HSU Academic Program Criteria
Academic Program in Fisheries

I. The Vision for Humboldt State University (Limit: 2 pages) [15%]

Describe up to 5 curricular or co-curricular features of the program that are consistent with the Vision of HSU, and indicate which aspect(s) of the Vision align with that particular feature. Please provide sufficient information such that an individual unfamiliar with your program will clearly understand the feature's relevance.

We begin by quoting directly from our departmental Mission statement:

> *The overall mission of the Fisheries Biology Program is to provide our majors with the knowledge, skills and motivation required to ensure the conservation of fish and aquatic resources that are faced with increasing societal demands and increasing loss or degradation of habitat.*

Our Program's curriculum and co-curricular features and activities are intended to realize this departmental Mission which seems clearly consistent with Vision Statements 1 ("campus of choice to … improve the human condition and our environment"), 2 ("premier center for the interdisciplinary study of the environment"), and 4 ("renowned for environmental responsibility and action"). Many of our Program activities have also been focused on Vision Statement 7 ("…. exemplary partners with our communities, including tribal nations").

Vision Statements 1, 2 & 4: Unique Interdisciplinary Program

HSU is the only institution in the CSU to grant a degree in Fisheries Biology. By its very nature, Fisheries Biology and management is an interdisciplinary effort (Math Modeling, Economics, Oceanography, Water Quality/ Chemistry, Pathology, Ecology, Geomorphology, Watershed Management, Genetics) with an overall long-term focus on conservation of fishes and the environments on which they depend.

Vision Statement 2: Hands-On, Field- and Laboratory-Oriented Program

Outdoor lab sessions in local natural freshwater habitats focus on restoration projects, land-use impacts, and development of tools and skills for study of fish abundance and habitat use. Outdoor lab sessions in the marine environment focus on ecological relationships between fishes and the ocean environment, and on fishery and environmental impacts on marine fish populations. The R/V Coral Sea and a fleet of smaller vessels provide students with hands-on opportunities to study fishes in varied marine habitats. Laboratory lab sessions make use of our

high quality facilities including an on-campus fish hatchery, marine lab (15 minute drive from campus), fish collection, and specialized on-campus laboratory facilities devoted to pathology, age and growth, genetics, and water quality. We believe that no other Fisheries program in California, and perhaps in the entire US, can offer these combined opportunities to undergraduate students.

Vision Statement 7: Tribal and Community Collaborations

HSU Fisheries Biology faculty were advisors to the Hupa and Yurok Tribes in development of the natural resources and fisheries programs; Hupa "interns" have graduated from the HSU Fisheries Biology program; HSU Fisheries Biology faculty have had a long history of collaborative fisheries and water quality research with Hupa and Yurok tribes; Fisheries Biology faculty have had a long-term involvement with the City of Arcata's Marsh project, including on-going water quality monitoring. Finally, HSU Fisheries Biology faculty and students continue to work collaboratively with federal and state resource management agencies (e.g., CA Dept. of Fish and Game, U.S. Forest Service, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Redwood National Park, U.S. Bureaus of Reclamation and Land Management).

Vision Statements 2 and 4: Conservation and Management of Fishes

Many of our courses (at least Fish Genetics (FISH 474), Population Dynamics (FISH 450), U.S. and World Fisheries (FISH 335), Ecology of Marine (FISH 435) and Freshwater (FISH 430) Fishes) stress conservation and management of fishes and the habitats that support them. Our capstone Fishery Management (FISH 460) course illustrates how conservation and management of fishery resources involves complex issues of policy, economics and law, in addition to biology.

Vision Statement 2: Grant and Contract Research by Faculty and Students

Key to HSU's success in achieving Vision Statement 2 will be active engagement of faculty and students in scholarship related to natural resources. HSU Fisheries Biology faculty members have a long and well-established record of grant and contract research, and current faculty members are as active as ever. The success of this research has always depended upon the active participation of graduate and undergraduate students.

II. Demand (Limit: 1.5 pages per option, not including tables) [20%]

A. Internal demand for the degree program and courses in the degree program

1. Headcount Data

Major Academic Year (Fall/Spring) Average Headcount Summary Majors_overview_FISH report generated: 16-APR-08									
Major Code	**Major Description**	**AY 00/01**	**AY 01/02**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
FISH	Fisheries Biology	76	75	80	64	58	32	28	37
FIAQ	Fisheries Biol (Aquaculture)	4	4	5	9	12	11	16	14
FIAS	Fisheries Biol (Aquarium Sci)-DefunctF06	0	0	1	1	3	5	2	1
FIFR	Fisheries Biology (Freshwater)	14	13	16	18	9	12	21	18
FIMA	Fisheries Biology (Marine)	5	3	4	7	9	9	23	28
Total		**98**	**94**	**105**	**98**	**90**	**68**	**89**	**97**

Second Majors by Academic Year (exclusive of primary majors) Majors_overview_FISH report generated: 16-APR-08									
Major Code	**Major Description**	**AY 00/01**	**AY 01/02**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
FISH	Fisheries Biology	4	2	0	0	0	0	1	1
FIAS	Fisheries Biol (Aquarium Sci)-DefunctF06	0	0	0	1	1	1	1	1
FIFR	Fisheries Biology (Freshwater)	0	0	0	0	1	1	0	1
Total		**4**	**2**	**0**	**1**	**2**	**2**	**2**	**3**

Minors enrolled AY Average in Fisheries Biology minors_enrolled_FISH report generated: 06-MAR-08								
CLASS	**AY 00/01**	**AY 01/02**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
Frosh	0	0	1	0	0	0	0	0
Soph	0	0	0	0	0	0	0	1
Jr	1	0	1	1	1	1	1	1
Sr	7	4	3	4	2	3	4	5
	8	**4**	**4**	**4**	**3**	**4**	**4**	**6**

Majors by Sex and Ethnicity Majors_overview_FISH report generated: 16-APR-08									
SEX	**Ethnicity**	**AY 00/01**	**AY 01/02**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
Female	Asian	1	1	1	0	0	1	1	1
	Hispanic	0	1	2	3	2	1	1	1
	Native Amer	3	2	1	0	0	0	0	0
	White	6	9	7	8	12	10	10	9
	Other	0	0	1	1	1	1	1	1
	Unknown	3	3	3	4	3	2	2	1
sum		**13**	**15**	**14**	**16**	**17**	**15**	**15**	**12**
Male	Asian	4	3	2	1	2	2	3	5
	Black	0	1	1	0	0	0	0	0
	Hispanic	4	1	3	3	2	2	5	6
	Native Amer	2	1	4	7	6	4	3	2
	Pacific Is	1	1	1	1	1	0	1	2
	White	64	56	65	56	49	34	45	47
	Other	1	3	2	3	5	4	9	14
	Unknown	11	14	13	11	9	7	9	10
sum		**85**	**79**	**91**	**82**	**73**	**53**	**74**	**85**

Fisheries Biology (with options) Degrees Awarded (incl. primary and second majors) degrees_awarded_B_FISH report generated: 25-JUN-08								
MAJOR	**AY 99/00**	**AY 00/01**	**AY 01/02**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**
Fisheries Biology	2	0	0	2	0	2	1	0
Fisheries Biol (Aquaculture)	3	12	9	7	4	2	5	3
Fisheries Biol (Aquarium Sci)-DefunctF06	0	0	0	0	1	1	0	0
Fisheries Biology (Freshwater)	8	10	8	8	10	16	10	6
Fisheries Biology (Marine)	8	4	2	4	2	9	2	1
sum	**21**	**26**	**19**	**21**	**17**	**30**	**18**	**10**

Fisheries Biology Degrees Awarded by Sex and Ethnicity (incl. primary and second majors) degrees_awarded_B_FISH report generated: 25-JUN-08									
SEX	**Ethnicity**	**AY 99/00**	**AY 00/01**	**AY 01/02**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**
Female	Asian	0	0	1	0	0	0	0	0
	Hispanic	0	0	0	0	0	2	0	0
	Native Amer	0	0	1	1	0	0	0	0
	White	1	1	1	1	2	2	2	1
	Other	0	0	0	0	0	1	0	0
	Unknown	1	1	0	1	1	1	2	1
sum		**2**	**2**	**3**	**3**	**3**	**6**	**4**	**2**
Male	Asian	1	2	1	0	0	0	1	0
	Hispanic	1	2	1	1	0	1	0	0
	Native Amer	0	0	0	0	0	0	2	0
	Pacific Is	0	0	0	0	0	1	0	0
	White	13	17	10	14	12	18	9	5
	Other	0	0	1	0	0	1	1	0
	Unknown	4	3	3	3	2	3	1	3
sum		**19**	**24**	**16**	**18**	**14**	**24**	**14**	**8**

Minors Awarded by Year in Fisheries Biology minors_awarded_FISH report generated: 25-JUN-08								
MINOR	**AY 99/00**	**AY 00/01**	**AY 01/02**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**
Fisheries Biology	5	4	1	2	3	0	1	2

2. FTES by Course Code

FTES taken in Fisheries classes by Majors (AY 02/03 - AY 07/08) course_ftes_smry_FISH report generated: 30-JUN-08								
SUBJ	**Course level**	**Student Major**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
FISH	Lower-div	Fisheries Biology	1.1	1.1	.5	.8	1.3	1.2
		Undeclared	.2	.1	.1	.1	.0	.2
		Biology	.5	.2	.1	.2	.2	.2
		Wildlife	.3	.2	.0	.1	.1	.1
		Environmental Science	.0	.0	.0	.1	.0	.1
	Sub-total		**3.4**	**2.1**	**.7**	**1.5**	**1.7**	**2.1**

FTES taken in Fisheries classes by Majors (AY 02/03 - AY 07/08) course_ftes_smry_FISH report generated: 30-JUN-08								
SUBJ	**Course level**	**Student Major**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
FISH	Upper-div	Fisheries Biology	30.1	31.2	28.3	21.8	21.9	26.0
		Wildlife	4.0	5.8	6.5	5.4	3.8	5.2
		Biology	4.1	4.2	3.1	5.1	4.6	4.2
		Natural Resources (Fisheries)-Grad	1.9	3.6	2.5	4.7	2.5	2.4
		Nat Resources Plng & Interptn	.8	1.1	1.5	.9	.4	.5
	Sub-total		**51.5**	**52.4**	**54.3**	**47.4**	**43.4**	**43.9**

FTES taken in Fisheries classes by Majors (AY 02/03 - AY 07/08) course_ftes_smry_FISH report generated: 30-JUN-08								
SUBJ	**Course level**	**Student Major**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
FISH	All Levels	Fisheries Biology	32.5	34.6	32.6	23.2	23.8	28.5
		Natural Resources (Fisheries)-Grad	12.8	11.6	13.5	16.5	10.4	10.3
		Wildlife	4.3	6.0	6.6	5.5	3.9	5.3
		Biology	4.7	4.5	3.6	5.4	4.8	4.7
		Nat Resources (Wastewater Utl)-Grad	.5	2.5	2.1	3.1	2.6	1.5
Total			**68.2**	**68.7**	**73.1**	**65.4**	**56.9**	**57.5**

3. Service to other HSU program/options

Document other HSU programs/options (including, GE) with required coursework from your program

Other HSU program/option name	Courses required List course number and units	Restricted elective courses List number and units

Information on this topic was provided from Analytic Services in a somewhat different format than requested above. We reproduce the file that we were sent:

Course #	Course Name	Units	Requiring Major/Minor
300	Introduction to Fishery Biology	3	Environmental Ethics - Minor Natural Resources - Master Natural Resources Planning & Interpretation Rangeland Resource Science
310	Ichthyology	5	Biology: Ecology Biology: Environmental Environmental Ethics - Minor

			Wildlife Zoology
320	Limnology	3	Biology: Ecology Environmental Resources Engineering Natural Resources Planning & Interpretation
443	Problems in Water Pollution Biology	3	Environmental Ethics - Minor
450	Introductory Fish Population Dynamics	4	Biometry - Minor
460	Principals of Fishery Management	3	Natural Resources Planning & Interpretation
474	Genetic Applications in Fish Management	4	Wildlife
485	Ecology of Running Waters	3	Environmental Science
320/320L	Limnology/Practicum	4	Natural Resources Planning & Interpretation
320L	Limnology	1	Environmental Science

4. Comment on the internal demand **FOR EACH OPTION** of the Major. Explain any significant changes in internal program demand over past 7 years. Provide any additional relevant information of internal demand.

Fisheries Biology

When students enter our Program, they are initially assigned the major "Fisheries Biology", but they often do not declare an option until at least their junior year. In order to graduate, students must declare an option, so (essentially) no students are (should be) listed as graduating in "Fisheries Biology" in the section 1 headcount data. Prior to AY 2005/06, there were four options in our Program: Aquaculture, Aquarium Science, Freshwater and Marine. Aquarium Science was a short-lived option that was dropped when Dr. Dennis Thoney, former curator of the New York Aquarium and Adjunct Faculty member in Fisheries Biology, left his HSU position as Director of Marine Facilities. The Aquaculture option was dropped as of fall 2007 in response to administration requests to streamline academic programs. The discussion below considers only our existing Freshwater and Marine options.

Total numbers of majors in Fisheries Biology (all options) have ranged from 68-105 over the 99/00 - 07/08 AYs, and have averaged 92.4. Females typically represent approximately 20% of our majors. The major headcount for AY 05/06 was unusually low (68), possibly responsible for the unusually low number of graduates in 07/08 (10 - which may also be an erroneous entry), and has led us to engage in active recruitment efforts that appear to have been successful (the fall 2008 census major headcount for Fisheries Biology is 103).

Courses offered by the Fisheries Biology program are geared almost exclusively to majors in Fisheries Biology. We have one upper division GE class for non-majors (FISH 300) which we have been allowed to teach at most once per year since the latest rounds of serious budget-cutting and increasing Administration demands for large GE class sizes to exceed 100 (FISH 300 classes have typically ranged from 60-80 students). Historically, FISH 300 was offered twice a year. Total FTES generation in courses with the FISH prefix has recently ranged from about 57-73 FTE, with lowest values in 06/07 (57) and 07/08 (58). These low values probably reflect the usually small headcount in AY 05/06.

Fisheries Biol (Freshwater)

Historically (1970-2000), about 65-70% of Fisheries Biology majors graduated in the Freshwater option, with the remainder split between the Aquaculture and Marine options. Over the period 00/01 - 07/08 there has bee a striking increase in the fraction of our majors who have declared the marine option (e.g., 5/23 = 0.22 in 00/01 vs 28/61=0.46 in 07/08) and this shift will likely be reflected in options at graduation in AY 08/09 and 09/10. Likely causes for this shift include exceptional instruction in the marine area (Tim Mulligan was HSU's Outstanding Professor in AY 04/05), increased CA State activity in the marine fisheries area and, most significantly, decreased institutional support for instruction in the Freshwater option (FERPing and then retirement of Terry Roelofs as of Fall 2007).

Fisheries Biol (Marine)

Our program has seen a recent surge of interest in the Marine option; possible reasons are noted in the above paragraph. We hope to maintain this current level of interest in our marine option and to restore the historic level of interest in our Freshwater option which has a strong focus on anadromous fishes, including salmon and steelhead (e.g., Klamath River Chinook salmon), which are of both regional and national importance.

Fisheries Biology Minor

From 0-5 minors in Fisheries Biology have been awarded annually from 99/00-06/07, with no apparent trend. Most of these minors have probably been awarded to students with majors in Wildlife. No special courses are taught specifically for this minor and there is no program cost associated with continuing the minor. Therefore, students minoring in Fisheries Biology provide a very modest FTES boost to our program, but have no other substantive impact.

B. External demand for "graduates" from the program

Imagine you are answering a parent's question about job prospects and the demand for graduates of your program/option. Describe evidence of external demand for this program. Evidence may be cited from one of the following sources: the State of California http://www.labormarketinfo.edd.ca.gov/, the US Department of Labor http://www.bls.gov/OCO/, the National Association of Colleges and Employers, http://naceweb.org. Evidence may be cited from an additional source from, for example, a professional society relevant to your discipline.

Fisheries Biology

Fisheries is a specialized field that is not separately listed as a job occupation category in the sources typically used for jobs projections. It is therefore difficult to find reliable projections of future demand for our graduates. In the table below, we summarize State of California job market projections (from http://www.labormarketinfo.edd.ca.gov/) for some occupational areas that require a bachelor's degree, sometimes with experience, and might be filled by graduates from our program. Based on this tabulation, it appears that the job market will improve from 2004 - 2014, with greatest increases in the Educational Services and Professional Services areas.

Employment Sector	**Occupation category**	**# Jobs 2004**	**# Jobs 2014**
CA: Educational Services - Colleges and universities	Natural Resource Managers	200	300
	Biological Technicians	1,300	1,600
CA: Professional & Tech. Services: Manage. and Tech. Consulting	Natural Science Managers	400	600
	Environ. Science and Protection Technicians	800	1,100
	Zoologists and Wildlife Bios	200	300
Federal Government	Natural Resource Managers	1,600	1,700
	Biological Scientists	1,300	1,500
	Biological Technicians	800	900
	Environ. Scientists	600	600
	Zoologists and Wildlife Bios	500	500
CA State Government	Environ. Scientists	1,500	1,600
	Zoologists and Wildlife Bios	200	200

We know that federal agencies employing fishery scientists, in particular the US Forest Service and National Marine Fisheries Service, anticipate a high level of retirements of high level

scientists over the next 5-10 years. Internal movement up the ranks in these agencies will generate a large number of vacancies for entry level fishery biologists.

As evidence of the local demand for fishery biologists that our program satisfies, we contacted local agency (California Department of Fish and Game, US Fish and Wildlife Service, National Marine Fisheries Service) and tribal (Yurok Tribal Fisheries Department) offices and the local office of a large environmental consulting firm. The table below shows that the HSU Fisheries Biology Program has satisfied a very substantial proportion of the local needs for fisheries biologists and that our graduates have successfully competed with graduates from other programs in securing these positions.

AGENCY	**Total Employment of Fishery Biologists**	**Number that are HSU Fisheries Graduates: BS**	**Number that are HSU Fisheries Graduates: MS**
Calif. Dept. of Fish and Game, Marine Region (statewide)	72 Marine and Environmental Biologists (not all fisheries positions)	15 (BS or MS)	
US Fish and Wildlife Service, Arcata Office	22 temp, term, permanent fisheries combined	6	9
Yurok and Hoopa Tribal Fisheries Program	22 permanent fisheries	14	2
Stillwater Sciences	18 permanent fisheries scientists	6	3
NOAA Fisheries, Southwest Region, Arcata Office	23 Biologist/NR Management Specialists (not all fisheries)	7 (BS or MS)	

Two other sources provide some evidence of demand for our graduates based on surveys of graduates. First, prior to the Career Development Center's elimination of their post-graduation employment surveys, HSU Fisheries graduates typically had a 80-85% success rate in securing jobs in a fisheries-related area. Second, in a departmental survey of students who had graduated in the past 10 years, carried out as part of our most recent program review (2002), we found that a very high percentage of our graduates were employed in fisheries-related areas. In response to a question asking whether current jobs were "*Very much* (1), *somewhat* (2), or *not at all* (3)" related to fisheries, the mean rating was 1.6, probably translating to an approximately 75% rate of employment in fisheries or fisheries-related job areas, and the median rating was 1, meaning that more than 50% of our graduates were employed in jobs that were "very much" related to fisheries.

Fisheries Biol (Freshwater)

Primary employers of graduates in the Freshwater Option include state fish and game agencies, other resources and/or environmental agencies, environmental consulting firms, private aquaculture ventures, and federal resource management agencies (Bureau of Land Management, Bureau of Reclamation, Forest Service, Fish and Wildlife Service, National Park Service). For many of these agencies, we believe that there will be a very substantial attrition of high level fishery manager positions due to retirements over the next ten years, especially in the US Forest Service. As other individuals within these agencies rise up the ranks, this will mean that unusually large numbers of vacancies will appear at the entry levels for which our undergraduates will be eligible.

Fisheries Biol (Marine)

Primary employers of graduates in the Marine Option include state fish and game agencies, environmental consulting firms, private mariculture ventures, and federal resource management agencies (US Fish and Wildlife Service, National Marine Fisheries Service). For most of these agencies, we believe that there will be a substantial attrition of high level fishery manager positions due to retirements over the next ten years. As other individuals within these agencies rise up the ranks, this will mean that unusually large numbers of vacancies will appear at the entry levels for which our undergraduates will be eligible. In addition, lead administrators from the National Marine Fisheries Service have alerted us to their on-going and future critical needs for technician level scientists who are experienced in performing work on ocean-going vessels. Our program produces graduates that clearly meet this need.

III. Program Quality (Limit: 6 pages, not including tables) [30%]

A. Students

1. For undergraduate programs

Fisheries Biology (with options) Mean GWPE Scores (incl. primary and second majors) **degrees_awarded_B_FISH report generated: 25-JUN-08**								
MAJOR	**AY 99/00**	**AY 00/01**	**AY 01/02**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**

Fisheries Biology				16.0		18.5	16.0	
Fisheries Biol (Aquaculture)	15.7	15.2	16.0	16.7	17.3	18.5	15.8	16.7
Fisheries Biol (Aquarium Sci)-DefunctF06					16.0	18.0		
Fisheries Biology (Freshwater)	16.3	16.2	16.4	17.8	17.1	16.1	16.4	15.5
Fisheries Biology (Marine)	16.3	15.3	16.0	17.0	15.0	16.7	14.5	16.0
Overall	16.2	15.6	16.2	17.2	16.8	16.6	16.0	15.9

> Provide evidence indicative of program quality related to student learning (e.g., patterns of student achievements in discipline-specific contexts such as special honors or awards, publications, presentations; passing rates on professional examinations; proportion of students who are admitted to graduate school and/or employed in a disciplinary field; and so on – as appropriate for your discipline).

Overall GWPE scores for Fisheries Biology graduates are similar to those for other discipline categories at HSU (see HSU Avg GWPE Scores by Discipline Categories, Analytic Studies).

We have commented above, in section II.B. (external demand), regarding the high success of our graduates in securing fisheries-related employment and the high fraction of local agency fishery biologists who received their degrees from our program. Throughout the Pacific Northwest, management agencies and academic institutions have developed a high regard for graduates from our program. Management agencies have consistently found our graduates to be better prepared to engage in and/or direct field research, presumably a reflection of the hands-on field-oriented nature of our program, and the finest academic institutions have routinely accepted our BS and MS graduates into more advanced programs of graduate study. Although we could provide outstanding individual illustrations of the success of our undergraduates in PhD programs, we cannot provide statistical evidence of success because our program has not tracked that and, indeed, we are uncertain just how we might accomplish that task given the great difficulty in maintaining contact with all (rather than some) alumni following their graduation from HSU. Thus we could provide "testimonials" of individual successes, but cannot provide reliable summary statistics.

HSU Fisheries Biology graduates have traditionally scored exceptionally well on state exams that must be taken to qualify for employment by California Fish and Game. For example, several of our students recently received scores ranked above the 90th percentile of all individuals taking the exam. We contacted state level employees who administer this exam and were told that they unfortunately cannot search their exam scores by institution of graduation, so we cannot provide a statistical summary of student performance on this exam. Finally, HSU

Fisheries Biology students established the student Sub-Unit of the Cal-Neva Chapter of the American Fisheries Society and developed associated web pages.

B. Faculty

1. Provide evidence of teaching effectiveness and commitment to continuous improvement of teaching. Include, for example, engagement in professional development for teaching (including around campus themes on learning outcomes and diversity, and on accessibility training), program approaches to ensure quality, and/or recognitions, honors, and awards for excellence in the classroom as appropriate for your program.

Over the years, the Fisheries Biology Program has received an exceptional level of recognition for excellence in teaching given the small number of tenure track faculty affiliated with our program. Terry Roelofs, who retired as of fall 2007, received the American Fisheries Society's (AFS) first Outstanding Educator award in 1988. AFS is the professional organization for fishery biologists from throughout the United States and Canada. Ron Fritzsche, who retired from HSU in 2006 after many years of teaching followed by administrative work, received HSU's Outstanding Professor Award in 1990. Tim Mulligan received HSU's Outstanding Professor Award in 2005 and continues to be an inspiration to our students. In keeping with our faculty's strong belief that scholarship, research and teaching go hand in hand, we have tried hard to involve our undergraduates in research projects as part of their academic programs. David Hankin was HSU's Scholar of the Year in 1999, and Andrew Kinziger was named a McCrone Promising Scholar in 2006.

Other evidence of teaching effectiveness and long-term commitment to teaching excellence is revealed in the mean teaching evaluation scores of courses taught in the Fisheries Biology program. Over the past two AYs (06/07, 07/08), the mean and standard deviation of "overall teaching effectiveness" scores for 26 "courses" (labs sometimes scored separately) taught by tenure track faculty under the FISH course label ranged from 3.5 - 5 with a mean of 4.585 and standard deviation of .38 respectively. Median course score was a remarkable 4.7 on a scale of 1-5. Comparable mean and standard deviation of "overall teaching effectiveness" for courses taught in the College of Natural Resources and Sciences (compilation provided by Julie Tucker, CNRS) were 4.2 and 1.0, respectively.

2. Evidence of faculty engagement in scholarship/creative activities and service. (Express as a percentage of full-time or FERP faculty members affiliated with the program. For example, if 9 of 10 faculty affiliated with your program gave a paper at a professional meeting in 04/05, then enter 9/10 = 90%.) This table is to be completed by the department.

Scholarship/Creative Activities/Service	05/06	06/07	07/08
At least one peer-reviewed publication or creative product	3/5	4/4	4/5
At least one funded grant or contract related to scholarship	4/5	4/4	5/5
Invited participant or leader of workshops, expert panels, or task forces	3/5	3/4	4/5
At least one presentation (paper, poster, exhibition, etc.) given at a professional society meeting	4/5	1/4	3/5
Professional service activities at a regional or national level	5/5	4/4	3/5
Service on at least one university or college-level committee (at least 1 hour/wk avg.)	5/5	4/4	4/5

3. Provide explanations of the data above and/or descriptions of the patterns of faculty engagement in scholarly and/or creative activities and service as appropriate for your program.

The above tabulations are for full-time tenure-track faculty only; one faculty member was on leave in 06/07. All Fisheries Biology faculty members are actively engaged in scholarship and research. Due to teaching commitments and low levels of travel support, however, our participation in scientific meetings has historically been inconsistent. Adjunct faculty members actively affiliated with our program (Duffy, Bjorkstedt, Loudenslager, and Wilzbach) are actively involved in research and would typically score a 100% rating on each item.

4. Provide evidence for faculty mentoring of students. Include, for example, approaches to advising, directed study or research, and/or clubs or student professional chapters that involve faculty mentorship.

In Fisheries Biology, advisors are not randomly assigned to students. Instead, we assign advisors to individual students on the basis of a matching of a student's apparent interests with a faculty member's interests and expertise (see Departmental report). These assignments are intended to ensure common interests of advisors and advisees, and to maximize expertise in guidance

concerning potential future employment in specific areas of fisheries. Direction of students on independent projects follows the same practice of matching student interest with faculty expertise so that faculty supervision is most appropriate.

When we believe that individual students require specialized attention, we try our very best to provide this. Examples include regular meetings of Native American Hupa "interns" and supervisors with their academic advisors; intensive mentoring of Asian students, especially those with serious language barriers or those unfamiliar with U.S. academic procedures.

Other examples of mentorship include routine service of one of our faculty members as advisor to the Fish Club (a university-recognized student club), and Kinziger's supervision of NSF REU students on summer genetics research projects. Supervision of these REU students, drawn primarily from minority or underrepresented groups, has often required considerable mentoring skill to ensure a productive experience.

5. Other evidence of quality indicators related to faculty that may not be listed elsewhere, including, for example, faculty diversity within the program.

Although the Fisheries Biology program has long struggled to increase the proportion of females among our undergraduate majors (usually ranging from 15-20%), we have been more successful in ensuring that our students are exposed to female instructors in our courses. Dr. Kristine Brenneman, a Native American tenure-track faculty member in our program, teaches FISH 320 and FISH 443 on a regular basis, both required for the Freshwater Option; Dr. Helen Mulligan has for many years taught FISH 311, required of all students, and assisted in FISH 540 in a temporary faculty capacity; and Dr. Peggy Wilzbach, Assistant Leader, CA Cooperative Fish Research Unit, teaches FISH 485/585, a required course for the Freshwater Option.

C. Curriculum (differentiate by option, if appropriate)

1. Writing and oral communication learning outcomes
   Describe how written and oral communication skills are included in your program.

Our program has long emphasized the importance of written and oral communication. We require that all of our students take FISH 314 (Fisheries Communications, 3 units: 2 lectures + 2 hr discussion). This course teaches the fundamentals of technical writing, including construction of graphs and tables, and oral presentations, including development of effective media

presentations and oral delivery. Almost all of our course examinations are in short answer or essay format, rather than multiple choice, because our class sizes are typically modest (less than 35). Grading of these essays is based on quality of writing not just on content.

2. Assessment
   [Data on program progress with assessment tasks will be provided from the Faculty Associate for Assessment]
   Provide 2 examples of how you have used results of assessment of your program's student learning outcomes to adapt, enhance, or affirm your program's curriculum.

The Fisheries Biology program has established six learning outcomes for our majors. We have thus far assessed and reported on assessment results for two student learner outcomes (skill areas of (1) fishery management and conservation, and (2) fisheries techniques), and our assessment process is fully described in our departmental report. For the two learning outcomes that we have thus far assessed, application of our scoring rubrics to assessment documents (mid-term take-home exams and take-home writing assignment, respectively) in both cases produced rubric score results that exceeded our goal of having a minimum of 75% of students scoring 2 or higher (on rubric scale of 1-3). Modest changes in delivery of course material (timing of administration of assessment materials or more clear separation between lecture and lab material) have been recommended based on evaluation of our assessment results. These modest changes in course delivery are intended to produce improvements in associated learner outcomes. We will next be evaluating "Communication Skills" and suspect that there may be greater variability in rubric scores for this learner outcome, thereby leading to a more dramatic departmental response/adaption to assessment results.

3. Accreditation (if applicable)
   If the program is accredited, describe the need for this accreditation and its impact on the quality and composition of the curriculum of the program.

   NA

4. Relevance and innovation
   Provide evidence through examples that demonstrate a curriculum that is relevant, innovative, forward looking, responsive to changing trends, and equips students to function in a diverse, global context.

Over the past 25 years, there has been a substantial shift within the Fisheries Biology Program from a focus that was historically based on very utilitarian, extractive objectives, such as

"maximum sustained yield", to more contemporary objectives that tend to emphasis preservation and restoration of fishery resources (e.g., location and design of marine protected areas, improvements in watershed management) rather than extractive uses, and recreational (often catch-and-release) rather than commercial fisheries. Our FISH 460 (Principles of Fishery Management) class very explicitly takes our students through these changes in philosophical orientation, but our other classes have changed, over time, to reflect these changed attitudes and objectives in our field. For example, our FISH 335 class, U.S. and World Fisheries, examines fisheries from ancient to modern times. In addition to studying the landings and disposition of catch by world fishing powers (e.g., China, Japan, U.S.), much attention is given to fisheries of developing nations and Native American tribes. Students meet local commercial fishermen, hear presentations from fishery management biologists, visit local fish processing plants, and develop a holistic appreciation of the social and economic repercussions of fishery regulation designed for conservation purposes.

A recent and, we think, extremely important innovation in our program has been the addition of a laboratory section to the course that virtually all of our students take to satisfy our genetics requirement (FISH 474). In this laboratory, students are exposed to and learn basic skills of modern molecular genetic analysis. Another innovation in our program has been the addition of Adjunct faculty member Dr. Eric Bjorkstedt and his associated PACOOS fisheries/ oceanography field program (see departmental report). Dr. Bjorkstedt has also introduced a fisheries/oceanography course that emphasizes interdisciplinary connections between these two fields in the context of global fisheries and a holistic view of marine ecosystems.

Finally, our faculty are considering development of a new three unit course that would be taken when students first enter our program and would replace our existing required FISH 110 (Introduction to Fisheries Biology) course. This new course would be team-taught, would consist of week-long segments designed to stress the interdisciplinary nature of the study of fisheries, and would have, as unifying themes, the potential impacts of global climate change on fish populations and possible causes for the current crises in abundance of many marine and freshwater fish populations.

5. Interactions between graduate and undergraduate programs (if applicable)
   If this is a graduate program, what opportunities for undergraduates result (or are lost) by virtue of the graduate program.

Fisheries Biology faculty have a long tradition of scholarship supported by grant and contract research and routinely try to take on and, ideally, provide two full years of financial support (currently about $15k + registration fees) for at least three graduate students per AY per faculty member. The presence of graduate students in our program enhances opportunities for undergraduate students in at least five important ways. First, presence of graduate students in our program allows us to offer courses at the graduate level that might not otherwise be adequately subscribed by undergraduates. The combined enrollment from graduate students and our best undergraduates in these classes allows us to keep the courses in our curriculum and provides a truly outstanding curriculum for those undergraduates who elect to take advantage of these courses. Second, the presence of graduate students, who are selected through a highly competitive process, elevates the general level of discussions and expectations in all courses in which they are present. Third, graduate students are routinely seeking the assistance of undergraduates in their MS thesis research. This provides undergraduates with mentoring and advanced research experiences that they could never experience were it not for the presence of graduate students. Fourth, graduate students allow faculty members to pursue cutting-edge research that keeps them at the forefront of their field. What faculty learn from their research in turn inevitably finds its way into the classroom, often via real-life examples of application of research that provides the very best way to convey many concepts or skills. Finally, existence of our substantial graduate program was one of the primary justifications for greatly augmented laboratory facilities that came with the Wildlife and Fisheries building remodel/expansion in 1999 (see Departmental report).

6. Program uniqueness
   If your program provides unique educational opportunities or course content that is found at few or no other CSU institutions, please describe this uniqueness.

We consider only the overall Fisheries Biology major in this section as all comments apply with equal force to both the Freshwater and Marine options.

Humboldt State University is the only CSU institution that offers an undergraduate degree in Fisheries Biology, and is the only academic institution in the state of California to offer an MS degree in Fisheries. As previously noted in the *Vision* section of this Program Report, and further detailed below under *Facilities and Resource,* we believe that the combination of our hands-on

field- and laboratory-oriented curriculum, combined with our impressive facilities, provides our students with unrivaled opportunities for study of Fisheries Biology.

7. Opportunities for undergraduate scholarship/creative activities/service
   Estimate the percentage of your undergraduate majors that participate in scholarship/creative activities/professionally-related service, and provide some illustrative examples of such activities. Can students receive academic credit for these activities and have them counted toward undergraduate major requirements?

We guess that about 25% of our undergraduates elect to participate in such activities. In many cases they may receive academic credit for such activities via FISH 499, independent study. We provide three illustrative examples of such activities. (1) In his projects relating to characterization of marine fishery resources off Redwood National Park, Tim Mulligan employed more than 15 undergraduates who assisted him and his graduate students in both intertidal and subtidal studies. These students received invaluable training in experimental design; fish, invertebrate and macroalgae identification; boatmanship; and the opportunity to work directly with National Park personnel. (2) Every year, 6-8 undergraduate students assist our hatchery manager, Eric Loudenslager, in spawning activities at our on-campus salmonid fish hatchery and receive FISH 499 credit for their work. (3) Over the past five years, more than 20 undergraduates have assisted Andrew Kinziger in genetic analyses required for 17 different research projects. Two of these students have gone on to enter our MS program in Fisheries.

D. Affiliations/Equipment/Facilities/Environment

1. Affiliations
   Some academic programs are affiliated with on-campus or off-campus centers, units or institutes that bring important benefits to programs. For any such center/unit/institute, please provide (1) the name of such center/unit/institute, and very brief descriptions of (2) the purpose of the center/unit/institute, (3) the nature of your program's affiliation with the center/unit/institute, and (4) the benefits accruing to your program/major from your affiliation with this center/unit/institute. Units/centers/institutes may be public (HSU, CSU, local, state, federal) or private.

California Cooperative Fish Research Unit. The HSU Fisheries Biology Program is extremely fortunate to have an intimate affiliation with the CA Coop Unit, one of only 40 similar units located at academic institutions throughout the United States. Cooperators include HSU, CA Department of Fish and Game (CDFG), and the U.S. Geological Survey (USGS). HSU provides office and facilities spaces for the Unit (in the Wildlife and Fisheries Building, following the

1999 expansion/remodel); CDFG provides a modest base funding for the Unit (currently $35,000/yr); and USGS pays salaries and benefits for two senior level PhD fishery scientists (Unit Leader and Assistant Leader). The Unit's mission is to: (1) Conduct scientific research that benefits fish, their habitats, and ecosystems upon which they depend; (2) Train graduate fisheries students, through mentoring and teaching graduate level courses, to become competent fisheries scientists; and (3) Provide technical assistance to the fisheries profession by sponsoring training workshops, reviewing and writing manuscripts for publication, and coordinating research activities. The Unit Leader and Assistant Leader each teach one senior/graduate student level FISH class per academic year and supervise/fund a substantial number of graduate students. Over the years, approximately 25% of the graduate students produced by our program have had committees chaired by Coop Unit scientists. In addition, the Coop Unit has provided substantial opportunities for training and employment of our undergraduate students on Unit projects.

NOAA Fisheries/PaCOOS Program. Beginning in fall 2006, the HSU Fisheries Biology program has been very fortunate to be affiliated with the NOAA Fisheries PaCOOS (Pacific Coast Ocean Observing System) program which has located Adjunct Professor Dr. Eric Bjorkstedt at HSU. Eric maintains an office and laboratory at the Marine Lab in Trinidad, periodically teaches in the fisheries/oceanography area, and is a major user of HSU's 90' vessel, the R/V Coral Sea, for PaCOOS-related activities. On a roughly monthly basis, Dr. Bjorkstedt has been using the Coral Sea to collect oceanographic data and larval fish along a perpendicular transect from Trinidad out about 25 miles. Dr. Bjorkstedt has successfully served as committee chair for a graduate student in our Fisheries MS program, has served as minor committee member on numerous MS student's committees, and many undergraduates have assisted on his monthly cruises, thereby gaining experience in oceanographic sampling methods.

2. Facilities and resources
   Provide a brief listing of your most important facilities, equipment and information/library resources, and describe the degree to which the current facilities, equipment and information/library resources affect program quality.

The HSU Fisheries Biology Program is fortunate to be able to offer our undergraduate and graduate students unrivaled facilities for research and instruction in fisheries biology. On the main HSU campus, students take classes and laboratories in the Wildlife and Fisheries building (WFB) that was extensively renovated and greatly expanded in 1999. In addition to lecture

rooms and laboratories for classroom instruction, the building contains specialized and up-to-date laboratories for research in fish pathology, fish genetics, water quality, age and growth, and taxonomy/ecology. The genetics laboratory facilities are particularly impressive, including a gene sequencer used for analysis of microsatellites and DNA, and five stations for student work. We also have access to a real-time PCR (polymerase chain reaction) device, shared with the Biology Department, that allows analysis of SNPs (single nucleotide polymorphisms). Together, this laboratory and associated equipment allow us to expose our students to the most up-to-date approaches to genetic analyses in fisheries. Also located in the WFB is our fish collection, the 4th largest in California and largest in the CSU System. The collection has an important regional role, as it is the only collection between San Francisco and Corvallis, Oregon. The collection contains approximately 46,000 specimens, with more than 1,200 catalogued species, and emphasizes northwestern California. The collection is cataloged into a computerized database available on the Internet and is used for both scientific and instructional purposes. Adjacent to the WFB on campus is found the HSU Fish Hatchery. This small-scale recirculating hatchery raises steelhead and coastal cutthroat trout. Hatchery facilities and fish reared in the hatchery are used in a large number of our FISH classes and the hatchery provides the primary laboratory setting for our Freshwater aquaculture class (FISH 370).

Off-campus facilities are also impressive. About 13 miles north of campus in Trinidad is the HSU Marine Laboratory. This facility provides offices and research space for several HSU Fisheries Biology faculty members, provides classroom and laboratory instruction in FISH classes that support our Marine option, and provides undergraduate and graduate students with unique opportunities for independent research in our "wet lab", an area where marine organisms can be maintained in recirculating seawater. We are aware of no other academic institution that has an associated marine laboratory located so close to the main campus or that has a wet lab which is routinely used for undergraduate student projects. As a consequence of its nearby location, HSU Fisheries Biology students can take marine lab-based courses during the same semesters that they take other classes on the main campus. Primary Marine Lab users include the departments of Biology, Fisheries Biology, and Oceanography.

About 13 miles southwest of the main campus, at Woodley Island Marina in Eureka, is located HSU's 90' ocean-going vessel, the R/V Coral Sea. Cruises on the Coral Sea provide our undergraduate and graduate students with important field experiences and instruction in use and

care of fisheries and oceanographic field equipment. With the arrival of the PaCOOS program at HSU and a related NSF equipment grant, the Coral Sea continues to become better equipped for modern fisheries/oceanography research. Our students greatly benefit by their exposures to new oceanographic technologies. Together, our on-campus and off-campus facilities allow us to provide our students with, we believe, an unrivaled combination of hands-on field- and laboratory-based exposure to study of fish in freshwater and marine environments.

3. Unique local and regional environment
   Describe how the program takes advantage of the unique local or regional social, cultural and/or natural environment available to students and faculty at HSU. (Do not include items listed under D1.)

The local natural environment and its proximity to the HSU campus allow us to provide "outdoor classroom" laboratory experiences on a routine basis. Within a 25-30 minute drive from the main HSU campus, we can offer afternoon field-based labs in topics ranging from effects of logging or success of instream habitat improvement structures on small coastal streams, to analysis of water quality and limnology of our unusual coastal lagoon systems, to study of fish community structure in nearshore marine habitats varying from small estuaries to open sandy beaches to rocky intertidal areas. Within 1-1.5 hours from the main campus, on weekend laboratory field trips, our students can study anadromous steelhead and salmon in large river systems (Klamath/Trinity, Smith, Eel), hike into the Marble Mountains of Trinity Alps to study dynamics of fish communities in alpine lakes, or study near-pristine coastal streams in Redwood National Park. And, of course, it's just a 15 minute drive from campus to the R/V Coral Sea in Eureka from which students can embark on cruises in Humboldt Bay or in the offshore environment. Our Fisheries Biology Program takes full advantage of the uniquely variable and relatively undamaged natural environments that are available for study within a short drive from our main campus.

IV. Investments, Revenues, and Efficiencies (Response Limit: 2 pages of narrative, not including tables) [20%]

A. Program Investments -

   1. Program Investment – Degree Requirements

Enter the total number of required course units (as listed in the catalog) for this academic program, and then the number of required course units for this academic program that are from the primary course code associated with your program. Provide a total for each option if appropriate.

Student Units (Varies by Option)

Total required Program SCUs	76-77	Required Program SCUs in the primary Course Code	37-40

Weighted Teaching Units (WTU's)

Total the number of WTUs required to teach 1 section of each of the required courses in the program. If there are lists of restricted electives (e.g., take 1 of the following 3 courses), then choose a representative course from the list. For required S-factor courses, estimate the typical number of WTU's assigned to a faculty member who teaches the course. Again, differentiate by option if appropriate.

Total Required Program WTUs	93.66 - 95.66	Required Program WTUs in the primary Course Code	43.44 - 45.44

2. Program investment – by Minimum Weighted Teaching Units required to offer coursework so students can make reasonable progress toward their degree.

Complete the table below using the definitions that follow. Include additional columns as needed for additional options.

Total WTU in Course Code	WTU for GE and service to other academic Programs	WTU for Freshwater Option	WTU for Marine Option
167.99	16	114.66	96.66

Total WTU in Course Code: Sum up the total number of WTU that were used to teach courses in the primary course code associated with your academic program ***over the past two academic years****. Exclude remedial courses.*

*Service to GE and other Academic Programs: Enter the total number of WTU that were used **over the past 2 years** to meet service demands imposed by students outside the major. (In other word, if 8 sections of Egyptology 301 have been offered over the past 2 years, but if 2 sections over the past 2 years would have been sufficient for the Egyptology majors, then count 6 sections of Egyptology, and the associated WTU, in this category.)*

*WTU for Major Option (s): Sum up the non-service WTU for the set of courses in the course code associated with your program that you would need to offer **over a two year period** to accommodate progress toward degree for your program students.*

Notes: 1) In programs with multiple options, courses common to the multiple options should be included in all options. Hence the entries to the right of the "Total" entry will not sum to the total. 2) Do not pro-rate WTU's by the percentage of students in a particular section of a course that are majors. Include the course in the count if it must be offered during a 2-year period for students to make progress toward their degree. The 4-year major plan for Freshmen may be useful.

In Section 2 (Program investment – by Minimum Weighted Teaching Units), we note that 14 WTU of instruction in courses that are required for our major options were taught on a voluntary basis (i.e., at no HSU cost) by Adjunct faculty affiliated with our graduate program. Of these 14 units, 12 supported the Freshwater Option and 2 supported the Marine Option. Adjusted **HSU-funded** WTU for the Freshwater and Marine options would therefore be 102.66 and 94.66, respectively.

3. Program Investments – by staff allocations.

Estimate the percent of departmental expenditures for staff positions that can be attributed to this academic program. Provide an explanation, as appropriate.

	Major Program
Percent of Staff FTEF	80% undergrad; 20% graduate

Staff FTE

	1/31/2004		1/31/2005		1/31/2006		1/31/2007		1/31/2008	
FISHERIES BIOLOGY	Count	Sum	Count	Sum	Count	Sum	Count	Sum	Count	Sum
R07	2	0.88	3	1.08	2	1.38	2	1.50	1	1.00
Total	2	0.88	3	1.08	2	1.38	2	1.50	1	1.00

The reporting of FTE staffing for the Fisheries Biology Program as stated in the above table seems incorrect. Over the past five years, we have consistently been charged for 0.5 FTE of a

full-time staff position in the WFB stockroom (field/lab equipment checkout, etc.) and 0.5 FTE of a full-time ASC II (Fisheries and Wildlife office). Additional office support has ranged from a maximum of 0.5*0.75 = 0.375, when we had a permanent 75% FTE ASC I also assigned to our office, to the current situation where we have just 0.5*0.25=0.125 additional ASC I support. Thus, our staff support has ranged from a high of 1.375 to the current low of 1.125, a reflection of the response to recent budget cuts. Fisheries Biology and Wildlife Programs share (50:50) the costs of these staff positions.

4. Program Investments – Other annual costs.

Provide dollar estimates for other program costs by the following categories. Annualize periodic costs (equipment purchases or facilities upgrades) as necessary. Include an explanation, if appropriate. Do not include costs for commonly used items (smart classrooms, faculty workstations, etc.).

Category	**Estimated Cost**
Equipment (including maintenance)	$1,270
Instructional Supplies	$1,840
Temporary Help (graders, lab assistants, GA's, etc.)	$18,710

Values reported in the above table are approximate means for the 06/07 and 07/08 AYs and exclude expendable instructional supplies purchased through student lab fees.

5. Program Investments – accreditation [if applicable]

If this program is accredited, describe how this accreditation effects program costs.

NA

B. Gross Revenues

Revenue DEPARTMENTS COMPLETE THIS SECTION	05/06	06/07	07/08
Fundraising/donations	57,375	12,520	14,255
Extended Education	596	1,408	689
Student fees	10,149	11,094	6,400
Instructionally Related Activities (IRA)	0	0	0
Instructionally-related grants	6,000	0	6,000
Grants and contracts to P.I.s	354,220	373,400	181,200
Other revenues	507,739	880,331	218,764

Provide an explanation for how these revenues support the academic program.

We have invested substantial effort into generating support from alumni and donors. Alumni donations are used to fund informational displays in the Wildlife and Fisheries Building, to host various social events for faculty and students (e.g., joint Fisheries and Wildlife BBQs in fall and spring semesters), and to provide modest support for undergraduate research projects. More generous donations from individuals often have earmarked purposes (e.g., C.L. Scott donations for furnishings in our conference room, and for support of the annual Michael Scott award for the outstanding Fisheries senior). Student (lab) fees support purchase of expendable materials used in course laboratory sessions. Grants and contracts to PIs are the primary source of funding for graduate student salaries, fund many undergraduates to assist in projects, and allow purchase of field equipment items that can later be used in class instruction. Instructionally related grants reflect Kinziger's participation in the NSF URP summer undergraduate research program. NOTE: In the above table, "Grants and contracts to PIs" reports income (total awards by year of award start date) for tenure-track faculty only, on a calendar year basis (2005, 2006, 2007). "Other revenue" reports grant and contract income generated on the same basis by Adjunct Faculty affiliated with the CA Coop Unit (Duffy, Wilzbach) and the NOAA Fisheries PaCOOS program (Bjorkstedt). Finally, PaCOOS program income not reported in the above table pays for ocean-going cruises on the Coral Sea. Coral Sea income generated from the PaCOOS program has thus far been $19,852, $27,600, and $20,145 for 2006, 2007, 2008. These funds more than cover vessel operation costs during cruises and contribute to a fund for vessel maintenance. (HSU internal funding for vessel maintenance is inadequate.)

C. Efficiency.

1. Efficiency – By SFR for course code

Academic Year Averages	Subject	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**
SFR	FISH	13.23	13.28	12.90	10.04	13.68	11.16
FTEF	FISH	5.16	5.18	5.67	6.54	4.16	5.15

SFR SUMMARY	02/03	03/04	04/05	05/06	06/07	07/08
AHSS	20.36	22.05	21.94	20.61	21.19	22.91
CNRS	15.66	16.90	17.17	16.04	16.82	18.28
CPS	15.12	16.29	15.68	15.22	20.80	25.33
UNIVERSITY TOTALS	17.28	18.65	18.57	17.52	19.32	21.43

Explain any substantial changes in SFR. Also explain why this SFR differs from the college and/or university SFR. What efforts have been made over the past few years by the program to improve this measure of efficiency? Use the data under part IV.E. as appropriate.

SFR for the Fisheries Biology Program has never been high relative to many other programs on campus for several reasons. First, our classes primarily support our majors, and all but one of our classes (FISH 110) are offered at the 300 level and up. Second, many classes for our major have a lecture/laboratory structure typical for the sciences, directly limiting the sizes of our labs to a maximum of 24 students, and adversely affecting "SFR". Third, since the 03/04 AY, we have rarely been allowed to offer our sole upper division GE course (FISH 300) on a twice a year basis, thereby reducing our FTES generation and directly affecting our SFR.

For several reasons, we do not believe that the SFR values reported in the above table are accurate. First, one of us (Hankin) teaches courses in the Biometry option. FTE generated from BIOM courses are not counted toward FISH program FTE, but faculty WTU are nevertheless charged to the instructor's home program (i.e., to Fisheries Biology). Second, tenure-track Fisheries Biology faculty have together carried an unusually large load of assigned time which is not always accurately accounted for in SFR calculations. For example, over the period covered in the above table, the Fisheries Biology faculty have always had at least the following release time assignments: DC (0.31), buyout from City of Arcata (0.25), and service as Graduate Coordinator for CNRS (0.25). Third, as a consequence of our relations with affiliated units (CA Coop Fish Unit, PaCOOS), a modest amount of instruction in FISH classes arises from volunteer instruction which carries no cost to HSU. For a program in which the number of full-time tenure-track faculty have ranged from only 5-6, failure to accurately back out assigned time from FTEF *available and charged for instruction* can make it appear that we use more instructional FTEF than we actually do, thereby creating a substantial negative bias in calculated SFRs. Below, I present an attempt to calculate accurate SFRs for the Fisheries Biology Program based on

salaried full-time faculty positions that were actually available for instruction (i.e., deducting assigned time from full-time faculty positions and excluding WTU instruction made on a no-cost volunteer basis), augmented by paid temporary faculty positions used to cover courses that could not be taught by tenure-track faculty. Note that FTEF calculated in this fashion are substantially less than those reported in the above table and that corresponding SFRs are therefore higher. Based on these calculations, mean SFR for the Fisheries program has been about 15.

Semester	Reported FTES	Calculated FTEF	Calculated SFR	SFR w/BIOM 406/506
Fall 2003	64.53	4.37	14.77	
Spring 2004	66.93	4.30	15.57	16.37
Fall 2004	74.07	4.77	15.53	
Spring 2005	65.40	4.70	15.21	
Fall 2005	55.67	4.33	12.86	14.55
Spring 2006	66.13	5.13	12.89	
Fall 2006	50.93	3.40	14.98	
Spring 2007	57.20	4.20	13.62	
Fall 2007	60.13	4.32	13.92	14.56

We have taken some actions to improve SFR for our program (e.g., by reducing frequency of offerings of certain classes so as to improve class size and reduce associated total WTU), but in a majors-oriented program like ours there is no way to dramatically increase SFR without dramatically increasing the number and frequency of GE classes which we would offer. As noted previously, we have been forced to reduce the frequency of offering of our only upper division GE course.

Finally, we wish to state our belief that it may be reasonable to compare SFRs across comparable academic programs (e.g., all science programs within CNRS that primarily serve majors), but that it makes no sense to compare SFRs across programs of very different types (e.g., Fisheries Biology vs English). In contrast to programs that are intrinsically low-cost, serve a large lower division GE audience, and may rely substantially on large lecture formats, effective science programs are typically geared toward upper division students and are constrained by the resources needed to provide effective, excellent education. In particular, laboratory sections are constrained by the typical 24-station laboratory format used throughout CSU and, generally, throughout higher education. Effective laboratory sessions are essential for effective instruction in the sciences.

2. Efficiency - Other views

The Prioritization Task Force will examine the data given under section IV.A and B in terms of the overall production (e.g. number of majors, number of graduates) in the program. Please comment if appropriate.

The Fisheries Biology major has always required large numbers of courses from other disciplines so that our graduates are well-rounded in the basic sciences and are well-equipped to pursue more advanced academic studies. As a consequence, only about one half of the SCUs required for our degree are taken in FISH classes, and less than half of the WTU required to generate these SCUs are generated from FISH classes (implying that other programs are generally less "efficient" than FISH classes, i.e. require greater WTU/SCU).

Fishery Biology faculty are all actively engaged in research and scholarship. The substantial grant and contract funding that we receive each year helps us to support the costs of educating our students, e.g., through allowing student use of equipment purchased on grants and contracts, and also provides unique opportunities for employment of undergraduates and stipends for graduate students.

D. Budget cut impacts.

Indicate how your program has been affected by recent (since 2002-2003) budget cuts that have directly affected resources for your program (faculty, staff, operating expense) and course offerings (class size, reduced course offerings or options for the major.) Refer to the data included under section IV. E. or in the departmental report as appropriate.

In response to budget cuts, the Fisheries Biology Program has taken steps to improve the efficiency of delivery of our major. These steps have included reduction in the number of options and offering some of our courses on an alternate year schedule rather than every other year, thereby reducing WTUs required to teach these classes and increasing FTES when the courses are taught. For the 02/03 AY, we had four options in our program (Freshwater, Marine, Aquaculture, Aquarium Sciences). The Aquarium Science option was dropped when Dennis Thoney left his position as Director of Marine Facilities, and the Aquaculture option was dropped in 2007 as a direct response to administration requests for such actions. We now offer three Fisheries Biology courses on an alternate year basis: FISH 370 Aquaculture, FISH 471 Fish Health Management, and FISH 450 Introductory Fish Population Dynamics.

The above responses to budget cuts have probably not had any dramatic negative impacts on our program. However, primarily because of budget reductions, we have been unable to recruit for a replacement for Terry Roelofs. Terry retired (after two years of FERPing) as of fall 2007 and has left our program without leadership in the core area of ecology of freshwater fish. Our program and students have suffered as a consequence.

E. Additional Data

Course Offerings Profile in Fisheries (AY 00/01 - AY 07/08)
class_offerings_FISH report generated: 27-JUN-08

	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Distinct Courses Enrolled	19	21	20	19	17	19	18	18
Sections Enrolled	38	36	35	34	36	39	32	31
Average Section Enrollment	13	12	13	13	13	11	11	11

Distinct Courses Enrolled in Fisheries by Level (AY 00/01 - AY 07/08)
class_offerings_FISH report generated: 27-JUN-08

Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	1	2	2	1	1	1	1	1
Upper-div	13	13	14	12	11	13	12	13
Graduate	6	7	5	6	6	5	5	4
Total	**19**	**21**	**20**	**19**	**17**	**19**	**18**	**18**

Sections Enrolled in Fisheries by Level (AY 00/01 - AY 07/08)
class_offerings_FISH report generated: 27-JUN-08

Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	1	2	2	1	1	1	1	1
Upper-div	18	18	19	17	18	19	15	17
Graduate	19	17	14	16	18	19	16	13
Total	**38**	**36**	**35**	**34**	**36**	**39**	**32**	**31**

Avg Section Enrollment in Fisheries by Level (AY 00/01 - AY 07/08)
class_offerings_FISH report generated: 27-JUN-08

Course Level	AY 00/01	AY 01/02	AY 02/03	AY 03/04	AY 04/05	AY 05/06	AY 06/07	AY 07/08
Lower-div	23	30	27	31	21	23	26	32
Upper-div	21	17	18	20	20	17	17	14
Graduate	5	5	5	5	6	5	4	5
Total	**49**	**52**	**50**	**55**	**46**	**44**	**47**	**50**

FTES in Fisheries by Course Level (AY 00/01 - AY 07/08)

class_offerings_FISH report generated: 27-JUN-08								
Course Level	**AY 00/01**	**AY 01/02**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
Lower-div	1.5	4.5	3.4	2.1	.7	1.5	1.7	2.1
Upper-div	61.0	50.0	51.5	52.4	54.3	47.5	43.4	43.9
Graduate	17.1	15.6	13.4	14.1	18.0	16.6	11.8	11.5
Total	**79.6**	**70.0**	**68.2**	**68.7**	**73.1**	**65.6**	**56.9**	**57.5**

NOTE: In the above tables all class sections have 2 or more students enrolled. This is done to minimize the influence of independent student sections.
Distinct Courses count each distinct SUBJ/Course-number combination enrolled.
All figures are Fall/Spring term averages. Due to the rounding of average Academic Year counts, the various breakouts may not add to the exact same amounts.

Other Class Offering Breakouts

These examine independent study sections, and sections by different modes of instruction. The Lecture-only sections have only a C1 through C6 mode. The Lab/Activity-only sections have only a C7 through C-16 mode. Other modes and combinations contain the remaining modes or combinations of lecture and lab/activity modes.

Other Special breakouts in Fisheries (AY 00/01 - AY 07/08) **class_offerings_FISH report generated: 27-JUN-08**								
	AY 00/01	**AY 01/02**	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
Sections with 1 student enrolled	8	9	11	13	7	8	8	6
Lecture only sections	13	14	13	12	11	11	10	7
Lab/Activity only sections	5	6	7	5	6	8	5	5
Other modes and combinations	20	17	15	18	20	20	17	20

NOTE: The entries posted above in " Sections with 1 student enrolled" probably correspond to FISH 499 independent study projects for which individual students work with individual faculty members. Supervision of such students is generally done as an instructional overload; when it is not an overload, it takes 3 undergraduate students enrolled in FISH 499 to generate the equivalent of 1 WTU.

V. Potential (Please complete this section for each option. Limit: 2 pages per option) [15%]

A. Program capacity with existing resources:

We believe that our program could expand by approximately 25% (graduates per year and FTES in major) and be accommodated with existing program resources. Thus, given current total FTES of 60 and number of graduates per year of perhaps 20, we believe that FTES could be increased to 75 and graduates per year to 25. Below we attempt to break this down by program options, but we note that the reported majors and graduates by options appear inconsistent and may not be reliable, and we also have no obvious way to calculate FTES generated by individual options. Each option has a similar number of courses that are unique to options, but students from individual options often take classes in both options (to satisfy approved elective requirements), so we do not believe that it is meaningful to calculate FTES "by option"

1. What is your program's maximum capacity with current resources? Use two metrics to define "capacity": The number of graduates per year, and the number of FTES generated by courses that are unique to this option, per year.

Freshwater Option

(Completed by the department)	Majors	FTES in the major per year
Existing	40	NA
Maximum capacity with existing resources	65	NA

Marine Option

(Completed by the department)	Majors	FTES in the major per year
Existing	60	NA
Maximum capacity with existing resources	60	NA

2. If your program is at maximum capacity, proceed to part B. If you have capacity to grow with existing resources, what steps have been taken to increase enrollment? What have been the effects of these steps, and what results are still anticipated?

Due to the surprisingly low headcount of Fisheries Biology majors for the 05/06 AY, Tim and Helen Mulligan have aggressively recruited at junior colleges which we believe have substantial potential for our program. Tim and Helen recruited at the following junior colleges from 2006 through 2008: Feather River (CA - 06, 07); Lassen (CA - 07,08), Shasta (CA - 06); College of the Redwoods (CA - 06, 07, 08); College of the Siskiyous (CA - 06, 07, 08); Central Oregon (OR - 06, 07); Mount Hood (OR - 06, 07); and Southwest Oregon (OR - 07, 08). They plan on recruiting at all of these junior colleges but Central Oregon and Mount Hood in 08/09, and propose adding Mendocino College (CA) and Butte College (CA) in 08/09. Recruiting visits

consist of a one hour Powerpoint presentation in which the College of Natural Resources and Sciences is described, with an emphasis on Fisheries Biology. Brochures from most CNRS departments are distributed as well as application and WUE information. Following the presentations, Tim and Helen typically meet with faculty, students, and staff. Visits on campus range from two to four hours in length.

Additional recruiting, though less directly targeted for Fisheries Biology per se, has been carried out by Lisa Perry, our new college recruiting officer. In 2007, Humboldt State University entered into a partnership with the U.S.D.A Forest Service to hire a recruiter to work directly for the programs in the College of Natural Resources and Sciences at HSU. In addition to specifically representing the Natural Resource and Science programs, Lisa is working to increase the diversity of students, with the end goal of providing more trained employees from these under-represented groups. This is being accomplished by targeting the recruiting efforts to more hands-on/activity field trips (e.g., forestry camps and Envirothons), classrooms, and small group presentations, rather than using the standard "college fair" approach. Efforts are being targeted in geographic areas that include: (1) schools closely associated with agricultural, rural or open-space areas, where students may have an inclination to pursue careers in these fields, and (2) areas that include populations of under-represented students. (Standard recruiting practices generally target large urban areas for the access to large numbers.) This more personalized and targeted approach should lead to better yield-per-contact in program areas such as Fisheries Biology. We will be working closely with Lisa Perry and with Jacquelyn Bolman, Director of INRSEP, to actively recruit for Native Americans, our target group with respect to improving the diversity of our students.

Evidence of recruiting success has been apparent in the appearance of some students that were directly attracted by these recruiting efforts and in the numbers of graduates as of fall 2008. The official Fisheries Biology census figure for majors (head count) for fall 2008 is a healthy 103.

B. Opportunities for future growth or substantial curricular changes

1. What opportunity does the program have for future expansion? Provide evidence for your response.

Freshwater Option

Our program has greatest potential for expansion in the Freshwater (FW) Option. We believe that numbers of students in this option could be increased by at least 50% if we were to refill our vacant freshwater fish ecologist tenure-track position. Historically, our majors were dominated by students with freshwater interests (salmon, trout, steelhead) and there is no reason that we could not recapture some of these students who we believe have been lost due to leaving this critical faculty position vacant. We believe that there is also modest potential for expansion if we were to revive our aquarium science option, but that would require additional faculty expertise (in operation and maintenance of large-scale aquariums). Increasing numbers of our majors have substantial expertise and interest in ornamental/aquarium fishes.

Marine Option

Given the current high visibility of many marine issues and continuing excellence of instruction in this area, we anticipate that demand for this option will remain strong.

3. Describe the curricular changes and/or staffing increases required to accomplish such an expansion?

Freshwater Option

As stated above, realizing the substantial potential for additional students in our freshwater option will require that we hire a full-time tenure-track faculty member with expertise in ecology of freshwater fisheries. It may be also possible to find expertise in aquarium science, through either an adjunct or temporary faculty hire.

Marine Option

Resources are currently adequate to sustain our numbers of majors in the marine option.

C. Impact of augmented resources
Suppose that your program were ranked in a category that recommended augmentation of resources. What would be the impact of augmented resources? (Answer for a 10% augmentation and a 20% augmentation.)

If Fisheries Biology were to receive augmented resources, we would devote these to support of our **Freshwater Option:**

20% augment. A 20% augmentation of our tenure-track faculty positions (from the existing 5 back to the previous 6) would allow us to provide adequate instruction and expertise for the Freshwater option which requires the kind of leadership that could be provided by an energetic

recent PhD. Because all but one of the existing faculty members in Fisheries Biology are Full Professors, we estimate the cost to restore our lost FW faculty position at approximately 12-15% of existing total faculty salary (wages + benefits) costs.

10% augment. A 10% augment of our tenure-track faculty positions (5 to 5.5) might allow us to hire a new tenure-track position in freshwater fish ecology IF one of the existing tenure-track faculty were to shift to a reduced time base or FERP.

D. Impact of reduced resources
Suppose that your program were ranked in a category that recommended reduction of resources. What would be the impact of reduced resources? (Answer for a 10% reduction and a 20% reduction.)

Further reduction in support for our program would further undermine the quality of instruction in all our courses and would probably continue the recent decline in numbers of students enrolled in our (once) flagship freshwater option. Faced by a 10% reduction in support, we would be forced to reduce the numbers of courses staffed by temporary faculty. To teach these courses, voluntary overloads would be required of existing faculty members, assuming that faculty would be willing to do so (unlikely). A 20% reduction in support would have catastrophic impacts on our existing program and it would be impossible to maintain our two options. A Fisheries Biology major with a single option might be salvaged following a 20% reduction in support, but would require major curricular overhaul.

E. Impact of program elimination
Suppose that your program were recommended to be discontinued. What would be the impact of program elimination?

Humboldt State University has long had the special status of being the only CSU institution authorized to offer programs in wildlife and fisheries. Therefore, if our program were recommended for elimination, CSU would no longer have an institution offering a degree in fisheries biology. Local, state and federal agencies, environmental consulting firms, and other entities within California, in particular, and on the west coast generally, would lose a recognized source of highly trained and highly qualified entry level fishery biologists. The associated impact on quality and competence of these agencies would be especially large at the local level.

VI. Additional Information (Limit: 1 page) [up to 5 extra credit points may be assigned to the overall score]

Provide crucial information that is not provided under the previous categories.

More than enough has been written on previous pages.

APPENDIX

HSU *Vision* Statement

1. Humboldt State University will be the campus of choice for individuals who seek above all else to improve the human condition and our environment.

2. We will be the premier center for the interdisciplinary study of the environment and its natural resources.

3. We will be a regional center for the arts.

4. We will be renowned for social and environmental responsibility and action.

5. We believe the key to our common future will be the individual citizen who acts in good conscience and engages in informed action.

6. We will commit to increasing our diversity of people and perspectives.

7. We will be exemplary partners with our communities, including tribal nations.

8. We will be stewards of learning to make a positive difference.