

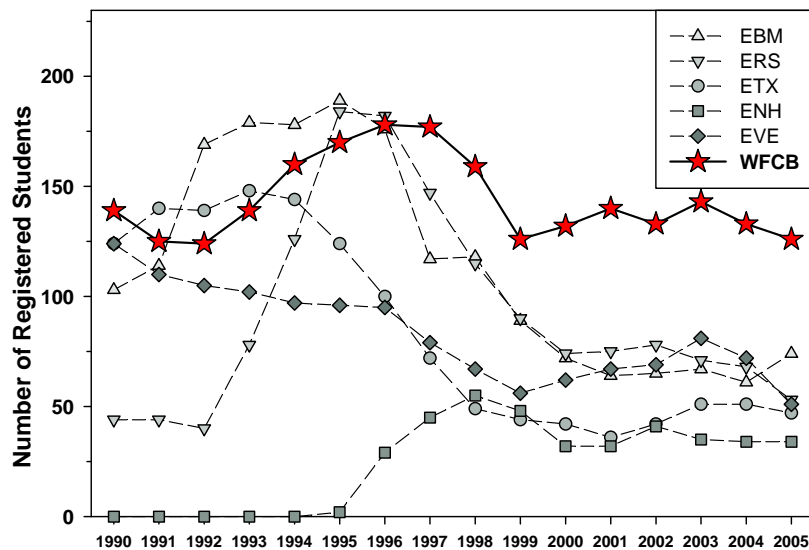
ACADEMIC AND STRATEGIC PLAN

2008 – 2013

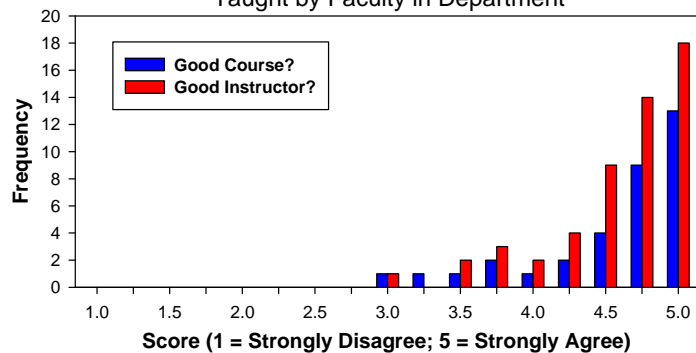
DEPARTMENT OF WILDLIFE, FISH, & CONSERVATION BIOLOGY

UC DAVIS – CA&ES

PREPARED DECEMBER 2007



Student Evaluations of WFCB Courses
Taught by Faculty in Department



EXECUTIVE SUMMARY

The Department of Wildlife, Fish, & Conservation Biology is unique within the higher education system of California, and has few peer programs throughout the west. Our constituency is the California public who value fish and wildlife and who are concerned about the conservation of our biota. Our research activities lead to increased understanding of the ecology, behavior, and conservation of wild vertebrates, and feed directly into management of these species and their ecosystems. Our teaching efforts are diverse and we have among the highest ratios of majors to faculty in the college. Faculty in WFCB are actively involved in student advising, reflecting our dedication to the educational mission. Undergraduate courses in WFCB emphasize experiential learning which often mandates relatively small enrollments. This is offset by our large-enrollment courses designed to introduce majors and non-majors to wildlife, fish, and conservation biology. Numbers of majors in WFCB have remained quite constant over the past decade, in spite of general reductions in enrollments in CAES and in most other environmental majors in the college. At the graduate level, WFCB faculty are disproportionately active in the Graduate Group in Ecology and they interact extensively with other graduate programs, including Avian Sciences (chair), Animal Behavior, Geography (chair), Population Biology, and Molecular, Cellular, and Integrative Physiology. Undergraduate and graduate alumni have obtained faculty positions at various colleges and universities as well as leadership positions in many state and federal agencies, NGOs and private firms.

Faculty losses have been severe in recent years, with an 80% reduction in Cooperative Extension faculty, and a projected 60% loss in Senate faculty within the next 6 years. Maintaining our instructional capacity as well as leadership needs within the Department as well as the College and the State requires immediate and ongoing faculty recruitments to compensate for recent and pending losses. Such positions afford a rare opportunity to reinforce and further strengthen our commitment to research and education in the field of wildlife and fish biology and conservation, and to increasing our extension and outreach efforts to the public as well as agency and private personnel. We believe that the optimal size for the department to meet our teaching and extension needs is 10 Senate FTE (including I&R and AES), and 5 CE FTE.

We intend to continue to increase enrollment in our courses, increase offerings of large-enrollment courses, revise our website to reflect current and ongoing developments within the Department, and increase outreach to potential WFCB students, both on campus (e.g., exploratory students) and elsewhere (e.g., high schools, community colleges). The recent development of a Minor Program in WFCB will also facilitate growth of our student constituency.

1) ACADEMIC MISSION.

The mission of the Department of Wildlife, Fish, & Conservation Biology (WFCB) is to promote research and understanding of the biology of wild vertebrates, including native, non-native, and pest species, with the goal of improving management of these species for the people of California and elsewhere. WFCB serves the needs of California through targeted research, extension and outreach, undergraduate teaching, and graduate mentoring in the increasingly critical fields of ecology, conservation, and wildlife and fisheries management. Our conceptual

arena is the ecology and conservation of wild vertebrates, and resolution of negative interactions between people and wildlife species. Our strength is our approach to conservation at multiple scales, from species (the level at which the federal and state Endangered Species Acts operate) to populations, communities, and ecosystems. Teaching efforts emphasize a broad-based interdisciplinary education with a core scientific foundation supplemented by courses emphasizing ecology and management of vertebrates. Students graduating from WFCB are well-versed in the biology and ecology of these species and are equipped to promote and direct enlightened management of species as well as their habitats. Our graduate students receive advanced training in these areas, and in the skills necessary to conduct relevant conservation research and to communicate the results to stakeholders. Faculty research often focuses on threatened and endangered species, through the development of better understanding of their ecology and helping to formulate viable management plans. This focus allows us to address knowledge gaps faced by a broad range of stakeholders, from federal and state agencies to non-profit organizations and private landowners. Consequently, we have a strong and diverse constituency that includes wildlife and fish managers from state and federal agencies (Dept. of Fish & Game, Dept. of Water Resources, US Fish & Wildlife Service, US Forest Service), focal user groups (sport hunters and fishers, commercial fishers), farmers and ranchers (e.g., through management of pest species), and all who recreate, bird watch, fish, or otherwise benefit from the vertebrate fauna of California. Our outreach and extension efforts educate stakeholders about options for responding to wildlife and fisheries issues. While such issues have historically tended to arise in rural areas, the rapid and ongoing expansion of California's human population is leading to an acceleration of issues arising at the urban-rural interface and increased opportunities for conservation efforts in urban areas experiencing renewal and reconstruction of aging infrastructure. Our research and teaching are distinct from that in other academic programs at UCD in our focus on the charismatic birds, mammals, and fish that capture the imagination of the public and fuel diverse economic sectors, while simultaneously challenging the public and political leaders to maintain and to manage the land and water resources that these species require. WFCB complements other programs on campus, elsewhere in UC, and in the CSU system by providing focal training on the ecology and management of these key animal groups.

2) DEPARTMENTAL SPECIALIZATIONS & CLUSTERS OF EXCELLENCE.

WFCB provides interdisciplinary expertise necessary for training the next generation of leaders in wildlife, fish, and conservation biology.

Faculty in WFCB are rooted in applied ecology with a focus on vertebrate species, and across hierarchical scales from individuals and populations, to communities and ecosystems, and ultimately to biogeographic patterns. Each faculty member provides a core knowledge base to the Department with strong taxonomic roots (emphasizing the ecology of mammals, birds, and fishes). Building on this foundation, faculty have interdisciplinary expertise including conservation biology, behavioral ecology, population and conservation genetics, wetland and coastal ecology, marine and freshwater ecology, physiological ecology, and ecotoxicology. WFCB faculty are positioned to address key and pressing environmental issues of relevance to California stakeholders, and to train the next generation of leaders in the biology and management of California wildlife and their habitats.

3) DEPARTMENTAL HISTORY AND SCOPE.

The major in Wildlife and Fisheries Biology was established at UCD in 1973, when a group of faculty recognized the need for an academic focus that integrated solid ecological,

physiological, and behavioral principles with contemporary issues confronting wildlife species and those arising between humans and wildlife species and their habitats. The Division of Wildlife and Fisheries Biology was also established in 1973 and became a department in 1986. Integration of Cooperative Extension faculty served to broaden and strengthen the department's role and influence statewide. The Department changed its name to Wildlife, Fish, and Conservation Biology in 1994, recognizing the broadening role of applied wildlife and fish biology and the merging of traditional wildlife biology with the more recent field of conservation biology. From its inception WFCB has been a leading force in the enlightened management of native species and control of exotics, receiving accolades along the way. The Gourman Report of 1993 reflected this excellence (nationally #1 in wildlife and fisheries management, #3 in wildlife ecology), and our recognition by state and federal agencies as well as academic peers internationally continues to be extremely positive and inter-fertile. Most of the original 6 Senate faculty have retired, but a younger generation retains the spark that keeps this program at the cutting edge of science and stewardship of wild vertebrates and their habitats. Recent years, however, have been both exciting and challenging. In 1999 we housed 15.3 FTE (5.36 I&R, 5.99 OR, 3.95 CE) as well as 1 professional researcher and 1 associate adjunct professor WOS. Retirements and recent losses have reduced this to 9.9 FTE (5.45 I&R, 3.45 OR, 1 CE), and FTE re-allocations will stabilize our numbers at 7.9 FTE (4.57 I&R, 3.33 OR); pending retirements will further reduce our strength, critically threatening our ability to uphold our mission to our students, the College, the University, and the State.

4) CURRENT ROLE AND FOCUS OF WFCB.

WFCB is unique within California – the only program within UC to emphasize wildlife and fish biology, and one of only 3 to emphasize conservation biology. Only 5 other universities in the far western states provide training in these key areas.

a) Context.

WFCB is unique within California. It is 1 of only 2 programs in the state, and the *only* program within UC, to emphasize wildlife and fish biology. Fisheries and wildlife programs at Humboldt State University place greater emphasis on “traditional” management of sportfish and game species, and within UC only 3 other programs emphasize conservation biology. UCR has a Center for Conservation Biology and recently initiated a “Conservation track” within the Biological Sciences major. UCB offers a major in “Conservation and Resource Studies” through the department of Environmental Science, Policy, and Management. Within UCD, ESP offers a more general curriculum in environmental science and policy, and includes conservation only as an option with the EBM major. WFCB is 1 of only 4 academic programs in California and only 1 of 2 within UC that are associated with the National Association of University Fisheries and Wildlife Programs (<http://www.ag.iastate.edu/departments/aecl/naufwp>; these programs include WFCB, UCB-ESPM, and HSU (both Fisheries and Wildlife).

In the broader regional context, only 5 other universities in the far western states provide formal training and expertise in wildlife and fish biology and management. These include Oregon State University (BS, Fisheries & Wildlife Science), Washington State University (BS, Wildlife Ecology), the University of Idaho (BS, Fishery Resources, Wildlife Resources), the University of Arizona (BS, Fisheries Conservation and Management, Wildlife Conservation and Management, and recently in Conservation Biology), and the University of Nevada-Reno (BS, Wildlife Ecology and Conservation).

b) Research.

California's vertebrate species are imperiled. We house the greatest number of vertebrates among US states, but also the 2nd greatest proportion of species at risk (after Hawaii).

	Rank in US (# Species)	Rank in US % at risk (percentage)	Rank in # Endemic* Species (# Species)
Mammals	#1 (195)	#3 (16.4%)	#1 (17)
Birds	#4 (415)	#3 (4.8%)	#2 (2)
Reptiles	#5 (86)	#5 (16.3%)	#1 (5)
Amphibians	#9 (57)	#1 (49.1%)	#1 (17)
Freshwater fishes	#34 (62)	#5 (50.0%)	#1 (20)
Overall	#1 (815)	#2 (15.3%)	#1 (61)

* endemic species are those found only in California

Sources: *The Nature Conservancy (2002) States of the Union: ranking America's biodiversity;*
CDFG (2003) Atlas of the biodiversity of California.

California boasts the greatest biological diversity in the United States, and is both a national and global “hotspot” of species at risk¹. WFCB faculty and graduate students are actively engaged in research at the cutting edge of vertebrate ecology and conservation in California and elsewhere, and as such are well positioned to help resolve and remedy issues concerning threatened or endangered species. This includes studies on aquatic habitats such as long-term demographic trends in fish populations in such key regions as the San Francisco Estuary and streams of the Sierra Nevada, and detailed work on the physiological ecology of California fishes, including assessments of the effects of fish screens and water diversions from the Sacramento River and Delta. In the marine realm, our faculty have made significant inroads in studies of fisheries and the application of quotas in fisheries management, as well as seminal contributions to understanding nearshore oceanic productivity and how marine reserves should be established to stabilize nearshore fisheries.

At the land-water interface, our faculty are actively engaged in research on the ecology and conservation of freshwater wetlands, including extensive studies on the effects of agriculture on wetland-dependent wildlife, and methods to develop wildlife-friendly agricultural practices. Other studies in the freshwater environment focus on the long-term impacts of toxic substances, such as mercury, and anthropogenic disturbances on aquatic ecosystems, particularly with respect to impacts on freshwater birds (western and Clark’s grebes, white and brown pelicans, osprey). A significant focus of several of our faculty is on terrestrial systems, including deserts, woodlands, shrublands, and forests. Here, we research topics as diverse as the effect of forest management options on mammalian ecology and diversity; the influence of invasive species (e.g., black rats, feral cats, feral pigs) on California ecosystems and means of managing these; design of reserves and parks to protect terrestrial vertebrate diversity; and development of safer means of disseminating rodenticides to reduce collateral losses.

Across all of these ecosystems, our faculty are actively engaged in research on the ecology and conservation of rare or endangered species including fish (delta smelt; steelhead; green sturgeon; coho, Chinook and other salmon; Lahontan cutthroat trout; Eagle Lake rainbow trout; Sacramento perch), small mammals (Stephens’ kangaroo rat, riparian woodrat, riparian brush rabbit), carnivores (island spotted skunk, island fox), songbirds (San Clemente shrike), waterfowl (Hawaiian Duck, Steller’s Eider) and raptors (osprey, bald eagle). In doing so, we

¹ Sources: : Stein, B. A. et al. (2000) *Precious heritage: the status of biodiversity in the United States.* Oxford; Mittermeier, R. A. et al. (1999) *Hotspots: earth’s biologically richest and most endangered terrestrial ecoregions.* CEMEX.

apply a broad suite of tools and approaches, including molecular genetics, ecotoxicology, environmental physiological studies in the field and lab, state-of-the-art radio-telemetry techniques, population and ecosystem modeling, mark-recapture analyses, GIS modeling, intensive field studies, and multivariate community-level analyses. Finally, our faculty maintain expertise and are world-recognized authorities on the biology and management of numerous vertebrate taxa, including anadromous and freshwater fishes, marine fishes, sharks, seabirds, waterfowl, songbirds, small mammals, and large ungulates.

c) Outreach and Extension.

WFCB faculty maintain high outreach and extension responsibilities. This largely reflects the nature of our research, which often has clear and immediate application to stakeholders such as farmers, commercial and sport fishers, hunters, private landowners, and water managers, among many others. The outreach and extension programs of Senate faculty and CE Specialists in WFCB target multiple ANR CORE issues, including: (1) “Invasive Species,” through the improvement of understanding of the basic biology or economic impact of invasive species affecting California, and the development and evaluation of strategies to mitigate the impact and/or control the spread of invasive species; (2) “Pest Management,” through the development and delivery of science-based information to quantify pest situations and help guide pest control decision-making; and (3) “Sustainable Use of Natural Resources” (ANR Program Council 2005), through the development and evaluation of management practices designed to promote ecological sustainability, and to promote economic opportunity in sustainable natural resource production. Through this work we educate agency staff, landowners, and others about the potential to improve their management efforts through the integration of scientific principles and methods. Our faculty are deeply involved in issues of managing water resources in the Bay-Delta system, in the design of both marine, freshwater, and terrestrial reserves and refuges, use of quotas and gear restrictions as means to develop sustainable fisheries, integration of waterfowl needs and those of farmers (particularly key agricultural sectors such as the rice industry), guidance and feedback to habitat and land use managers in the Channel Islands, the Coast Ranges (e.g., pigs), and Sierra (fishes, health of montane meadows, small mammal responses to forestry practices), and management of ranching operations to minimize (and to reverse) negative impacts on salmonid populations.

WFCB is unique within UC in supporting an active natural history museum (MWFH) that provides a platform from which we have developed extensive and regionally important activities to monitor biodiversity, for example in the Putah and Cache Creek watersheds and in California State Parks.

d) Teaching.

WFCB graduates are leaders in the field of natural resource management and conservation, with key positions in State and Federal agencies, as well as with influential private organizations and firms.

WFCB faculty provide instruction in diverse topics to train the future leaders in management and conservation of wildlife and fish resources, and to teach students the critical thinking and quantitative analytical skills that are increasingly necessary in a complex and multifaceted world. Our students have become leaders in many facets of natural resource management and conservation, including state (e.g., Department of Fish and Game, State Parks, Water Resources), federal (e.g., Fish and Wildlife Service, Geological Survey, Forest Service), and private sectors (e.g., The Nature Conservancy, Ducks Unlimited, California Waterfowl Association, Point Reyes Bird Observatory, and many consulting firms). To maximize our impact we offer both Major and Minor programs in Wildlife, Fish, & Conservation Biology.

i) Enrollment in the Major:

Enrollments in all environmental majors at UC Davis increased dramatically through the early 1990s, peaked in 1996, declined through 2000, and have since remained relatively stable (Fig. 1). The reasons for such changes are unknown; however, despite this ‘boom and bust’ cycle experienced by most environmental majors, WFCB has remained relatively constant throughout this period, with an enrollment of 130-160 students, making it the largest major in environmental sciences since 1997, by a considerable margin. We are proud of this accomplishment and believe that it speaks strongly to the continued need (and recognition of that need by students) for a program focusing on the ecology and conservation of wild vertebrates, as well as to our hands-on approach to both teaching and advising. Our goal is to further increase our enrollments by contacting students earlier in their program; we receive large numbers of students who transfer from other majors into our program and their most frequent comment is “I wish I knew about this major earlier.” Our WFC 10 and 11-level classes have proven to be excellent recruiting tools and we plan to increase the scope and frequency of our lower division offerings to provide non-majors and exploratory students with an opportunity to discover WFCB earlier in their UCD careers.

ii) Teaching Effort:

WFCB faculty teach 2-4 courses with an average of 1,091 students annually, yielding 3,870 student credit hours (SCH) per year (1995/96 through 2006/07). Total enrollments in WFCB courses have remained relatively constant. One feature that distinguishes WFCB courses from many others on campus is our emphasis on experiential learning; proper training for students in our discipline requires hands-on learning in the field as well as in lab exercises. Accordingly, we offer a number of dedicated field courses, and field trips and exercises are an essential component of many of our other courses. However, such classes are necessarily limited in enrollment (20-25 students), limiting the number of SCH that are

**Enrollment in Environmental Majors (Fall Qtr)
Registered Students**

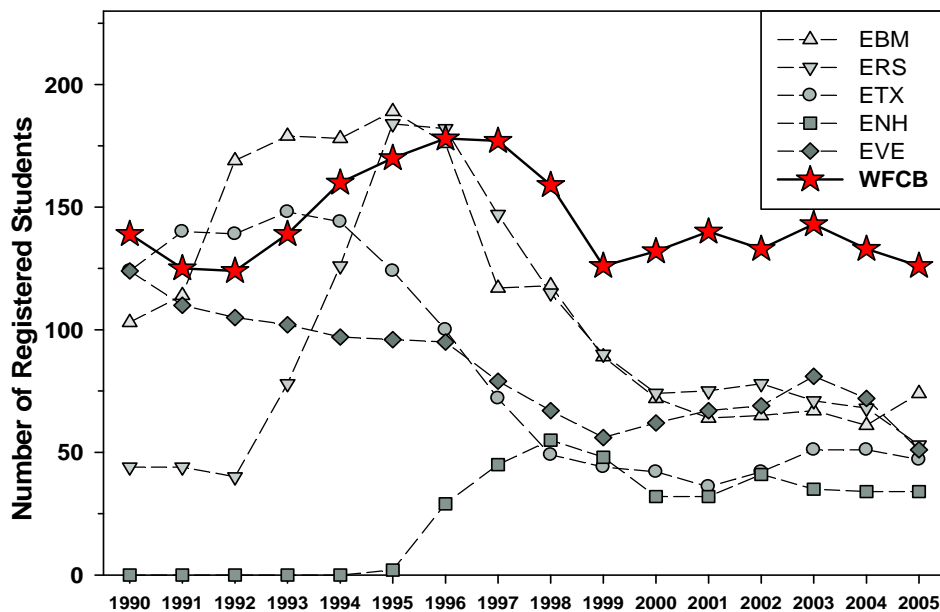


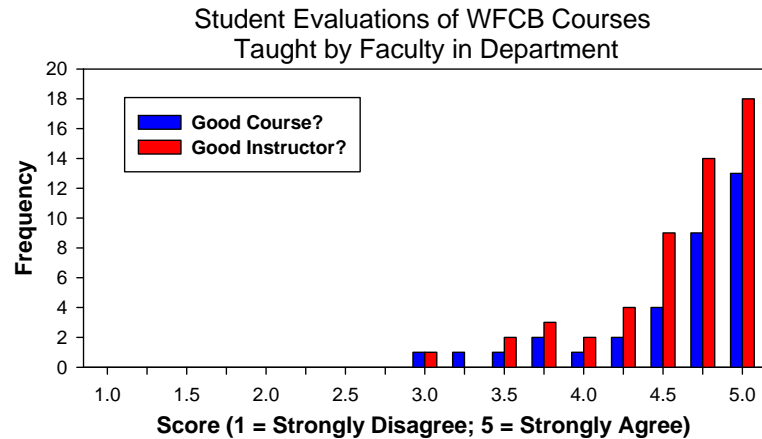
Figure 1. Enrollments of students in environmental science majors at UCD. WFCB has remained buffered from large shifts that have characterized most UCD environmental science majors.

attributed to our department relative to the number of courses taught. We are working towards increasing SCHs via larger and more frequent offerings of lower-division classes, but we remain steadfast in our commitment to providing a practical, experiential learning experience that is essential for developing scientists in the field of wildlife and fish conservation.

iii) Quality of Instruction:

Our faculty are highly valued instructors (Fig. 2). Student reviews of WFCB classes often comment that these are some of the best courses they have taken at UC Davis. Scores on student evaluation surveys are correspondingly extremely high – almost all courses and instructors score above 4.0 (on a scale of 1–5 with 5 being highest). The few lower scores (all above the median value of 3.0) reflect courses that are extremely challenging and quantitative; however, we have no intention of reducing the rigor of our program simply to obtain higher student evaluation scores. As further evidence of our dedication to excellence in teaching, several prestigious campus and national teaching awards have been bestowed upon faculty in our department.

Figure 2. Distribution of scores on campus student evaluations of courses taught by WFCB faculty in the past 5 years. Courses (blue) and instructors (red) are rated on a scale of 1 (low) to 5 (high).



iv) Student Advising:

In WFCB, one-on-one student advising is conducted by faculty.

Senate faculty in WFCB are actively involved in student advising, with each faculty member serving as advisor for ca. 18-27 students. Thus, all 'one-on-one' student advising is done directly by the faculty, reflecting our belief that faculty involvement is fundamental to the educational and professional development of our students. In doing so, we not only are able to provide effective educational and professional guidance to our students, but we also develop strong faculty-students relationships. Our majors feel comfortable asking faculty for advice, and in doing so gain many more opportunities to enrich their understanding of course material, obtain internships and summer employment, participate in on-going research projects, attend professional seminars and meetings, and begin, early in their education, to develop the professional skills and relationships that will serve them well in their future careers.

v) Graduate Advising and Graduate Education:

A final, but critical role of both Senate and Federation faculty in WFCB is advising graduate students. The Graduate Group in Ecology (GGE) at UC Davis is the top-ranked program in the nation (*US News and World Report*, 2007), and the Conservation Biology area of

emphasis within the GGE is ranked #3 (*Conservation Biology* 2007). WFCB faculty are integral to this achievement through their research and teaching of graduate students. Currently, WFCB faculty supervise over 55 graduate students (an average of over 5 students per faculty member). Most of these graduate students are in the GGE and, accordingly, comprise a disproportionately large share of the 184+ students in this graduate group. Graduate students working in WFCB also make up well over 1/3 of all students in the Conservation Biology area of emphasis. WFCB faculty also are active in numerous other graduate groups, including Avian Sciences; Animal Behavior; Geography; Molecular, Cellular, and Integrative Physiology; and Population Biology. WFCB places high importance to our commitment to the teaching and training of the next generation of university professors, research scientists, and resource managers through our extensive graduate advising.

5) Service.

WFCB faculty are committed to their numerous and important service roles within the College and University. This includes leadership roles in the Geography Graduate Group (e.g., Chair), the Graduate Group in Ecology (e.g., Awards Committee, Admissions and Admissions Screening Committee, Chair of Conservation Biology AOE), and the Animal Behavior Graduate Group (e.g., Curriculum Committee). At the College level our faculty participate in the Term Appointment Review Committee (TARC), the Executive Committee, the College Award of Distinction ad hoc review committee, Outreach Review Committee, the Strategic Planning Committee, the College Commission on the Environmental Biology Curriculum, Sustainable Agriculture Curriculum Workgroup, the Environmental Biology Strategic Planning Committee, and the Rules and Jurisdiction Committee. We also provide CA&ES representation to the L&S Executive Committee and L&S Representative Assembly, the School of Veterinary Medicine Academic Planning Committee (Environmental Health), the College of Biological Sciences Center for Biosystematics, and the UC Davis Boating Safety Committee. Our faculty also play key roles in DANR, including service with DANR Communication Services and on research advisory committees (RACs) with both Hopland and Sierra Foothills Research and Extension Centers. Within the Natural Reserve System we are deeply involved with 3 reserves (Eagle Lake, Quail Ridge, Stebbins Cold Canyon) including roles (for Quail Ridge) as campus faculty representative.

Additionally, WFCB faculty are actively and productively engaged with their peers within the state of California as well as on national and international arenas. This includes service as external referees for journals and funding agencies (including NSF, NIH, and their equivalents in Argentina, Canada, Chile, and Israel). Our faculty are recognized leaders in their respective disciplines as well as in integrative societies, serving on various committees in societies such as the American Society of Mammalogists, the Ecological Society of America, The Wildlife Society, the American Fisheries Society, the Animal Behavior Society, and the Society of Environmental Toxicology and Chemistry. WFCB faculty also serve important editorial posts, including editorial boards of *Animal Conservation*; *Biological Conservation*; *Ethology*, *Ecology*, and *Evolution*; *Journal of Mammalogy*; *Ecography*; *UC Press*; *UC Publications in Zoology*; *Copeia*; *The Wildlife Society Bulletin*; and *California Agriculture*.

Finally, a number of WFCB faculty are highly involved in public service through their roles on key local and regional committees and commissions, including the Central Valley Joint Venture, Cal-Fed Ecosystem Restoration Program, Cal-Fed Bay-Delta Program, Point Reyes Bird Observatory Conservation Science, and California Waterfowl Association among others, as well as serving as key scientific witnesses in legal briefs. Nationally and internationally, our faculty serve on committees with the National Research Council, the National Science Foundation, the

IUCN, The Nature Conservancy, the National Marine Fisheries Service, the National Park Service, U.S. Fish & Wildlife service, and the U.S.A. Rice Foundation.

6) Facilities.

The Museum of Wildlife and Fish Biology was established in 1972 and has grown to become one of the largest academic museums in California. This facility is in the final year of a Facilities Improvement Grant from the National Science Foundation, and soon will have a web-based search engine allowing full access to the approximately 8,000 mammals, 12,000 birds, and 15,000 fishes stored therein. This facility is core to a number of WFCB courses but importantly it also is used by over 30 classes from all colleges on campus as well as several regional community colleges. As noted earlier, the museum also provides a platform on which we have developed a field program that is documenting biodiversity in California and beyond, and training both graduate and undergraduate students in field biomonitoring methods. An internship program trains 10-12 students annually in museum science, and several additional students (typically 3-4) work on paid assistantships. The museum receives approximately 350 visitors and processes about 25 scientific loans annually; this activity is certain to increase when the online search engine is completed.

Additionally, WFCB supports:

- deep-water well to provide high-quality water for maintenance and research on fishes (also available to most research labs in the Department).
- back-up generator to provide power for critical facilities (e.g., ultracold freezer, walk-in freezer, physiology lab equipment, etc.).
- Temporary Building 1 (TB1), which includes a workshop, storage space, and a fully accredited animal facility for research on small- to medium-sized species. This includes 18 covered outdoor pens (14 mid-sized, 20' L x 10' W x 7.5' H; 4 large, 36' L x 15' W x 7' H), a fenced 2 acre field (suitable for research on rabbits or other small mammals), and one humidity- and temperature-controlled room (AAALAC approved) with small animal cages and cage racks.
- Herder's Cottage 2 (HC2), seismically unsafe and currently used only for storage.
- West Entry Trailer, a portable but very comfortable double-wide trailer on the west edge of campus.

7) Needs and Projections for the Future.

WFCB is at a critical juncture; we have recently lost 80% of our faculty in Cooperative Extension, and within the timeframe of this Academic Plan our Academic Senate losses will exceed 60%. Key to the ongoing success of our teaching, research, extension, and outreach programs is recruitment to replace faculty positions. Additionally, our age structure is such that it is critical that we obtain positions soon so that new faculty will have time to develop professionally and assume leadership roles within the Department and the College. In this section we outline current and projected teaching needs within WFCB, projected needs for Senate and Federation faculty, and projected needs in terms of facilities to support our teaching, research, and service obligations.

a. Projected Teaching.

i) Structure of the Major.

Our major is structured in 3 parts. Preparatory Subject Matter includes many of the basics typical of all science majors, including chemistry, mathematics, physics, and basic biological

sciences. Depth Subject Matter provides for deeper investigation into more advanced subjects, and provides our students with a broad but comprehensive background in the evolution, ecology, behavior, anatomy, physiology, and conservation of wild vertebrates. Finally, all students elect to pursue one of 9 Areas of Specialization, allowing students to tailor their education to an arena that suits their professional aspirations. Areas require 4 to 6 courses in:

- i. Behavioral Ecology
- ii. Conservation Biology
- iii. Ecotoxicology and Disease Ecology
- iv. Fisheries Biology
- v. Physiological Ecology
- vi. Wildlife Damage Management
- vii. Wildlife Biology
- viii. Population Dynamics
- ix. Individualized AOS

Thus, WFCB prepares students with a solid foundation in sciences, topped with broad and comprehensive training in vertebrate ecology, biology, and conservation, and an individualized focus to meet their professional and intellectual objectives. It is worth noting that some of our students use the major as a basic biology major, providing them with access to medical, veterinary, and other professional schools, as well as to other types of graduate programs in the biological sciences.

ii. Core Courses that Must be Maintained.

Our department offers 2 lower division courses which are GE eligible and satisfy both writing and socio-cultural diversity for GE. WFC 10 (*Wildlife Ecology and Conservation*) is a team-taught course offered every fall. We recently increased the capacity in this class, and enrollments are rapidly increasing. We also are initiating a spring offering of this course, to begin 2008. WFC 11 (*Introduction to Conservation Biology*) provides a comprehensive introduction to this key societal topic for students who are not necessarily well-trained in the sciences.

We provide 3 courses to train students in field methodology. One of these (WFC 100, *Field Methods in Wildlife, Fish, and Conservation Biology*) is offered every spring and is campus-based. The other 2 (WFC 101, *Field Research in Wildlife Ecology*; WFC 102, *Field Studies in Fish Biology*) are taught off campus (e.g., Eagle Lake Field Station, Bodega Marine Lab) in alternate years, and most field activities occur during the summer.

Our core courses in organismal biology include highly popular treatments of the biology and ecology of wild mammals (WFC 110), birds (WFC 111), and fish (WFC 120). These courses prepare students to understand the biology and ecology of these groups in order to prepare them to manage them (and their habitats) wisely. We teach an increasingly popular course on *Conservation Biology* (WFC 154) which provides students with the conceptual foundations of this rapidly growing field as well as numerous examples of their application to vertebrates. This course has recently been added to the list of courses required by all of our majors.

WFC 136 (*Ecology of Waterfowl and Game Birds*) and WFC 151 (*Wildlife Ecology*) provide more advanced treatments of focal species and of the ecology of wildlife in general. The latter course is designed to complement and build upon existing ecology courses elsewhere on campus. We have traditionally offered 2 courses in physiological ecology; these included WFC 121 (*Physiology of Fishes*) and WFC 130 (*Physiological Ecology of Wildlife*). With the retirement of Dr. Nadine Jacobsen in 1997, the latter course has been offered only

sporadically, and with the recent retirement of Dr. Joe Cech the future of the former course is uncertain. We provisionally anticipate merging these courses (pending a future hire) into a more generally applicable course on physiological ecology, spanning all vertebrate classes. We offer a foundational course on *Behavioral Ecology* (WFC 141) that emphasizes the functional and evolutionary significance of observed behaviors (and management implications of these). *Wildlife Ecotoxicology* (WFC 153) provides students with in-depth understanding of both the ecologic and metabolic consequences of environmental pollutants, while a course on *Wildlife Disease Ecology* (WFC 158) integrates organismal ecology with the ecology and transmission of wildlife diseases. Finally, WFC 155 (*Habitat Conservation and Restoration*) is part of a 3-course series on conservation and restoration ecology (WFC 154, 155, ENH 160) that prepares students to understand and manage species and habitats, and to plan for successful restoration when habitats are degraded. WFC 156 (*Plant Geography*) and 157 (*Coastal Ecosystems*) train students in the distribution of plant species and assemblages (critical to our students as most wildlife “map” onto plant assemblages) and on the ecology and management of our imperiled coastal regions

iii. New Courses & Teaching.

Recently we developed a lower division course titled *Introduction to Conservation Biology* (WFC 11), which has proved popular and is likely to increase in enrollment. Our fall WFC 10 (*Wildlife Ecology and Conservation*) continues to be highly popular, and we look forward to continued growth of this course. We will begin a spring offering of this course in the 2007/08 academic year, and we hope to maintain this at similar enrollment levels.

We are actively considering additional course options to meet the ever-changing needs and interests of our students. Our newest initiative is a mid-level course on the ecology, conservation, and management of California vertebrates; WFC 50. Our intent is to develop this as a team-taught course with five 2-week modules, including habitats, fishes, reptiles and amphibians, birds, and mammals.

b. Projected Faculty Needs, including a Listing of Ladder-rank Faculty and CE Positions in Order of Need.

WFCB is facing at least a 60% loss in Senate faculty in the coming 6 years, and has suffered an 80% decline in Cooperative Extension faculty in the past 5 years. WFCB requires immediate recruitment to fill critical teaching gaps, to offset pending retirements, and to allow time for maturation of the next generation of departmental leadership.

In the face of general declines in environmental majors in CAES, the WFCB major has maintained a stable population of 130-160 students over the past decade. In recent years WFCB has maintained one of the highest ratios of faculty to majors within the college, which we attribute to a combination of teaching excellence, active faculty/student interaction (especially via active advising by faculty), and the dynamic nature of our courses and available careers. We expect to attract increasing numbers of students as our faculty rebuilds following a series of retirements.

Pending and recent retirements have serious consequences for WFCB. Current Senate faculty are all full professors and the youngest is approaching 50 years. Cultural and gender diversity are poorly represented in WFCB, with one white female in each of our Senate and Federation faculty; all other faculty are white males. Within ca. 6 years we will have lost 60% of our Senate faculty. This age structure, combined with our teaching and service needs within WFCB, UCD, and California, underscore a critical need to recruit young faculty so they may be integrated into UCD and WFCB and prepared to assume leadership roles relatively early in their careers.

WFCB obligations to the mission and needs of the AES remain strong despite recent faculty losses. Sustainable use of California's diverse and often fragile natural resources will be a key socio-political theme in California and for the AES in the coming decade. One such issue, the conservation and management of marine and especially freshwater systems, is currently becoming increasingly prominent in California politics and is likely to become progressively more important to the AES mission. Continuing loss of wetlands and increasing degradation of our freshwater habitats, especially in the Delta, Klamath basin and Central Valley have had huge socio-political and ecological implications WFCB contributions in this arena have been strong and highly visible, and we anticipate maintaining this leadership role. Sustainable management of forestlands in the face of the twin threats of increasing urbanization of California forests and increasing threat of wildfire will be another important arena for AES contributions. WFCB faculty have been deeply involved in collaborative studies in this area and we anticipate continued developments here as well. A third key thrust of AES will be the impact and damage caused by invasive and pest species; WFCB has been at the forefront of seeking ecologically sustainable means of addressing these issues, and we anticipate further and ongoing work there. We note that these issues are mirrored in a recent UC-ANR ranking of priorities ("*UC-ANR Core Issues and Target Opportunities, September, 2005*"); invasive and pest species are considered high priority to ANR, and sustainable use of natural resources and wildland fire are medium priority issues.

Given our current and projected teaching, research and extension needs, we consider the optimal size for the department to be 10 Senate FTE (including I&R and AES), and 5 CE FTE. Current FTE "targets" for WFCB are 4.82 I&R FTE and 3.33 AES FTE (8.15 total). With recent retirements, resignations, and appointment changes, our FTE currently stands at target for AES, and 0.25 below target (4.57) for I&R. Pending retirements will draw us dramatically further below these targets. Moderate FTE allocations in the immediate future will help offset dramatic losses faced by WFCB in the coming decade. Because WFCB strives to integrate I&R and AES responsibilities into all its FTE, our hiring priorities are driven by both factors simultaneously; consequently, our I&R and AES priorities are virtually identical. Reflecting College FTE targets, WFCB Senate faculty priorities are designed to replace faculty that have retired or are soon to retire, and who are essential to maintaining our core teaching curriculum. In light of the current lack of diversity in Senate faculty, we need to make special efforts to attract a diverse set of candidates for each replacement and growth position. If student growth increases or FTE targets are increased, we will strive to add 1-2 faculty for a target of 10-12 FTE. Our priorities, in order, are as follows:

- #1. Physiological Ecologist, aquatic emphasis
- #2. Conservation Biologist, avian focus
- #3. Conservation Biologist, fish/watershed emphasis, freshwater or marine focus
- #4. Quantitative Vertebrate Population Ecologist
- #5. Conservation Geneticist

Losses to Cooperative Extension have been severe in the last 5 years, with 4 of 5 CE specialists (80%) retiring, transferring, or resigning. Lost were extension expertise in vertebrate damage management (Whisson and Salmon) and wildlife habitats (Fitzhugh) as well as marine fisheries (Deweese); the latter is currently being replaced, but remaining critical gaps in CE coverage leave us unable to address key and increasingly important societal needs in pest management and habitat management and restoration. Our priorities, in order, are as follows:

- #1. Wildlife Damage Management/Human-Wildlife Conflicts
- #2. Wetlands & Waterbird Management
- #3. Wildlife Habitat/Conservation Planning

c. Projected Needs for Facilities Support.

WFCB houses and supports the Museum of Wildlife and Fish Biology. Established in 1972, the MWFB currently is the 4th largest academically-based vertebrate museum in California, and an increasingly recognized resource nation-wide. A recent Facilities Improvement Grant from NSF allowed us to replace a number of aging cabinets, fully catalog our collections, and make this available via an online search engine. As noted above, the Museum has become a platform from which extensive and increasing outreach activities have been developed. To support these activities the Museum requires two FTE – one to manage the collections and associated student volunteers and employees, and another to manage the outreach and extension activities. Current CAES Special Facilities support provides one FTE and modest support funds; we are moving towards acquiring sufficient extramural funds to allow us to establish an endowment that would cover salary for a second FTE. We will continue to seek support from the College as we make progress towards this key objective.

Whereas TB1 received a new roof recently (within the past 10 years), one of the associated out-buildings is in dire need of a new roof.

HC2 is seismically unsafe and has potential for vandalism and occupancy by vagrants. Currently used for storage only, WFCB recognizes that this facility may become unsuited for even this need, and we are seeking alternate facilities for storage of field supplies and equipment.

Assuming FTE growth in coming years, we will need new lab, office, and graduate student office space for any growth Senate hires. We would need new lab space for the 5th CE Specialist.

WFCB is in the process of updating and upgrading our web site, with the objective of developing an attractive portal to Major and Minor programs and related events. We hope to begin development of outreach materials soon (e.g., colorful flyer, brochure) to raise visibility of the Department and major to students on campus (e.g., exploratory majors) and throughout California (e.g., High Schools and Community Colleges).

8) Assessment of Success in Meeting Departmental Objectives.

Key Departmental goals include replacement of both I&R and CE FTE and increasing enrollment in WFCB and in our courses. Therefore, we will consider our Academic Plan a success if we are successful in the following key goals over the coming 5 years:

- i. Recruitment of new FTE to replace faculty losses in both Senate and CE. If student FTE growth is achieved, then we hope to add 1-2 I&R FTE, bringing our strength to 10 FTE. We hope to regain a full complement of 4-5 CE Specialists.
- ii. Remain capable of offering WFC courses on a routine and reasonable basis such that students are able to graduate according to their Study Plans.
- iii. Maintain the number of majors that we have had in recent years, and increase enrollment in our courses. In particular, we plan to raise the combined enrollments of our introductory GE courses (WFC 10 & 11) to 300-500 students annually within 5 years.
- iv. Continue to attract top graduate students and post doctoral fellows, and to see these rising scientists move on to leadership roles in academia and both the private and government sectors.
- v. Finally, we will need to provide adequate and up-to-date facilities to support our Mission, including research, undergraduate and graduate teaching, and outreach/extension.