

## **Final Draft**

### **A History of the Fisheries and Wildlife Programs, the Animal Ecology Department, and the Natural Resource Ecology and Management Department at Iowa State University**

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The Department of Animal Ecology (A Ecl) officially existed between 1975 and 2002 but its roots in the Department of Zoology and Entomology (Z&E) go back much further in time and its presence is found in the current Department of Natural Resource Ecology and Management (NREM). As most of the faculty members that played a role in the Department of Animal Ecology for most of its existence are now retired, it seems an appropriate time to try to write this history so that younger faculty members and their students can become more aware of their roots. This is not intended for publication or as a thoroughly researched study that relies on original departmental data from the archived files. It is intended as an overview of the evolution of the academic programs, courses, and faculty, and to provide context for future evolution of the program.

One of the factors that motivated this work was a request in January 2009 from Dave Willis, Head of the Department of Wildlife and Fisheries Sciences at South Dakota State University, to Mike Quist to provide historical information on ISU's fisheries and wildlife program. Willis and others were preparing a paper entitled "The changing face of university wildlife programs" to be presented at the North American Wildlife & Natural Resources Conference that year. Mike asked Atchison to help him, but they quickly found that it would take a lot of work to pull this together in the short time they had. They did go through catalogs from 1940 to present and developed a long set of tables with course numbers, titles, credits, and instructors for those years. Mike sent what they had to Willis, but the final published paper did not mention Iowa State (McDonald et al. 2009). They relied mainly on the programs associated with U.S. Geological Survey Cooperative Fisheries and Wildlife Research Units, and programs that already had historical information readily available. The fact that Iowa State was left out was unfortunate because Iowa State had a longer and more illustrious history than most other such programs in the country. Indeed, as you will see, Iowa State was not only one of the original nine Cooperative Research Units, but the concept of the unit program originated at Iowa State.

Another motivating factor was an article on Ken Carlander published in the U.S. Fish and Wildlife Service magazine, *Eddies* (Allen 2009). In the first three paragraphs there were four factual errors on our program and Carlander's role in it. These mistakes may have been avoided had a written history of the Animal Ecology program been available.

**Approach:** Much of this review of the programs was based on course catalogs, class schedules, Registrar records, a series of self-assessment reports written in 1978, 1983, 1989, 1995, 2008 and 2015 for outside reviews of the program, and personal communications. There are several weaknesses in relying on catalogs: just because a course or instructor is listed in a catalog does not mean the course was actually taught or the listed instructor actually taught it; from 1957 to 2009, they were 2-year catalogs which meant that courses could be taught every year or alternate

years during that time, and by one or more instructors; often, especially for undergraduate courses, no instructor was listed, and at times temporary instructors were hired to teach specific courses at times when faculty took improvement leaves or between when one faculty member left the university and another was hired to take that role. Temporary instructors were seldom listed in the catalogs. Where a course was listed, but was known to have not been taught, it was deleted from the tables presented in this paper. Where it is known who taught a course where no instructor was listed, those names were included. So, there may be discrepancies between the catalogs and tables and what actually happened, but this approach has provided a fairly clear picture of how the program evolved and the main players involved. Jim Dinsmore, Bruce Menzel and Bob Moorman (all retired at the time) reviewed the original draft manuscript and offered input, as did several current faculty members.

This review is divided into several time periods based on changes in the program:

- The beginnings in the Department of Zoology and Entomology until the development of the first undergraduate Fish and Wildlife Management major in 1958
- The period of 1958 to 1975 – before the Department of Animal Ecology was formed
- The period of 1975 to 2002 – the lifetime of the Department of Animal Ecology
- The period of 2002 to 2018 – the beginning of the Department of Natural Resource Ecology and Management to present

Given the fact that some individuals and programs sometimes exist beyond a specific time period there are some situations where their activities are described beyond that actual period.

Tables and figures are included in Appendix I. Table 1 is a list of faculty and the abbreviations used for those included in the tables that follow. Tables 2 thru 7 list courses offered in each catalog, along with the instructor. Tables 8 thru 13 deal with enrollment data. The tables are followed by six figures showing departmental faculty at various times in program history.

### **Fisheries and Wildlife in the Department of Zoology and Entomology 1922-1958**

The Department of Zoology and Entomology at Iowa State College of Agriculture and Mechanical Arts (ISC) was established in the Division of Industrial Science in 1919 (a Department of Zoology preceded this); in 1939 the Division was renamed the Division of Science and remained that until 1959. In 1922, when we begin to track faculty and courses in this document, the department had two Professors (Guthrie and Baldwin), two Associate Professors (Paddock and Fenton), two Assistant Professors (Harrison and Wellhouse), and four Instructors. Joseph Guthrie was Acting Head of the department, replaced the next year by Carl Drake who remained in that position until 1946. Courses in the department were broken down into sections; general zoology, physiology, embryology, entomology, and apiculture. The only courses that would be of direct interest to Fisheries and Wildlife (F&W) students were Zool 50 Evolution of Animals and Zool 60 Bird Study (first taught in 1916), both listed under general zoology.

Two new undergraduate courses were initiated in 1924, which began the trend toward development of a program in F&W; Zool 26 Forest Zoology and Zool 35 Fish and Game. Although the faculty teaching these courses were generally not identified until the mid-1930s,

when most F&W-oriented courses were at the graduate level, Joseph Guthrie taught the Fish and Game course at least once and was the teacher of the Bird Study course at least four times. Bruce Harrison taught Evolution of Animals, probably until 1926 when Walter Wellhouse joined the faculty and taught that course for many years. Neither Harrison nor Guthrie had earned a Ph.D.

George O. Hendrickson began working on his Ph.D. in Zoology at ISC in 1925. He was an instructor and probably took over the teaching of the Bird Study and Fish and Game courses. He received his Ph.D. in 1929 and became an Assistant Professor in 1930. He became the heart of the wildlife teaching program and developed and taught most of the wildlife-oriented courses until his death in 1961. Hendrickson taught the first graduate courses in wildlife, including Zool 504 Game Birds and Mammals, Zool 506 Fishes, and Zool 508 Techniques in Wildlife Management. He taught Zool 520 Wild Life Management for the first time during the 1934-35 academic year; the name was changed to Wildlife Management in 1936. See Tables 2 and 3 for details of his teaching contributions. He was promoted to Associate Professor in 1945 and Professor in 1951. His research focused on wildlife ecology and management and he was well published in the scientific journals. He studied not only birds and mammals, but also insects. Hendrickson was major professor to 39 M.S. and 16 Ph.D. recipients. He was active in the Iowa Ornithologists' Union, American Society of Mammalogists, American Ornithologists' Union, and the Wildlife Society (Madson and Kozicky 1961). Hendrickson Marsh in southeastern Story County is named for him.

Elery Becker joined the faculty in 1925 and was an important part of the program until 1958. He was a parasitologist and began a long tradition at Iowa State of outstanding parasitologists who contributed to the F&W program. He first taught Zool 510 Parasites of Game Animals (which was later renamed Parasites of Animal Wildlife), and for many years he taught a summer field zoology course. The Parasites of Animal Wildlife course was split into two 4-credit Parasitology I and II courses in 1947 (these were not entered into Table 3 and were not tracked after that). Martin Ulmer taught the parasitology and helminthology courses during the 1950s and 60s, followed later by Larry Mitchell and Edwin Powell. Larry is still alive, but the rest have been the subjects of Memorials written in the Journal of Parasitology (Levine 1963, Oaks 2008, and Wittrock et al. 2009).

The Cooperative Wildlife Research Unit was established in 1932 and Paul L. Errington, one of Aldo Leopold's students, was its Unit Leader from 1933 to 1935. The three "Cooperators" in this unit were Iowa State College, the Iowa Fish and Game Commission, and J.N. "Ding" Darling. Darling pledged \$3,000 for each of the first three years and the College provided facilities, services and salaries; the Unit was housed in the Insectary Building (Lendt 1979).

On 10 March 1934, Darling became the Director of the Bureau of Biological Survey in Washington, D.C. From that position he was able to expand his vision of the Cooperative Wildlife Research Unit to the national level. He obtained support from nine land-grant universities and nine states to fund about two-thirds of the money he felt would be needed for the first three years of the program. In addition, he persuaded the executive officers of several large companies to fund the rest. They formed The American Wildlife Institute (became The Wildlife Management Institute in 1946), which provided guidance on wildlife conservation and was a

repository for funds donated from the arms-and-ammunition companies in support of the units (Lendt 1979). See Goforth (2006) for an extended history of the unit program.

In 1935 the Iowa Cooperative Wildlife Research Unit (ICWRU) was formed with Logan J. Bennett (1935-1938), one of Elery Becker's Ph.D. students, as its first Unit Leader. Bennett mainly studied waterfowl. He was followed by Thomas G. Scott (1938-1942, 1945-1948), one of Hendrickson's doctoral students who not only studied waterfowl but also pheasants, bobwhite, and rabbits. Scott had been a wildlife conservation specialist for the Iowa State Extension Service beginning in 1935. During World War II Carl J. Drake was Acting Unit Leader and George Hendrickson was Acting Assistant Unit Leader (1942-1945). Edward J. Kozicky was the Unit Leader from 1948 to 1956, the point in departmental history when it was decided to develop an undergraduate program in fisheries and wildlife management. Kozicky and his graduate students primarily studied game bird ecology and management.

The ICWRU was clearly a research unit and for most of the years until the late-1970s the ICWRU leaders did not participate in the teaching functions of the Z&E Department. Paul Errington, for example, did not teach courses until 1961 (Tables 2 and 3), just before his death. He, and later Reeve Bailey, was housed in the Insectary Building (built in 1928), while most of the department was located in Science (built in 1916). He was a Research Assistant Professor from 1932-1938, a Research Associate Professor from 1938-1948, and a Research Professor from 1958-1962. He was probably best known for his research in predation and population dynamics. He published a number of books, including *Of Men and Marshes* (1957), *Muskrats and Marsh Management* (1961), *Muskrat Populations* (1963), and *Of Predation and Life* (1967). Many of his books were published posthumously by his wife Carolyn. Carlander and Weller (1964) published a survey of his writings, and Pritchard et al. (2006) described his broader contributions to ecology and conservation. He received the Aldo Leopold Memorial Award from The Wildlife Society in 1962.

Unit leaders were seldom listed as faculty members in the Z&E Department in the course catalogs until about 1950; from that point on they were listed, as was Errington. Tom Scott was listed 1938-39 catalog as an Instructor, although his name did not show up on any of the courses in the catalog. He was not in the catalogs after that.

There was, however, Zool 690 – Research, where graduate students obtained credit for research, and that was divided by subject areas, each of which listed the faculty members who directed graduate students in that area. Errington began to show up on these in 1937, first in the zoology section and later in the wildlife section. As an example, in the 1946-47 catalog under Zool 690 – zoology was listed Becker, Errington and Hendrickson, and under Zool 690 – entomology was Drake, Knight and Wellhouse, among others. The 1949-50 catalog was the first to include Zool 690 credits in wildlife (Errington, Hendrickson, Kozicky) and fisheries (Carlander). From that point on the unit leaders and Errington were included. From 1951 on the catalogs included the unit leaders and assistant leaders as members of the faculty.

To backtrack here, the ICWRU leaders and Errington may not have taught courses but they did have graduate students, as did Hendrickson, and those students needed graduate level courses to support their graduate education (See Anonymous 2007 for a short history of the Unit and a

listing of graduates.). As seen in Table 2, the development of these courses began with the 1933-34 academic year and expanded from there. The bulk of the teaching was done by Drs. Becker, Hendrickson, Knight and Wellhouse.

The first ecology graduate course, Zool 578 Animal Ecology, was taught by Harry H. Knight during the 1936-37 academic year. He came to ISC in 1920 as an entomologist and taught the Animal Ecology course until Milton Weller came in 1959. George Hendrickson began teaching wildlife management courses in 1934. Areas of specialization were listed in the catalog for both graduate and undergraduate majors in Zoology & Entomology. Game Conservation was first listed as an area of specialization for M.S. and Ph.D. programs in the 1939-40 catalog, and Wildlife Management first showed up at the undergraduate level in the 1940-41 catalog. The 1949-50 catalog listed the graduate specialization as Wildlife Management to match the listing for the undergraduate area and to be consistent with the listing of Fishery Management at the graduate level. There was an interesting evolution of terminology from game conservation to wildlife conservation to wildlife management to wildlife biology to the current wildlife ecology.

The next significant expansion of the program came in 1938 when Reeve Bailey joined the faculty as an Instructor (he was not promoted to Assistant Professor until 1943). He taught Zool 506 Fishes, Zool 508 Fisheries Management, and Zool 518 Cold-blooded Vertebrates, so he was essentially Hendrickson's counterpart. Bailey did extensive research on reptiles and amphibians as well as fishes. The hiring of Bailey reflected the intent of Iowa State College to develop a Cooperative Fisheries Research Unit parallel to the Wildlife Unit, with Bailey as the Unit Leader. In 1941 the Iowa Conservation Commission established such a unit with state funding. World War II interrupted its development, and Bailey moved on to become a well-respected ichthyologist at the University of Michigan (Stewart and Smith 2000). Kenneth D. Carlander became Unit Leader in 1946 and remained so until 1965. The first listing of a graduate specialization in Fishery Management occurred in the 1947-48 catalog. Carlander taught two graduate courses, Zool 662 Techniques of Fishery Research, and Zool 663 Fishery Resources, for many years and these were the heart of the graduate course work. He taught many other courses (Tables 3 and 4).

In 1965, the federal government joined into an agreement with the Iowa Conservation Department and Iowa State University to form the Iowa Cooperative Fisheries Research Unit (ICFRU) with Robert "Jess" Muncy as its Unit Leader (1965-1979). From Reeve Bailey on, the unit and assistant fisheries unit leaders were involved in teaching graduate courses in fisheries and were listed as departmental faculty. Teaching was an especially strong tradition with Bailey and Carlander, who taught as much or more than most other faculty members. Later, Carlander was also involved with teaching and advising undergraduates. But with federal involvement, in both the fisheries unit and the wildlife unit, the cooperative agreements stipulated that unit personnel could teach up to one graduate course per year, thus keeping the federally-employed faculty from teaching undergraduate courses.

Carlander was promoted to Associate Professor in 1948, Professor in 1957, and Distinguished Professor in 1974. No other Animal Ecology faculty member at Iowa State has received the honor of Distinguished Professor. It is interesting to note that the fisheries program at Iowa State became so well known when it essentially relied on one main faculty member until Roger

Bachmann arrived in 1963. Until Bachmann was added, the Zool 690 – fisheries only listed Carlander. Carlander developed his reputation in fisheries with his work on fish population dynamics, and studies of fish age and growth analysis. During the 1950s and 60s he established a long-term research project on the fish and fisheries of Clear Lake, Iowa. He published his first edition of *Handbook of Freshwater Fishery Biology* in 1953: eventually he published a three-volume third edition of this book. He graduated 34 Ph.D. and 60 M.S. students over his lengthy career, and many went on to become leaders in the fisheries profession (Muncy 1987, Summerfelt 2003). He received the American Fisheries Society's Award of Excellence in 1979. The award originated in 1969 and Reeve M. Bailey received it in 1980.

On the fisheries side of the department it is clear that Carlander's reputation greatly influenced the reputation of the fisheries program at Iowa State. On the wildlife side, Paul Errington's reputation continued to grow after his death, in part because Carolyn Errington continued to edit and publish his works; his last book was *A Question of Values* in 1987. In addition, the annual Errington Lecture at ISU brings in well-known ecologists and conservationists, and reintroduces Errington to an audience of new graduate and undergraduate students each year. Not to lessen his impact on the reputation of the wildlife program, because it clearly is significant, but it is our opinion that the contributions of George Hendrickson are underappreciated. Errington spent much of his time either in the field or working at home. He had much less interaction with graduate and undergraduate students than most of the other faculty; he had relatively few graduate students over his 30-year career at Iowa State College. In two significant articles written about Errington after his death, neither mentioned his graduate students (Scott 1963; Schorger 1966). Most of his published papers are single authored with very few co-authored with students. On the other hand, Hendrickson taught most of the wildlife courses, advised the undergraduate wildlife students, mentored many graduate students, and carried out a well-respected research program. Without him, or someone like him, the wildlife program would not have developed as it did.

Although many changes occurred in wildlife unit personnel during the 1940-50s, the academic program remained stable with Drs. Becker, Carlander, Hendrickson, Knight, and Wellhouse. The program was directed toward graduate students, but the 500-level courses could also be taken by undergraduates. The next stage was to formally recognize this by declaring an undergraduate major in Fisheries and Wildlife Management.

A word about the extension program before we move on. The 1989 Comprehensive Program Review document for the Animal Ecology Department included a good history of the wildlife and fisheries extension programs at Iowa State. We will repeat some of the highlights here as that document is not readily available. The Z&E Department had Extension Wildlife Conservation Specialists who were working on graduate degrees. These included Thomas G. Scott (1935-37), Thomas S. Baskett (1938-39), and Ellis Hicks (1939-42). In 1948, Robert B. Moorman held the position while working on his Ph.D. He got his M.S. at ISC with Hendrickson as his major professor and his Ph.D. at ISC with Carlander as his major professor, so he had a background in both fish and wildlife. He left for Kansas State College in 1953, but returned in 1956 as a full-time extension wildlife conservationist. He did not teach college courses or get involved in original research, but he did publish many extension publications and

worked extensively with the public. Moorman evolved the extension position to suit his background, interests and talents.

It is important to note that Bob Moorman was the extension program until he retired in 1986. He was named the Iowa Conservationist of the Year in 1980 by the Iowa Wildlife Federation and in 1983 received the Conservation Service Citation from the National Wildlife Federation. Bob died on 9 March 2017 at the age of 100.

### **Fisheries and Wildlife in the Department of Zoology and Entomology 1959-1975**

The Fisheries and Wildlife Management (FWM) baccalaureate curriculum was established in 1958. Iowa State College of Agricultural and Mechanical Arts became Iowa State University of Science and Technology on 4 July 1959. The Division of Science became the College of Sciences and Humanities, and the Division of Agriculture became the College of Agriculture. The Department of Zoology and Entomology came under the joint administration of these two new colleges. Some of these changes could be seen coming, as the 1957-59 catalog had Z&E courses organized into three sections; zoology, entomology, and fish and wildlife management.

The 1959-61 catalog was the first to indicate that a student could get a B.S. in FWM. In that catalog the courses oriented toward FWM or entomology were designated as administered by the College of Agriculture, and those in zoology were administered by the College of Sciences and Humanities. The vertebrate biology courses were clearly allied with FWM and not zoology, which takes on significance when Z&E split up in 1975. The 1965-67 catalog changed the name of the undergraduate major from FWM to Fisheries and Wildlife Biology (FWB).

The new FWM/FWB major was established on basic zoological science, but emphasized management of wild animal populations. The focus was on basic principles of animal biology, ecology, and wildlife and fisheries management, not on a more traditional “how-to-do-it” approach. The philosophy behind the FWM/FWB major was that each student should have broad training in both fisheries and wildlife to be best prepared for an uncertain future in natural resource management. Therefore, all students were required to take both fisheries and wildlife courses, so this program had just the one track. Later, when The Wildlife Society (TWS) and the American Fisheries Society (AFS) established professional certification programs, the FWB curriculum was adapted to try to meet their certification requirements. A practical work experience requirement was added to provide students with real-world applications of classroom learning.

Until the early 1960s the fisheries and wildlife programs were driven by research and graduate education. Once the FWM/FWB major became established the undergraduate program became a driving force. The new undergraduate major grew rapidly, reaching 316 students, 95% males, by 1970 (Table 8).

A number of faculty changes occurred in the late 1950s and early 1960s. Wellhouse was replaced by Oscar Tauber who taught the evolution course for a few years and then became Chair of Z&E from 1963 to 1975. We did not continue to track the evolution course after that.

Knight was replaced by Milton W. Weller as the instructor of the animal ecology course. Errington was listed as instructor for Zool 141 Wildlife Conservation, Zool 603 Population Dynamics, and Zool 645 Wildlife Management in the 1961-63 catalog, but he died in November, 1962, thus had a very short teaching career.

Milt Weller was on the faculty from 1957 until 1974 and not only taught the animal ecology course, but also took over many of the courses taught by Hendrickson. He taught Zool 340 Ornithology, 447 Mammalogy, 448 Wildlife Techniques, 540 Waterfowl Biology and Conservation, and 645 Wildlife Management (Table 4). He was the Professor-in-charge of the Fisheries and Wildlife Section of the Z&E Department from 1957-1974, essentially the entire time his was at Iowa State. His research focused on waterfowl and marsh ecology and management. He later published *Freshwater Marshes: Ecology and Wildlife Management*, which was based in large part on his work in Iowa. Weller received the Aldo Leopold Memorial Award from The Wildlife Society in 1997. He got help in teaching from Paul A. Vohs, who was an Instructor in 1963 and an Assistant Professor from 1964 to 1968; he taught some of the animal ecology and wildlife techniques classes.

Arnold O. Haugen replaced Edward Kozicky as the ICWRU Leader (1957-73). Kozicky and his students mostly studied game birds, and Haugen continued that trend but was also known for his work on white-tailed deer and wildlife diseases and parasites. As with Kozicky, he was listed with the Z&E faculty in the catalog and was also listed under wildlife in Zool 690, but it does not appear from the catalogs that he taught courses.

Roger W. Bachmann joined the faculty in 1963 and took over the teaching of Zool 505 Limnology. In 1967 he developed two levels of limnology courses, Zool 405 Fundamentals of Limnology, and Zool 605 Advanced Limnology. His B.S. and M.S. degrees were in Fisheries, so he could also teach fisheries courses, and he consistently had his graduate students take the fisheries courses along with limnology. For a short period he taught the ichthyology, herpetology and fish propagation courses, especially during the 1965-66 academic year when Carlander was in Egypt as a Ford Foundation consultant. Bachmann added a graduate course, Zool 602 Ecological Energetics, in 1971 and taught that until 1980. His research focused on issues of water quality, nutrient dynamics and eutrophication. He began state-wide water quality surveys funded by the state. Roger was one of the original members of the Water Resources graduate program and had a number of students graduate with that major. Over the years he was the departmental faculty member most allied with that program.

Jess Muncy became the Unit Leader of the Iowa Cooperative Fishery Research Unit in 1965 and took an active teaching role with Zool 662 Techniques of Fishery Research, and 663 Fishery Resources. This freed Carlander to focus on teaching the undergraduate fisheries courses and Zool 603 Population Dynamics, which he at times team-taught or alternated with entomology faculty. Ross Bulkley became the Assistant Unit Leader of the ICFRU in 1966 as a Ph.D. student and he earned that degree in 1969 with Carlander as his major professor. He took over teaching Zool 563 Fish Propagation and added Zool 560 Fishery Aspects of Water Pollution.



Bruce W. Menzel came in 1970 and took over teaching the herpetology and ichthyology courses. Thus, the fisheries program significantly expanded in the 1960s, and continued to grow through the 1970s.

Larry Wing and Mike Petersen joined the faculty in 1970. Wing taught the Animal Ecology course, first as Zool 402 and then as Zool 502. He also taught Principles of Wildlife Conservation. Petersen taught Zool 447 Mammalogy, and Zool 448 Wildlife Techniques. Weller moved on in 1974 to the University of Minnesota. In 1973 Arnold Haugen was replaced as ICWRU leader by Robert B. Dahlgren, and Kenneth Russell (Assistant Unit Leader from 1969-1974) was replaced by Erwin E. Klaas, who came in 1975. Dahlgren's area of research was upland game ecology, agriculture-wildlife interfaces, and rangeland wildlife. Klaas originally studied pesticide effects on terrestrial wildlife, wildlife ecology, and eventually became interested in restoration ecology. So, there were considerable changes in the wildlife program during the early 1970s.

Throughout the 1960s there was an interesting evolution of the titles of the degrees offered by Z&E. In 1961-63 one could earn a M.S. or Ph.D. in Fishery Management or Wildlife Management. In 1963-65 it could be Fishery Management, Wildlife Management, or Fishery and Wildlife Biology, or a B.S. in Fish and Wildlife Management. In 1965-67 the graduate degrees remained the same, but the B.S. changed to Fisheries and Wildlife Biology (FWB). In 1967-69 the graduate degrees were in Fisheries Biology, Wildlife Biology, and Limnology. So, the main interplay was between biology vs. management, and fishery vs. fisheries. Once settled, the titles were quite stable for many years.

Earth Day in 1970, along with the growing interest of citizens in broader environmental issues, led to a more diverse group of students becoming attracted to the FWB major, though they were often seeking a more basic ecological program. An undergraduate major in Animal Ecology (A Ecl) was established in 1973 and grew rapidly from six students in its first year to 61 students (51% females) in 1980 (Table 8). The A Ecl major was seen as more suitable for students planning on graduate study, and was not directed at specific entry-level employment opportunities. Students were required to develop an area of specialization, a set of elective courses that formed a common theme. They were required to gain practical work experience or to attend a biological field station before graduation.

The growth in the FWB and A Ecl majors, and the broadening of student interests, not only placed increased pressure on classroom space, especially laboratory space, but also increased demand on faculty for undergraduate teaching and advising. Much of the hiring of new faculty, especially in the 1970s and 1980s, was determined by undergraduate teaching and advising needs and most faculty appointments became 75% teaching and 25% research. The teaching load throughout the 1970s was generally one course per quarter, and by that time each university-salaried faculty member advised on average about 30 undergraduate students.

## **Animal Ecology Department 1975-2002**

In 1972 the Science II building was completed on the site of a parking lot north of the old Science (I) building and over the next couple of years most of the Zoology and Entomology faculty, including those in fisheries and wildlife, moved to the new building. A prairie was constructed on the remaining part of the parking lot between the old and new buildings. The prairie became home to more than 100 species of plants. Roger “Jake” Landers (1962-1979), a plant ecologist in the Botany Department, was instrumental in the planting and maintenance of the prairie for many years. When Landers left ISU in 1979 Erv Klaas took over management of the prairie until 1999 when he retired. Rolf Koford maintained it until his retirement in 2012; Cathy McMullen has been the manager until the present.

The next major change in programs came in July 1975 when the Department of Zoology and Entomology split into three new departments; Zoology, Entomology, and Animal Ecology. Animal Ecology took most of the basement and first floor of the new building and kept most of east and north corridors of the basement of Science I.

Until this time, the Unit office was the main office for most fisheries and wildlife graduate student transactions. Hazel Clausen, the Unit secretary from 1951 to 1978, had taken care of much of the research side of the program. With the new department, this changed as the administration of the entire fisheries and wildlife program, graduate and undergraduate, now resided with the Chair of the department and his office staff. The Unit continued to be an integral part of the research program and many faculty funneled their research grants through the Unit (there was a benefit of lower overhead by doing this). Many students with non-Unit major professors were, nonetheless, considered Unit students by virtue of funding. As a consequence, they and their major professors wrote Unit quarterly reports on their research activities and accomplishments. It was an excellent synergistic relationship.

University-salaried faculty generally had 12-month appointments with summer salary coming from the Iowa Agriculture and Home Economics Experiment Station. Most extramurally-funded research (if not channeled through the Unit) was administered by the Station. Each state-funded faculty member supported by the Station had a fairly broadly defined research project that acted as an umbrella for other funding. The Station generally provided state-funded faculty members between \$1,000 to \$3,000 in current expenses annually (faculty paid copy charges and telephone bills, among other things with this) and supported page charges for published papers. The department received from the Station several research assistantships per year that could be used to support graduate students. Because of the high undergraduate enrollment and participation in the Biology Program, the department also received teaching assistant support from the college. This support was greatly diminished by the late 1990s. There was a resurgence of TA support in the early 2000s, major cuts during the recession in the early 2010s, and then another resurgence that has continued to the present. Currently, NREM has 13 ½-time TA lines supported by the college, of which 11 are for Animal Ecology courses and the other two for broader NREM courses. This support is enrollment justified, from which the Animal Ecology major has benefited.

Roger Bachmann was the Acting Chair of the Department of Animal Ecology until a new Chair could be hired. Robert C. Summerfelt was Chair from the fall of 1976 to 1985, followed by Bruce W. Menzel from 1985 until 2002, a rather stable leadership for the 27-year life of the department.

When the Zoology and Entomology Department split up, the basic vertebrate biology courses became part of the Animal Ecology Department, while most invertebrate courses went to either Zoology or Entomology. An aquatic insects course was periodically offered by Entomology (generally Robert Lewis) and animal behavior courses were taught by Zoology (Kenneth Shaw). The Biology Program was instituted in 1971. In 1973/74 the undergraduate course in animal ecology was dropped and Z&E joined with Botany to offer Biol 309 Basic Ecology. In the 1975/77 catalog that became cross-listed as Biol/A Ecl/Bot 309; one Botany and one A Ecl faculty member team-taught the course. Animal Ecology generally had one faculty member contributing to the general biology sequence of courses. This “sorting out” of course responsibility would continue to evolve over the years, but there was relatively little friction or territorial squabbling.

The first catalog for the new Animal Ecology Department offered graduate degrees in Fisheries Biology, and Wildlife Biology, and undergraduate majors in Animal Ecology, and Fisheries and Wildlife Biology. The Animal Ecology major was felt by many to be more appropriate for students planning on graduate study in many ecological and environmental fields; within it, students developed areas of specialization based on how they used their elective courses. It was not until the next catalog (1977/79) that the M.S. and Ph.D. degrees in Animal Ecology were offered. Within the graduate major students could specialize in various areas such as limnology, animal behavior, ecology, or taxonomy. Many of Roger Bachmann’s students majored in Animal Ecology – Limnology instead of Fisheries Biology as they had in the past.

The next major change in courses came with the change from quarters to semesters with the 1981-83 catalog. This required a reorganization of courses and degree requirements and allowed for some rethinking in the program. Table 5 is based on semester credits, whereas Tables 2, 3, and 4 are based on quarter credits. The average teaching load for state-salaried faculty was one course per semester and for Unit faculty one graduate course per year.

By reducing the number of courses taken by students by about one-third, the semester system reduced the breadth of courses a student could take. The number of required courses in the fundamental and supporting sciences and in advanced courses in animal ecology and management were reduced in both undergraduate majors; the liberal education cores of the curricula were retained. At the same time this was occurring, TWS and AFS were increasing their educational requirements for professional certification. This eventually made it impractical for a student to take all the courses needed for certification by both organizations. The curricular goal of having students meet education standards for certification in both wildlife and fisheries through required courses was abandoned; students could then voluntarily choose to meet certification requirements through elective courses.

### ***Wildlife Program***

Milt Weller left in 1974 and Rich Crawford, one of his last graduate students at ISU, filled his position from 1974-1975. James J. Dinsmore (1975-2002) replaced Weller and took over the teaching of A Ecl 324 Ornithology, A Ecl 325 Bird Study, and A Ecl 320 Vertebrate Biology. In the late 1990s he began teaching A Ecl 455 International Wildlife Issues and a Study Abroad course that took students to Costa Rica. His research interests were in the area of aquatic birds and wetlands. He taught a graduate course in aquatic birds for a few years. He published *A Country So Full of Game: The History of Wildlife in Iowa* (1994), co-authored with T.K. Kent *Birds of Iowa* (1996), and co-authored several other books.

Louis B. Best (1975-2004) was hired to teach undergraduate and graduate ecology courses. Lou was an avian ecologist. For 30 years he team-taught, along with an instructor from Botany, the undergraduate ecology course. He began A Ecl 514 Evolutionary Ecology in 1979 and taught that for many years. He also taught A Ecl 350 Wildlife Techniques and Habitat Analysis, and developed and coordinated A Ecl 130 Wildlife and Agriculture, a course mainly for non-majors. In 1991 he began teaching A Ecl 620 Avian Ecology. His research focused on avian ecology, especially how bird populations interacted with agricultural habitats, including buffer strips. Beginning in the late 1980s he became interested in the risks of agricultural insecticides to birds.

William L. Franklin (1977-2000) replaced Mike Peterson and taught A Ecl 323 Mammalogy and A Ecl 350 Wildlife Techniques. He also taught A Ecl 551 Wildlife Sociobiology and Management (later Wildlife Behavioral Ecology). His research area focused on the ecology and behavior of large mammals; he was best known for his studies of the sociobiology, ecology and conservation of South American camelids. National Geographic Society sponsored some of his research and he was involved in a number of National Geographic films.

Marilyn D. Bachmann (1979-1993) became a member of the Animal Ecology faculty in 1979, although she had been at Iowa State in the Biology Program and the Zoology Department since 1969. She took over A Ecl 322 Herpetology when Bruce Menzel became department Chair. She also taught A Ecl 512 Vertebrate Behavioral Ecology, which was alternated with Franklin's Wildlife Behavioral Ecology course. These behavioral ecology courses, along with Ken Shaw's ethology courses in the Zoology Department, provided students with substantial opportunities in that area of study. Her main research interests were the behavior, ecology and management of amphibians and reptiles. She was the first female faculty member in the animal ecology program.

Larry Wing left in 1976 and his teaching was taken over by a couple of temporary Assistant Professors, first Ernie Gluesing and then Pete Davis. William R. Clark (1979-2003) was hired in 1979 to teach the population ecology courses and A Ecl 451 Wildlife Management. He taught A Ecl 511 Population Ecology and A Ecl 611 Analysis of Populations. His research was on population ecology and wildlife management.

A point to note from this listing of faculty and perusal of Tables 4 and 5 is the relative stability of the wildlife faculty from the mid-1970s at least into the 1990s. There were significant changes in the ICWRU during this time, but that had relatively little impact on the undergraduate academic program. Changes in the Unit will be traced a bit later.

### ***Fisheries and Aquatic Ecology Program***

Robert C. Summerfelt (1976-2005) became the first Chair of the Department of Animal Ecology in fall 1976 and served in that position until 1985. This added another faculty member in fisheries. His research, while serving as Chair, was mainly on lake destratification and its effects on lake ecology and fisheries. After 1985 his research focused more on aquaculture, fish biology, and aquatic toxicology. He taught A Ecl 440 Fishery Management from 1985 to 2001, and A Ecl 541/442 Aquaculture from 1985 to 2003.

Bruce W. Menzel (1970-2004), as mentioned earlier, taught the ichthyology and herpetology from 1970 until he became Chair in 1985. In addition, he taught A Ecl 520 Fish Ecology and A Ecl 515 Ecology of Freshwater Invertebrates. His research interests were fish biology and ecology, aquatic ecology, and watershed management.

Gary J. Atchison (1978-2004) was hired in 1978 to replace Ken Carlander and to teach ecology in the general biology courses and A Ecl 440 Fishery Management. Carlander had reached a mandatory retirement age and was planning to retire. However, after Atchison arrived, the retirement ruling was changed and Carlander decided to stay on. Atchison and Roger Bachmann combined the labs from fishery management and limnology to create A Ecl 441 Fishery and Limnological Techniques. He developed and coordinated a team-taught introductory course for the department, A Ecl 231 Wildlife Resource Conservation, in which most faculty members participated. For many years he taught A Ecl 544 Aquatic Toxicology, and A Ecl 513 Ecological Toxicology. He and Erv Klaas were originating members (1985) of the Interdepartmental Toxicology Graduate Major; Atchison served on the Faculty Supervisory Committee, and on occasion coordinated and taught in Tox 501 Principles of Toxicology. He was Coordinator of the Environmental Studies Program from 1987 to 1993, and taught several courses in environmental studies. In 2000 he began A Ecl 460 Controversies in Renewable Resources and taught that until 2009. Atchison's research was primarily in aquatic toxicology.

For the decade after Menzel became Chair in 1985, the A Ecl 321/521 Ichthyology course was taught by a progression of Ph.D. candidates, Post-Docs, and Joe Morris. In 1995 Atchison changed the content of the course and it became Fish Biology; he taught it until 2005 when Mike Quist took over.

Carlander did retire in 1985 and Dennis L. Scarnecchia was hired to replace him. So, it took two people to replace Ken Carlander! Scarnecchia took over the teaching of A Ecl 231 Wildlife Resource Conservation, A Ecl 441 Fishery and Limnological Techniques, and A Ecl 543 Advanced Fishery Management. His research focused on fish ecology, population dynamics, and fishery management. He left ISU in 1990.

Lawrence G. Mitchell, a Professor in the Zoology Department, became affiliated with Animal Ecology (listed in the catalog in both departments) in 1989. He had begun teaching A Ecl/Zool 510 Histology and Pathology of Fish Diseases in 1988. In addition, he taught A Ecl 515 Ecology of Freshwater Invertebrate several times. He had a couple of Ph.D. students working on federal grants administered through the Unit. Larry left ISU in 1993.

The ICFRU underwent significant change during this time. Ross Bulkley left in 1978 and was replaced by Wayne A. Hubert as Assistant Unit Leader. Wayne was at ISU for only a short time (1979-82) but was very productive and energetic. His research involved many aspects of fish ecology and fishery management. He taught A Ecl 543 Advanced Fishery Management. Jess Muncy left in 1979 and was replaced as Unit Leader by John G. Nickum in 1980. Nickum's research focused on fish culture, and he taught the fish culture course that Ross Bulkley taught for many years. In 1985 the wildlife and fisheries units were combined into the Iowa Cooperative Fisheries and Wildlife Research Unit (ICFWRU); this change resulted in the unit having three instead of four staff. This had a greater impact on the fisheries program at ISU than on the wildlife program. Robert Dahlgren was appointed as the Unit Leader and Nickum left ISU. Klaas remained as the Assistant Unit Leader in wildlife. Hubert had left in 1982 and had yet to be replaced, so there was no one left in fisheries with the Unit. In 1986 John S. Ramsey became Assistant Unit Leader for fisheries and remained until 1990. His specialization was fish ecology and systematics. He taught A Ecl 321 Ichthyology and A Ecl 520 Fish Ecology. He was not very involved in research and had few graduate students. After Ramsey left it took until 1993 to replace him with Clay L. Pierce as Assistant Unit Leader; he remains the Assistant Unit Leader in 2017. Pierce studies aquatic ecology, fisheries science, and fisheries management. He has taught A Ecl 520 Fish Ecology, which was converted to A Ecl 520 Fisheries Science in 2005. He alternates that course with A Ecl 518 Stream Ecology. So, between the time Hubert and Nickum left and Pierce arrived the Unit program contributed relatively little to the department's fisheries program.

### ***Extension***

We have not said much about the department's extension program, which people in extension would say is typical treatment. We pick up the story here. Bob Moorman retired in 1986 during a period of reorganization of extension. The department hired James L. Pease on a 0.25 FTE basis trying to keep the position alive. Prior to this he was full-time Extension 4-H and Youth Programs. Jim's appointment in those days was split between wildlife extension, Extension 4-H and Youth Programs, and teaching in Animal Ecology. Bruce Menzel, when he became Chair of Animal Ecology, began to add more and more Animal Ecology to Jim's appointment base. By 1989 he was 55% Extension Wildlife Specialist, 35% teaching, and 10% youth programs, entirely within Animal Ecology. While working full-time he began to work on his Ph.D., which he received in 1992. His research area was human dimensions of wildlife management.

Pease began teaching A Ecl 330 Interpretation of Natural Resources in 1987 and then added A Ecl 430 Media Techniques in Natural Resources in 1993. He advised students in the Animal Ecology and FWB majors interested in careers as naturalists. A "specialization" was formed for students majoring in either A Ecl or FWB and specialization sheets were available for those students with suggested courses. The Interpretation of Natural Resources specialization attracted many students. Many found jobs in zoos and as naturalists with the county conservation boards, of which Iowa had one for each of its ninety-nine counties. In 1995, Pease began to teach A Ecl 532 Human Dimensions of Wildlife Management. So, unlike Bob Moorman, Pease contributed significantly to the teaching program and his graduate students carried out research in the area of human dimensions of natural resource management.

In 1987 Mark Sandheinrich, a recent Ph.D. graduate in fisheries, was hired for one year to teach the A Ecl 321 Ichthyology course and to team-teach with Larry Mitchell A Ecl 515 Ecology of Freshwater Invertebrates. He also provided extension services in the aquatic resource area. Joseph E. Morris was then hired in 1988 as an Instructor and Extension Fisheries Specialist. In 1990 he became an Assistant Professor and the Associate Director of the North Central Regional Aquaculture Center (NCRAC). His formal extension, teaching, administrative and research responsibilities have been quite variable over the years. He taught A Ecl 321 Ichthyology/Fish Biology several times. He taught A Ecl 440 Fishery Management in the fall of 1988, and then took over the course in 2006. He taught A Ecl 515 Ecology of Freshwater Invertebrates between 1989 and 2005. Since 2006 he has taught the A Ecl 442/542 Aquaculture course. In 2009 he took over the NREM 460 Controversies in Natural Resource Management course for a couple of years. His research has ranged from aquaculture to pond management and water quality. His extension appointment ended in 2004 and the position of Fisheries Extension Specialist was taken over by Rich Clayton (2004-2010) and D. Allen Pattillo (2011-2017). In 2018, Morris again had a limited Extension appointment.

### *Changes in the 1990s*

The number of full-time faculty, including Unit Collaborators, was quite stable at 14 to 15 from 1978 to 2001 (Figures 1-4). However, within the department there was some faculty turnover, and along with that some significant shifts in the roles of faculty members.

Many changes in the ICFWRU had occurred in the 1980s and early 1990s. On the fisheries side things stabilized with the hiring of Clay Pearce in 1993; he has been the Unit's fisheries person since his hiring. On the wildlife side, Paul Vohs was leader from 1987 to 1992, then Erv Klaas was promoted to Unit Leader. Klaas retired in 1999 and was replaced in 2001 by David L. Otis, whose main research interests were in wildlife population biology. When Klaas became Unit Leader, Rolf R. Koford was hired as the Assistant Unit Leader for wildlife; he remained in that position from 1994 to 2012. Koford's main interests were conservation biology and ecology of birds that nest in grasslands. He taught A Ecl/NREM 535 Restoration Ecology.

Dennis Scarnecchia left for the University of Idaho in 1990. It was at this stage the faculty began to debate a change in the department's hiring approach. Until then, new faculty were generally hired to fill undergraduate teaching needs, but it was decided that the next several hires would be based more on research and graduate student mentoring. Part of the impetus for this decision was the development of the Ecology and Evolutionary Biology (EEB) Interdepartmental Graduate Major, established in 1989. Many Animal Ecology faculty became members of that program and a significant number of A Ecl graduate students decided to major in EEB. Brent J. Danielson was hired in 1992 to replace Scarnecchia; his areas of interest were community ecology, landscape ecology and theoretical ecology, and he mostly worked on terrestrial species. For several years he taught A Ecl 231 Wildlife Resource Conservation, the name of which was changed to Introduction to Conservation Biology in 1993. In addition, he developed A Ecl 570 Landscape Ecology and alternated it with A Ecl 614 Evolutionary Ecology. From 1999 to 2005 he taught A Ecl 413 Community Ecology and Management. This was a shift in faculty positions from aquatic ecology to terrestrial ecology; from fisheries to wildlife.

Larry Mitchell left ISU in 1993, so the department lost one more fish biologist/aquatic ecologist. A Ecl/Zool 510 Histology and Pathology of Fish Diseases continued to be taught by Edwin Powell in Zoology, and A Ecl 515 Ecology of Freshwater Invertebrates was taken over by Joe Morris, and later by Tim Stewart.

Also in 1993 Roger and Marilyn Bachmann retired to Florida. These two full-professor positions provided an opportunity to hire three assistant professors, which was the original hiring plan. Diane M. Debinski, a conservation biologist, was hired in 1994 to fill Marilyn's position. She taught in the introductory biology course and developed A Ecl 531 Conservation Biology.

John A. Downing, a limnologist/aquatic ecologist, was hired in 1995. Downing was very effective at negotiating with the higher administration and came in as a Professor, not the Assistant Professor originally sought. The potential third position in this hiring round was lost due to financial constraints. Downing changed the title of A Ecl 410 Limnology to Aquatic Ecology, and the A Ecl 441 Fishery and Limnological Techniques course was dropped in favor of putting the laboratories back into the Aquatic Ecology and Fishery Management courses. He also added A Ecl 560 Ecological Resource Management to the catalog, and taught it once or twice.

The strategy of hiring based on research interests and expanding graduate opportunities worked out well as long as the Department of Animal Ecology remained as an independent unit. The involvement of Animal Ecology faculty in EEB expanded and many, if not most, of the graduate students of the new faculty members majored in EEB.

In the 20 years between 1975 and 1995 the average enrollment in the undergraduate majors in Animal Ecology and Fisheries and Wildlife Biology was about 310 students (Table 8). The peak total was 401 in 1993. In the 1990s there began an erosion of TA support from the college, and the department began to have difficulty funding sufficient TAs to teach all of the laboratory courses and sections offered by the department. Cutting back enrollment was not an option from the perspective of college and university administrators. Therefore, the department saw a need to convert some RA support from the Agriculture Experiment Station into TAs. Faculty understandably did not wish to expand their teaching responsibilities at the expense of their research and grant seeking. The decision was made for the 1995-97 catalog, primarily on financial grounds, to drop the various courses in vertebrate biology (mammalogy, ornithology, and herpetology), and to expand the introductory vertebrate biology course into a two-semester course (A Ecl 310, 311 – 6 credits). A Ecl 321 Ichthyology was changed to A Ecl 321 Fish Biology in 1995 and the course no longer (at least while Atchison was teaching it) focused on the systematics and taxonomy of fishes.

At the same time, the FWB major was dropped and only the A Ecl major was offered. Students majoring in Animal Ecology were required to declare an option; originally Aquaculture, Ecology, Fisheries, Interpretation of Natural Resources, or Wildlife. In 1997 Preveterinary and Wildlife Care was added to the options. Eventually, the Aquaculture and Ecology options were dropped. The reasoning at the time for dropping the FWB major was that students needed, for career development, more depth in the particular area, fisheries or wildlife, than they were getting with the FWB major. With the broader FWB major, students were required to take



Wildlife Techniques and Habitat Analysis, Wildlife Management, Fishery Management, and Fishery and Limnological Techniques, 13 credits in all. There were only 10-15 credits of free electives. With the new requirement, students had 17-21 free elective credits. In addition, by moving to just an Animal Ecology major, there would be a reduction in student enrollment in some courses with laboratories, thus requiring fewer TAs. It took several years to phase out the FWB majors from the student body (Table 8).

One of the stress points for faculty that came with the large enrollment was undergraduate advising. The Cooperative Unit faculty did not advise undergraduates, so that left 11 or 12 faculty to advise 300 to 400 students. John Burnett was hired in 1997 as a Student Service Specialist. He became the academic advisor to most freshmen and sophomores, and took on the duties of recruiting, retention, and coordinating orientation. John improved the department's career services program and taught the orientation and careers courses. State-funded faculty became the primary advisors to juniors and seniors after students declared an option. A Student Services Office was established and staffed. The Student Services Office significantly reduced the involvement of faculty in these duties. This arrangement has also served the students very well.

Mostly through Burnett's efforts, A Ecl (and now NREM) developed a freshman residential-based learning community, part of a university program. Students enrolling in the program live on a coed floor in a residence hall. They enroll together in a cluster of courses (introductory biology and introductory NREM) that meet degree requirements. Mentors work with students to enhance their social, study, and time-management skill. A goal of the program is to help students gain a sense of belonging within the department and university. A second learning community for sophomores and transfer students (termed the Transitions LC) is now available; they can live on or off campus. As a group, they take a second-year series of courses and have mentors to assist students and coordinate study groups for common classes. Burnett is an important part of administering and coordinating these programs.

After the FWB major was dropped in favor of an A Ecl major, faculty and staff began to hear from colleagues around the state and country that ISU no longer offered fisheries and wildlife, and it was reported that many high school counselors were also telling their students that. Enrollment declined for a while until that was clarified. By 2001 enrollment in A Ecl was up to 346 (Table 8).

Over the next several years both students and faculty became concerned that students were not learning enough about the identification and natural history of vertebrates. In 2001 a series of courses was developed on the natural history of the various vertebrate groups (Table 5). This required an increase in TA support, so again put a stress on departmental finances, but was considered necessary at the time.

Franklin left ISU in 2000 and his position was not replaced with a tenure-track person. Tammy Stafford was an Adjunct Assistant Professor for a several years and taught A Ecl 310 Vertebrate Biology, A Ecl 451 Wildlife Management, A Ecl 363 Natural History of Birds, and A Ecl 364 Natural History of Mammals. Going into the 2001-2002 academic year there were 11 primarily state-funded faculty, along with three ICFWRU faculty, in the department (Figure 4).

### *Some Observations*

Over the years both the graduate and undergraduate student numbers and composition changed. In addition, the College of Agriculture and the College of Agriculture Curriculum Committee began to play an increasing role designating curriculum requirements at the departmental level. Below are highlighted some of the changes or trends.

#### *Expanding and Evolving Role of the College in Departmental Curriculum Development*

In the 1989-91 General Catalog the College of Agriculture listed college core requirements of 6 credits in Social Sciences and 6 credits in Humanities, but provided only very general guidance on fulfilling these. In the 1991-93 catalog the core area of social sciences and humanities was increased to 15 credits with the inclusion of a requirement to take “one 3-credit course in foreign culture or multicultural awareness from an approved list.” The list was then developed by the college curriculum committee. Larger changes came with the 1993-95 catalog. The social sciences and humanities core became an area of 15 credits in “personal development, human relations, and global awareness.” In addition to 3 credits in humanities, 3 credits in social sciences, and 3 credits in international/multicultural awareness from an approved list, were added 3 credits in ethics from an approved list and 3 credits of critical thinking from an approved list.

This was also the beginning of the College requiring departments to develop, within departmental courses, certain embedded “intensive” requirements. These included the equivalent of 3 credits in each of the following areas: communication, problem solving, and environmental awareness. Departments were required to incorporate these communication, problem solving, and environmental subjects into their courses and to demonstrate to the college curriculum committee that all students, no matter the major or area of specialization, would accumulate the equivalent of 3 credits in each area. So, curricula were essentially certified by the College of Agriculture Curriculum Committee. Over the next several catalogs these requirements were refined and the critical thinking requirement dropped. Several A Ecl courses were added to specifically address these college core requirements. Jim Dinsmore began teaching A Ecl 455 International Wildlife Issues, which was added to the College international perspectives list in 1999. He and Jim Pease used A Ecl 496/596 (later NREM 496/596) Animal Ecology Travel Course to offer a Costa Rica Natural History course, which also met the international perspective requirement. That course has been offered since 2000 by some combination of Jim Dinsmore, Jim Pease, Stephen Dinsmore, and/or James Adelman.

Atchison developed A Ecl 460 (later NREM 460) Controversies in Natural Resource Management with the intent of meeting significant parts of several of these new embedded intensive requirements. The course was accepted by the College as meeting the 3-credit ethics requirement, 2 of the 3 credits of communications, and 2 of the 3 credits of problem solving. The course has been taught every semester since fall 2000.

A Ecl 120 (later NREM 120) Introduction to Renewable Resources was first offered in fall 1997; it met the environmental intensive requirement for the department and was also used by many other majors to meet that requirement. The course was developed by representatives of several departments and was cross-listed as A Ecl 120, Agron 120, AST 120, Env S 120, and For 120.

The course was taught for many years primarily by Atchison and Rick Hall (with the Forestry Department before NREM was formed). James Pritchard replaced Atchison in 2004.

This embedded intensive requirement approach evolved into a broader approach of stating in the catalog specific expected learning outcomes for each major. These were first articulated for NREM in the 2005-2007 catalog. The original approach eventually evolved into a complex program, overseen by the College, for developing student learning outcomes, and outcome assessment policies and tools.

### *Enrollment*

Tables 7 and 8 show enrollment figures for undergraduates in the FWB and Animal Ecology majors. Note the fairly steady increase in the number and percentage of A Ecl majors compared to FWB majors, and the percentage of women in the program. There was a decline in enrollment in the 1980s, and then an upswing until the program reached a high of 401 students in 1993. When the department dropped the FWB major in 1995, another drop occurred until the word got out to high schools that Fisheries and Wildlife options were available within the A Ecl major. Another drop occurred when the Department of Natural Resource Ecology and Management was formed; it took several years to alert high schools that an A Ecl major still existed.

### *Gender*

Traditionally fisheries and wildlife management/biology was male-dominated (Table 8). Before the 1970s, it was uncommon to have females enrolled in these degree programs or in many of the courses. Gender was not addressed in the first two departmental self-studies. Marilyn Bachmann was the only female role model on the faculty, and when she left Diane Debinski became the only female faculty member. The Animal Ecology major tended to attract many more females than the FWB major; the mean percentage female in FWB from 1975 to 1995 was 21% compared to the mean percentage female in A Ecl over the same period of 49%. When Jim Pease began offering the Interpretation of Natural Resources course, the opportunities for females expanded. Many women also came to the department with an interest in taking a preveterinary program, which they could do most easily via the Animal Ecology major. Overall, the proportion of undergraduate women students in the Department of Animal Ecology went from 17% in the Fall of 1975, to 38% in the Fall of 1995, to 50% in the Fall of 2002.

One aspect of the gender shifts in the Department of Animal Ecology was the shift in enrollment towards the A Ecl major. In Fall 1985, only 20% of students majored in A Ecl compared to FWB, but by Fall 1994 that had risen to 31%. After that, only the A Ecl major was available. Within the major students declared an option by their junior year and the options included Interpretation of Natural Resources. The addition of the Preveterinary and Wildlife Care option in 1997 also attracted many females to the department.

There was also a significant increase in women in the graduate program in the Animal Ecology Department (Table 11). Between 1966 and 1975 the average percentage of female graduate students majoring in FWB, Fishery Biology, and Wildlife Biology was 5%. Until 1982 the Registrar kept data on individual majors within a department, so we can track first the FWB major, and then the Fisheries Biology, Wildlife Biology, and Animal Ecology majors. Within those majors Animal Ecology attracted the most females and the Fisheries major the fewest.

Between 1981 and 2002 only the totals for the department were reported. During that period there was an early trend of increasing numbers of women. The overall average for that period was 27% female. Even though undergraduates had only one A Ecl faculty role model, the number of female Teaching Assistants increased and these women became the main role models for the undergraduates.

#### *The Issue of Critical Mass in the Graduate Majors*

There were so many undergraduate students that it was seldom a problem having full enrollment in undergraduate courses; that was not the case at the graduate level, especially in fisheries. The graduate program is more faculty-centered than the undergraduate program. Graduate students require financial support (stipend and benefits), and faculty must find the money to support both the students and the research. Funding through university sources declined over the years, and outside funding tends to track the ups and downs of state and national economies. Keeping the funding up for research and graduate support requires not only good ideas, but also a great deal of persistence, time, and luck. It takes new faculty time to establish their program and faculty nearing retirement often reduce their research commitment. So, the graduate program is more volatile and unpredictable than the undergraduate program.

Table 11 tracks the numbers of graduate students in the FWB/A Ecl program. There are two discrepancies to point out in that table. From 1966 to 1969 some of the graduate students were still enrolled as Zoology students and could not be added to this table; these were especially Roger Bachmann's students in limnology. The total number of graduate students in 1972 to 1975 may be under-reported. The 1978 Animal Ecology Department self-study reported graduate students still majoring in FWB in 1972 (13), 1973 (12), and 1974 (5), as the major was phased out. The information presented in the Annual Reports of the Dean of Admissions and Records for those years, and thus Table 11, does not list these students. If those are added to the totals, the numbers are more consistent with those on either side of them.

The 500-level courses are graduate courses, but also allow upper-class undergraduates to enroll; 600-level courses are only for graduate students. To maintain the 500-level courses as truly graduate level, it takes a critical mass of graduate students, and to maintain a critical mass of graduate students it takes a critical mass of faculty in those areas. There was a steady erosion of critical mass of graduate students, mainly in the areas of fisheries and wildlife management. Some of the 400-level courses, such as A Ecl 440 Fishery Management and A Ecl 442 Aquaculture, became dual listed as 400/500-level courses, essentially allowing graduate students to take 400-level courses for graduate credit.

In fisheries, Carlander and Muncy were able to continue to teach 600-level courses in Fishery Resources, and Techniques in Fishery Research. For many years R. Bachmann taught Advanced Limnology. Most of their students were interested in some aspect of fisheries management or fisheries biology, and their graduate students tended to take all or most of the graduate courses offered. The 500-level courses also tended to attract many, if not most, graduate students. However, as faculty became more diversified, expanding into aquaculture, aquatic toxicology, water quality and watershed management, student interests expanded and there was no longer a critical mass of students interested in taking the 600-level courses. They had very small enrollments in the last years they were taught and eventually they were dropped or reduced to

500-level courses. Scarnecchia changed A Ecl 640 Fishery Resources and Research Techniques to A Ecl 540, and then in 1989 changed the title to World Fisheries, but that course was never taught. The 500-level courses often became dominated by undergraduates, with just a few graduate students and that is when a number of them were dropped and the 400-level courses in those areas became dual listed as 400/500-level courses (see Table 5). This trend was strengthened in the 1990s with the reduction in faculty numbers in the fisheries area.

Similar trends occurred with the diversification of faculty and graduate majors in the wildlife area, especially in the 1990s. With the development of the EEB Interdepartmental Graduate Major, more students began to choose that major and newer faculty tended to gravitate to that program. This did not hurt the graduate courses as much as diversification hurt the fisheries program because many of the new courses attracted students from EEB that were outside the Animal Ecology Department; indeed, a number of courses became cross-listed with Botany. However, the Advanced Wildlife Management course was dropped from A Ecl 650 to A Ecl 550 in the mid-1980s, and then dropped from the catalog in 1997. A Ecl 531 Wildlife Planning, Policy, and Administration was dropped in 1993. The trend was away from wildlife management and toward wildlife ecology.

When NREM was formed and four Animal Ecology faculty transferred to the newly established Ecology, Evolution and Organismal Biology Department (EEOB), the critical mass of students available to enroll in wildlife-oriented courses was not greatly curtailed because the EEOB faculty still had graduate students interested in some NREM courses. In addition, those faculty continued for a time to teach the courses they had originated in A Ecl. Many NREM faculty continue to be members of EEB and have students majoring in EEB. So, the pool of graduate students interested in wildlife ecology is still large, but the interest in wildlife management is much reduced.

### ***The Lead Up to the Animal Ecology – Forestry Merger***

Beginning about the 2000-2001 academic year rumors began to spread about an initiative to reduce the number of departments in the College of Agriculture (COA) and to reorganize the life sciences in the COA and the College of Liberal Arts and Sciences (LAS). Several departments were dual administered by the two colleges. In the COA the departments of most interest to this paper were Animal Ecology, Entomology, and Forestry; in LAS, Botany. Dual listed were the Department of Biochemistry, Biophysics, and Molecular Biology, and the Department of Zoology and Genetics.

From the perspective of Animal Ecology, the debate centered on two main visions for the future. One group of faculty envisioned a department comprised of ecologists and evolutionary biologists that focused mainly on research and graduate education. This would essentially be a Department of Ecology and Evolutionary Biology patterned after the EEB Interdepartmental Graduate Major to which most of these faculty belonged. A subset of people from Botany, Zoology, and Animal Ecology supported this. The other larger group of Animal Ecology faculty had a broader vision of natural resources and recognized that there was a large number of undergraduate students that were interested in careers in natural resources. This group of faculty looked favorably on a merger with Forestry and was willing to include faculty from other departments with an interest in finding a home in the new department. Several meetings were

held with faculty in attendance from Animal Ecology, Botany, Forestry, Entomology, and Zoology. There were several fault lines that formed; an especially strong one was between those that considered themselves more basic scientists and those that considered themselves more applied scientists, though there was probably no real agreement as to what that actually meant.

In the end, a less-than-unanimous vote by Animal Ecology and Forestry faculty led to the formation of the Department of Natural Resource Ecology and Management; NREM came into being in July 2002. Entomology decided to remain an independent department. The other departments mentioned above negotiated for another year and in July 2003 formally realigned into the departments of Biochemistry, Biophysics, and Molecular Biology (BBMB), Genetics, Development and Cell Biology (GDCB), and Ecology, Evolution and Organismal Biology (EEOB). Faculty from the original departments sorted themselves into the new departments (BBMB did not have a name change but did gain some faculty from other departments).

For NREM, one of the more controversial aspects of the final negotiations was the loss of four faculty lines; four Animal Ecology faculty rejected membership in NREM. A small group of Animal Ecology faculty met with the Dean of Agriculture, Catherine Woteki, and tried to make the case that the loss of these lines would be very detrimental to the success of the new NREM Department, in part because it would significantly unbalance the numbers of animal ecology faculty compared to forestry faculty (Figure 4). It was agreed that a goal of the new department would be to eventually eliminate or at least blur these designations, but that it would have to evolve. So, building a strategic plan for the department would have to be negotiated among the faculty on board and those that would be hired in the near term. It was also pointed out to the Dean that a significant number of animal ecology faculty would soon be retiring and that it would be critical that these be replaced in a timely fashion.

Dean Woteki decided to transfer the faculty lines. Downing chose to transfer to the Botany Department in July 2002, but Danielson, Debinski, and Clark waited a year before joining the new EEOB department. The four faculty lines were lost, although an agreement was reached that the four former animal ecology faculty would continue for some time to teach some of the courses that they had been responsible for in the Animal Ecology major. They did not, however, contribute to the advising of Animal Ecology undergraduates.

Another issue that had to be resolved was the future home of the ICFWRU. Unit personnel were conflicted as to whether EEOB or NREM would be best for them. NREM argued for the Unit staying with its historical roots in NREM. The Unit Coordinating Committee decided to retain the Unit in NREM and it has continued to be an integral part of the department.

### **Department of Natural Resource Ecology and Management 2002 – 2018**

The first Chair of NREM was J. Michael Kelly, the former Chair of Forestry. Bruce Menzel, former Chair of Animal Ecology, took a leave from ISU to work in Washington, DC with the Cooperative State Research, Extension and Education Service of the USDA. Jim Dinsmore retired in July 2002. Not counting the future EEOB faculty still listed with NREM, or Menzel who was on leave, the new department was comprised of the following faculty: animal ecology –

Atchison, Best, Koford, Morris, Otis, Pease, Pierce, Summerfelt (note that Koford, Otis and Pierce did not advise undergraduate students, but were generally involved in most other aspects of the department); forestry – Asbjornsen, Colletti, Hall, Jungst, Kelly, Kuo, Mize, Peszlen, Rule, Schultz, Stokke, Thompson, and Wray (Figure 4). A number of other faculty with various kinds of appointments were also involved in the new department, including James Miller and James Pritchard (both with joint appointments with NREM and Landscape Architecture), Thomas Isenhart (mainly a research position), Tammy Stafford (a temporary position filling in for the loss of Franklin and Dinsmore), and James Forsberg (a Lecturer who taught a variety of courses, including a couple of distant education courses).

The faculty got right to work on developing a governance document, strategic plan, and getting materials together for the 2003-2005 catalog. In the catalog, courses were designated as A Ecl, For, or NREM, and over the next several catalogs there was a shift of courses from A Ecl and For to NREM (Table 6). However, no NREM major was developed; students majored in Animal Ecology or Forestry, with specific options in each.

An important agreement that came with the merger was the commitment of the COA administration to replace faculty as they retired. In addition, NREM was provided one faculty line to be used as the department chose. The first hire by NREM, in 2003, was W. Sue Fairbanks to replace Jim Dinsmore. Her main teaching role was A Ecl 451 Wildlife Ecology and Management, and A Ecl 551 Wildlife Behavioral Ecology. She also taught A Ecl 459/559 Mammalogy on an alternate year basis. Her main area of research was the ecology and behavior of mammalian wildlife, and later the role of behavior in wildlife disease transmission. The next hire, also in 2003, was the new position provided by the COA. Lisa Schulte (now Schulte-Moore), a landscape ecologist with a background studying both avian ecology and forest ecology and management, was hired, in part because she could help integrate animal ecology and forestry. Early on she taught A Ecl 366 Natural History of Iowa Vertebrates, and NREM 472/572 Landscape Ecology and Natural Resource Management. Her main teaching role has evolved into For 201 Forest Biology, For 442/542 Dynamics of Forest Stands, and For/NREM 452/552 Ecosystem Management. Her research interests are in landscape ecology, human-landscape interactions, and sustainable land management.

In 2004 Atchison, Best and Menzel retired. Summerfelt retired in 2005. Atchison continued as an Instructor teaching the NREM 460 course until 2009. As promised, the College of Agriculture supported replacing these four faculty lines.

To replace Menzel, NREM sought a person to develop a research program in the area of assessment of aquatic ecosystem health. Thomas M. Isenhart was hired in August 2004. Tom's teaching has included NREM 130 Natural Resources and Agriculture, A Ecl/Biol 312 Ecology, A Ecl 418/518 Stream Ecology, which he team teaches with Clay Pierce, and NREM 390 Fire Ecology and Management. His research interests include stream, riparian, and watershed management; design and establishment of conservation buffers; and watershed assessment.

The Water Resources Interdepartmental Graduate Major was dropped in the 2005-2007 catalog and was replaced by the Environmental Science Interdepartmental Graduate Major (ENVSC). William Crumpton (EEOB) was its first Chair, followed by John Downing (EEOB) and Tom

Isenhart. Many NREM faculty became members of the program and a number of NREM graduate students have chosen ENVSC as their major (Table 13).

With the retirement of Atchison, Best and Summerfelt, NREM no longer had faculty and graduate students affiliated with the Toxicology Program. Michael C. Quist was hired in April 2005 to replace Atchison. His teaching included A Ecl 321 Fish Biology, A Ecl 366 Natural History of Iowa Vertebrates, and A Ecl 441/541 Fisheries Techniques. He team-taught A Ecl 520 Fisheries Science with Clay Pierce. His research interests focused on management of fish and their habitats. Quist moved on to the University of Idaho in 2010.

Stephen J. Dinsmore was hired in August 2005 to replace Best. He has taught A Ecl 371 Ecological Methods, A Ecl 365 Vertebrate Biology laboratory, A Ecl 458/558 Ornithology, and A Ecl 516 Avian Ecology. His research is centered on the intersection of avian ecology and population biology. Best's other teaching responsibilities, A Ecl/NREM 130 Natural Resources and Agriculture, and A Ecl/Biol 312 Ecology, were taken over by Isenhart.

Bob Summerfelt's faculty line was filled by Julie Blanchong in January 2007. Joe Morris took over Summerfelt's teaching responsibilities in aquaculture; he had already taken over the Fisheries Management course when Summerfelt began his phased retirement. Blanchong brought a new dimension to NREM; she is a wildlife ecologist primarily interested in wildlife health and wildlife genetics. She has taught A Ecl 365 Vertebrate Biology laboratory, A Ecl 454 /554 Principles of Wildlife Disease, and, with Kevin Roe, NREM 315 Genetics for Natural Resource Managers.

From the time the Preveterinary and Wildlife Care option was instituted until the hiring of Blanchong, the department did not have a faculty member with a specific interest in the area. With their interests in wildlife disease, Blanchong and Fairbanks better positioned the department to support the option, and that attracted even larger numbers of students. To better meet course needs for these students, the department hired an Animal Ecology lecturer (Michael Rentz) to develop and teach a wildlife care/rehabilitation course (currently offered as a 3-credit NREM 305 seminar). The department is also interested in developing at least one additional wildlife care course targeting these majors.

Tim Stewart, who had been an adjunct (non-tenure track) Assistant Professor since 2003, became a tenure-track Assistant Professor in August 2006. This move was made after the decision to hire Blanchong to replace Summerfelt. Stewart has taught A Ecl/Biol 312 Ecology, A Ecl 366 Natural History of Iowa Vertebrates, and A Ecl 515 Ecology of Freshwater Invertebrates. He is an aquatic community ecologist with a research focus on using aquatic invertebrate assemblage characteristics to assess ecological conditions of ecosystems.

Kevin Roe became an adjunct Assistant Professor in NREM in 2005. His research focused on phylogenetic systematics and biogeography of freshwater animals, but now focuses more on population and conservation genetics. He has taught Biol 211 Introductory Biology, A Ecl 321 Fish Biology, A Ecl 361 Natural History of Fishes, A Ecl 455 International Issues in Wildlife Management, NREM 580 Research Methods for Graduate Students, and NREM 315 Genetics



for Natural Resource Managers (with Julie Blanchong). He has a joint appointment with EEOB. He became a tenured Associate Professor in 2016.

The College of Agriculture became the College of Agriculture and Life Sciences in July 2007.

A four-member outside panel carried out a comprehensive NREM program review in April 2008. To prepare for the review the faculty wrote a strategic plan, updated the NREM Governance Document, and wrote an extensive self-study. The *Final Report of the Comprehensive Program Review* was later submitted to COA and NREM. The review committee pointed that the “true integration of the department has proven elusive; faculty are still struggling with departmental identity and creating an NREM that is greater than the sum of its Animal Ecology and Forestry parts.” They recommended that the department “move towards a common philosophy that embodies integrated natural resource management and transcends disciplinary boundaries.” The panel further suggested that two majors, each with five options, spread the faculty too thin, delayed declaration of majors by students, and led to options with great disparities in enrollment.

As pointed out earlier, the options for the Animal Ecology major changed during the first several catalogs. The 2003-2005 catalog was the first to spell out the major under NREM. Students chose from six options: Ecology, Aquaculture, Fisheries and Aquatic Sciences, Wildlife, Interpretation of Natural Resources, and Wildlife Care and Veterinary Sciences (Wildlife Care and Veterinary Sciences was renamed Preveterinary and Wildlife Care in 2011). The Aquaculture and Ecology options were dropped in the next catalog, but the Fisheries and Aquatic Sciences option was split into two options in the 2007-2009 catalog. These two options were again combined in the 2011-2012 catalog. Since then, only the four options have been offered (Table 10).

Forestry had four options in 2003, including Forest Ecosystem Management, Natural Resource Conservation, Urban and Community Forestry, and Wood Products. Interpretation of Natural Resources, and Sustainable Materials Science and Technology options were added in the 2005-2007 catalog. The Wood Products option was dropped in 2008 and the Natural Resource Conservation option became the Natural Resource Conservation and Restoration option in the 2009-2011 catalog. Since that time, the five options have been maintained, with Forest Ecosystem Management being the most highly subscribed option (Table 10).

The 2008 review team suggested an undergraduate curriculum with an integrated core with majors in Natural Resource Ecology and Management, Forestry, Fisheries, and Wildlife. However, there has been no consensus among faculty on whether there should be an integrated Natural Resources Ecology and Management major.

One of the next major changes in the animal ecology faculty was the retirement of Jim Pease in 2008. He had a 60% Extension, 40% Teaching appointment. He ran the wildlife extension program and was the major teacher/advisor for the Interpretation of Natural Resources option in both the Animal Ecology and Forestry majors. As pointed out earlier, he taught A Ecl/NREM 330 Interpretation of Natural Resources, A Ecl/NREM 430 Media Techniques in Natural Resources, and A Ecl 532 Human Dimensions of Wildlife Management. Pease developed the interpretation program at ISU and was the main force maintaining it.

Rebecca Christoffel was hired in 2009 as the Wildlife Extension Specialist. Originally, she had an extension and research appointment with no teaching responsibilities. Eventually, that changed to include a 10% teaching appointment and she took over teaching NREM 330 Interpretation of Natural Resources in spring 2011. She also developed and taught a one-credit course, NREM 207 Natural Resource Management under the North American Model of Conservation. Her research interests focused on the integration of ecological and sociological data. John Burnett became the academic advisor for the Interpretation of Natural Resources option, and continues in that role in 2018.

The Preveterinary and Wildlife Care option continued to grow, from 28.8% of NREM declared majors in 2003 to a high of 53.6% in 2015 (Table 10). Although not just directed toward the Preveterinary and Wildlife Care option, Blanchong added a wildlife disease course (A Ecl 454/554) in spring 2008. Fairbanks had also developed an interest in wildlife disease transmission. In addition, in 2007 Dusan Palic (Biomedical Sciences Department and Adjunct to NREM) became the instructor of A Ecl/BMS 401, now called Introduction to Aquatic Animal Medicine. This course was first developed in about 2002, and was taught by a team of instructors from A Ecl, the College of Veterinary Medicine, and the National Animal Disease Laboratory, USDA. When Palic left ISU in 2012, David Starling (BMS) took over the course. The addition in 2011 of NREM 315 Genetics for Natural Resource Managers, developed by Blanchong and Kevin Roe, further enhanced the offerings to preveterinary and wildlife care students. As pointed out above, Rentz is developing a new wildlife care/rehabilitation course to further enhance the option.

Since 2009, the Preveterinary and Wildlife Care option has attracted the highest percentage of students declaring an option in the Animal Ecology major (Table 10). Currently, John Burnett advises the A Ecl majors selecting this option with a primary interest in enrolling a veterinary program after graduation; Dinsmore advises the AECL Honors students in this option. Julie Blanchong advises many of those interested in wildlife care.

The Wildlife option had always attracted the highest percentage of Animal Ecology majors prior to the addition of the Preveterinary and Wildlife Care option. That option now runs a strong second. The Fisheries and Aquatic Sciences option was split up in the 2007-2009 catalog, with the majority of those students enrolling in the Fisheries option. That division was abandoned in the 2009-2011 catalog; over the past several years the Fisheries and Aquatic Sciences option has attracted a little over 10% of the Animal Ecology majors declaring an option (Table 10).

There was a slight decrease in the percentage undergraduate women majoring in Animal Ecology after NREM was formed, but by 2008 it had returned to the 50% level and has been over 60% since 2013 (Table 9). The higher percentage of women in the program mirrors the increase in the percentage of students choosing the Preveterinary and Wildlife Care option (Table 10).

Gender distribution in the graduate program is more difficult to determine because the Registrar's annual reports combine Animal Ecology and Forestry majors (Table 12). The percentage of women graduate students in NREM reached a low of 27% in 2007 and a high of 51% in 2016. However, the percentage female is quite variable among the different majors.

Based on a listing of individual post-baccalaureate graduates of NREM between 2008 and 2015 found in the 2015 NREM self-study report, 38.8% of the 85 graduates were women. Results among the following majors were: animal ecology 60% (5 total graduates); fisheries biology 7.1% (14); wildlife ecology 52% (25); forestry 33.3% (12); ecology and evolutionary biology 41.7% (12); environmental science 33.3% (6); and sustainable agriculture 45.4% (11).

An interesting curriculum trend occurred between NREM and EEOB. As pointed out above, when EEOB was formed four A Ecl faculty, Clark, Danielson, Debinski and Downing, chose not to remain with NREM and instead joined EEOB. Most of the graduate-level A Ecl courses they had taught became cross-listed in the first catalog that included EEOB (2005-07). EEOB does not offer EEOB undergraduate courses, but a number of A Ecl courses became cross-listed in Biology, including Vertebrate Biology, Ecological Methods, and Aquatic Ecology. The course numbering was changed from what it had been in A Ecl to better fit with the expanding number of courses being offered by Biology. By the next catalog (2007-2009), new courses in Herpetology, Ornithology and Mammalogy were offered as dual-listed (400 and 500 levels) and cross-listed courses (Table 6). As 400-level courses they were cross-listed with Biol and as 500-level courses they were cross-listed with EEOB. Fred Janzen (EEOB) has since taught the Herpetology course and Bill Clark (EEOB) taught the Mammalogy course in alternate years until he retired. The dual listings were dropped in the 2017-2018 catalog.

Another issue with the establishment and evolution of the NREM Department was leadership. Whereas the Department of Animal Ecology had only two Chairs over its 27-year history (not counting the short tenure of R. Bachmann in the beginning as Acting Chair), there has been a great deal of turnover in the Chair position in NREM. Mike Kelley was Chair from July 2002 until July 2004, when he left for Virginia Polytechnic Institute and State University. Joe P. Colletti was Acting Chair until David M. Engle, a rangeland ecologist, was hired in August 2005. Engle left for Oklahoma State University in 2008. Richard Hall was Acting Chair from July 2008 until July 2009, Steven Jungst was Acting Chair from July 2009 to July 2011, and Joel Coats (Entomology) was Acting Chair until September 2011.

Significant changes in the forestry faculty occurred between the time Kelly resigned as department chair and a new chair was hired in 2011 (Figure 5). Joe Colletti, a forest economist, became Senior Associate Dean in the College of Agriculture in 2006. He was replaced by John Tyndall in August 2008. Tyndall has research interests in environmental and natural resource economics, policy and sociology, primarily focused on forestry and agriculture. Doug Stokke, a wood scientist, moved from a tenure-track Assistant Professor to a non-tenure-track Senior Lecturer in May 2006. Paul Wray, Extension Forester, retired in 2006; Jesse Randall replaced him as Extension Forestry Specialist in 2007. Randall resigned in 2018 for a position at Michigan State University. Carl Mize, forest biometrics, retired in 2007 and was not replaced. Lita Rule, forest economics and policy, retired in July 2010 and was not replaced. Heidi Asbjornsen, forest ecology and ecosystem management, left ISU in December 2010 and has not been replaced. Steve Jungst, forest biometry, retired in 2011; Peter Wolter replaced him that same year.

Changes also occurred in the animal ecology faculty. Mike Quist, fish biologist hired in 2005, left ISU in May 2010; Michel J. Weber was hired in 2012. His area of interest is fisheries

ecology and management, especially mechanisms regulating population dynamics, food webs, and community structure and function. Dave Otis retired as the ICFWRU Leader in 2011. Robert Klaver became the new leader in 2012; his interests are biostatistical analysis and wildlife ecology, management and conservation. He took over teaching A Ecl 611 Analysis of Populations after Bill Clark retired.

Sue L. Blodgett became the new NREM Chair in September 2011, right in the midst of these other faculty changes; she is also the Chair of Entomology. The business office staff are also shared with Entomology but the Student Services office still mostly serves NREM because Entomology no longer has an undergraduate major. In addition, the two departments share an Associate Department Chair whose primary role is to provide leadership in teaching programs, help with curriculum development, and oversee the Business Office. This position was first added in 2008 (Morris) when it was just NREM, and continued beginning in 2014 (Dinsmore) with the addition of Entomology.

With these changes some trends in the performance expectations of faculty were exacerbated. Historically, at least for much of the time the Department of Animal Ecology existed, the average faculty member had a 12-month appointment at about 75% teaching, 25% research (service was expected but often not specifically designated), with the teaching appointment generally being one course per semester. Teaching assistants taught most labs. By 2010, the average appointments were for 9 months at about 45% teaching, 45% research and 10% service, with the expectation that each faculty member would teach two to three courses per semester with the actual number adjusted for high enrollment classes. In addition, the limited number of TAs initially required some faculty with low enrollment courses to teach their labs; number of TA lines has recently increased. At least for the animal ecology-oriented faculty, the ratio of undergraduate students to faculty members had gone up significantly, meaning that the number of advisees per faculty also went up. Faculty were expected to obtain their 3-month summer salary with outside grants. This trend in academic appointments is similar to other universities in these days of decreasing public support for higher education in the U.S.

Table 9 shows the history of undergraduate enrollment in the Animal Ecology and Forestry majors in NREM. Over the 15-year period, the A Ecl major contributed an average of 79% of the NREM undergraduate enrollment. Figure 5 shows the distribution of faculty supporting the two majors in 2010. The decline in state funding for higher education since then has resulted in fewer tenure-track faculty lines, some of which were replaced with full-time lecturers (100% teaching). This has been beneficial in the short-term because of the increasing enrollment in Animal Ecology and the need for more instructors and additional courses. To this end, full-time lecturers for Animal Ecology were added in 2014 (Michael Rentz) and 2017 (Jennifer Schieltz); both make significant contributions to the teaching program. The Rentz position emphasizes on-campus courses while Schieltz has primary responsibility for overseeing the teaching program at the department's French Conservation Camp in Montana.

The growth in international travel courses offered by NREM faculty has continued in concert with College and University initiatives to expand student experiences abroad. Since 2009, NREM has offered travel courses for students in Antarctica, China, Ecuador, Greece, Madagascar, New Zealand, Norway, Peru, South Korea, Tanzania, Turkey, Uganda, and the U.S.

Virgin Islands. Richard Schultz, Julie Blanchong, and Stephen Dinsmore have led or co-led the majority of these courses. The department also offers domestic travel courses including recent offerings to visit Yellowstone National Park and western Montana.

In 2012, the North Central Regional Aquaculture Center (NCRAC) moved its main office from Michigan State University to ISU and Joe Morris became its director; he had been the assistant director almost from its inception in 1988. Joe's faculty appointment then became 90% NCRAC, 10% state-funded on fisheries and aquaculture issues, although he continued to teach A Ecl 442 Aquaculture. Subsequent changes occurred in his appointment so that it now includes Extension and teaching.

Sue Fairbanks left ISU in 2012 for Oklahoma State University and Rebecca Christoffel resigned in 2014, leaving significant vacancies in the wildlife area. Lidia Skrynnikova (2013) and Michael Rentz (2014) were hired as Lecturers. Skrynnikova teaches NREM 270 Foundations in Natural Resource Policy and History, and Rentz coordinates A Ecl 365 Vertebrate Biology labs, and teaches A Ecl 459 Mammalogy, NREM 460 Controversies in Natural Resource Management, and NREM 305 Wildlife Rehabilitation. James Pritchard and Mike Rentz eventually co-taught NREM 330 Interpretation of Natural Resources.

Peter Moore became an Adjunct Assistant Professor in 2013. His interests are geomorphology and hydrology, and he teaches NREM 533 Erosion and Sediment Transport, and NREM 460; he also developed NREM 240 Quantitative Problem Solving.

In 2015, James Adelman was hired into a new position funded through the ISU high impact hires program. He teaches A Ecl 451 Wildlife Ecology and Management and A Ecl 371 Ecological Methods. Cassandra Nuñez was also hired in 2015 as an Adjunct Assistant Professor. She now teaches A Ecl 231 Principles of Wildlife Conservation, A Ecl 451 Wildlife Ecology and Management, A Ecl 455 International Wildlife Issues, and A Ecl 551 Behavioral Ecology.

Adam Janke became the Extension Wildlife Specialist in 2016. His appointment was 70% extension, 5% service, 25% research. He began teaching NREM 207 in the fall of 2017. His interests are in the relationships between wildlife populations and their habitats.

Steve Bradbury, hired with a dual appointment in NREM and Entomology in 2015, has now joined the Toxicology faculty and once again gives the department a presence in that program. He has interests in environmental toxicology, pesticide risk assessment and environmental policy. He co-instructs ENT/TOX 550 Pesticides in the Environment, and ENT/TOX 675 Insecticide Toxicology, and contributes to TOX 501 Principles of Toxicology.

An external panel reviewed NREM's academic program in November 2015. As a significant aspect of the review process, the department completed a lengthy self-study document. Two of the most prominent issues discussed were follow-ups to the 2008 external review. First, was the recommendation in 2008 that the department create a new Natural Resource major. The faculty had voted in favor of the recommendation, but has yet to formally establish it.

The second recommendation dealt with expanding the forestry camp for animal ecology students. The Department of Forestry historically had a summer camp experience for its students. In fall 1993 this was changed to a full semester of forestry courses in the sophomore year including a 3-week camp experience, which has continued to present. In fall semester, sophomores enroll entirely in forestry coursework, including 11 credits of forestry courses on campus, which include forest biology, sustainable materials, resource measurements/evaluation, forest ecosystem decision-making and integrated forestry laboratory. Each week there is a day-long laboratory that makes it possible to get into much more depth on forestry problems than is possible with the typical 2 or 3-hour labs associated with other courses. All of those courses take place for 12 weeks during the fall semester, and during the other three weeks, students attend forestry camp. Since the sophomore series began, camps have been held in North Carolina, Wyoming, Montana, Alabama, Missouri, Minnesota, and Michigan.

The Rod and Connie French Conservation Camp was established in the Fish Creek Valley west of Missoula, Montana in 2016. Jennifer Schieltz was hired as a Lecturer and Director of the camp. Her interests are in wildlife biology, animal behavior and conservation. The first summer courses were taught there in 2017 and the first forestry camp was held there fall 2017.

From the beginnings of the NREM Department there have been discussions about the possibility and desirability of having a captive semester in Animal Ecology to facilitate participation in the camp. A significant challenge to orchestrating such a program is the sheer numbers of students involved. Fall 2017 enrollment included 90 A Ecl sophomores compared to 22 Forestry sophomores. Faculty are currently working on a proposal to offer a late summer Animal Ecology camp experience in 2019, limiting enrollment to just Wildlife Option students. Discussions about a future captive semester are also on-going, and for several reasons this may occur during the junior year. The French Conservation Camp offered several courses under the designation of NREM 496B during the summer of 2017, including Wildlife Population Methods (Rentz, Adelman) and Field Ecology (Schieltz, Keiser, Russell). The same two courses were offered during the summer of 2018 with greater enrollment.

The integration of forestry and animal ecology continues to improve. The most recent move was to combine the capstone courses (AEcl 451 and FOR 454) into a single course. Students thus work in teams comprised of both majors. Initial feedback from students through senior exit interviews indicates this is working well.

One course that does not show up in the tables listing courses and instructors is NREM 305 – Seminar. Seminars were taught in the Animal Ecology Department and they have been continued in NREM. Seminar topics have generally been based on faculty interest and in some years only one or two were offered. In recent years, a concerted effort has been made to offer three to five seminars per year on diverse topics, some recurring and others offered just once.

Keven Roe became a tenured Associate Professor in NREM in 2016. His teaching role continues to include A Ecl 321 Fish Biology, NREM 315 Genetics for Natural Resource Managers with Julie Blanchong, and A Ecl 455 International Wildlife Issues, as well as Biol 211.

Rick Hall died in 2016, leaving a void in the Department. Among his many contributions, Rick taught the NREM 120 Introduction to Renewable Resources course. His co-instructor, James Pritchard, took over the course, but then he left ISU in 2017 for Montana State University. Mike Rentz taught the course in fall 2017 and is now co-teaching it with Schieltz. Pritchard also taught NREM 207 Natural Resource Management under the North American Model of Conservation, NREM 385/585 Natural Resource Policy, and co-taught NREM 330 Interpretation of Natural Resources with Mike Rentz. Adam Janke will be teaching the NREM 385/585 course, and Rentz will continue with the NREM 120 and NREM 330 courses.

Figure 6 shows the NREM faculty as of fall 2018. There is a rich past in Fisheries and Wildlife/Animal Ecology and also a rich past in Forestry. The Forestry program celebrated its centennial in 2004. As was seen with the retirement of the “old guard” Animal Ecology faculty by 2005, the forestry faculty with long ties to the department have retired or are entering their retirement planning. Like all departments, there will continue to be changes in the faculty in the future, some predictable and others unexpected.

### Epilogue

The Fisheries and Wildlife program, with its roots in the 1920s, morphed into the Department of Animal Ecology in the early 1970s, and then into the Department of Natural Resource Ecology and Management (NREM) in 2002. It has further evolved during the past sixteen years and will continue to evolve to meet future challenges in understanding and managing our natural resources.

As with similar programs in the U.S. the NREM department now consists of faculty members that have diverse research programs with both applied and basic foci; teach a larger number of courses compared to faculty appointments in the Department of Animal Ecology; and are more likely to be considered as ecologists than resource managers. This is very different from the early days when the program was just beginning to develop at Iowa State College of Agriculture and Mechanical Arts. The field was new then and the focus was on research and training graduate students in fisheries and wildlife management. In the intervening years the program has experienced many significant changes including increases in the number of undergraduate students, gender shifts in both graduate and undergraduate programs from almost all males to greater balance, shifts in student backgrounds from traditional agriculture to more urban, and diversification of research and academic programs. One example of research programmatic change is the shift from applied game species management in the early years to a more diverse research program that includes game management but also conservation disease, genetics, and a host of other related topics.

Challenges for our department include questions about how best to prepare students for current and future employment opportunities, how to manage increasing student expectations and needs, how to meet university and college evolving institutional requirements, how to address future societal needs in natural resources, and decreasing teaching and research budgets. Specific strategies for addressing these challenges may result in changes to curricula, staffing, research programs, and more.

Although today's NREM is very different from the Fisheries and Wildlife program and Department of Animal Ecology, the current Mission Statement would not be foreign to those earlier programs. The current Mission Statement reads: *The Department of Natural Resource Ecology and Management (NREM) is dedicated to the understanding, effective management, and sustainable use of our renewable natural resources through the land-grant missions of teaching, research, and extension. The disciplinary focus of NREM is broad in scope, ranging from individual organisms to landscapes, from natural to managed ecosystems, from wilderness to agricultural and urban systems, from local to international environments, and from resource preservation to sustainable use. Understanding and effectively managing our natural resources requires long-term vision and multidisciplinary approaches. As such, NREM personnel work with people from diverse disciplines across the University and within federal and state agencies and nongovernmental organizations. A diversity of disciplines is reflected in NREM, including ecology and other biological sciences, social science, economics, sustainable resource management and use, and human dimensions. The expertise of NREM personnel helps to serve society through the landgrant tradition of working with undergraduate and graduate students, state and federal government agencies, nongovernmental organizations, businesses, and the public. Thus, NREM provides answers to natural resource problems in Iowa, the Midwest, and the nation.* Compare this with past mission statements found as Appendix II.

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# **A History of the Fisheries and Wildlife Programs, and the Animal Ecology Department at Iowa State University**

## **Appendix I**

Table 1. Brief descriptions, with abbreviations used in the following tables, of the faculty important to the fisheries and wildlife/animal ecology program at Iowa State. Note that until 1975 these faculty members were in the Department of Zoology and Entomology, from 1975 to 2002 the Department of Animal Ecology, and from 2002 to present in the Department of Natural Resource Ecology and Management. Non-teaching faculty without abbreviations.

JA = James S. Adelman (B.S. Duke 1999; Ph.D. Princeton 2010). Interests: disease ecology, ecological immunology, physiological ecology, wildlife. 2015-P

A = Gary J. Atchison (B.S. Michigan State 1965; M.S. Iowa State 1967; Ph.D. Michigan State 1970). Interests: environmental studies, natural resource management, aquatic toxicology, and fish biology. 1978-2004 (continued to teach NREM 460 until F2009)

RB = Roger W. Bachmann (B.S. Michigan 1956; M.S. Idaho 1958; Ph.D. Michigan 1962). Interests: limnology, water quality, nutrient dynamics. 1963-1993

MB = Marilyn D. Bachmann (B.S. Ball State 1955; M.A. Michigan 1960; Ph.D. Michigan 1964). Interests: animal behavior, and management of amphibians and reptiles. 1969-1993

Ba = Reeve M. Bailey (B.A. University of Michigan 1933; Ph.D. University of Michigan 1938). He was an Instructor from 1938-40 and an Assistant Professor from 1940 to 1944. Taught fishes, fisheries management, and cold-blooded vertebrates. He went on to a distinguished career at the University of Michigan (see Stewart and Smith 2000). 1938-1944

Be = Elery R. Becker (A.B. University of Colorado 1920; D. Sc. Johns Hopkins University 1923). He was a protozoologist and taught the parasites courses and the summer Field Zoology course (see Levine 1963). 1925-1958

LB = Louis B. Best (B.S. Weber State 1968; M.S. Montana State 1970; Ph.D. 1974 Illinois). Interests: avian ecology with emphasis on effects of agriculture on birds. 1974-2004

JB = Julie A. Blanchong (B.S. Bowling Green 1995; M.S. Michigan State 1999; Ph.D. Michigan State 2003). Interests: wildlife disease ecology and wildlife genetics. 2007-P

Sue L. Blodgett (B.S. Syracuse 1974; M.S. Cornell 1987; Ph.D. Kansas 1989. Department Chair of both NREM and Entomology. Interests: entomology, integrated pest management, and monarch butterfly conservation. 2011-P

BB = Bonnie S. Bowen (B.S. Cornell 1972; Ph.D. California-Berkeley 1978). Adjunct. Interests: animal ecology, behavior, evolutionary processes, and genetic structure in natural populations. 1995-2013.

Steve Bradbury (B.S. Wisconsin 1978; M.S. Iowa State 1981; Ph.D. Iowa State 1985). Joint appointment NREM and Entomology. Interests: environmental toxicology, pesticide risk assessment, environmental policy, conservation, sustainability. 2015-P

Bu = Ross V. Bulkley (B.S. Utah State 1952; M.S. Utah State 1957; Ph.D. Iowa State 1969). Interests: fish culture, and effects of water pollution on fish. Assistant Unit Leader ICFRU 1966-1978

C = Kenneth D. Carlander (B.A. Minnesota 1936; M.S. Minnesota 1938; Ph.D. Minnesota 1943). Taught all the fisheries courses for many years. Interests: fish age and growth, and population ecology (see Muncy 1987; Summerfelt 2002). 1946-1985

RC = Rebecca Christoffel (B.S. Wisconsin 1993; M.S. Wisconsin 1998; Ph.D. Michigan State 2007). Extension Wildlife Specialist. 2009-2014

Cl = William R. Clark (B.S. Rutgers 1971; M.S. Utah State 1974; Ph.D. Utah State 1979). Interests: mammalogy, wildlife ecology and population ecology. 1984-2003. Transferred to EEOB in 2003. Retired 2013

RD = Robert B. Dahlgren (B.S. South Dakota State 1950; M.S. Utah State 1955; Ph.D. South Dakota State 1972). Interests: wildlife ecology and management. Unit Leader of ICFWRU 1973-1985

Da = Brent J. Danielson (B.S. Michigan State 1980; Ph.D. 1986 Kansas). Interests: community and landscape ecology. 1992-2003. Transferred to EEOB in 2003.

De = Diane M. Debinski (B.A. Maryland 1984; M.S. Michigan 1986; Ph.D. Montana State 1991). Interests: conservation biology. 1994-2003. Transferred to EEOB. Left ISU in 2017

JD = James J. Dinsmore (B.S. Iowa State 1964; M.S. Wisconsin 1967; Ph.D. Florida 1970). Interests: avian and wetland ecology. 1975-2002

SD = Stephen J. Dinsmore (B.S. Iowa State 1990; M.S. North Carolina State 1994; Ph.D. Colorado State 2001). Interests: avian ecology, population ecology, and community ecology. 2005-P

Do = John A. Downing (B.S. Hamline 1973; M.S. North Dakota State 1975; Ph.D. McGill 1980). Interests: aquatic ecology. 1995-2002. Transferred to Botany in 2002. Retired 2016

CD = Carl J. Drake (B.Sc. Baldwin-Wallace 1912; M.S. Ohio State 1914; Ph.D. Ohio State 1921). He was department Head from 1922 until 1946. Taught the fishes course just before Carlander arrived. An entomologist. 1922-1965

David M. Engle (B.S. Abilene Christian 1972; M.S. Abilene Christian 1975; Ph.D. Colorado 1978). Department Chair 2005-2008

PE = Paul L. Errington (B.S. South Dakota State 1930; Ph.D. Wisconsin 1932). Mostly involved in research but in the early 1960s taught several courses (See Pritchard et al. 2006). Interests: wetland ecology, population dynamics, wildlife management. 1936-1962

SF = W. Sue Fairbanks (B.S. Nebraska Wesleyan 1982; M.S. Colorado State 1985; Ph.D. Kansas 1992). Interests: ecology and behavior of wildlife populations, and behavior and wildlife disease transmission. 2003-2012

F = William L. Franklin (B.S. California [Davis] 1964; M.S. Humboldt 1968; Ph.D. Utah State 1978). Interests: wildlife behavioral ecology with an emphasis on large mammals. 1975-2000

G = Joseph E. Guthrie (B.S. University of Minnesota 1900; M.S. University of Minnesota 1901). Acting Head of the Department of Zoology and Entomology in 1922 as a full Professor. Taught Zool 35 Fish and Game and Zool 60 Bird Study. An entomologist. 1901-1922

RH = Richard B. Hall (B.S. Iowa State 1969; Ph.D. Wisconsin 1974). Interests: forestry, genetics, and silviculture. 1974-2016

Ha = Bruce M. Harrison (B.S. Ottawa University 1905; M.S. University of Illinois 1908). He was an Assistant Professor in 1922 but was no longer listed in catalog after 1925. Taught Evolution of Animals until Wellhouse took over about 1926.

He = George O. Hendrickson (B.A. Iowa State Teachers College 1921; M.S. Iowa State College 1926; Ph.D. Iowa State College 1929). He was an Instructor in the department from 1925 to 1930, an Assistant Professor from 1930-1945, Associate Professor from 1945 to 1951, and a Professor from 1951 until his death in 1961. Assistant Leader of the ICFWRU from 1935 to 1961. He taught most of the courses dealing with game (wildlife) biology and management, including Game Birds and Mammals, Techniques of Wildlife Management, Warm-blooded Vertebrates, Wildlife Management, Wildlife Administration, Wildlife Conservation. He even taught Fishes before Reeve Bailey came to ISC. 1925-1961

William L. Hohman (B.S. St. John's 1973; M.S. North Dakota 1977; Ph.D. Minnesota 1984). Collaborator: wildlife biologist with USDA Natural Resources Conservation Service, Wildlife Habitat Management Institute. 1997-2004

WH = Wayne A. Hubert (B.S. Illinois State 1969; M.S. Southern Illinois 1972; Ph.D. Virginia Polytechnic Institute 1979). Interests: fish biology and management. Assistant Unit Leader ICFRU 1978-1982.

TI = Thomas M. Isenhardt (B.S. Iowa State 1983; M.S. Iowa State 1988; Ph.D. Iowa State 1992). Interests: stream, riparian, and watershed management. Adjunct 1998-2004; tenure-track 2004-P

Adam K. Janke (B.S. Purdue 2009; M.S. Ohio State 2011; Ph.D. South Dakota State 2016).  
Extension Wildlife Specialist. Interests: wildlife-habitat relationships. 2016-P

J. Michael Kelley (B.S. East Tennessee 1966; M.S. Tennessee 1968; Ph.D. Tennessee). NREM  
Department Chair 2002-2004

EK = Erwin E. Klaas (B.S. Missouri 1956; M.A. Kansas 1963; Ph.D. Kansas 1970). Interests:  
environmental contaminants, wildlife ecology, restoration ecology. Assistant Unit Leader  
ICWRU/ICFWRU Assistant Leader (1975-92) and Leader (1992-1999).

RWK = Robert W. Klaver (B.S. Iowa State 1971; M.S. Montana 1976; Ph.D. South Dakota State  
2001). Interests: biostatistical analysis, wildlife ecology, management and conservation. Leader  
ICFWRU 2012-P

K = Harry Hazelton Knight (B.S. Cornell University 1914; Ph.D. Cornell University 1920). His  
specialty was in entomology. Taught the Animal Ecology course from 1936 until 1959. 1924-  
1976

RK = Rolf R. Koford (B.S. California-Davis 1970; Ph.D. California-Berkeley 1979). Interests:  
grassland bird ecology, conservation ecology, restoration ecology. Assistant Unit Leader  
ICFWRU 1994-2013

BM = Bruce W. Menzel (B.S. Wisconsin 1964; M.S. Marquette 1966; Ph.D. Cornell 1970).  
Animal Ecology Department Chair 1985-2002. Interests: ichthyology, herpetology, fish ecology,  
aquatic ecology, watershed management. 1970-2004

Mi = James R. Miller (B.S. Colorado State 1991; M.S. Colorado State 1994; Ph.D. Colorado  
State 1999). Joint appointment with Landscape Architecture. Interests: landscape ecology,  
conservation ecology. 2001-2009

LM = Lawrence G. Mitchell (B.S. Pennsylvania State 1964; Ph.D. Montana 1970). Member of  
the Department of Zoology and Genetics from 1971 to 1993; from 1987 to 1993 also a member  
of A Ecl. Taught A Ecl 510 Histology and Pathology of Fish Diseases, cross listed with Zoology,  
and team-taught A Ecl 515 Ecology of Freshwater Invertebrates. 1971-1993

PM = Peter L. Moore (B.A. Carleton College 1998; M.S. Iowa State 2002; Ph.D. Iowa State  
2009). Adjunct. Interests: geomorphology, hydrology, conservation. 2013-P

Robert B. Moorman (B.S. Iowa State 1939; M.S. Iowa State 1942; Ph.D. Iowa State 1953).  
Extension Wildlife Conservationist 1948-53; Extension Wildlife Specialist 1956-1986.

JM = Joseph E. Morris (B.S. Iowa State 1979; M.S. Texas A&M 1982; Ph.D. Mississippi State  
1988). Interests: aquaculture, pond management, water quality. 1988-P

M = Robert “Jess” Muncy (B.S. Virginia Polytechnic Institute 1950; M.S. Virginia Polytechnic Institute 1954; Ph.D. Iowa State 1957). Interests: fishery biology and management. Unit Leader ICFRU 1965-1979

N = John G. Nickum (B.S. Mankato 1957; M.S. South Dakota 1961; Ph.D. Southern Illinois 1966). Interests: fish culture and management. Unit Leader ICFRU 1979-1985

CN = Cassandra M. V. Nuñez (B.S. Rutgers 1993; Ph.D. Princeton 2000). Adjunct. Interests: behavioral ecology, wildlife. 2015-P

O = David L. Otis (B.S. Colorado State 1971; M.S. Colorado State 1974; Ph.D. Colorado State 1976). Interests: population ecology of wildlife. Unit Leader ICFWRU 2001-2011

DP = Dusan Palic (D.V.M. University of Belgrade, Serbia 1997; MVSc, University of Belgrade, Serbia, 2002; Ph. D. Iowa State 2005). Department of Biomedical Science and adjunct in NREM. Taught A Ecl 401 Aquatic Animal Health and Medicine. 2005-2012

AP = D. Alan Pattillo (B.S. Georgia 2008; M.S. auburn 2010). Extension Fisheries Specialist and Program Assistant North Central Regional Aquaculture Center. Interests: Aquaculture. 2011-2017

JP = James L. Pease (B.S. Wisconsin 1972; M.S. Wisconsin 1977; Ph.D. Iowa State 1992). Interests: interpretation of natural resources, environmental education, human dimensions of wildlife management. 1985-2008

MP = Michael K. Petersen (B.S. Michigan State 1964; M.S. Michigan State 1966; Ph.D. Michigan State 1970). Interests: mammalogy and wildlife ecology. 1970-1976

CP = Clay L. Pierce (B.S. Mankato 1980; M.S. Kentucky 1982; Ph.D. Maryland 1987). Interests: aquatic ecology, fisheries science and fisheries management. Assistant Unit Leader ICFWRU 1993-P

P = James A. Pritchard (B.A. Miami-Ohio 1976; M.A. Montana State 1991; Ph.D. Kansas 1996). Adjunct Assistant/Associate Professor joint with Landscape Architecture. Interests: natural resource history and policy. 1997-2017

Q = Michael C. Quist (B.S. Idaho 1996; M.S. Kansas State 1999; Ph.D. Kansas State 2002). Interests: fisheries management and applied fish ecology. 2005-2010

JR = John S. Ramsey (B.S. Cornell 1960; Ph.D. Tulane 1965). Interests: fish biology. Assistant Unit Leader ICFWRU 1986-1990

MR = Michael S. Rentz (B.A. Minnesota-Morris 1994; Ph.D. Minnesota 2014). Lecturer. Interests: sustainability, mammalogy, wildlife. 2014-P

KR = Keven J. Roe (B.S. Georgia 1988; M.S. Georgia 1994; Ph.D. Alabama 1999). Interests: conservation and evolutionary genetics with emphasis on freshwater organisms. Adjunct Assistant Professor, joint with EEOB 2005-2016; Associate Professor 2016-P

AR = Ann E. Russell (B.S. Cornell 1976; M.S. Florida 1983; Ph.D. Iowa State 1996). Interests: terrestrial ecosystem ecology. Adjunct Assistant/Associate Professor 2003-P

DS = Dennis L. Scarnecchia (B.S. Arizona 1976; M.S. Oregon State 1979; Ph.D. Colorado State 1983). Interests: fish ecology and fishery management. 1985-1990

Sc = Jennifer M. Schieltz (B.S. Washington & Lee 2008; Ph.D. Princeton 2017). Lecturer. Director of French Conservation Camp in Montana. Interests: wildlife biology, animal behavior and conservation. 2016-P

LS = Lisa A. Schulte-Moore (B.S. Wisconsin – Eau Claire 1993; M.S. Minnesota 1996; Ph.D. Wisconsin 2002). Interests: landscape ecology and sustainable land management. 2003-P

RS = Richard C. Schultz (B.S. Iowa State 1965; M.S. Iowa State 1968; Ph.D. Iowa State 1970). Interests: forest ecology, hydrology, and watershed management. 1979-P

Thomas J. Scott (B.S. Iowa State College 1935; M.S. Iowa State College 1937). Wildlife Specialist 1937-38; Instructor 1938-39; Unit Leader of the Iowa Cooperative Wildlife Research Unit 1938-42 and 1945-48.

Sk = Lidia R. Skrynnikova (B.S. St. Petersburg, Russia 1993; M.A. Notre Dame 1995; M.S. Michigan 1998). Lecturer. Interests: renewable resources, natural resource policy, environmental history, conservation. 2013-P

TS = Timothy W. Stewart. (B.A. Ithaca College 1989; M.S. SUNY Brockport 1993; Ph.D. Bowling Green State University 1999). Interests: aquatic community ecology. Adjunct 2003-2006; tenure-track 2006-P

St = Douglas D. Stokke (B.S. Iowa State 1980; M.S. Minnesota 1982; Ph.D. Iowa State 1986). Interests: forestry. Assistant Professor 1999-2006; Senior Lecturer 2006-P

S = Robert C. Summerfelt (B.S. Wisconsin Stevens Point 1957; M.S. Southern Illinois 1959; Ph.D. Southern Illinois 1964). Interests: fish biology, aquaculture, aquatic toxicology, water quality, and fishery management. 1976-2005

T = John C. Tyndall (B.S. Western Michigan 1991; M.S. Iowa State 1996; Ph.D. Iowa State 2003). Interests: natural resource economics, human interactions, sustainability. 2008-P

V = Paul A. Vohs (B.S. Kansas State 1955; M.A. Southern Illinois 1958; Ph.D. Iowa State 1964). He was an Instructor at ISU in 1963-64 and then an Assistant Professor of Wildlife Biology from 1964-68. Returned as Unit Leader of the ICFWRU 1987-1992

MW = Michael J. Weber (B.S. South Dakota State 2005; M.S. Illinois 2008; Ph.D. South Dakota State). Interests: fisheries ecology and management, aquatic ecology. 2012-P

W = Milton W. Weller (A.B. Missouri 1951; M.A. Missouri 1954; Ph.D. Missouri 1956). Interests: avian ecology, wetland ecology, wildlife management. 1957-1974

WW = Walter H. Wellhouse (B.A. University of Kansas 1913; M.A. University of Kansas 1917; Ph.D. Cornell University 1920). 1921-1957. An entomologist; taught the evolution courses. 1921-1956

GW = Grace M. Wilkinson (B.S. Saint Olaf College 2010; Ph.D. Virginia 2015). EEOB and NREM. Interests: limnology, ecosystem ecology. 2017-P

LW = Larry D. Wing (B.S. Idaho 1958; M.S. Idaho 1966; Ph.D. Idaho 1970). 1970-73 (also listed as Assistant Professor in Biology Program in 1973-75 catalog and taught the Basic Ecology course). Interests: wildlife ecology and management. 1970-1976

Note: Collaborator (including unit faculty) and adjunct professors are non-tenure track positions. Several adjunct faculty became tenure-track, with subsequent promotions with tenure. The start date for that transition is given, but as with most other faculty, dates of promotions are not listed.



Table 2. Animal ecology-oriented courses taught in the Department of Zoology and Entomology from 1922 through the spring of 1940. Based on course catalogs and the quarter system. See Appendix Table 1 for faculty abbreviations. X indicates no instructor listed in the catalog.

Number	Course Title	Crs	Years											
			22-23	23-24	24-25	25-26	26-33	33-34	34-35	35-36	36-37	37-38	38-39	39-40
26	Forest Zoology	4			X	X	X							
35	Fish and Game	3			X	G	X							
50	Evolution of Animals	2	Ha	Ha	Ha	Ha	X	X						
60	Bird Study	2	X	G	G	G	X	X						
75	Field Zoology - Summers	4						X						
315	Bird Study	2 or 3							X	X	X	X	X	X
405	Fish and Game	3							X	X				
504	Game Birds and Mammals	3									He	He	He	He
506	Fishes	3										He	He	He
508	Tech. in Wildlife Mgmt	3									He	He	He	He
510	Parasites of Game Animals	4								Be	Be	Be	Be	
510	Parasites of Animal Wildlife	4												Be
516	Field Zoology - Summers	4							Be	Be	Be	Be	Be	Be
518	Cold-blooded Vertebrates	4												Ba
519	Warm-blooded Vertebrates	4												He
520	Wild Life Mgmt	4							He	He				
520	Wildlife Mgmt	4									He	He	He	He
578	Animal Ecology	4									K	K	K	K
595	Evolution of Animals	2										WW	WW	WW
617	Evolution of Animals	2							WW	WW	WW			

Table 3. Animal ecology-oriented courses taught in the Department of Zoology and Entomology from 1940 through the spring of 1961. Based on course catalogs and the quarter system. See Appendix Table 1 for faculty abbreviations. X indicates no instructor listed in the catalog. The curriculum in 1949-56 was very stable and these catalogs were condensed into one column.

No.	Course title	Cr	Years										
			40-44	44-45	45-46	46-47	47-48	48-49	49-56	56-57	57-59	59-61	
315/340	Bird Study*	2/3	X	X	X	X	X	X	X	X	X	X	He
504	Game Birds & Mammals	3	He	He	He	He	He						
519	Warm-blooded Vertebrates	4	He	He	He	He							
519	Wildlife of the World	3					He						
541	Game Birds	3							He	He			
542	Game Mammals	3							He	He			
441	Game Birds and Mammals	3									He	He	He
520	Wildlife Mgmt	4	He	He	He	He	He						
508/544	Techniques of Wildlife Mgmt*	4	He	He	He	He	He	He	He				
543	Wildlife Mgmt Tech (mammals)	4									He	He	He
544	Wildlife Mgmt Tech (birds)	4									He	He	He
545/644	Wildlife Administration**	3							He	He	He	He	He
645	Wildlife Conservation	4							He	He	He	He	He
518	Cold-blooded Vertebrates	4	Ba		He								
518/567/367	Amphibians and Reptiles***	4						C		C'	C	C	C
506/561/461	Fishes***	3	Ba	CD			CD	C	C	C	C	C	C
507/562	Fisheries Mgmt*	3/4	Ba	CD			CD	C	C	C	C	C	C
521/563	Fish Propagation & Pond Mgmt**	3						C		C'			
522/663	Fishery Resources **	3							C	C'	C	C	C
662	Techniques of Fishery Research	4									C	C	C
505	Limnology	3						C	C	C	C	C	C
516/441	Field Zoology*	4	Be	Be			Be	Be	X				
510	Parasites of Animal Wildlife	4	Be	Be			Be						
578/501	Animal Ecology*	4	K	K	K	K	K	K	K	K	K	K/W	W
595/503	Evolution of Animals*	2	WW	WW	WW	WW	WW	WW	WW	WW	X	X	OT

\* Changed numbers in 1948-49; \*\* Changed numbers in 1956-57; \*\*\* Changed numbers in 1948-49 and 1956-57; C' Carlander taught in alternate years

Table 4. Animal ecology-oriented courses taught in the Department of Zoology and Entomology from 1961 through the spring of 1975 and the Department of Animal Ecology from Fall 1975 through spring 1981. Based on course catalogs and the quarter system. See Appendix Table 1 for faculty abbreviations. X indicates no instructor listed in the catalog.

Number	Course title	Cr	61-63	63-65	65-67	67-69	69-71	71-73	73-75	75-77	77-79	79-81
	<b>Introductory Courses</b>											
141	Wildlife Conservation	3	E	X	V	X						
241	Principles of Wildlife Conservation	2					X	X				
342	Principles of Wildlife Conservation	2							X	LW	LW	X
	<b>Organismal Biology/Ecology</b>											
402	Animal Ecology	4	W	W	V	X	X	LW				
309	Basic Ecology**	3							LB	LB	LB	LB
200	Vertebrate Biology	5							BM/P	X	JD	JD
340	Ornithology	4	W	W	W	W	W	W	W	JD	JD	JD
464	Ichthyology and Herpetology	5	C	C	RB							
306	Herpetology	3				X	X	BM	BM	BM	BM	BM
464	Ichthyology	4				X	X	BM	BM	BM	BM	BM
447	Mammalogy	4	W	W	W	X	X	P	P	P	F	F
502	Animal Ecology	2							LW	LB		
502	Evolutionary Ecology	4										LB
602	Ecological Energetics	3						RB	RB	RB	RB	RB
603/503	Population Dynamics*	3	E	X	C	C	C	C	C	C	A	X
	<b>Wildlife Biology/Ecology/Mgmt</b>											
548/448	Wildlife Techniques	4	W	W	V	X	X	P	P	P	F	F
530	Wildlife Pollution Ecology*	3									EK	EK
540	Waterfowl Biol & Conservation*	3					W	W	W	JD		
540	Aquatic Birds	4									JD	JD
542	Wildlife Habitat Mgmt	4										X
544	Ungulate Ecology & Mgmt*	3									LW	F
545	Upland Game Mgmt*	3										RD
546	Wildlife Sociobiology & Mgmt*	3									F	F
546	Wildlife Administration	3	X									
645	Wildlife Mgmt*	3	E	X	W	X	W	W	W	RD	EK	EK

Table 4. Continued.

Number	Course title		61-63	63-65	65-67	67-69	69-71	71-73	73-75	75-77	77-79	79-81
	<b>Fisheries Biology/Ecology/Mgmt</b>											
465	Fishery Mgmt	4	C	C	C	C	C	C	C	C		
361	Principles of Fishery Mgmt	4									A	A
461	Fisheries & Limnological Tech	2									A/RB	A/RB
563	Fish Propagation	3		C	RB	RB	Bu	Bu	Bu	Bu	Bu	S
560	Fishery Aspects of Water Pollution*	3					Bu	Bu	Bu	Bu	A	A
564	Ecology of Fishes	3									BM	BM
565	Fisheries Mgmt	4									M	M
505/405	Fundamentals of Limnology	3	C	RB	RB	RB	RB	RB	RB	RB	RB	RB
605	Limnology	5				RB	RB	RB	RB	RB	RB	RB
662	Techniques of Fishery Research*	4	C	C	C	C	M	M	M	M	C	C
663	Fishery Resources*	3	C	C	C	C	M	M	M	M	C	C

\* taught alternate years; \*\* listed in Biology – taught every year with one instructor from Botany and one from Animal Ecology – only the A Ecl instructor is listed

Table 5. Animal ecology courses taught in the Department of Animal Ecology (NREM 2002-2003) from Fall 1981 through spring 2003. Based on course catalogs and the semester system. See Appendix Table 1 for faculty abbreviations. X indicates no instructor listed in the catalog.

Number	Course title	Cr	81-83	83-85	85-87	87-89	89-91	91-93	93-95	95-97	97-99	99-01	01/03
	<b>Natural Resource Conservation</b>												
130	Wildlife (Nat Res) & Agriculture	2	LB	LB	LB	LB/JD	LB/JD	LB	LB/BM	LB	LB	LB	LB
231	Wildlife Resource Conservation	3	A	A	A/DS	DS	DS/	?/Da					
231	Intro to Conservation Biology	3							Da	Da			
120	Intro to Renewable Resources	3									A/RH	A/RH	A/RH
331*	Ecological Living	2					F	F	F				
330	Interpretation of Nat Resources	3				JP	JP	JP	JP	JP	JP	JP	JP
430*	Media Tech. in Nat Resources	3							JP	JP	JP	JP	JP
460	Controversies in Nat Res Mgmt	3										A	A
	<b>Organismal Biology/Ecology</b>												
320	Vertebrate Biology & Lab	2 or 3	JD	JD	JD	JD	JD	JD	JD				
310,311	Vertebrate Biology & Lab	6								JD	JD	JD/JF	
310	Vertebrate Biology	3											TaS/JF
321/521	Ichthyology/Fish Biology	4-3	BM	BM	X	JR/JM	JM	JM	X	A	A	A	A
322/522	Herpetology	3	BM	X	MB	MB	MB	MB	X				
323/523	Mammalogy	4	F	F	F	F	F	F	F	F			
324/524	Ornithology	2	JD	JD	JD	JD	JD	JD	JD	JD			
325	Bird Study	1	JD	JD	JD	JD	JD	JD	JD	X	X	X	
361	Natural History: Fishes	1											JF
362	Natural History: Rept/Amphibs	1											JF
363	Natural History: Birds	1											TaS
364	Natural History: Mammals	1											TaS

Table 5. Continued.

Number	Course title	Cr	81-83	83-85	85-87	87-89	89-91	91-93	93-95	95-97	97-99	99-01	01/03
	<b>Wildlife Biology/Ecology/Mgmt</b>												
350	Wildlife Techniques	2	LB	LB	LB	F	F	F	F				
451	Wildlife Mgmt	3	CI	CI	CI	CI	CI	CI	CI	F	F	F	TaS
455	International Wildlife Issues	3										JD	JD
531*	Wildlife Planning, Policy, Admin	3	EK	X	X	V	X	X					
532*	Human Dimensions Wildl Mgmt	3								JP	JP	JP	JP
650-550*	Advanced Wildlife Mgmt	3	X	X	X	EK	EK	EK		EK			
550	Wildlife Energetics	3							EK				
	<b>Fishery Biology/Ecology/Mgmt</b>												
341	Fish Farming	2	X		S	S	S	S	S				
401	Aquatic Animal Health & Med	1											DES
440**	Fishery Mgmt	2/3	A	A	S	S/JM	S	S	S	S	S	S	S/JM
441	Fishery & Limnological Tech	2	A/RB	A/RB	A/RB	RB/DS	RB/DS	RB/JM	RB/Do				
442/542	Aquaculture & Lab	3								S	S	X	JF
510*	Histo & Pathology Fish Diseases	3					LM	LM	EP	EP	EP	EP	EP
520*	Fish Ecology	3	BM	BM	X	JR	X	X	X	CP	CP	CP	CP
640-540*	Fishery Resources & Res Tech	4	C	C	DS	DS							
540	Analysis of World Fisheries	2					X	X					
541*	Fish Culture/Aquaculture	3	N	N	S	S	S	S	S				
543*	Advanced Fishery Mgmt	3	WH	X	DS	DS	X	JM	X				
544*	Aquatic Toxicology	3		A	A	A	A	A	A	A	A	A	

Table 5. Continued.

Number	Course title	Cr	81-83	83-85	85-87	87-89	89-91	91-93	93-95	95-97	97-99	99-01	01/03
	<b>Basic/Applied Ecology</b>												
312	Ecology	3	LB	LB	LB	LB	LB	LB	LB	LB	LB	LB	LB
350	Ecological Methods & Analyses	3								CI	CI	CI	CI
410/510	Limnology	2	RB	RB	RB	RB	RB	RB	TI				
410	Aquatic Ecology	2/3								Do	Do	Do	Do
610-516	Advanced Limnology	3	RB	RB	RB	RB	RB						
515*	Ecology of Freshwater Inverts	3			BM	LM/BM	LM/JM	JM	JM	JM	JM	JM/Do	JM
518*	Stream Ecology	3					RB	RB	TI	CP	CP	CP	CP
513*	Pollution Ecology/Ecol Tox	3	A	A	A	A	A	A	A	A	A		
514-614*	Evolutionary Ecology	3	LB	LB	LB	LB	LB	Da	Da	Da	Da	Da	Da
511*	Population Ecology	3	CI	CI	CI	CI	CI	CI	CI				
588	Population Ecology	3								CI/KM	CI/KM	CI/KM	CI/KM
611*	Analysis of Populations	3				CI		CI	CI	CI	CI	CI	CI
512*	Vertebrate Behavioral Ecology	3		MB	MB	MB	MB	MB	X				
551*	Wildlife Sociobiology & Mgmt	3	F	F	F	F	F	F					
551*	Wildlife Behavioral Ecology	4							F	F/RK	F	F	BB
413	Community Ecology and Mgmt	3										Da	Da
531*	Conservation Biology	3								De/RK	De	De	De
552-535	Restoration Ecology	3								EK	EK/RK	RK	RK
560*	Ecological Resource Mgmt	3									Do	Do	Do
570*	Landscape Ecology	3								Da/KM	Da/KM	Da/KM	Da/KM
620-516*	Avian Ecology	3						LB	LB	LB	LB/RK	LB	LB

A Ecl 312 taught every year with one instructor from Botany and one from Animal Ecology – only the A Ecl instructor is listed; \* taught alternate years; \*\* A Ecl 440 became dual listed as A Ecl 440/540 in the 1995/97 catalog; JF = James Forsberg (Lecturer 1999-2004); TaS = Tammy Stafford (Adjunct Assistant Professor 2001-2003); EP as instructor for A Ecl/Zool 510 refers to Edwin Powell of the Zoology & Genetics Department – the course may not have been taught all of those times. KM = Kirk Moloney of the Botany Department – A Ecl 570 and A Ecl 580 were cross-listed with Botany

Table 6. Animal ecology-oriented courses taught in the Department of Natural Resource Ecology and Management from Fall 2003 through spring 2010. Based on course catalogs, class schedules and instructor communication. See Appendix Table 1 for faculty abbreviations. X indicates no instructor identified.

<b>Number</b>	<b>Title</b>	<b>Cr</b>	<b>3/5</b>	<b>5/7</b>	<b>7/9</b>	<b>9/10</b>
	<b>Natural Resource Management</b>					
NREM 120	Intro to Renewable Resources	3	A/RH	RH/P	RH/P	RH/P
NREM 130	Wildlife (Nat Res) & Agriculture	2	LB/TI	TI	TI	TI
NREM 330	Interpretation of Natural Resources	3	JP	JP	JP	JP
NREM 385/585	Natural Resource Policy	3		P	P	P
NREM 407/507	Watershed Mgmt	3	RS	RS d	RS	RS
NREM 430*	Media Techniques in Nat Res	3	JP	JP	JP	X
NREM 452/552	Ecosystem Mgmt	3			LS	LS
NREM 460	Controversies in Nat Res Mgmt	3	A	A	A/T/JM	JM
NREM 535	Restoration Ecology	3	RK	RK	RK	<b>BW</b>



Table 6. Continued.

Number	Title	Cr	3/5	5/7	7/9	9/10
	<b>Organismal Biology/Ecology</b>					
310	Vertebrate Biology	3	X			
365	Vertebrate Biology labs	4		SD/JB	JB	JB
321/521	Fish Biology	4	A/JM	Q	Q	Q
360	Natural History of Aquatic Biota	1		<b>Do</b>	<b>Do</b>	<b>Do</b>
361	Natural History: Fishes	1	X	KR		
362	Natural Hist: Reptiles/Amphibians	1	X	TS		
363	Natural History: Birds	1	X	LS		
364	Natural History: Mammals	1	X	TS		
366	Natural History: Iowa Vertebrates	1			TS	TS
411	Id of Aquatic Organisms	1	<b>Do</b>			
425/525*	Aquatic Insects	3	<b>GC</b>	<b>GC</b>	<b>GC</b>	
457/557	Herpetology	3			<b>FJ</b>	<b>FJ</b>
458/558	Ornithology	3			SD	SD
459-559	Mammalogy	3			SF/CI	SF/CI

Table 6 Continued.

Number	Course title	Cr	3/5	5/7	7/9	9/10
	<b>Wildlife Biology/Ecology/Mgmt</b>					
451	Wildlife Ecology and Mgmt	3	SF	SF	SF	SF
454/554	Principles of Wildlife Disease	3			JB	
455	International Wildlife Issues	3	X	X	X*	KR*
NREM 532*	Human Dimensions of Wildlife Mgmt	3	JP	JP	JP	P
		3				
	<b>Fishery Biology/Ecology/Mgmt</b>					
401	Aquatic Animal Health & Medicine	1	<b>DES</b>	<b>DES</b>	<b>DES</b>	DP
440/540	Fishery Mgmt	3	JM	JM	JM	JM
441/541	Fisheries Techniques	3			Q	Q
442/542	Aquaculture & Lab	3	S/JM	JM	JM	JM*
520*	Fish Ecology	3	CP			
520*	Fisheries Science	3		CP	CP	CP/Q

Table 6. Continued.

Number	Course title		3/5	5/7	7/9	9/10
	<b>Basic/Applied Ecology</b>	<b>Cr</b>				
312	Ecology		LB/TJ	TI/TJ	TI/TJ	TI/TJ
350	Ecological Methods and Analyses	3	CI			
371	Ecological Methods	3		SD	SD	SD
410	Aquatic Ecology & Lab	4	Do			
413	Community Ecology and Mgmt	4	Da			
472/572	Landscape Ecology/Nat Res Mgmt	3			LS	LS
486/486L	Aquatic Ecology	4		Do	Do	Do
514*	Evolutionary Ecology	3	Da	Da	Da	Da
415/515*	Ecology of Freshwater Invertebrates	3	JM/TS	X	TS	TS
516*	Avian Ecology	3	LB	SD	SD	SD
518*	Stream Ecology	3	CP	CP	CP (d)	CP/TI
531*	Conservation Biology	3	De	De	De	De
551*	Wildlife Behavioral Ecology	3	SF	SF	SF	SF
560*	Ecological Resource Mgmt	4	Do			
570*	Landscape Ecology	3	Da	Da	Da	Da
580	Research Methods in Ecology	2	X			
588	Population Ecology	2	CI	CI		
589	Population Ecology	3			CI	CI
611*	Analysis of Populations	3	CI	CI	CI	CI

Notes for Table 6.

- ❖ Courses offered but not listed include orientation, careers, work experience, seminars, research orientation, and travel. Some NREM courses are seldom taken by Animal Ecology students and, therefore, not listed
- ❖ **Bold** – taught by instructor from other department; instructors not listed in Table 1 include Gregory W. Courtney (GC – Ent), Frederic J. Janzen (FJ – EEOB), Thomas Jurik (TJ – EEOB), David Starling (DES – Biomedical Science), Brian J. Wilsey (BW – EEOB)
- ❖ \* = taught alternate years
- ❖ (d) = dual listed for first time
- ❖ A Ecl 401, first taught in 2001-2003, was a collaboration between A Ecl and Veterinary Medicine. Now titled *Introduction to Aquatic Animal Medicine*, and is an 8-wk course taught by Biomedical Sciences and cross-listed with A Ecl
- ❖ A Ecl 442/542, dropped lab in 2005-2007 catalog
- ❖ NREM 301 – name changed from Forest Ecology and Soils to Natural Resource Ecology and Soils in 2009-2012 catalog

Table 7. Animal ecology-oriented courses taught in the Department of Natural Resource Ecology and Management from Fall 2010 through Spring 2017. Based on records from the Registrar's Office, Iowa State University. See Appendix Table 1 and notes following Table 7 for faculty abbreviations. X indicates no instructor identified.

Number	Title	Cr	10/11	11/12	12/13	13/14	14/15	15/16	16/17
	<b>Natural Resource Management</b>								
NREM 120	Intro to Renewable Resources	3	RH/P	RH/P	RH	RH/P	RH/P	RH/P	P
NREM 130	Wildlife (Nat Res) & Agriculture	2	TI	TI	TI	TI	TI	TI	TI
NREM 207	Mgmt & N.A. Model of Cons	1				RC	P	P	P
NREM 270	Found Nat Res Policy & History	3		P	P	P	Sk	P	Sk
NREM 301	Nat Res Ecology & Soils	4	RS	RS	RS	RS	RS	RS	RS
NREM 315	Genetics for Nat Res Managers	3	JB	JB/KR	JB/KR	JB/KR	JB/KR	JB/KR	JB/KR
NREM 330	Interpretation of Natural Resources	3	RC/G	RC	RC	RC	P/MR	P/MR	P/MR
NREM 385/585	Natural Resource Policy	3	P	P	P	P	P	P	P
NREM 407/507	Watershed Mgmt	3	RS	RS	RS	RS	RS	RS	RS
NREM 452/552	Ecosystem Mgmt	3	TK/T	LS	LS	LS	LS (d)	LS	LS
NREM 460	Controversies in Nat Res Mgmt	3	JM	JM/TK/T	G/RH	RH/St	PM/RH/St	RH/MR/PM/St	MR/PM/St
NREM 535	Restoration Ecology	3	RK	<b>BW</b>		<b>BW</b>		<b>BW</b>	
	<b>Organismal Biology/Ecology</b>								
365	Vertebrate Biology	4	<b>DA/JB</b>	<b>DA/JB</b>	<b>DA/JB</b>	<b>DA/JB</b>	<b>DA/MR</b>	<b>JW/MR</b>	<b>DA/MR</b>
321/521	Fish Biology	3	KR	KR	KR	KR	KR	KR	KR
366	Natural History: Iowa Vertebrates	3	TS	TS	TS	TS	TS	TS	TS
425/525*	Aquatic Insects	3	<b>GC</b>		<b>GC</b>		<b>GC</b>		<b>GC</b>
457/557	Herpetology	3	<b>FJ</b>	<b>FJ</b>	<b>FJ</b>	<b>FJ</b>	<b>FJ</b>	<b>FJ</b>	<b>FJ</b>
458/558	Ornithology	3	SD	SD	SD	SD	SD	SD	TH
459-559	Mammalogy	3	SF	<b>CI</b>	SF	<b>DK</b>	MR	MR	MR

Table 7 continued.

Number	Course title	Cr	10/11	11/12	12/13	13/14	14/15	15/16	16/17
	<b>Wildlife Biology/Ecology/Mgmt</b>								
451	Wildlife Ecology and Mgmt	3	SF	SF	SF	Sk	PE	JA	JA/CN
454/554	Principles of Wildlife Disease	3	JB	JB	JB	JB	JB	JB	JB
455	International Wildlife Issues	3	KR		KR		KR		CN
		3							
	<b>Fishery Biology/Ecology/Mgmt</b>								
401	Aquatic Animal Health & Medicine	1	DP	DP	<b>DES</b>	<b>DES</b>	<b>DES</b>	<b>DES</b>	<b>DES</b>
440/540	Fishery Mgmt	3	JM	AP	JM	MW	MW	MW	MW
333	Fisheries Techniques	2					MW	MW	MW
442/542	Aquaculture & Lab	3	JM	JM		JM		JM	JM
520*	Fisheries Science	3	CP		CP		CP		CP
	<b>Basic/Applied Ecology</b>								
312	Ecology	4	<b>TJ/TI</b>	<b>TJ/TI</b>	<b>TJ/TI</b>	<b>TJ/TI</b>	<b>TJ/TI</b>	<b>TJ/TI</b>	<b>TJ/AR/VDV</b>
371	Ecological Methods	3	SD	SD	SD	SD	JA	JA	JA
486/486L	Aquatic Ecology	4	<b>Do</b>	<b>Do</b>	<b>Do</b>	<b>Do</b>	<b>Do</b>	<b>Do</b>	GW
514*	Evolutionary Ecology	3		<b>Da</b>		<b>Da</b>		<b>Da</b>	
415/515*	Ecology of Freshwater Invertebrates	3	TS		TS (d)		TS		TS
516*	Avian Ecology	3		SD		SD		SD	
518*	Stream Ecology	3		CP/TI		CP/TI		CP/TI	
531*	Conservation Biology	3	<b>De</b>	<b>De</b>	<b>De</b>	<b>De</b>	<b>De</b>	<b>De</b>	<b>De</b>
551*	Wildlife Behavioral Ecology	3		SF				CN	
570*	Landscape Ecology	3	<b>Da</b>		<b>Da</b>		<b>Da</b>		<b>Da</b>
589	Population Ecology	3		<b>KM</b>	<b>KM</b>		<b>KM</b>		<b>KM</b>
611*	Analysis of Populations	3		<b>Cl</b>		<b>Cl</b>	RWK		RWK

Notes for Table 7.

- ❖ Courses offered but not listed include orientation, careers, work experience, seminars, research orientation, and travel. Some NREM courses are seldom taken by Animal Ecology students and, therefore, not listed
- ❖ **Bold** – taught by instructor from other department and instructors not listed in Table 1: Dean Adams (DA – EEOB), Gregory W. Courtney (GC – Ent), Frederic J. Janzen (FJ – EEOB), Thomas Jurik (TJ – EEOB), Danielle Kness (DK – NREM), (Kirk Moloney (KM – EEOB), David Starling (DES – Biomedical Science), Arnold van der Valk (VDV – EEOB), Brian J. Wilsey (BW – EEOB)
- ❖ NREM graduate students and post-docs and not listed in Table 1; Michaeleen Gerken (G – Ph.D. candidate), Tyler Harms (TH – Ph.D. candidate), Tricia Knoot (TK – Post-doc)
- ❖ \* = taught alternate years
- ❖ (d) = dual listed for first time
- ❖ A Ecl 457, 458, and 459 – split the labs off as 457L, 458L, and 459L (1 cr) in the 2014-2015 catalog, with lecture course now 2 credits
- ❖ A Ecl 515 – name changed from *Ecology of Freshwater Invertebrates* to *Ecology of Freshwater Invertebrates, Plants and Algae* in 2011-2012 catalog
- ❖ A Ecl 551 – name changed from Wildlife Behavioral Ecology to Behavioral Ecology 2011-2012 catalog
- ❖ NREM 301 – name changed from Forest Ecology and Soils to Natural Resource Ecology and Soils in 2009-2012 catalog
- ❖ NREM 330 – name changed from Interpretation of Natural Resources to Principles of Interpretation in 2012-2013 catalog

Table 8. Undergraduate enrollment data from Fall quarter or semester for students majoring in Fish and Wildlife Management, Fisheries and Wildlife Biology, or Animal Ecology at Iowa State from 1959 to 2002. % W = Percentage of enrollment by women.

<b>Year</b>	<b>FWB*</b>	<b>% W</b>	<b>A Ecl</b>	<b>% W</b>	<b>Total</b>	<b>% W</b>
1959	36	na	NA	NA	36	na
1960	63	na	NA	NA	63	na
1961	87	na	NA	NA	87	na
1962	92	na	NA	NA	92	na
1963	116	na	NA	NA	116	na
1964	122	na	NA	NA	122	na
1965	160	na	NA	NA	160	na
1966	186	1	NA	NA	186	1
1967	244	1	NA	NA	244	1
1968	254	2	NA	NA	254	2
1969	305	4	NA	NA	305	4
1970	316	5	NA	NA	316	5
1971	320	7	NA	NA	320	7
1972	340	9	NA	NA	340	9
1973	350	9	6	50	356	10
1974	332	12	14	14	346	12
1975	333	15	32	38	365	17
1976	293	16	49	43	342	20
1977	296	23	74	39	370	26
1978	258	23	76	46	334	28
1979	254	27	75	60	329	34
1980	223	27	61	51	284	32
1981	220	25	51	49	271	29
1982	199	26	51	51	250	31
1983	200	20	46	48	246	26
1984	220	17	42	43	262	21
1985	202	16	49	53	251	23
1986	191	18	54	43	245	23
1987	183	20	69	52	252	29
1988	206	20	75	51	281	28
1989	231	16	72	42	303	22
1990	236	17	77	53	313	26
1991	263	23	88	53	351	31
1992	276	25	100	59	376	34
1993	290	28	111	57	401	36
1994	270	27	120	56	390	36
1995	165	25	225	48	390	38
1996	67	24	251	42	318	38
1997	11	18	261	46	272	45
1998	3	33	270	47	273	47
1999	1	0	303	44	304	44
2000	NA	NA	308	46	308	46
2001	NA	NA	346	46	346	46



Table 8. Continued.

Source: Annual Reports of the Dean of Admissions and records at Iowa State University; 2000-2017 data from the Registrar at <http://www.registrar.iastate.edu/enrollment/enrollment-by-major>.

FWB\* – From 1959 to 1964 the major was Fish and Wildlife Management. It was changed to Fisheries and Wildlife Biology in 1965.

na = not available; NA = not applicable

Table 9. Undergraduate enrollment data from Fall semester for students majoring in Animal Ecology and Forestry in the Department of Natural Resource Ecology and Management at Iowa State University. % W = Percentage of enrollment by women.

<b>Year</b>	<b>A Ecl</b>	<b>% W</b>	<b>For</b>	<b>%W</b>	<b>Total</b>
2002	316	50	92	13	408
2003	298	49	80	19	378
2004	298	48	75	21	373
2005	258	45	72	18	330
2006	264	44	84	15	348
2007	225	42	72	15	297
2008	248	51	66	21	314
2009	295	50	78	22	373
2010	313	50	75	23	388
2011	339	54	83	28	422
2012	340	58	97	27	437
2013	365	63	97	20	462
2014	357	65	96	22	453
2015	372	67	87	18	459
2016	372	62	87	17	459
2017	395	62	97	22	491

Source: Office of the Registrar, Iowa State University – <http://www.registrar.iastate.edu/enrollment/enrollment-by-major>.

Table 10. Percentage distribution of students enrolling in fall semesters in each of the available options in the Animal Ecology major. Na = not available. Note that the Fisheries and Aquatic Sciences option was split during the 2007-2009 and 2009-2011 course catalogs; there was some phasing in and out of those changes. \* = based on Registrar's data

Option	F03	F04	F05	F06	F07	F08	F09	F10	F11	F12	F13	F14	F15	F16	F17
<b>Animal Ecology Majors</b>															
Ecology	5.6	3.8	4.0	5.8	1.9	na	na	na	na	na	na	na	na	na	na
Aquaculture	0.0	0.5	2.3	na	na	na	na	na	na	na	na	na	na	na	na
Aquatic Sciences	na	na	na	na	0.0	0.8	1.7	2.6	5.4	4.5	2.2	1.3	na	na	na
Fisheries	na	na	na	na	11.4	14.3	10.1	8.9	6.2	5.9	2.6	1.3	na	na	na
Fisheries & Aquatic Sci	10.7	14.3	14.9	12.3	1.9	na	na	na	2.2	3.6	8.8	11.2	10.9	10.5	12.1
Interpretation Nat Res	13.0	9.5	8.0	9.4	7.6	7.5	8.4	6.8	7.1	12.6	12.3	8.5	8.9	9.9	9.3
Prevet & Wildlife Care	28.8	33.3	35.1	41.3	39.0	36.8	41.6	45.3	44.2	45.0	43.6	51.3	53.6	49.2	47.8
Wildlife	41.8	38.6	35.6	31.2	38.1	40.6	38.2	36.3	34.8	28.4	30.4	26.3	26.6	30.4	30.8
Total A Ecl Declared	177	210	174	138	105	133	178	190	224	222	227	224	192	181	182
Total Animal Ecology*	298	298	258	264	225	248	295	313	339	340	365	357	372	372	395

<b>Forestry Majors</b>															
Forest Ecosystem Mgmt	37.0	32.2	32.7	27.9	28.2	61.0	46.2	29.8	28.0	34.5	33.9	35.8	48.6	63.2	63.4
Interpretation Nat Res	na	1.6	1.9	0	0	0	3.8	6.4	12.0	15.5	19.4	11.3	8.6	2.6	4.9
Nat Res Cons & Restor	na	na	na	na	na	na	42.3	61.7	44.0	32.8	35.5	45.3	37.1	34.2	19.5
Nat Res Conservation	30.4	40.3	42.3	44.2	41.0	26.8	na	na	na	na	na	na	na	na	na
Sustainable Materials	na	na	0	0	2.6	2.4	1.9	0	8.0	6.9	0	0	0	0	2.4
Urban & Com Forestry	8.7	4.8	5.8	11.6	12.8	9.8	5.8	2.1	8.0	10.3	11.3	7.5	5.7	0	9.8
Wood Products	23.9	21.0	17.3	16.3	15.4	na	na	na	na	na	na	na	na	na	na
Total Forestry Declared	46	62	52	43	39	41	52	47	50	58	62	53	35	38	41
Total Forestry*	80	75	72	84	72	66	78	75	83	97	97	96	87	87	97

Table 11. Graduate student enrollment data from Fall quarter or semester, 1966-2002, for students majoring in Fisheries and Wildlife Biology or Animal Ecology at Iowa State. % W = % women.

Year	FWB	%W	Fisheries	%W	Wildlife	%W	A Ecl	%W	Total	%W
1966	16	0	NA		NA		NA		16*	0
1967	22	0	NA		NA		NA		22*	0
1968	19	0	NA		NA		NA		19*	0
1969	36	11	NA		NA		NA		36	11
1970	36	6	NA		NA		NA		36	6
1971	38	3	NA		NA		NA		38	3
1972	?		13	8	14	14	NA		27	11
1973	?		14	7	15	13	NA		29	10
1974	?		18	11	14	21	NA		32	16
1975	NA		15	13	14	7	11	27	40	15
1976	NA		11	18	16	19	13	38	40	25
1977	NA		8	12	11	18	18	28	37	22
1978	NA		7	14	13	23	22	41	42	31
1979	NA		5	0	8	25	26	23	39	20
1980	NA		3	33	10	33	32	22	45	24
1981	NA						49	20	49	20
1982	NA						49	16	49	16
1983							36	17	36	17
1984							35	23	35	23
1985							29	17	29	17
1986							26	8	26	8
1987							32	19	32	19
1988							39	26	39	26
1989							50	24	50	24
1990							40	28	40	28
1991							39	33	39	33
1992							33	36	33	36
1993							29	38	29	38
1994							27	37	27	37
1995							33	48	33	48
1996							38	42	38	42
1997							33	42	33	42
1998							40	32	40	32
1999							33	33	33	33
2000							30	30	30	30
2001							32	31	32	31
2002							48	42	48	42

Table 12. Graduate student enrollment data from Fall quarter or semester, 2003-2017, for students in the Department of Natural Resource Ecology and Management at Iowa State. % W = % women.

Year	NREM	%W
2003	43	35
2004	51	39
2005	51	37
2006	51	33
2007	44	27
2008	47	32
2009	44	36
2010	42	40
2011	35	31
2012	35	43
2013	33	42
2014	36	39
2015	42	43
2016	43	51
2017	42	45

Notes for Tables 11 and 12:

- ❖ The 1972-1974 data may underestimate enrollment. The *Annual Reports of the Dean of Admissions and Records* do not list any enrollment in the FWB major, but the 1978 *Research in Animal Ecology: A Special Review* shows that as the FWB major was being phased out there were 13 students enrolled in 1972, 12 in 1973, and 5 in 1974. No information on gender was given.
- ❖ Students majoring in the interdepartmental programs, such as Water Resources, Environmental Science, Toxicology, and Ecology and Evolutionary Biology, are included in these figures
- ❖ From 2003 to present the Registrar's office only provide data for the entire NREM department, so include Forestry majors.

Source: Annual Reports of the Dean of Admissions and Records at Iowa State University; 2000-2017 data from the Registrar at <http://www.registrar.iastate.edu/enrollment/enrollment-by-major>.

Table 13. Number of Natural Resource Ecology and Management M.S. and Ph.D. students graduated by year and major, 2002-2015. (Ph.D. students in parentheses.)

Year	A ECL	EEB	ENVSC	F B	FOR	SUSAG	W R	W B/W E	Total
2002	0	0	0	1	2	0	0	1	4
2003	3	4(1)	0	1	4(2)	0	0	1	13(3)
2004	0	1	0	2	2(1)	0	0(1)	1	6(2)
2005	4	2	0	4(1)	4(1)	2	1	0	17(2)
2006	2(1)	3	0	0	2	1	1	1	10(1)
2007	3	0(1)	2	3	1(2)	1	0	1	11(3)
2008	4	1(1)	2(1)	2	1(2)	1	0	2	13(4)
2009	1(1)	1(1)	0	2	1	0	0	1	6(2)
2010	0	2	0	2	0(1)	0	0	4(1)	8(2)
2011	0	1(2)	0	1(1)	1(1~)	3	0	5	11(4)
2012	0	0	0	1(2)	0(1)	1	0	1	3(3)
2013	0	0(1)	0(1)	3	0	1	0	5*#	9(2)
2014	0	0(1)	0	0	1	4	0	2	7(1)
2015	0	0	0(1)	1	2*	1	0	2(2)	6(3)
Total	17(2)	15(8)	4(3)	23(4)	21(11)	15(0)	2(1)	27(3)	124(32)

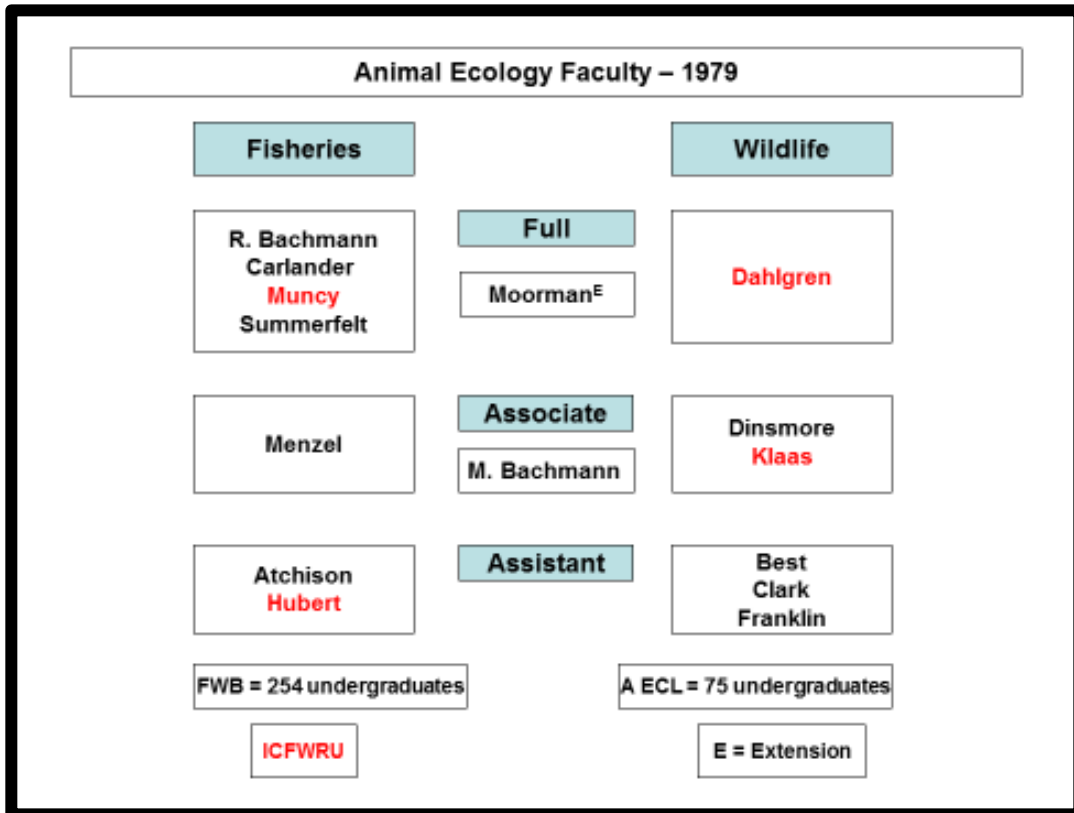
Abbreviations: A ECL = Animal Ecology; EEB = Ecology and Evolutionary Biology; ENVSC = Environmental Science; F B = Fisheries Biology; FOR = Forestry; SUSAG = Sustainable Agriculture; W R = Water Resources; W B/W E = Wildlife Biology or Wildlife Ecology

Notes: \* = one double major with Sustainable Agriculture; ~ = one double major with Toxicology; # = one double major with Environmental Science

Sources: NREM Program self-study documents for 2008 and 2015 reviews.

Figures 1-6. This is a series of faculty diagrams showing distribution of faculty in either fisheries or wildlife (1979-1999) or animal ecology or forestry (2001-2017). Blue = tenured or tenure-track faculty.

Figure 1. Animal Ecology Department faculty with interests in fisheries or wildlife based on faculty listings in the 1979-81 Iowa State University Bulletin. Student numbers based on Table 8.



Note: Moorman and M. Bachmann were a blend of Fisheries and Wildlife.

Figure 2. Animal Ecology Department faculty with interests in fisheries or wildlife based faculty listings in the 1989-91 Iowa State University Bulletin. Student numbers based on Table 8.

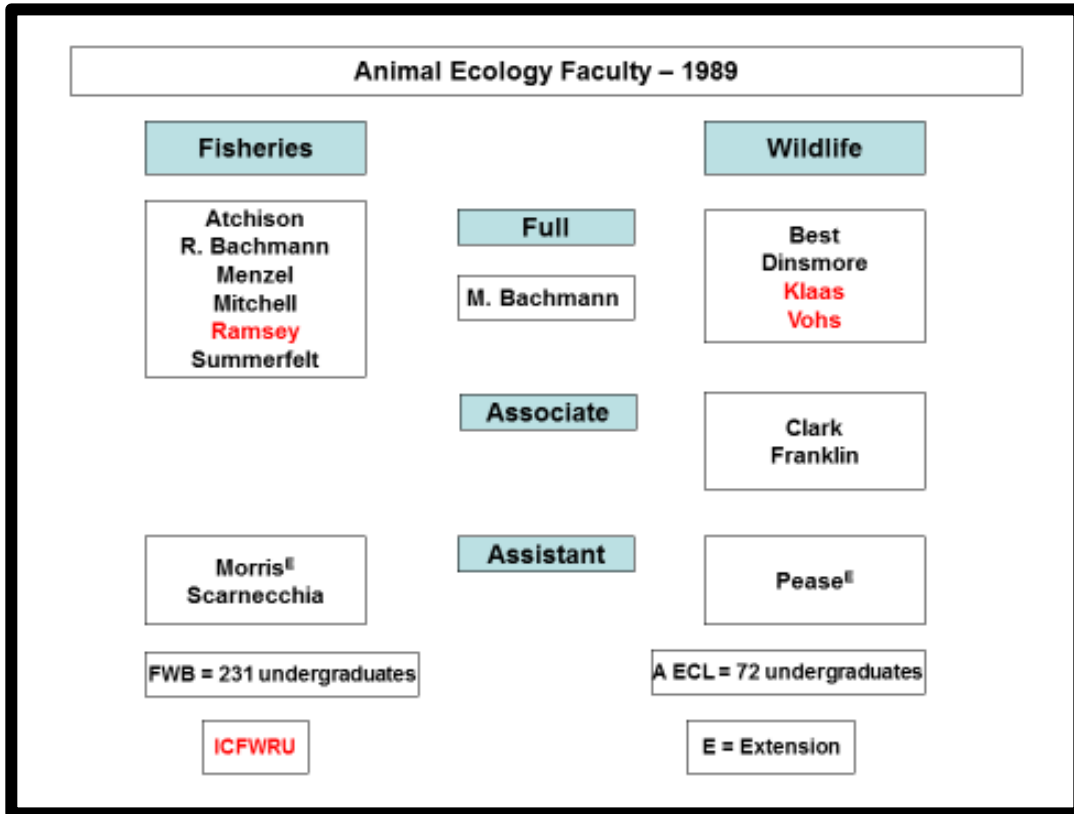


Figure 3. Animal Ecology Department faculty with interests in fisheries or wildlife based faculty listings in the 1999-2001 Iowa State University Bulletin. Student numbers based on Table 8.

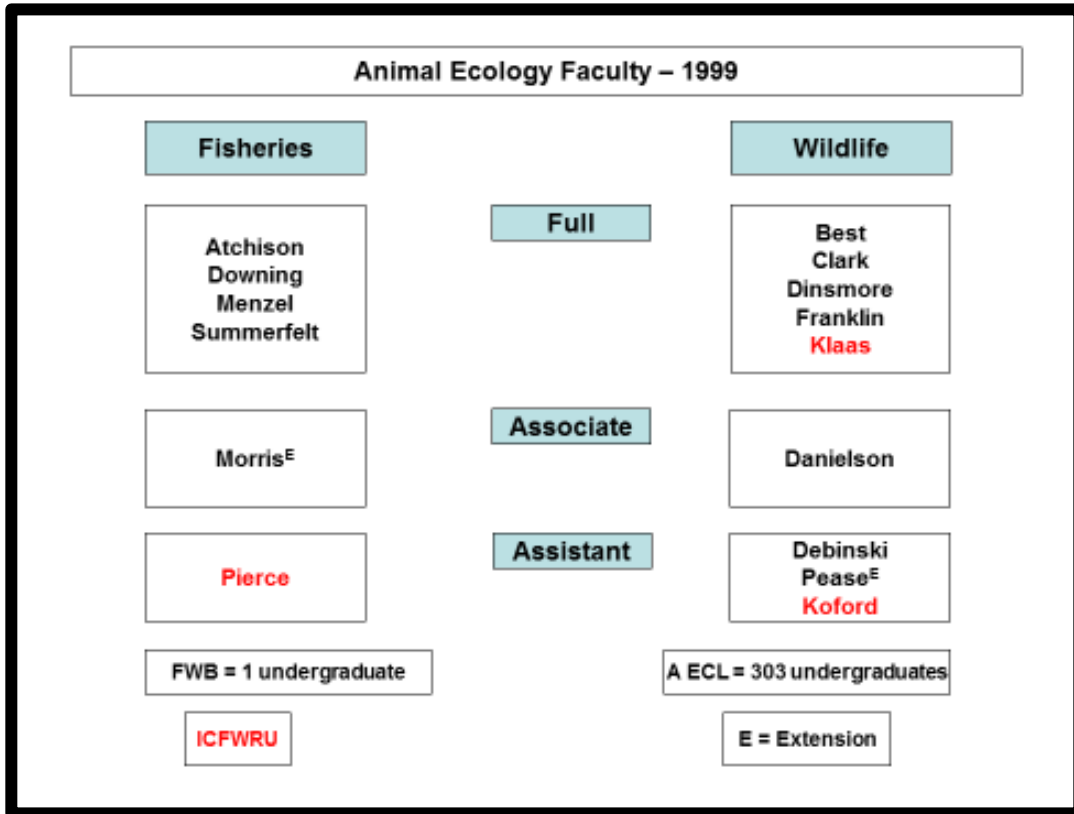




Figure 4. Animal Ecology Department and Forestry Department faculty based faculty listings in the 2001-2003 Iowa State University Bulletin. Coll/Adj = Collaborators/Adjunct faculty; not tenure-track but with a formal association with the department. Student numbers based on Table 8 and Annual Reports of the Dean of Admissions and Records at Iowa State University; 2000-2016.

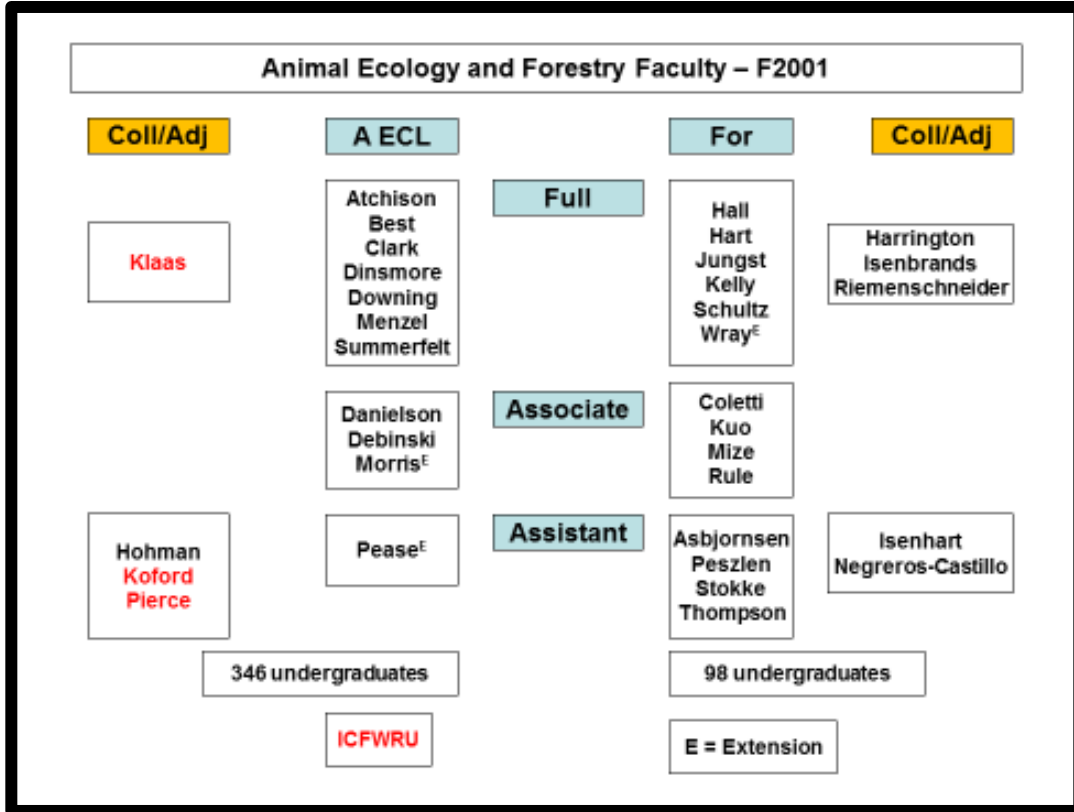


Figure 5. Natural Resource Ecology and Management Department faculty with specializations in animal ecology or forestry. Lecturer is primarily a teaching position. Coll/Adj = Collaborators/Adjunct faculty; not tenure-track but with a formal association with the department. Student numbers based on Table 8.

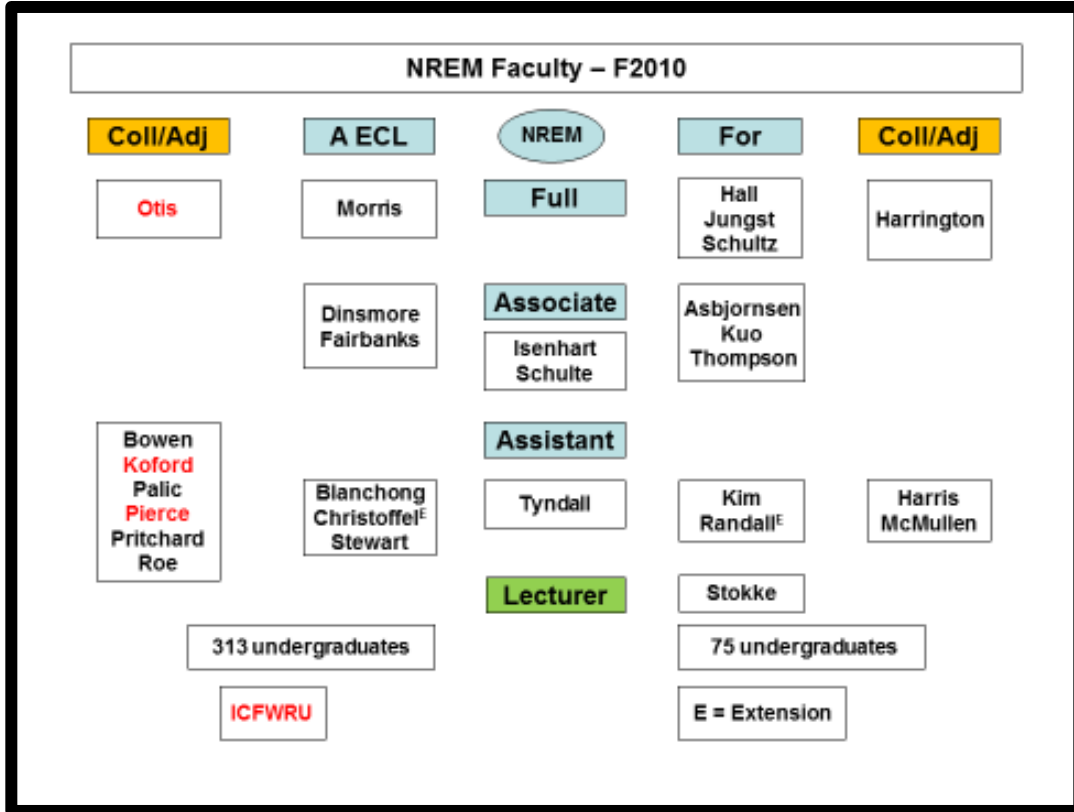
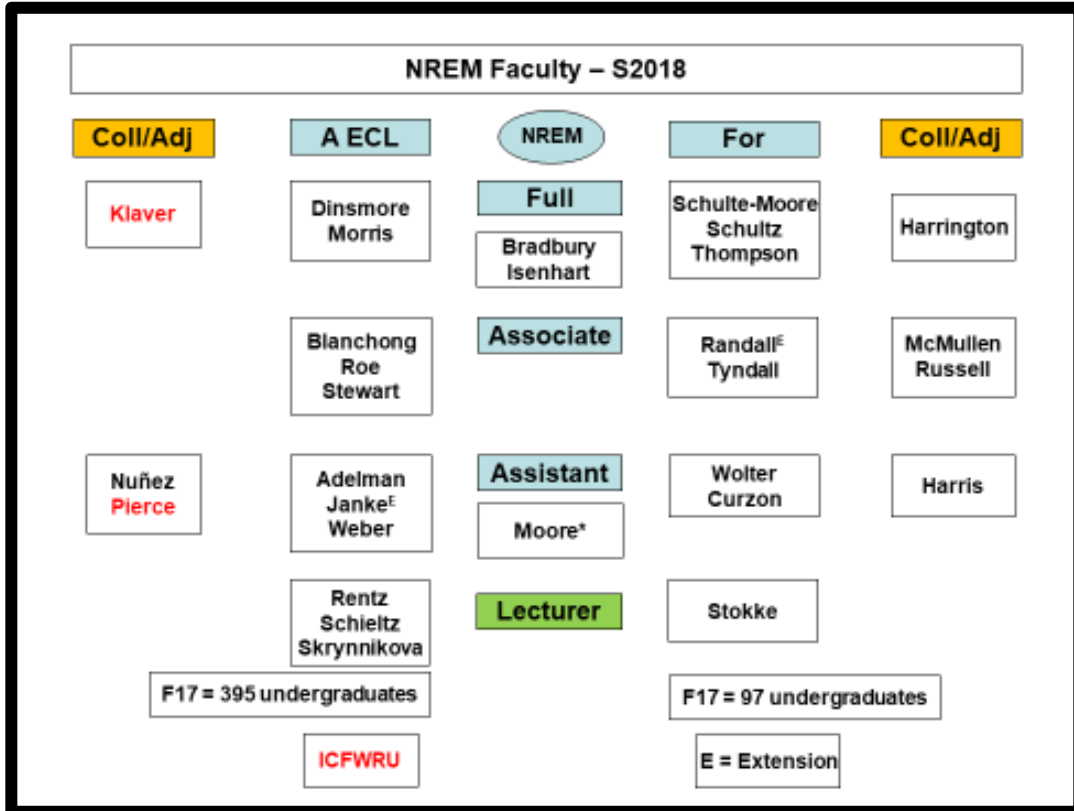


Figure 6. Natural Resource Ecology and Management Department faculty with specializations in animal ecology or forestry. Lecturer is primarily a teaching position. Coll = Collaborators/Adjunct faculty; not tenure-track but with a formal association with the department. Student numbers based on Table 8. \*Moore is Adjunct faculty.



## **Appendix II**

The following series of departmental vision and mission statements is from the various self-assessment reports written in 1989, 1995, 2008 and 2015 for outside reviews of the program. The 1978 and 1983 outside reviews were focused on research and did not include mission statements for the department. There clearly is no standard approach, but they show how the program changed over time based on how the faculty viewed the program at those points in time.

### **Animal Ecology – 1989**

The faculty of the Department of Animal Ecology in the College of Agriculture teach and advise undergraduate and graduate students, carry out research in basic and applied ecology of aquatic and terrestrial organisms and their habitats, and offer extension programs in aquaculture, and fish and wildlife management. Ecology is founded in the discipline of biology but it is a multifaceted science, requiring an integrated interdisciplinary approach to problem solving. We study population, community, ecosystem, behavioral, and evolutionary ecology of animals and the applications of basic ecological concepts to understanding and resolving environmental problems. Faculty are responsive to issues of concern to the State of Iowa, as well as to national and international audiences. We believe that an understanding of ecological concepts is critical to sustaining productivity of food and fiber, and to the health and aesthetic well-being of human society.

The Department offers the only baccalaureate and graduate degree programs in fishery and wildlife biology and animal ecology in Iowa. Besides a strong foundation in biological sciences, the undergraduate curricula require a broad background in mathematics, natural sciences, communication, social sciences and humanities. The faculty believe that our undergraduate curricula should provide educational breadth as a basis for life-long learning as well as the focus necessary for professional employment and post-baccalaureate studies. Teaching in the Department includes courses and curricula needed for the education of professional ecologists, educators, natural resource managers and other specialties, and courses designed to provide instruction for the entire university community. Faculty in Animal Ecology also teach and advise in the interdepartmental baccalaureate programs in Biology, Environmental Studies, and Pest Management. The Department endeavors to provide a high quality teaching and advising experience that is nationally recognized as among the very best available.

The Department offers work for the Masters of Science and Doctor of Philosophy degrees in Wildlife Biology, Fishery Biology and Animal Ecology, and actively participates in interdepartmental graduate programs in Toxicology, Water Resources, and Ecology and Evolutionary Biology. Extramural grants provide a substantial portion of support for research and graduate stipends. Personnel of the U.S. Fish and Wildlife Service staff the Iowa Cooperative Fish and Wildlife Research Unit. As adjunct faculty in the Department, they teach graduate level courses, direct graduate student research, and administer extramural grants. The Department's research primarily relates to the Iowa Agriculture and Home Economics Experiment Station goal of improving and protecting Iowa's natural resources, including its soil, water, environment and wildlife. Faculty research in the Department emphasizes agriculture-wildlife interactions, animal behavior, aquaculture, aquatic ecology, environmental contaminants, and fish and wildlife biology.

Faculty communicate research findings to the scientific community and natural resource specialists through talks at professional meetings and workshops and by means of publications in scientific journals, symposia, books and popular articles. The Department also shares in an official extension function. Our extension specialists disseminate research findings to county, state and federal agencies, private organizations and the general public. Extension programming includes information on aquaculture, enhancement, wise and sustained use of natural resources, the management of habitat for those resources and the impact of harmful interactions of those resources with humans.

### **Animal Ecology – 1995**

The Department of Animal Ecology has a focus on the ecology and management of free-living vertebrate and invertebrate animals commonly referred to as wildlife and treated in U.S. law as a public natural resource. The Department seeks to provide high quality programs contributing to the wildlife resources in Iowa, the nation, and the world. To accomplish this, the Department:

- conducts formal and informal teaching and administers undergraduate and graduate degree programs concerned with the biology, ecology, and management of wildlife and with the ecosystems which support them,
- guides the development of its students in preparation for technical and professional careers, for further education, and for world citizenship,
- emphasizes in its science-based degree programs disciplinary and interdisciplinary education, including social and cultural dimensions of wildlife and ecological science,
- conducts basic and applied wildlife research, especially in the context of agroecosystems,
- responds to needs of natural resources management agencies, legislative and policy-making bodies, agricultural and other industries, and the general public for research based information,
- contributes to cooperation between ISU academic, research, and extension units and between other organizations elsewhere of similar mission.

### **Natural Resource Ecology and Management – 2003**

(First version drafted by new department)

The Department of Natural Resource Ecology and Management (NREM) serves to address in a holistic, multidisciplinary manner many of the problems and opportunities associated with the broad spectrum of natural resource and environmental management issues that now confront us. The Department is dedicated to the understanding, effective management and sustainable use of our natural resources through the land-grant missions of teaching, research, and extension. The interests of NREM are broad in scope, ranging from individual organisms to landscapes, from natural to managed ecosystems, from wilderness to agricultural and urban systems, from local to international environments, and from resource preservation to utilization. This is reflected in a diversity of faculty expertise, including ecology, social science, economics, resource management and utilization, sustainable harvest, and human dimensions. NREM serves society through the land-grant tradition of working with undergraduate and graduate students, state and federal government agencies, non-governmental organizations, businesses, and the public.

The Department fulfills its land-grant mission to serve the state, the nation and the world by achieving excellence through:

- A nationally-recognized undergraduate program based on a commitment to modern teaching methods, experiential learning and personal attention to all students

- An internationally respected graduate program, enhanced by integrative study, mentoring, and participation in interdepartmental graduate programs
- A research program that spans basic to applied sciences, as well as the human dimensions aspects that address critical issues of natural resource management, especially those in agricultural environments
- Extension and outreach programs and activities that address the expectations and needs of our stakeholders, particularly in conservation and management of fish, wildlife and forest resources.

### **Natural Resource Ecology and Management – 2008**

NREM is dedicated to the understanding, effective management, and sustainable use of our renewable natural resources through the land-grant missions of teaching, research, and extension. NREM's disciplinary focus is broad in scope, ranging from individual organisms to landscapes, from natural to managed ecosystems, from wilderness to agricultural and urban systems, from local to international environments, and from resource preservation to sustainable use.

Understanding and effectively managing our natural resources requires long-term vision and multidisciplinary approaches involving NREM personnel working with people from other diverse disciplines across the university and within federal and state agencies and nongovernmental organizations. NREM reflects a diversity of disciplines, including ecology and other biological sciences, social science, economics, sustainable resource management and use, and human dimensions. NREM serves society through the land-grant tradition of working with undergraduate and graduate students, state and federal government agencies, non-governmental organizations, businesses, and the public. As such, NREM provides answers to natural resource problems in Iowa, the Midwest, and the nation.

The vision that drives NREM is multidimensional and consists of the following:

- Providing a student-centered environment for instruction and advising, and promoting activities that foster social, learning, and professional networking;
- Producing graduates who are widely considered top-quality professionals - competent, capable, collaborative, dependable, and disciplined;
- Maintaining mutually productive and supportive relationships with stakeholders (landowners, agencies, parents, students, and conservation groups);
- Conducting excellent applied and basic research, particularly “problem-oriented science” that is relevant and focused on Iowa and the Midwest, but also has global application;
- Providing outreach and extension that serves the interest of stakeholders and promotes natural resource sustainability.

### **Natural Resource Ecology and Management – 2015**

The Department of Natural Resource Ecology and Management (NREM) is dedicated to the understanding, effective management, and sustainable use of our renewable natural resources through the land-grant missions of teaching, research, and extension. The disciplinary focus of NREM is broad in scope, ranging from individual organisms to landscapes, from natural to managed ecosystems, from wilderness to agricultural and urban systems, from local to international environments, and from resource preservation to sustainable use. Understanding and effectively managing our natural resources requires long-term vision and multidisciplinary approaches. As such, NREM personnel work with people from diverse disciplines across the University and within federal and state agencies and nongovernmental organizations. A diversity

of disciplines is reflected in NREM, including ecology and other biological sciences, social science, economics, sustainable resource management and use, and human dimensions. The expertise of NREM personnel helps to serve society through the landgrant tradition of working with undergraduate and graduate students, state and federal government agencies, nongovernmental organizations, businesses, and the public. Thus, NREM provides answers to natural resource problems in Iowa, the Midwest, and the nation.