

ITEM 122-1005-R0104

PROPOSAL

FOR IMPLEMENTATION OF AN

AVIAN SCIENCE CENTER OF

THE UNIVERSITY OF MONTANA



Milo Burcham Photo

September 15, 2003

TABLE OF CONTENTS

Program Description	1
Faculty and Staff Requirements.....	7
Capital Outlay, Operating Expenditures, and Physical Facilities.....	9
Internal Assessment Plan.....	10
Literature Cited.....	11
Appendix I.....	12
Appendix II.....	16
Appendix III.....	17
Appendix IV.....	18

PROGRAM DESCRIPTION

- 1. Briefly describe the proposed new program. Please indicate if it is an expansion of an existing program; a new program; a cooperative effort with another institution, business, or industry; or an on-campus or off-campus program. Attach any formal agreements established for cooperative efforts.**

The University of Montana has acquired both international and national stature in the field of avian biology, primarily because of the high quality research conducted by its faculty and graduate students. The program has also achieved national recognition through the creation of regional and national bird monitoring programs that now provide a valuable service for various state and federal agencies and other industries and organizations that need access to such information for planning purposes. In addition, The University of Montana has a relatively large number of tenure-track and adjunct avian biology faculty (currently 10), two of whom have served as hosts of nationally televised programs about bird biology (“All-bird TV” on Animal Planet, and “BirdWatch” on PBS). These strengths have been highlighted in an article in the Montanan (Appendix I), and have served as the basis for developing a program in avian biology at The University of Montana (Appendix II). Thus, The University of Montana is uniquely positioned to develop a formal “Avian Science Center of The University of Montana” to address specific research and monitoring needs that are not being satisfactorily addressed through largely independent efforts of individual faculty members, and to take advantage of the unique education and outreach opportunities that would be provided by a center with a focus on birds. Specifically, the purpose or mission of such a center would be four-fold: (1) to promote and conduct high caliber, basic avian research, as well as service-oriented avian research and monitoring for various public agencies and for private organizations that operate primarily within the state of Montana; (2) to facilitate collaborative efforts with other research and monitoring programs so that avian scientists can address questions that require such collaboration; (3) to enhance traditional and continuing educational opportunities related to bird research and monitoring; and (4) to disseminate research and monitoring results in a manner that promotes conservation of natural resources through informed land management and land stewardship practices.

The Avian Science Center of The University of Montana would be a new on-campus program within the Division of Biological Sciences at UM-Missoula, and would rely heavily on the financial support provided by cooperative agreements, grants, and contracts with federal and state agencies, private industry, and private foundations. For example, Dr. Hutto has recently secured a formal agreement with the U.S. Forest Service (dated 21 February 2003), which provides support to work cooperatively to

“...improve the ability of the Forest Service to monitor population trends and to understand habitat relationships of landbirds across the Northern Region and adjacent lands. It is also the intent to use this information to: (1) increase the understanding of landbird ecology; (2) understand the strengths and limitations of landbird monitoring efforts; (3) monitor the effects of Forest Service management activities on landbirds

and (4) use this information to help revise Forest Plans. In addition, it is intended that the University of Montana use this information to develop or update curricula related to bird ecology and conservation. Moreover, this Agreement will serve to further the intent of the January 10, 2001, Presidential Executive Order [13186] regarding the responsibilities of federal agencies to protect migratory birds and the Interagency Memorandum of Understanding between the Forest Service and the U.S. Fish and Wildlife Service regarding the conservation and management of migratory birds, their habitats and associated values” (full agreement attached and on file in the Office of Research and Sponsored Programs).

The aforementioned USFS-UM agreement is not a typical research grant or contract; instead, money is specifically made available to enhance educational opportunities for undergraduates, graduates, and the public-at-large. Other contracts are now in place with PPL-Montana and the Bureau of Land Management to conduct bird monitoring on the Madison and Missouri River corridors, and with Montana Fish, Wildlife and Parks, and the Montana Department of Environmental Quality to conduct bird monitoring in eastern Montana. We are particularly interested in developing a number of outreach programs for students, professionals, and the public-at-large, which would generate support for the Center and our graduate program, and be coordinated by Continuing Education and the Montana Natural History Center (see conceptual framework in Appendix III). Other likely avenues of support include the National Science Foundation and the National Center for Ecological Analysis and Synthesis, each of which is currently encouraging creative ways to synthesize and disseminate research results.

2. Summarize a needs assessment conducted to justify the proposal. Please include how the assessment plan was developed or executed and the data derived from this effort.

(a) The legal mandates to monitor natural resources are currently in place for state and federal agencies but, as evidenced by the USFS agreement above, agencies need assistance to achieve those mandates. Local governmental planning bodies and private land trusts also need assistance evaluating the ecological costs and benefits associated with alternative land development and land acquisition strategies. At the same time, birds (the most conspicuous of all vertebrates) are becoming recognized as important and powerful monitoring tools (Hutto 1998, Hutto and Young 2002). As a state institution with special expertise in this area, we have a responsibility to provide “service” research (monitoring) for state, federal, and private organizations. This demonstrated need cannot be met without an entity like the Avian Science Center of The University of Montana in place because the administration associated with such service is too overwhelming for any one faculty member to carry as a “service” load. For example, Dr. Hutto already employs several full-time staff members to conduct work related to a USFS-funded landbird monitoring program (<http://biology.dbs.umt.edu/landbird/landbird.htm>). Most of this monitoring work is not intimately tied to his primary research focus in fire ecology, and is actually best considered a form of professional service. Similarly, Dr. Martin employs several full-time staff members to coordinate BBIRD—a nationwide nest monitoring program (<http://pica.wru.umt.edu/BBIRD/>),

which is also not central to his own research focus on the evolution of bird life-history traits. To expand these monitoring programs into a multi-agency effort to include all-bird monitoring across the entire state would be an unreasonable expectation without the help of some sort of center. Again, expansion of our monitoring programs is deemed important because *statewide bird monitoring is being requested now more than ever across the state, and it should be a reliable service provided by the universities, rather than a less reliable effort that exists only because some faculty member happens to take it on during his or her tenure.* The presence of an Avian Science Center of The University of Montana would facilitate growth in a statewide, service-oriented research and monitoring program.

(b) There is tremendous potential for an academic institution to take the lead and serve as the catalyst to bring scientists conducting basic research and monitoring together to discover patterns or trends that would be impossible to uncover without such a collaborative effort. In their recent overview of priority research needs, Donovan et al. (2002) state that large-scale, replicated studies are needed because they are "...the strongest path toward understanding that we have available at big scales." They note that we also need "...expanded and better coordinated monitoring efforts."

(c) Training in the latest, cutting edge field techniques is an important part of bird research and monitoring, but there are currently few places where one can gain formal training in such skills. A regional field training center could provide consistency in field methods, and could certify that a participant is able to perform at a given level of field expertise. We anticipate that numerous professional organizations and students from throughout the West would want to participate in field training courses offered through the Avian Science Center of The University of Montana, and that numerous agencies and organizations would want to hire from the pool of certified field technicians. The addition of new small-enrollment, hands-on courses (either through traditional channels or through Continuing Education) and the addition of new course opportunities in existing curricula would also serve to raise the profile of the Wildlife Biology and the Organismal Biology & Ecology programs and make UM more attractive to potential undergraduate and graduate students who might be interested in avian biology and conservation. The recruitment of top-caliber students, in turn, promotes success in the acquisition of nationally competitive graduate and undergraduate fellowships and grant funding.

(d) There is a growing national need for the synthesis of environmental information. The National Science Foundation just released a "10-year outlook" for its Environmental Research and Education portfolio on 8 January 2003, and the thrust of its recommendation was captured by Dr. Rita Colwell, director of the National Science Foundation, when she stated that "NSF should move in the direction of synthesis of environmental knowledge." The report emphasizes the need for "environmental synthesis to frame integrated interdisciplinary research questions and activities and to merge data, approaches, and ideas across spatial, temporal, and societal scales." The need for information synthesis emerges from both the need for better communication between scientists and managers and the need to address a serious national science literacy problem through discussion of what constitutes science-based decision making.

Unbiased, high-quality science can enable decision makers and the public-at-large to make informed choices, while poor quality science can hinder the same. Thus, syntheses of results from high-quality science need to be made readily available. But who can best deliver such a promise? An independent group of qualified, active, and professionally respected University scientists should be able to develop the best possible synthesis of what we really know (through bird research and monitoring), what stands as mere speculation, and where future research might be most profitably directed to remove uncertainty associated with a particular idea or generalization (e.g., see a pilot effort to provide web-based dissemination of fire effects information at <http://www.northernrockiesfire.org/>). Syntheses by conservation organizations, land management agencies, or industry may be perceived as (or may actually be) self-serving; contracts with independent University scholars may provide a solution to this perceived (or real) problem.

(e) There is a huge need for University involvement in statewide education outside the formal institution. Service to other educational institutions and off-campus entities are not what they could (or perhaps even should) be. The Avian Science Center of The University of Montana would help fill this need, and would constitute a valuable form of outreach that the University of Montana has not yet exploited to the extent that it might. Because people are inherently attracted to birds, the University has an opportunity to reach the public in a manner that is unique. Unlike sports and the arts, the natural sciences have not capitalized on their potential to reach a different public, to inform them about the contribution that research and monitoring make to the state and nation, and to provide another form of community outreach and service. The various forms of outreach could include things as wide ranging as bird identification workshops; K-12 teacher education opportunities; the development of science-based curricula for dissemination by the Montana Natural History Center; summer field excursion opportunities with graduate students and practicing research biologists; summer research internships; a evening lecture series; science writing for the local newspapers; science advising for national programs like NPR's Earth and Sky; and the development of web-based birding routes designed to educate while promoting tourism in the state.

3. Explain how the program relates to the Role and Scope of the institution as established by the Board of Regents.

The University of Montana (as reflected in its mission statement) is responsible for creating knowledge, providing an active learning environment for students, and offering programs and services responsive to the needs of Montanans. The University's dedication to education for and throughout life reflects the commitment to service learning and community building on and off the campuses. The University should, therefore, have a strong interest in establishing an Avian Science Center of The University of Montana because the center will (1) provide a valuable applied research and monitoring service to the state; (2) develop or improve coursework that would serve primarily students in the natural sciences; (3) engage students in the theoretical and practical issues surrounding the monitoring of wildlife populations; (4) be responsible for managing a large,

multi-agency data set taken from across the entire region; (5) benefit from the use of the same data in courses; (6) facilitate the publication of articles based on such data sets; and (7) establish a science-based form of service, information dissemination, and outreach to the citizens of Montana.

4. Please state what effect, if any, the proposed program will have on the administrative structure of the institution. Also indicate the potential involvement of other departments, divisions, colleges, or schools.

The Avian Science Center of The University of Montana will have little effect on the current administrative structure of the institution. The Center will be housed in, and administered by the Division of Biological Sciences within the College of Arts and Sciences at The University of Montana. The director of the Center will report directly to the Associate Dean of the Division of Biological Sciences. Participating faculty members will include the nine UM faculty members and 2 MSU faculty members listed below. We will also take full advantage of the education and outreach potential associated with the Montana Natural History Center, a non-profit organization affiliated with the Division of Biological Sciences.

The Center will convene a nationally recognized group of 9 avian scientists, educators, and resource managers to serve three-year terms as members of an external Advisory Board. This Advisory Board will provide advice about programs, agency needs, and scientific rigor so that the center develops in a way that assures a solid footing for service to Montana and the Nation. A diagram of the proposed administrative organization is appended (Appendix IV).

5. Describe the extent to which similar programs are offered in Montana, the Pacific Northwest, and states bordering Montana. How similar are these programs to the one herein proposed?

Montana: Montana State University has two faculty members in avian biology, and both have expressed an interest in participating in the center. None of the other University of Montana campuses has a formal department, center, or institute dedicated to service through avian science.

Idaho: Boise State University has three faculty in avian biology, and the Idaho Bird Observatory is associated with its Department of Biology, but the focus of that observatory is on monitoring birds that funnel through that part of Idaho and on providing education and outreach for a citizenry that we would not reach. Boise State also has adjunct faculty in avian biology who are associated with the Peregrine Fund, which runs the nonprofit World Center for Birds of Prey in Boise. The focus of the Peregrine Fund is on reintroduction and conservation of birds of prey, an area of focus that does not overlap with our focus on applied research, monitoring, and education. Idaho State University and the University of Idaho each have a limited number of faculty in avian biology, and neither institution has a specific focus or program in avian biology.

North Dakota: None of the colleges or universities in North Dakota has a specific focus or program in avian biology.

South Dakota: None of the colleges or universities in South Dakota has a specific focus or program in avian biology.

Utah: Utah State University, the University of Utah, and Brigham Young University each have a limited number of faculty in avian biology, and none of them has a specific focus or program in avian biology.

Washington: Although both the University of Washington and Washington State University are recognized as leaders in selected areas of avian biology because of the reputation of several faculty associated with each institution, neither has a specific focus or program in avian biology.

In general, the proposed Montana Avian Biology Center will be the only such academically based center in the nation that serves the mission outlined in the introductory paragraph. We should point out that there are numerous “bird observatories” situated nationwide—the best known being the Long Point Bird Observatory in Ontario, the Manomet Bird Observatory in Massachusetts, the Rocky Mountain Bird Observatory in Colorado, and the Point Reyes Bird Observatory in California. The mission statements of these nonprofit organizations overlap somewhat with our own with respect to research, monitoring, and information dissemination, but none of the existing bird observatories focuses its research and monitoring efforts in Montana. There is also an important distinction between the proposed Avian Science Center of The University of Montana and all of the major bird observatories—the bird observatories are not linked to academic institutions. The proposed Avian Science Center of The University of Montana will capitalize on the credibility associated with a university faculty affiliation, and it may actually serve as a model to be followed by other universities in other regions. The Cornell Laboratory of Ornithology is perhaps the closest academic entity to what we are proposing. In many respects, we envision establishing ourselves as a western version of the Cornell Laboratory of Ornithology, an organization with whom we already work closely to provide real-time analysis and dissemination of information from our landbird monitoring program, which is handled by computer servers at Cornell University [see our information dissemination web page (<http://www.birdsource.org/LBMP/>), which is housed on servers at Cornell University.]

6. Please name any accrediting agency(ies) or learned society(ies) that would be concerned with the particular program herein proposed. How has this program been developed in accordance with the criteria by said accrediting body(ies) or learned society(ies)?

We are not aware of any accrediting bodies that would be interested in the proposed Center.

7. Prepare an outline of the proposed curriculum showing course titles and credits. Please include any plans for expansion of the program during its first three years.

We plan to enhance or offer new materials and opportunities in association with *currently offered* undergraduate courses in Ornithology (Biology 304) and Field Ecology (Biology 413), and with *currently offered* graduate courses in Fire Ecology (Biology 595) and Avian Ecology (Biology 510). The Center's faculty and staff will also offer various "experiential learning" courses in Avian Census Methods (currently offered as Biology 595) and Field Methods in Avian Biology (currently offered as Biology 495), and will collaborate with Five Valleys Audubon Society to offer a series of Bird Identification workshops or short-courses for undergraduates, graduates, and the public-at-large through Continuing Education. The only plans for expansion beyond the already existing numbered courses listed above would be through a variety of continuing education offerings for the public-at-large, or through workshops targeted at professional land managers. These course opportunities have yet to be developed.

FACULTY AND STAFF REQUIREMENTS

1. Please indicate, by name and rank, current faculty who will be involved with the program proposed herein.

Organismal Biology and Ecology Program, Division of Biological Sciences, UM

Ken Dial, Professor

Erick Greene, Associate Professor

Richard Hutto, Professor

Chris Guglielmo, Assistant Professor

Roland Redmond, Associate Professor

Montana Cooperative Wildlife Research Unit, UM

Joe Ball, Professor

Tom Martin, Professor

Wildlife Biology Program, School of Forestry, UM

Dave Naugle, Assistant Professor

Jon Haufler, Adjunct Professor

Jeffrey Marks, Adjunct Assistant Professor

Department of Ecology, MSU

Andrew Hansen, Associate Professor

Jay Rotella, Department Head and Associate Professor

2. Please project the need for new faculty over the first five-year program. Include special qualifications or training. If present faculty are to conduct the new program, please explain how they will be relieved from present duties.

The center will not require the addition of any new faculty lines. Rather, the allocation of faculty effort toward center activities will be at the discretion of individual faculty and their associated units. Specifically, the time normally allocated to research and creative activity may include activities associated with the center. We do propose allowing release time for one faculty member who will serve as an interim Center Director, however. Specifically, we propose that Dr. Hutto be released from normal teaching duties to administer the Center, coordinate collaborative efforts, revise existing curricula, and coordinate course offerings associated with the Center.

3. Please explain the need and cost for support personnel or other required personnel expenditures.

The current USFS-UM agreement includes funding to cover some of Dr. Hutto's release time, and we propose that the University cover the remaining funds (\$20K/year) needed to complete a half-time teaching buyout plus 2-mo summer salary for a period of three years, after which period his buyout and summer salary would be fully funded through grants and contracts. We will actively seek endowment funds to fully support the Center Director's position. A half-time (\$20K/year) administrative support staff position would be required as well to help with accounting, grant writing, web page maintenance, and newsletter production.

In addition to personnel needs, we ask the University to support travel expenses for Advisory Board members until additional grant dollars are secured (\$10K/year). Finally, we request a modest annual budget for the continual acquisition, replacement, and maintenance costs for furniture and computer equipment associated the office space in Health Science 209, 210, and 211 (\$5K/year).

This clearly represents a real dollar commitment by the University to the Center, but this modest investment will elevate the stature of the Avian Science Center of The University of Montana to a point where we will see (1) new grant, contract, and private foundation support to achieve the Center's mission; (2) an increase in program demand and in the overall quality of students attracted to work with faculty in the program; (3) a modest but measurable increase in the number of Ph.D. degrees awarded; (4) an increase the number of undergraduate and graduate field course opportunities; (5) an increase the level of collaboration with the UM Biological Station, MSU, and other universities through video conferencing technology; and (6) a measurable increase in University outreach and service to the state.

CAPITAL OUTLAY, OPERATING EXPENDITURES, AND PHYSICAL FACILITIES

1. Please summarize operating expenditure needs.

Below, we have provided an anticipated annual budget, broken down by funds to be received from existing and anticipated grants/contracts/agreements, and from the University over the next five years. We request financial assistance from the University as described above during this interim period only, after which we expect to be fully supported through outside funding sources. We emphasize that such an investment by the University will help us leverage not only the impact of center activities, but additional external funding as well.

Avian Science Center 5-year operating expense budget--1 January 2004-1 January 2009

	annual total	contributions 2004-07		contributions 2007-09	
		grants	UM	grants	UM
Salaries					
Acting Director (Hutto--half-time buyout + summer)	30,000	14,000	16,000	22,000	8,000
Staff positions (2 full-time; 3 part-time)	125,000	110,000	15,000	117,500	7,500
Seasonal technicians	24,000	24,000	0	24,000	0
Subtotal	179,000	148,000	31,000	163,500	15,500
Fringe					
Acting Director (.225)	6,750	3,150	3,600	4,950	1,800
Staff positions (.28)	35,000	30,800	4,200	32,900	2,100
Seasonal technicians (.1)	2,400	2,400	0	2,400	0
Subtotal	44,150	36,350	7,800	40,250	3,900
Health (Staff positions)	18,860	16,400	2,460	17,630	1,230
Travel	40,000	30,000	10,000	30,000	10,000
Supplies	17,000	12,000	5,000	12,000	5,000
Publication costs	4,000	4,000	0	4,000	0
Communications	1,000	1,000	0	1,000	0
Total direct	304,010	247,750	56,260	268,380	35,630

2. Please evaluate library resources. Are they adequate for operation of the proposed program? If not, how will the library need to be strengthened during the next three years?

2. Please project the need for new faculty over the first five-year program. Include special qualifications or training. If present faculty are to conduct the new program, please explain how they will be relieved from present duties.

The center will not require the addition of any new faculty lines. Rather, the allocation of faculty effort toward center activities will be at the discretion of individual faculty and their associated units. Specifically, the time normally allocated to research and creative activity may include activities associated with the center. We do propose allowing release time for one faculty member who will serve as an interim Center Director, however. Specifically, we propose that Dr. Hutto be released from normal teaching duties to administer the Center, coordinate collaborative efforts, revise existing curricula, and coordinate course offerings associated with the Center.

3. Please explain the need and cost for support personnel or other required personnel expenditures.

The current USFS-UM agreement includes funding to cover some of Dr. Hutto's release time, and we propose that the University cover the remaining funds (\$20K/year) needed to complete a half-time teaching buyout plus 2-mo summer salary for a period of three years, after which period his buyout and summer salary would be fully funded through grants and contracts. We will actively seek endowment funds to fully support the Center Director's position. A half-time (\$20K/year) administrative support staff position would be required as well to help with accounting, grant writing, web page maintenance, and newsletter production.

In addition to personnel needs, we ask the University to support travel expenses for Advisory Board members until additional grant dollars are secured (\$10K/year). Finally, we request a modest annual budget for the continual acquisition, replacement, and maintenance costs for furniture and computer equipment associated the office space in Health Science 209, 210, and 211 (\$5K/year).

This clearly represents a real dollar commitment by the University to the Center, but this modest investment will elevate the stature of the ana Avian Science Center to a point where we will see (1) new grant, contract, and private foundation support to achieve the Center's mission; (2) an increase in program demand and in the overall quality of students attracted to work with faculty in the program; (3) a modest but measurable increase in the number of Ph.D. degrees awarded; (4) an increase the number of undergraduate and graduate field course opportunities; (5) an increase the level of collaboration with the UM Biological Station, MSU, and other universities through video conferencing technology; and (6) a measurable increase in University outreach and service to the state.

aspects of center functions, including 1) new and continuing grant funding; 2) recruitment, progress, and completion of graduate students in OBE and WBIO working on center initiatives; 3) interactions with external agencies and other constituencies and of new research and monitoring initiatives; 4) new and continuing course offerings for UM students, agency professionals, and members of the public, along with enrollment patterns and demand; 5) a full accounting of Center budget and expenditures.

The full assessment of center contributions must measure actual progress against the context of stated goals. One of the first tasks of the new Center will be to select, convene, and meet with our advisory committee, which will focus its initial effort in developing a strategic plan (by the end of summer 2004). The strategic plan will contain mission and vision statements, core values, strategic goals, and a set of specific, measurable goals and objectives for 2 and 5 year horizons. These goals and outcomes will relate to proposed research, monitoring, education, and outreach targets. These targets should provide an excellent template against which progress can be directly assessed.

Literature Cited

- Donovan, T. M., C. J. Beardmore, D. N. Bonter, J. D. Brawn, R. J. Cooper, J. A. Fitzgerald, R. Ford, S. A. Gauthreaux, T. L. George, W. C. Hunter, T. E. Martin, J. Price, K. V. Rosenberg, P. D. Vickery, and T. B. Wigley. 2002. Priority research needs for the conservation of Neotropical migrant landbirds. *Journal of Field Ornithology* 73:329-339.
- Hutto, R. L. 1998. Using landbirds as an indicator species group. Pages 75-92 *in* Avian conservation: research and management (J. M. Marzluff and R. Sallabanks, Eds.). Island Press, Covelo, CA.
- Hutto, R. L., and J. S. Young. 2002. Regional landbird monitoring: perspectives from the northern Rocky Mountains. *Wildlife Society Bulletin* 30:738-750.

Faculty



	Joe Ball Effects of habitat fragmentation on waterfowl, including the pintail duck.
	Dona Boggs Breath control and flight kinematics in birds, including tufted ducks.
	Kenneth Dial Wind tunnel and free-flight avian flight studies using magpies.
	Erick Greene Lazuli bunting and brown-headed cowbird research.
	Sallie Hejl Effects of forestry management practices on bird distributions, such as the winter wren.
	Richard Hutto The effect of habitat on the distribution of land birds, such as black-backed woodpeckers in burned-over forests.
	Donald Jenni Behavioral approaches to ecology problems and evolution of mating systems in the jacana.
	Delbert Kilgore, Jr. Physiological mechanisms that permit burrowing owls to tolerate extreme respiratory environments.
	Tom Martin Nest site selection and reproduction of songbirds, such as the hermit thrush.
	Roland Redmond Behavior and population ecology of migratory shorebirds, especially curlews.

BIRDS OF A

by Marnie Prange

In a cramped room of the University of Montana's biology building a magpie is flying in a wind tunnel, going nowhere. As it flies, a video camera records its body adapting to changes in wind velocity; sensors on its wing muscles record energy expended at varying rates of speed; and a cineradiographic camera peers through feathers and skin to reveal a steady skull attached to an oscillating skeleton.

The flight is all in a day's work for the magpie—and for Associate Professor Ken Dial, who is using new technologies to unravel the mystery of how birds fly.

Less experienced birds, mostly juvenile pigeons, learn the vagaries of wind tunnel flight for a project run by Research Associate Professor Dona Boggs, Dial and Professor Delbert Kilgore. Midsummer, birds, wind tunnel and faculty will travel to California's White Mountain Research Station, 12,500 feet above sea level, to study how birds tolerate an oxygen-depleted environment.

On the edge of campus, lazuli buntings are setting up housekeeping. Not only have they returned to the same brushy hillsides they occupied in previous years, they've returned to the same shrubs. Assistant Professor Erick Greene is there to welcome them home.

Thirty miles south, in an old-growth ponderosa pine forest in the Bitterroot Valley, Sallie Hejl of the U.S. Forest Service is directing a point count—each of her field assistants stands in one spot and writes down everything he sees and hears—to determine the number of woodpeckers and other cavity nesters. If she's lucky, she'll find the nests that go with the various drums and calls of different species.

Professor Dick Hutto is getting ready to send twenty-five young ornithologists across western Montana to monitor the occurrence

of species in a variety of habitats. He also monitors projects ranging from a study of flammulated owls in a ponderosa pine forest south of Darby to a study of cavity nesters, such as woodpeckers, in Glacier National Park.

This is just a sampling of the bird research at The University of Montana, for quietly, without fanfare, the University has turned itself into one of the world's leading avian research centers. Faculty and research associates from the Division of Biological Sciences, the Montana Cooperative Wildlife Research Unit and the U.S. Forest Service work at the cutting edge of their disciplines, from the molecular to the biogeographic, creating a vast potential for collaboration. A unique characteristic of the group is that their disciplines cover both basic biology and applied conservation.

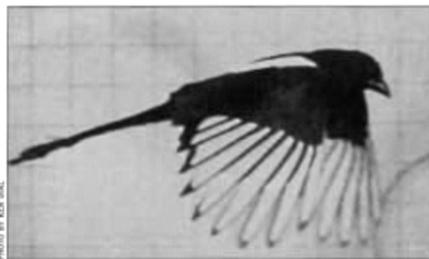
The faculty's convergence at UM is partly by chance and partly by design, according to Hutto, a seventeen-year veteran of the biology division. Traditional slots had been filled by biologists who also happened to specialize in avian research until the faculty recognized their potential as "the bird group."

"We're more than a nucleus now, we're a mass," Dial says, noting that the faculty has attracted some of the most accomplished researchers in the nation. Members of the bird group are also compatible. "People get to be like the organisms they study, most of the time," says Joe Ball, leader of the Montana Wildlife Cooperative Unit. "We get along, as do birds—generally."

Everyone in the bird group juggles the demands of their projects with those of graduate students, all the while publishing and bringing in large grants. Dial's and Greene's research, in particular, has generated popular and professional interest. Greene has been featured on National Public Radio, in *The Washington Post*, *The New York Times*, and this summer a Japanese film crew will film him for a television documentary. Dial



FEATHER



Slow-motion photographs of a magpie in a wind tunnel.

has appeared on "NOVA" and "Scientific American Frontier" and has given presentations before NASA and the entire worldwide aerospace community at the Paris Air Show.

Peer recognition is probably the best indicator of the bird group's national standing. In 1994, three venerable North American ornithological societies chose UM for a conference site. And last November, UM was selected as the new editorial headquarters for the *Auk*. Plain in appearance, inscrutable in contents, the *Auk* is to avian researchers what the *Journal of American Medicine* is to medical researchers—the place to see and be seen. Tom Martin, assistant leader of the Montana Cooperative Wildlife Research Unit, is editor-in-chief; five faculty members serve as the editorial board. Martin says he brought the magazine to UM "to raise the visibility of what I think is the best ornithological faculty in the world."

Spread across campus in offices tucked in corners of buildings, teaching in crowded classrooms using antiquated equipment, the bird group's research is conducted in laboratories suitable for confined work, such as dissection and surgery, and in the great outdoors. "We need something in between," Dial says, "where we can attempt to have outdoor behavior in a more controlled and observable habitat. If you're watching a bird and all of a sudden, BOOM, it blows a mile away, your day is finished."

Imagine a state-of-the-art aviary located on the edge of UM's golf course, with indoor chambers such as the wind tunnel and flight corridor Dial needs in his research and the dive tank and water flume Boggs needs in hers. Imagine outdoor facilities, partitioned and netted, where their colleagues can simulate native environments. It would be a place where researchers work alone and as a unit,

exploring the uncharted territory that lies at the interface between disciplines.

"We are in a position to draw new research with this facility that will make a significant difference in how we understand bird biology," Dial says of the proposed Center for Excellence in Avian Studies that he will co-direct with Martin. "When we collaborate, we can do more sophisticated experiments in a way that will bring new science, not just to ornithology, but to biology."

"Each person's perspective helps broaden the project," says Sallie Hejl, who is collaborating with the biology faculty to oversee the research projects of two graduate students. "It helps you think about all the different reasons a bird might or might not be there, what's happening to it or not happening to it. The more peoples' opinions you have, the better the knowledge."

The bird group has submitted a funding

It's a Bird, It's a Plane

Ken Dial loves almost anything to do with flight. Dial grew up watching planes at the Los Angeles airport and is himself a pilot. His consuming interest in flight has evolved into his "own little research arena" exploring the function of the central nervous system in flight control, the coordination of flight and breath, and communication during flight—as a skein of geese flies, the way one goose tips its wings may convey particular information to the other geese.

Creating excitement outside the field of avian research is Dial's examination of avian flight mechanics and its application to aeronautics. Dial says this avenue of research is a "tremendous resource" for engineers who are looking again at birds as models for aircraft designs. This hasn't happened since the earliest aircraft designers ceased imitating the flap of birds' wings in favor of the unbirdlike wings of today's airplanes.



These cineradiographic photos reveal the movements of the bird's skeleton as it flies.

While rigid wings create stability, Dial says they forfeit maneuverability. This is demonstrated dramatically on Dial's videotape as the wing-flapping magpie compensates for changes in wind velocity: becoming streamlined and horizontal for rapid flight, increasing its body angle and lowering its feet in slow flight. Likewise, Dial's pigeons reveal incredible mobility, negotiating 120 degree banked turns in a wing beat, and righting themselves in the next.

Bird flight as it pertains to aircraft engineering "has nothing to do with my biology directly," Dial says. "It's just that I love it." The aeronautical community at the Paris Air Show was equally enthralled. "Some of these people were just loving it," he said. "And while [our discussion] was fun and cute and aesthetically pleasing, at the same time it had some science behind it that described things of function and design and control that affect future aircraft modeling."

proposal for the center to The University of Montana Foundation and the Montana legislature. If the aviary becomes a reality, it will not only become a destination for faculty research, it will enable UM to enroll more of the nation's top graduate students. Currently, half of the 200 graduate applications for the biology program are from students hoping to work with the bird group, and only five or six are accepted. Program graduates find careers in academia as well as with conservation organizations, the Nature Conservancy and Audubon Society among them.

The Center of Excellence in Avian Studies would go a long way toward providing researchers the time and means to carry on research, but Dial is not optimistic about its chances because the bird group is too busy writing grants to keep their research afloat to beg for alms. "If it's dependent on us panhandling and having to go around the country, it will not happen," Dial says.

For those who think bird biology is a narrow avenue of inquiry, Dial emphasizes that birds are models for understanding other organisms, focal points of conservation and

indicators of environmental health—if birds are in trouble, other species are in trouble too.

And for those who think bird research is a luxury Montana cannot afford, Hutto asks them to think again. Because of our geographic isolation, he says, researchers in Montana often undertake locally oriented projects. And if Montana doesn't gather information on its own well-being, he warns, no one else is going to do it for us. **M**

"Mamas, don't let your babies grow up to be cowbirds"

Turn the lights off and the slide projector on, and Erick Greene is a very funny guy about the mating rituals of a charming species. "It's a Peyton Place," he deadpans, referring to Mt. Jumbo and Mt. Sentinel, where over the past five years he and his students have banded entire populations of lazuli buntings, following birds with personalities and habits as quirky as soap stars'.

"When you get to know individual birds and watch their behavior, it gets really interesting," Greene says. "Females paired with dull yearling males will tend to sneak off—'Hey, I'm bowling with the girls, dear'—and actively seek copulations from bright males." Or the females will flirt with mountain bluebirds, three times their size. Brightly colored males are not exactly models of fidelity either, he says, as they spend a lot of time "mucking around in others' territory" or "seeking extra-pair copulations."

Every male bird, Greene has determined, sings his own private song, his warblings serving as his acoustic fingerprint. Birds within range of one another speak in a shared dialect that develops as young birds attempt to imitate the "crystalized," or fully developed, songs of reproductively successful older males. Extremely attractive to the females, one such elder, "Red," suffered numerous pretenders until he changed his song.

The ripple effect has led Greene from lazuli buntings to a study of brown-headed cowbirds in remote wilderness areas. The connection is parasitism, the phenomenon of one bird species laying its eggs in another's nest. For some birds, it's not a problem. Red-winged blackbirds, for example, are larger than cowbirds and are able to raise their young, plus the invader's chicks.

For the tiny buntings, however, cowbird parasitism is cata-



Spotted cowbird eggs next to small, bluish lazuli bunting eggs.

strophic. The larger cowbird chicks starve out the baby buntings, squashing them or pecking them to death. In some years, every one of the 100 nest sites in Greene's study has been parasitized.

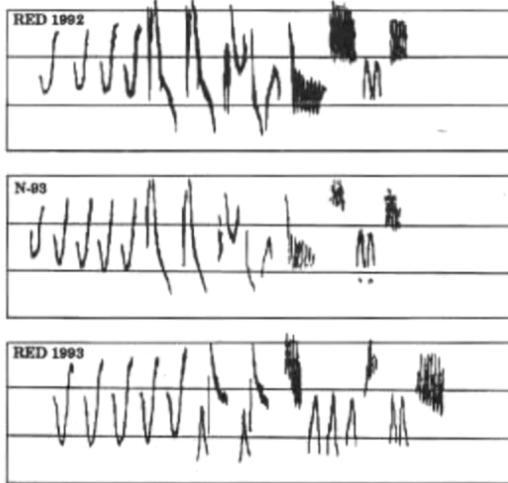
Greene was perplexed by the high incidence of parasitism until he discovered a communal cowbird roost on Jacob's Island on the edge of campus. "You won't see cowbirds on Jacob's Island unless you're there about ten minutes before dark, and then flocks of ten, twenty, fifty, maybe up to 100 cowbirds come zooming in very fast, very low. We estimate there may be

up to 5,000 cowbirds that come in to roost at night."

Having expanded to western Montana in the past two decades, cowbird numbers are increasing exponentially, "a worrying thing," Greene says. Cowbirds lay eggs large for their body size, one a day, for forty days—comparable to a human producing a twelve pound baby every day for forty days.

Despite the cowbirds' parasitism, lazuli buntings are widespread and abundant, according to the monitoring group Partners in Flight. What they're not detecting, Greene says, is massive reproductive failure in breeding grounds. "Here we have this paradox: an extremely common species in this habitat and yet they're not replacing themselves."

Undoubtedly, the hillsides of Mt. Jumbo and Mt. Sentinel are being restocked from other "source sites," where bunting fledglings are successfully hatched. But nothing is known about these sites, Greene says. "If there are only a few critically important sites for an entire species," Greene says, "we may inadvertently knock out some of those source areas and bingo, the whole population may crash."



Using a shotgun microphone, Assistant Professor Erick Greene (left) records lazuli bunting songs. To the right are sonograms of Red; N-93, a Red pretender; and Red's altered song. "Around Red there developed a song neighborhood," Greene explains, "and the acoustic space was getting crowded with all these Red wannabes. So Red changed his song...and left the others in the dust."

Phoenix Rising: Black-backed Woodpeckers in Burned-Over Forests

Dick Hutto's earliest memory of birds is of sitting in the chaparral country of southern California and blasting them with his BB gun. Then, in a college biology class, Hutto says, "Ecology just hit. We would walk out and talk about fire and succession in the chaparral and it was Wow! I was starting to understand things I'd lived with my whole life."

These days he's traded in his firearm for binoculars and mist nets, but that enthusiasm persists as he talks about his penchant for fire ecology. Taking advantage of the number of forest fires of 1988, Hutto studied bird life on thirty-four burn sites in western Montana and northern Wyoming on a two-year grant funded by the National Geographic Society.

"When you go in [to a burned forest] part of the interesting thing is that there's tons of birds in there," Hutto says. "It's not a desert. That's the first misconception, that a burned forest is useless. If you ask the birds, they're not saying the same thing."

Bird species, such as the black-backed woodpecker, depend on standing, fire-killed trees, which result from the infrequent,



PHOTO BY RICHARD HUTTO

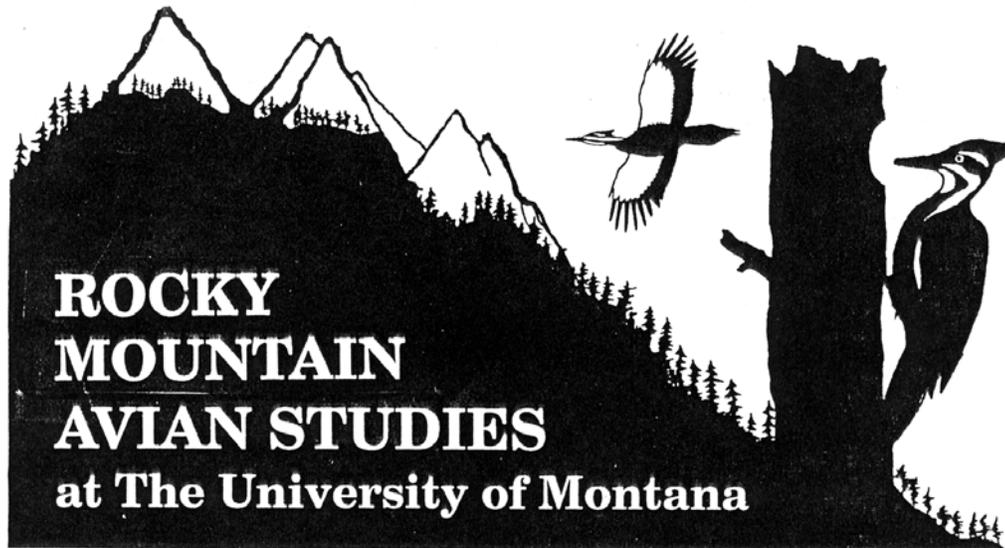
intense forest fires and not the frequent, low-intensity understory burns that current land management policies dictate. Hutto is convinced the woodpecker evolved to fill an ecological niche in the blackened forests. "The black-backed woodpecker matches the tree so well it blows your mind. It's every bit as impressive as a ptarmigan in snow," he says.

The ramifications for land management are clear: If we prevent fires, if we rush to salvage burned stands, we will harm these species. Or, as Hutto puts it, if you take out all the trees, you're not going to have any fire-dependent bird species.

Why should anyone care about black-backed woodpeckers?

"That's the major question for the conservation of wildlife," Hutto says, acknowledging all the utilitarian reasons for saving wildlife, such as the interdependency of species. "But I think more than anything it's an ethic, period," Hutto says. "Why do you want certain things? Why do you want anything? Because it provides variety in life. This variety is the source of it all. If you throw it all away, you have a pretty boring world."

Appendix II. Copy of a recruitment flyer that was mailed several years ago to biology departments nationwide.



The University of Montana offers outstanding opportunities for undergraduate and graduate study in avian biology. Research interests and course offerings span a wide range of disciplines, including behavior, ecology, population biology, community ecology, environmental physiology, functional morphology, bird flight, and conservation biology. Situated in the northern Rocky Mountains, our geographic location provides an exceptional setting for education and research in avian biology. The University is surrounded by the largest expanse of wilderness in the contiguous 48 states, and is close to a variety of habitats and diverse bird assemblages.

FACULTY AND RESEARCH AFFILIATES

JOE BALL, Montana Cooperative Wildlife Research Unit, Adjunct Professor
Behavior, ecology, and management
 Effects of habitat fragmentation, nest predation, and human exploitation on populations of ground-nesting birds, especially waterfowl and galliforms.

DONA BOGGS, Research Assistant Professor, Division of Biological Sciences
Avian physiology
 Control of breathing in birds, and its interaction with flight kinematics; temperature regulation and thermal tolerance.

KENNETH DIAL, Assistant Professor, Division of Biological Sciences
Vertebrate Flight and Ecology
 Wind tunnel and free-flight studies focusing on the neuromuscular control and biomechanics of avian flight; field studies of flight behavior and ecology.

ERICK GREENE, Assistant Professor, Division of Biological Sciences
Behavior, Ecology, and Conservation
 Behavioral mechanisms in community ecology, foraging behavior, vocal communication, population dynamics, and conservation biology.

SALLIE HEJL, Research Wildlife Biologist, U.S. Forest Service, Affiliate Faculty Member
Ecology and Conservation
 Bird distributions on different spatial and temporal

RICHARD HUTTO, Professor, Division of Biological Sciences
Ecology, Behavior, and Conservation
 Distribution of land birds in relation to habitat landscape, especially in early successional habitats; winter ecology of migratory songbirds.

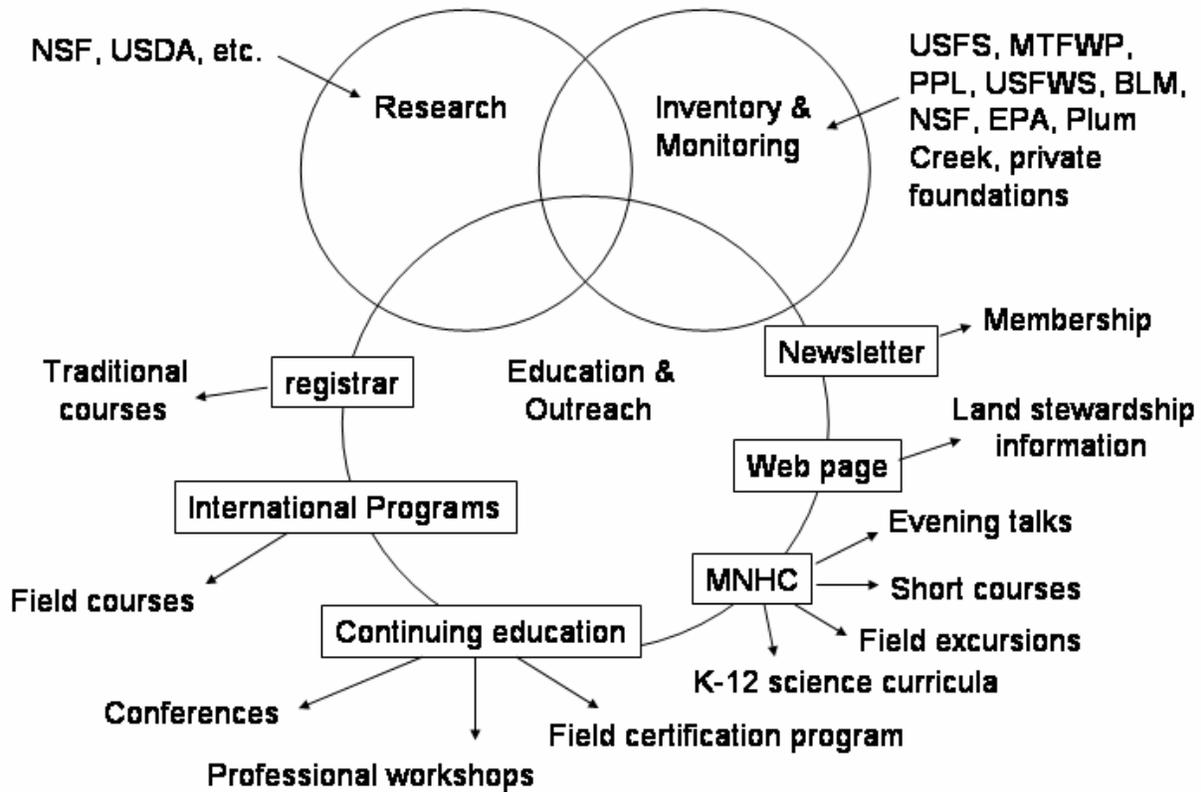
DONALD JENNI, Professor, Division of Biological Sciences
Ethology and Behavioral Ecology
 Behavioral approaches to classic ecological problems; evolution of mating systems, especially non-monogamous systems.

DELBERT KILGORE, Professor, Division of Biological Sciences
Avian Physiology
 Physiological mechanisms that permit birds to tolerate extreme respiratory environments at high altitude and in burrows; nest architecture.

TOM MARTIN, Assistant Leader, Montana Cooperative Wildlife Research Unit
Non-game Bird Ecology
 Ecological factors that influence reproductive success, selection of nest sites, territories, and habitat; life history evolution.

ROLAND REDMOND, Research Assistant Professor, Division of Biological Sciences and Montana Cooperative Wildlife Unit
Ecology and Conservation Biology

Montana Avian Science Center



Appendix IV. Administrative organization of the proposed Avian Science Center of The University of Montana.

Proposed fiscal and administrative reporting routes for the Montana Avian Science Center

