate change.

Broader Impacts

The goal of this SMP is to promote teaching, training and learning for MS students in integrative and innovative approaches to marine ecosystem management and research. We will recruit, retain and confer MS degrees to at least 10 trainees over the course of the grant and will broaden participation of underrepresented groups by actively recruiting women and minorities, especially Alaska Natives. Although Alaska Natives comprise 16% of the state population, fewer than 4% of faculty and professionals in marine resource management agencies (Alaska Department of Fish and Game, Alaska Region of NOAA) are Alaska Natives. Our recruiting goal is for at least 20% of the supported students to be Alaska Natives or other under-represented minorities. We will form partnerships with government agencies and stakeholder organizations to provide for career development opportunities. Results of research projects undertaken by SELMR students will be disseminated broadly through presentations at local, regional, and national forums. Graduates of this program will be well-prepared to contribute to ecosystem-based analyses of policy alternatives for the conservation and management of living marine resources and thereby contribute to public discourse and informed decision-making.

Alaska is the ideal location for SELMR because:

- Alaska comprises more than half of the U.S. coastline, continental shelf, and exclusive economic zone. Substantial segments of five large marine ecosystems (LMEs) border Alaska: the Gulf of Alaska, Bering Sea, Chukchi Sea, Beaufort Sea, and Arctic Ocean. Consequently, ecosystem-level approaches to management of living marine resources are politically feasible. In fact, the North Pacific Fishery Management Council (NPFMC) has implemented a Fishery Ecosystem Plan for the Aleutian Islands and an ecosystem-based Fishery Management Plan (FMP) for the Arctic Ocean. Moreover, the overall harvest caps adopted in the late 1970s for the Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA) FMPs, coupled with restrictions on total harvests of individual species and bans on harvests of forage fish species represent an implicit effort to manage fisheries as components of an overall ecosystem.
- Although more than half of U.S. commercial fish and shellfish landings (~\$1.7 billion exvessel revenue to fishermen) are harvested in waters offshore of Alaska, these exploited stocks remain healthy (Witherell et al. 2000). Nevertheless, Alaska also presents examples of living marine resource stocks that have been driven to extinction (e.g., the Steller sea cow), been identified as endangered (e.g., the western DPS of the Steller sea lion and the Bowhead whale), remain far below historic levels (e.g., GOA king crab, and Pribilof Island blue king crab), have been adversely impacted by environmental disasters (e.g., Prince William Sound herring in the wake of the 1989 Exxon Valdez oil spill), or have recovered from depleted levels (e.g., Pacific ocean perch in the 1950s, Pacific halibut in the 1930s and 1970s, and Pacific salmon in the 1970s).
- While fish, shellfish, and other living marine resources off Alaska are harvested by some of the largest and most technologically advanced fishing vessels, they are also harvested in small-scale fisheries including artisanal fisheries that rely on gear and harvest strategies that have scarcely changed in the past century. Harvests taken from Alaskan waters are inextricably linked to regional economic prosperity, individual and cultural identity, and ecosystem and human health. Thus, Alaska's fisheries provide an appropriate model for study of world-class industrial fisheries, for the study of artisanal fisheries that are still prominent in many less developed regions around the world, and for studies of the interface between industrial and artisanal fisheries.

- Fisheries off Alaska are managed under a diverse array of alternative governance and regulatory structures, including co-management, limited entry, individual fishing quotas, AFA cooperatives, processing quotas, community development quotas, community quotas, super-exclusive registration areas, seasonal apportionments, bycatch caps, sector allocations, gear limits, marine protected areas, hot-spot closures, local-area management plans, subtidal leases, etc. Nearly every form of fisheries management in use around the world exists or has existed in Alaska.
- The PI (Criddle) and several of the co-PIs and collaborators in this SMP (Atkinson, Eckert, Kruse, Mueter, Norcross) are directly involved in the management of Alaska's living marine resources through their membership in science advisory committees to the NPFMC and as members of the recovery teams for ESA listed marine species. This ensures that students in this program will benefit from information on current and pending efforts by NPFMC to implement an ecosystem-based approach to fisheries management and provides a conduit for outcomes of student and faculty research to enter into consideration in the management process.
- Climate change is magnified in northern latitudes of Alaska (ACIA 2004, Grebmeier et al. 2006). Past changes in the marine ecosystem have led to substantial changes in the absolute and relative abundance of commercially and culturally important living marine resources, changes that have reverberated through the social and economic fabric of resource-dependent communities. Deepening climate change can be expected to have ongoing impacts on the economies and cultures of the commercial and subsistence fisheries associated with these ecosystems.

3. Research Experience:

In addition to completing coursework, SELMR students will be required to complete a MS research-based thesis that explores aspects of sustainable ecosystem-based management of living marine resources. They will develop the plan for this research project during their first academic year and will complete the research in the summer and following academic year. Each thesis committee will include at least one member of the SELMR steering committee who will have responsibility to ensure that the thesis proposal addresses ecosystem-based management of living marine resources. SFOS includes faculty from diverse disciplines who share a common interest in understanding the physical, biological and social processes that comprise marine ecosystems and a desire to design management measures that will sustain those systems. Although most student research projects will focus on Alaska, SFOS faculty also engage in research projects in other regions, and the skills that students will acquire are readily transferable to other regions. Research projects will focus on: 1) Interrelationships between Marine Management and Science; or 2), Responses of Marine Ecosystems to Human-Induced Changes. These research focus areas include cutting-edge problems and topics that SFOS faculty are distinctively poised to address. In many cases, we envision that students will partner with public agencies, conservation groups or the private sector to complete analyses and/or syntheses of pre-existing data collected by these organizations. As a result, students will be able to learn more about how these organizations work as well as complete their research project within the planned timeline. These topics relate to real-world management issues and will prepare students for careers in marine management, conservation or industry.

Interrelationships between Marine Management and Science

The relevance of marine research conducted by SFOS faculty and students is amplified by the strong role of SFOS faculty in fishery management. Five of the current 16 North Pacific Fisheries Management Council (NPFMC) Scientific and Statistical Committee (SSC) members, including three former committee chairs and the current vice-chair, are SFOS faculty (three current SSC members are SELMR co-PIs). Three SFOS faculty currently serve on the NPFMC's groundfish and crab plan teams (including 1 SELMR co-Investigator). Several more members of the groundfish and crab plan teams, the SSC, and analysts for the agencies and stakeholder organizations are SFOS graduates. In addition, SFOS faculty routinely undertake contracts from state and federal agencies to conduct research to address pressing fishery management and ecosystem issues; these projects engage graduate students and often combine elements of fisheries oceanography, population dynamics, fisheries management, bioeconomics, and

fisheries anthropology. Graduate thesis committees often include researchers employed by federal and state fishery management agencies and many SFOS graduate students are part- or full-time employees of these agencies. SFOS-based research has stimulated changes in fishery management in Alaska, e.g., the establishment of fishery thresholds (levels below which commercial fisheries are closed); harvest rate strategies for groundfish, salmon, and invertebrates; Steller sea lion protection measures; management of impacts of fisheries on benthic habitats; hatchery operations; mechanisms for maximizing the value of catches; incentive structures to minimize bycatch; criteria for allocating catches among competing user groups; product development for new fisheries; and other fishery management measures. The intimate involvement of SFOS faculty in fishery management assists them to design research projects that answer fundamental questions and provides information that is directly relevant to priority fishery management issues, which fosters the development of collaborative relationships with agency scientists, and leads to ongoing service of SFOS faculty as science advisors to state and federal managers. Examples of research questions that SELMR students might address include:

How can existing fisheries legislation incorporate an ecosystem based approach? National law and policy mandate EBFM (MSFCMA 2007). To date, most progress in this area has been conceptual, focusing on definitions, broad statements of goals and objectives, and compilations of lists of ecosystem indicators (Pew Commission 2003, NMFS 2004). New policies and institutional frameworks are needed to put ecosystem-based management into practice (Pikitch et al. 2004, Arkema et al. 2006, Marasco et al. 2007). Moreover, research is required to develop useful performance measures for specific ecological and social indicators, so that they can be implemented directly into decision rules for fisheries management (Leslie and McLeod 2007, De Young et al. 2008, McLeod and Leslie 2009).

What are feasible new paradigms for fisheries management? Fisheries management requires decisions about harvest limits based on available information and understanding of populations gained through research. State and federal fisheries management in Alaska have a well-deserved reputation of rendering science-based management decisions. In federally managed fisheries, the abundances of fish and invertebrate stocks are assessed by scientists who combine fishery-dependent data with routine fishery-independent surveys and state-of-the-art statistical estimation models. Nevertheless, aside from a few commercially important fish and invertebrates, information about the structure and functioning of pelagic and benthic communities off Alaska is sparse. A more comprehensive understanding of the functioning of benthic habitats and how they are affected by fishing or other stressors is needed. As climate changes, fisheries and other human activities are likely to shift into the northern Bering, Chukchi and Beaufort Seas – areas where knowledge about biological communities and habitats is even more limited.

How can multiple trophic levels be included in fisheries management? While commercially exploited fish stocks off Alaska are well-managed, declining populations of some marine mammals (e.g., Steller sea lion, northern fur seal, Western Aleutian sea otters, Cook Inlet beluga whales) and some seabirds (e.g., short-tailed albatross, Steller's eiders) have raised concerns about the adequacy of current management processes for addressing ecosystem-scale issues. Although federal law requires consideration of ecosystem effects, and although annual catch quotas for commercially exploited fish stocks are often reduced below the single species acceptable biological catches (ABCs) to reflect concerns about trophic relationships, progress towards adopting an ecosystem-based management regime has been halting. While the models of population dynamics used to determine ABC and overfishing levels (OFLs) increasingly include trophic relationships, and while a new generation of ecosystem models is being developed for the GOA and BSAI regions, lingering doubts about the structure of these models and their associated trade-offs between sampling and specification errors have limited the direct use of ecosystem models in establishing ABCs and OFLs (e.g., Quinn 2003, Longhurst 2006). Moreover, regulation, sampling, and enforcement institutions – and the fishing industry and some fishery-dependent communities – have been structured around a single-species or species-suite; little is known about how these institutions, industries, and communities would change under an EBFM regime.

How can stakeholders be included in an ecosystem-based approach to management? In addition to ethnic, cultural and environmental drivers, the social and economic structure of Alaska's fisheries and fishery-dependent communities have evolved to their present form, partly in response to the various single species management regimes that have governed access to fishery resources. While the social and economic attributes of open access, limited entry, spatial use rights, and IFQ and pooled quota share managed fisheries have been studied extensively (e.g., Criddle and Macinko 2000), the design of regulatory structures to support EBFM and the likely social and economic impacts the transition to and implementation of EBFM have not been well-explored. There is a need for research to examine the magnitude and distribution of costs and benefits under alternative EBFM management structures; to anticipate how EBFM might affect net benefits to fishermen, crew, processors, wholesalers, etc.; to anticipate how EBFM might impact direct, indirect, and induced benefits (costs) to communities and industry sectors; and to anticipate how EBFM might alter external benefits and costs to real and vicarious resource users (e.g., recreation, personal use, subsistence, non-consumptive). Integrated management approaches encourage coordination of local and national strategies to guide resource allocation among competing interests. Broad stakeholder participation is critical if EBFM is to succeed in defining solutions to emerging conditions in Alaskan waters and beyond. In addition to federal, state, and local government entities, stakeholders might include tribes, non-governmental organizations (NGOs), universities and research institutes, fishermen, processors, local communities, developers, coastal industries (including tourism, processing, mining), and others at national and international levels of interest and organization.

How robust and resilient are alternative management strategies under varying environmental and ecological conditions? This is an avenue of research that has not yet been well-examined in the context of current regulatory structures, let alone in the context of EBFM. Research topics that could be explored include questions about whether entitlement and tenure-based management regimes increase or decrease the resilience of social and economic institutions when the abundance, value, and distribution of target and non-target species vary in response to changes in the biophysical system. Included within this area of research are questions about how spatial and temporal dimensions of fishing effort respond to changes in relative abundance or relative value of target species, incidental catches of bycatch species, and changes in the relative abundance of species that might compete for target or incidental catches of overlapping or non-overlapping size-classes of the same species (e.g., sea birds, marine mammals, sharks).

Responses of Marine Ecosystems to Human-Induced Changes

Humans are constituents of ecosystems; our actions shape and are shaped by ecosystem structure and function. For millennia, humans have significantly and substantially altered environments, including marine and coastal systems (Jackson et al. 2001, Springer et al. 2003, Briggs et al. 2006). Research questions that SELMR students might address include:

What are the effects of climate-induced ecosystem changes? There is a need for research to understand the linkages between marine ecological communities and habitats and climate and climate change. These linkages need to be understood in light of large-scale drivers, which in Alaskan waters include changes in temperature, magnitude and timing of precipitation and river runoff, seasonal ice cover, and large-scale nutrient regimes. Predictive models are needed in each Alaskan LME to forecast how these large-scale drivers affect marine community composition, primary production, secondary "invertebrate" production, fish production, marine mammals, and ultimately the human communities and economies that are dependent on marine ecosystems.

To what extent are regime shifts the result of fishing? In the last decades, research efforts in Alaskan waters have clearly demonstrated the need for a better understanding of connections between lower and upper trophic level marine populations. While some observed transitions in marine community structures appear to be connected to climate regime shifts (Anderson et al. 1997, Anderson and Piatt 1999), the

processes leading to the restructuring of marine ecosystems remain less transparent. Ecological regime shifts have had far-reaching consequences for the marine ecosystems of the GOA and BSAI. Some of the observed species responses included increases in gelatinous zooplankton in the Bering Sea (Brodeur et al. 1999, 2002), the occurrence of coccolithophore blooms in the southeastern Bering Sea (Iida et al. 2002), shifts in the species composition to large piscivorous groundfish in the GOA (Mueter and Norcross 2000), and the collapse of marine mammal and bird populations around the Aleutian islands (Estes et al. 1998, Estes et al. 2005, Byrd et al. 2005). However, responses of apex predators to climatologic regime shifts are particularly difficult to establish, primarily due to their longer response time (Francis et al. 1998). To date, causal relationships for ecological regime shifts have been suggested to be either bottom-up initiated by climate change, top-down, or a combination of both (Francis et al. 1998, Mueter and Norcross 2000, Hunt et al. 2002, Lees et al. 2006, Litzow et al. 2006, Mueter et al. 2006).

Are declines in higher trophic levels the result of fishing? The decline in Steller sea lions, particularly in the eastern Aleutian Islands and the western GOA, dramatically demonstrates the need for a better understanding of causal relationships between the dynamics of upper trophic level organism and changes in the abundance and species composition of lower trophic level taxa. By 1990, the population of Steller sea lions had declined by about 80%, prompting their listing as threatened under the Endangered Species Act (ESA). As required under this listing, research was initiated with the aim of investigating the functional linkages in the BSAI ecosystems and of identifying factors responsible for their reorganization. Mechanisms hypothesized to explain the decline of Steller sea lions can be broadly divided into bottom-up and top-down; bottom-up hypotheses included nutritional limitation caused by declines in prey taxa abundance resulting from an ecological regime shift or increased commercial fishing pressure of preferred prey (Anonymous 1993, Merrick et al. 1997). Top-down hypotheses encompass mechanisms such as intentional takes, incidental mortality due to commercial fishing pressure or increased predation pressure on Steller sea lions as a result of prey switching of transient killer whales. Thus, while there is little doubt about the patterns of Steller sea lion population change, factors responsible for these patterns remain unknown, and proposed regulative mechanisms severely disputed. A better understanding of the mechanisms responsible for changes in abundance is necessary to formulate and evaluate hypotheses of marine population regulation in Alaskan waters.

What is the effect of fishing on habitat? Fishing can significantly impact the physical and structural properties of a habitat, which can translate into changes in epifaunal communities (Brown et al. 2005). Mortality of bottom fauna caused by bottom trawling is particularly high for large-sized infauna, while smaller organisms are usually less affected (Bergman and Hup 1992, Gilkinson et al. 1998). Hence, diversity, abundance, size structure and the production of benthic communities can be greatly affected, and with that productivity of the system and food sources of the targeted fish resources (Jennings et al. 2002). Moreover, structural disturbance of the habitat can be significant, especially in vulnerable habitat types such as seamount coral systems (Johnston and Santillo 2004). Benthic invertebrate bycatch can account for up to 90% of commercial catches, including undersized target species and non-target species (Andrew and Pepperell 1992, Broadhurst et al. 2006). Bottom trawling can therefore lead to changes in community composition and size structure (Kaiser and Spencer 1996, Collie et al. 2000). However, the impacts of bottom trawling depend on the character of the gear being used, how that gear is deployed, the nature of the habitat and the density and frequency of tows. With the increasing recognition of the value of EBFM, where management starts with the ecosystem rather than a target species, the impact of bottom trawling on benthic communities has to be carefully evaluated. Comparisons between fished and protected areas often are flawed by inherent (and possibly unknown) differences in the system that are independent of fishing. An innovative solution to the problem could be through small-scale manipulative studies simultaneously targeting multi-faceted aspects such as the physical environment, community composition, size-distribution, functional trophic groups and productivity.

Summary and Conclusions

In summary, SELMR trainees will have the opportunity to address the challenge of how to structure ecosystem-based management and to analyze its ecological and social effects. SELMR will, therefore, serve as a catalyst to prepare students for careers in management while having them work at the forefront of the field. In this regard, we will train leaders, not followers, and advance the field and practice of ecosystem-based management.

4. Education and Training:

The education and training program is designed to attract students from a variety of backgrounds and provide them with a common interdisciplinary base that will prepare them to address real-world problems in ecosystem-based conservation and management of living marine resources. Students will gain a broad foundation of knowledge about ecosystem processes and their interface with people. Our education and training program capitalizes on the strengths of existing UAF SFOS and MESAS IGERT graduate programs. SELMR graduates will be able to devise ecosystem-based solutions to critical research and stewardship questions in the sustainable use of living marine resources.

Required Courses: Trainees are expected to enter with a background in calculus, introductory statistics, and ichthyology or invertebrate zoology. They will complete a common core of coursework in Human Dimensions (FISH 411 or CCS 612), Bioeconomics (FISH 694), Population Dynamics (FISH 421, FISH 621, or FISH 622), Marine Ecosystems and Fisheries Oceanography (MSL 652 or MSL 640, and IAME), and Statistics (STAT 401 or equivalent). To ensure that students recognize how these discipline-based courses mesh, the program will begin with a three-week integrative course that is in place for the MESAS IGERT. With exception of the three-week integrative course, all course requirements are designed so that they can be completed via two-way video-conference.

1. *Social, Oceanographic, and Ecological Perspectives in Marine Ecosystems* (ANTH/FISH/MSL/NRM 693) (3 cr) An intensive three-week, team-taught course for all entering students immediately preceding their first fall semester. This theme-based course exposes students from diverse backgrounds to how different disciplinary perspectives contribute to conceptualization and design of management and governance systems to foster sustainable ecosystem-based management of living marine resources. Workshops and discussions in communication, scientific ethics, group dynamics, and conflict resolution are held in the evenings. This summer course is held at a University of Alaska facility, in Sitka, Kachemak Bay, Seward, Juneau or Kodiak. These locations offer the advantage of having research vessels, small boats, access to marine habitats, and outstanding amenity values, as well as offering an off-campus community-building experience for faculty and SELMR and MESAS students. This course is taught by SELMR co-PIs Ginny Eckert (marine ecology) and Gordon Kruse (fisheries ecology and management), SELMR PI Keith Criddle (marine policy & economics), SELMR co-Investigator Tom Weingartner (oceanography), and MESAS faculty Bill Smoker (fisheries) and Maribeth Murray (fisheries anthropology).
2. Human Dimensions
 - a. *Human Dimensions of Environmental Systems* (FISH 411) (3 cr) Study of human environment relationships and applications to resource management. Draws on a range of social scientific approaches to the study of environmental systems, including: environmental anthropology, environmental history, historical ecology, political ecology, ethnoecology, property theory, and environmental justice. Taught by Courtney Carothers (SELMR co-PI).
 - b. *Traditional Ecological Knowledge* (CCS 612) (3 cr) Students examine ways in which traditional and local ecological knowledge is acquired and utilized in indigenous and local community contexts; explore the potential for application of traditional ecological knowledge to expand our understanding of contemporary issues, locally and globally; examine the epistemological structures typically associated with traditional ecological knowledge; examine the relationship between traditional ecological knowledge and the knowledge associated with Western academic disciplines;

Michelle Rizk,
Associate VP Budget
(907) 450-8180
(907) 450-8181 fax
Michelle.rizk@alaska.edu



Office of Planning & Budget
SW Administration & Finance
PO BOX 755260
910 Yukon Drive Ste. 108
Fairbanks, AK 99775-5260

May 7, 2010

Steve Hildebrand
Chief Budget Analyst
P.O. Box 110020
Juneau, Alaska 99811

Dear Mr. Hildebrand,

The University of Alaska has received one stimulus award for \$699,998 that is pending approval of stimulus authority from the LB&A Committee before work may begin (see attached RPL). Included within the RPL packet are the award documents for the project. Please let me know if additional information is necessary.

Sincerely,

Michelle Rizk