HSU Academic Department Report – Fisheries Biology
October 10, 2008 - Program Prioritization

I. Departmental History, Mission, and Goals

Insert the department mission statement and the department goals. In addition, provide a brief (2 page limit) overview of the departmental history with emphasis on the last 5 years.

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.

GOALS: We stress development of a field-based understanding of the relationships between freshwater and marine fishes and the habitats upon which they depend, but our program is broad enough to provide specialized training in fish population dynamics and fishery management, restoration ecology, systematics and fish genetics, marine and freshwater aquaculture, fish health management and water pollution biology. Each of these specialized areas within the broader fisheries biology field has its own important role to play in the overall conservation of fish and aquatic resources. Our goal is to help students to understand and appreciate the roles that their chosen disciplinary specializations contribute to this overall conservation objective.

HSU first began offering a four year undergraduate Fisheries degree program in 1949, and in 1962 was authorized to grant a graduate MS degree in Fisheries. Undergraduate and graduate programs grew steadily though the late 70s, reaching a maximum of about 180 undergraduate majors and 30 MS students. In the early 80s, enrollments declined rapidly in Fisheries Biology (and in other natural resources programs), stabilizing at about 110-115 undergraduate majors and 25 enrolled graduate students in the mid-late 1980s. Enrollments since 1998 have ranged from about 70-110 undergraduates and 18-22 enrolled MS students, with an average of about 100 undergraduates and 20 enrolled MS students. The program has always had a strong hands-on, field- and laboratory-based orientation emphasizing real world training in use of equipment employed in fisheries work, and in observation/experience of fish habitat relationships, including impact of anthropogenic activities on fish populations.

Fisheries Biology, by its very nature, is an exceptionally interdisciplinary field. For that reason, more than 50% of the units required for the Fisheries Biology undergraduate degree correspond to fundamental courses in mathematics, biology, physics or geology, chemistry, and

statistics that would often constitute the first two years of a rock solid undergraduate degree in the biological sciences. Remaining coursework for the degree consists primarily, but not exclusively, of upper division courses offered under the FISH course code. Until very recently, the program offered three distinct options: aquaculture, freshwater and marine. All three options shared a common set of upper division requirements, but then had specialized groupings of courses specific to each option. In response to Administration requests to "streamline" programs and enhance program efficiency, the aquaculture option was dropped as of fall semester 2007 and the frequency of offering of some aquaculture-related courses was decreased to every other year instead of annually. We have been able to make these changes without suffering any substantive declines in quality of instruction or time to completion of degrees, but several students have expressed disappointment over the loss of the aquaculture option.

Traditionally, students in the freshwater fisheries option have accounted for 60-70% of our total number of majors, with remaining students fluctuating erratically between aquaculture and marine options. Since the mid 1980s, however, we have made a substantial effort to boost our expertise and course offerings in the marine fisheries area. With the addition of Tim Mulligan (replacing a retirement in the marine fisheries area) in 1987, we increased the breadth of our course offerings, dramatically improved the quality of instruction in the marine area (Mulligan was HSU's Outstanding Professor for 04/05), and we substantially increased the number of MS students working in the marine Fisheries area. Until very recently, however, our program remained dominated by the Freshwater option, perhaps because Terry Roelofs (our freshwater fish ecologist) was himself a recognized outstanding professor (receiving national recognition from the American Fisheries Society in 1988). Over the period 00/01 - 07/08 there has been an apparent increase in the fraction of our majors (among those who have declared majors) who have declared the marine option (e.g., 5/23 = 0.22 in 00/01 vs 28/61=0.46 in 07/08). Likely causes for this shift include exceptional instruction in the marine area, increased CA State activity in the marine environment (resulting from legislation mandating preparation of fishery management plans and development of a marine reserve system) and, most significantly, decreased institutional support for instruction in the Freshwater option (due to retirement of Terry Roelofs and subsequent loss of this position).

For the period 1994/05 through 2004/05, ignoring sabbatics and difference-in-pay leaves, the Fisheries Biology Program had 6 tenure-track positions that together were adequate to cover most of the areas of expertise required to offer a top-notch program in Fisheries Biology. Areas of expertise that are minimally required include the following: (a) water quality and limnology; (b)

ecology and habitat relationships of freshwater fishes; (b) ecology and habitat relationships of marine fishes; (d) Ichthyology and genetics; (e) modeling and statistics; and (f) pathology. (We do not currently have a tenure-track appointment with expertise in physiology and have relied upon temporary faculty (Dr. Helen Mulligan) to teach our FISH 311 (Fish Physiology) course.) Beginning in AY 04/05, Terry Roelofs, our freshwater fish ecologist, entered the FERP program; two years later he retired, leaving the freshwater position unfilled beginning fall semester 07/08. As noted above, this decline and then complete loss of permanent faculty in the traditional heart of our program has had an apparent dramatic impact on our students' selection of option, has adversely affected instruction in the freshwater fish ecology area, and it has also adversely affected our graduate program. Only tenure-track faculty members may serve as chairs of graduate committees for our MS students; the numbers of MS students in our program is therefore currently smaller than what it would be if the freshwater position were filled. A reduced pool of graduate students in turn makes it more difficult to offer graduate level courses which must meet minimum enrollment targets, thereby affecting the entire graduate program.

II. Departmental Faculty and Staff

Fisheries Biology Dept Instructors -- AY Average Count of Appointments **facpos_FISH report generated: 22-FEB-08**						
Appt Category	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
Lecturer	2	1	1	2	2	2
Assist Prof	0	1	1	1	1	1
Assoc Prof	1	1	1	1	1	0
Professor	4	3	4	4	3	4
Volunteer	8	8	5	6	5	3
Total	**15**	**14**	**12**	**13**	**12**	**10**

Fisheries Biology AY average FTEF (time base totals) **facpos_FISH report generated: 22-FEB-08**						
Appt Category	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
Lecturer	.38	.24	.24	.34	.40	.50
Assist Prof	.00	1.00	1.00	1.00	1.00	1.00
Assoc Prof	1.00	1.00	1.00	1.00	1.00	.00
Professor	4.00	3.00	4.00	3.50	2.40	4.00
Volunteer	.53	.53	.35	.86	.35	.21
Total	**5.91**	**5.76**	**6.59**	**6.69**	**5.15**	**5.71**

NOTE: "Volunteer" FTEF generally consist of courses taught by Adjunct Faculty: Drs. Walt Duffy and Peggy Wilzbach, the Leader and Assistant Leader, respectively, of the CA Cooperative Fish Research Unit (1 3-4 WTU class per year each); Dr. Bret Harvey, U.S. Forest Service, who has frequently taught our graduate seminar (1 WTU roughly every other year); and Dr. Bjorkstedt who has been developing a course in Fisheries/oceanography (eventually 4 WTU every other year). There is no salary cost to HSU associated with this Volunteer FTEF.

Fisheries Biology department release/assigned time **facpos_FISH report generated: 22-FEB-08**						
Assignment Description	**AY 02/03**	**AY 03/04**	**AY 04/05**	**AY 05/06**	**AY 06/07**	**AY 07/08**
Excess Enrollment (=>75)	.00	.00	.00	.03	.00	.00
Instr Experimt Innov/Research	.20	.25	.13	.00	.00	.00
Advising Responsibilities	.34	.34	.26	.26	.00	.13
Instr-Related Comm Assignmts	.00	.00	.00	.00	.00	.10
Dept Chair AY, Leaders/Dir.	.18	.18	.18	.18	.44	.18
Dept Chair - 12mo	.13	.13	.13	.13	.13	.13
Proj/Prog Leaders, Dir., Coord	.25	.07	.13	.00	.19	.00
Other State Funds	.00	.00	.00	.25	.13	.00
Total	**1.10**	**.97**	**.83**	**.85**	**.89**	**.54**

Assigned time reported in the above table are not consistent with actual assigned time received by faculty members. Over the period 02/03 through 07/08, Fisheries Biology faculty have the following assigned time or buyouts on a regular continuing basis: Brenneman (25% "buyout" via contract with City of Arcata); Hankin (0.13 DC 12 month + 0.18 DC AY except for AY 06/07 when Mulligan served as Chair and had identical assigned time); and Hendrickson (25% assignment as Graduate Coordinator for CNRS). None of us have ever had "assigned time" for advising; advising duties have been shared among our faculty as a normal component of "collateral duties". Thus, typical departmental assigned time has been 0.25+0.13+0.18+0.25=0.81.

Personnel (At least .5 FTE)

The Fisheries Biology Department currently has five full-time tenure track faculty members. In addition, we have three adjunct faculty members who take an active instructional role in our program, teaching courses at the senior/graduate student level, and devoting substantial time to direction of graduate student research projects. The table below provides a listing and summary of areas of expertise for these tenure-track and adjunct faculty members.

Name	Position	Description of Specialty and Key Contributions (no more than 100 words per person)
Dr. Kristine Brenneman full-time faculty	Professor	Expertise: Water quality; wastewater treatment and utilization; aquatic invertebrates. Teaching: FISH 320 (Limnology), FISH 443 (Water Pollution Biology), FISH 525 (Wastewater Ecosystem Analysis) Research: Wastewater treatment and utilization; water supplies
Dr. David Hankin full-time faculty	Professor	Expertise: Fish population dynamics, biometrics; fishery management. Teaching: FISH 450 (Population Dynamics); BIOM 406/506 (Sampling Theory); FISH 460 (Fishery Management) Research: applications of sampling theory to estimation of fish population status and trends; improving salmon hatchery management practices
Dr. Gary Hendrickson full-time faculty	Professor	Expertise: Fish pathology/parasitology; aquaculture. Teaching: FISH 471 (Fish Health Management); FISH 370 (Aquaculture); FISH 314 (Fisheries Communications). Research: Diseases of adult and juvenile salmon in the Klamath River
Dr. Andrew Kinziger full-time faculty	Assistant Professor	Expertise: Phylogenetics - application of genetic methods to assess evolutionary relationships among fishes. Teaching: FISH 310 (Ichthyology); FISH 474 (Fish Genetics); FISH 380 (Fishery Techniques). Research: Genetic variation among populations of fishes (tidewater goby, Klamath Chinook salmon); hybridization; phylogenetics of sculpins.
Dr. Timothy Mulligan full-time faculty	Professor	Expertise: Ecology of marine fisheries; fish habitat relationships. Teaching: FISH 335 (U.S. & World Fisheries); FISH 435 (Ecology of Marine Fishes); FISH 440/540 (Early Life History); FISH 375 (Mariculture). Research: Eel grass communities; characterization of nearshore marine fish communities and associations with habitat.
Dr. Walt Duffy full-time research	Adjunct Professor	Expertise: Wetlands; freshwater salmonid ecology and habitat use. Teaching: FISH 575 (Bioenergetics); FISH 480 (River Restoration Ecology). Research: salmonid ecology in coastal streams; indicators of spawning escapement.
Dr. Peggy Wilzbach full-time research	Adjunct Professor	Expertise: Ecology of stream fishes; salmonid ecology. Teaching: FISH 485 (Ecology of Running Waters). Research: Ecology of salmonid fishes in streams
Dr. Eric Bjorkstedt full-time research	Adjunct Professor	Expertise: fisheries/oceanography; population dynamics and modeling; marine reserves. Teaching: FISH 480 (Fisheries/oceanography) Research: larval recruitment of rockfish; PaCOOS oceanographic surveys (long-term monitoring of coastal ecosystem processes)

Adjunct Professors Duffy and Wilzbach are Leader and Assistant Leader, respectively, of the CA Cooperative Fish Research Unit, are employees of the U.S. Geological Survey, and are housed in the Wildlife and Fisheries building along with other Fisheries Biology faculty. Adjunct Professor Bjorkstedt is a scientist with the Southwest Fisheries Science Center, National Marine Fisheries Service, Santa Cruz Laboratory, and is housed at the HSU Marine Lab in Trinidad.

III. Recruitment and Retention

Describe any specific actions (other than HOP or similar standard efforts) the department has taken to recruit and/or retain students, particularly diversity students and/or students who are underrepresented in your discipline. What have been the results of those actions?

We reproduce the information presented in our Program Report:

Due to a surprising recent reduction in Fisheries Biology majors for the 05/06 AY (to just 68 majors), Tim and Helen Mulligan have aggressively recruited at junior colleges where we believe we have substantial recruitment 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.) We feel that this more personalized and targeted approach will lead to better yields-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. We will also work with Lisa Perry to improve the percentage of females among our undergraduates (which has rarely exceeded 20%).

Evidence of success has been apparent in the appearance of some students that were directly attracted by these recruiting efforts and in the numbers of undergraduate majors as of fall 2008. ***The official Fisheries Biology census figure for majors (head count) for fall 2008 is 103, well above the 05/06 AY count (68) that triggered our serious recruiting efforts.***

IV. Learning, Curriculum, and Assessment.

List the student learning outcomes for your academic programs. Then for each learning outcome that has been assessed, provide a summary paragraph that includes the methodology and results of the assessment.

Learner outcome assessment in the Fisheries Biology Department includes assessment of six skill areas: fishery management and conservation, fisheries techniques, communication, mathematics, independent learning, and critical thinking. Our initial thought was to assesst one learner outcome per year, but our recent discussions, based on our recent assessment experiences, may lead us to identify a reduced set of learner outcomes with more frequent assessments of each. Thus far, we have completed assessment of learner outcomes for the first two skill areas:

1. Fishery Management and Conservation Skills.

Statement of Learner Outcome: Students should be able to understand physical and ecological elements and processes sustaining commercial, recreational and non-game fish species, and recognize the implications of altering those components; apply conservation principles in developing conservation approaches for fishes; and incorporate social (e.g., laws and regulations) and economic information in developing fish conservation plans.

Assessment Methodology: We assessed this learning outcome during the 2006-07 academic year in FISH 460, Principles of Fisheries Management. There were a total of 23 students in the class, 14 undergraduates and 9 graduate students. The assessment was conducted using a midterm take home examination in which students were asked to develop a conservation plan for a hypothetical situation involving a small island nation. For students to develop an adequate conservation plan, they would need to demonstrate an appreciation of the importance of each of the issues identified in the above statement of learner outcomes.

Assessment Results: Our scoring rubric evaluated student essays with respect to three distinct criteria: (1) Understand physical and ecological elements and processes sustaining commercial, recreational and non-game fish species, and recognize the implications of altering those components; (2) Apply conservation principles in developing conservation approaches for fishes; and (3) Incorporate social (e.g., laws and regulations) and economic information in developing fish conservation plans. Results of our assessment indicated the following percentage of undergraduate students meeting competencies requirement (ranking of 2 or better) for the three grading rubrics: Rubric 1 - 78%, Rubric 2 - 86 %, Rubric 3 - 62%. For graduate students, corresponding percentages were: Rubric 1 - 100%, Rubric 2 - 77%, Rubric 3 - 77%. Our goal of having a minimum of 75% of students scoring 2 or higher was achieved in all cases except for undergraduates on Rubric 3.

Assessment Implications: First, a take-home examination appears to be an excellent tool for assessing this skill area because this student learning outcome requires integration and synthesis of a diverse set of information. Second, for a more accurate assessment of this student learning outcome, the take-home examination should be given towards the end of the semester, rather than as a midterm, after rather than before most of the social and institutional information has been presented. Third, results from graduate students should be kept separate from undergraduates. Graduate students may have acquired most of these skills at another university and thus it may not be appropriate to include their data in an assessment of undergraduate skills acquired at HSU.

2. Fisheries Techniques Skills.

Statement of Learner Outcome: Students will develop a suite of field, laboratory, and computer-based techniques for studying and managing fishes and will learn to appropriately use and apply these techniques.

Assessment Methodology: During the 2007-08 academic year we assessed the "Fisheries Techniques Skills Area" in FISH 474, Genetic Applications in Fisheries Management. There were

a total of 20 student responses to the assessment device: 17 undergraduate students and 3 graduate students. The assessment was conducted using a writing assignment associated with the laboratory portion of the class. The assignment required students to collect, analyze, interpret and discuss results of a large-scale genetic analysis project.

Assessment Results: Our scoring rubric evaluated student writing assignments with respect to the following criterion: knowledge of field, laboratory, and computer-based techniques for studying and managing fishes, and appropriate use and application of these techniques. Results of our assessment indicated that the percentage of undergraduate students meeting competencies requirement (ranking of 2 or better) for the grading rubric was 83%; the percentage of graduate students meeting competencies requirement for the grading rubric was 100%. Although students appear to be meeting their competency requirements for this skill area (86%), the majority (55%) of scores received intermediate (2) ranks on the scoring rubric, suggesting that many students are achieving only the minimal requirements.

Assessment Implications: To improve student achievement for this learner outcome in FISH 474, the delivery of course content will be modified. In the current structure, methods for conducting genetic assays are presented in a piecemeal fashion in both lecture and laboratory. This style appears to confuse students because it blurs the distinction between lecture and laboratory components of the course. In the future, laboratory procedures will be presented exclusively during laboratory and lecture material exclusively during lecture. The goal is to improve student performance in this skill area so that the majority of students score 3 instead of 2.