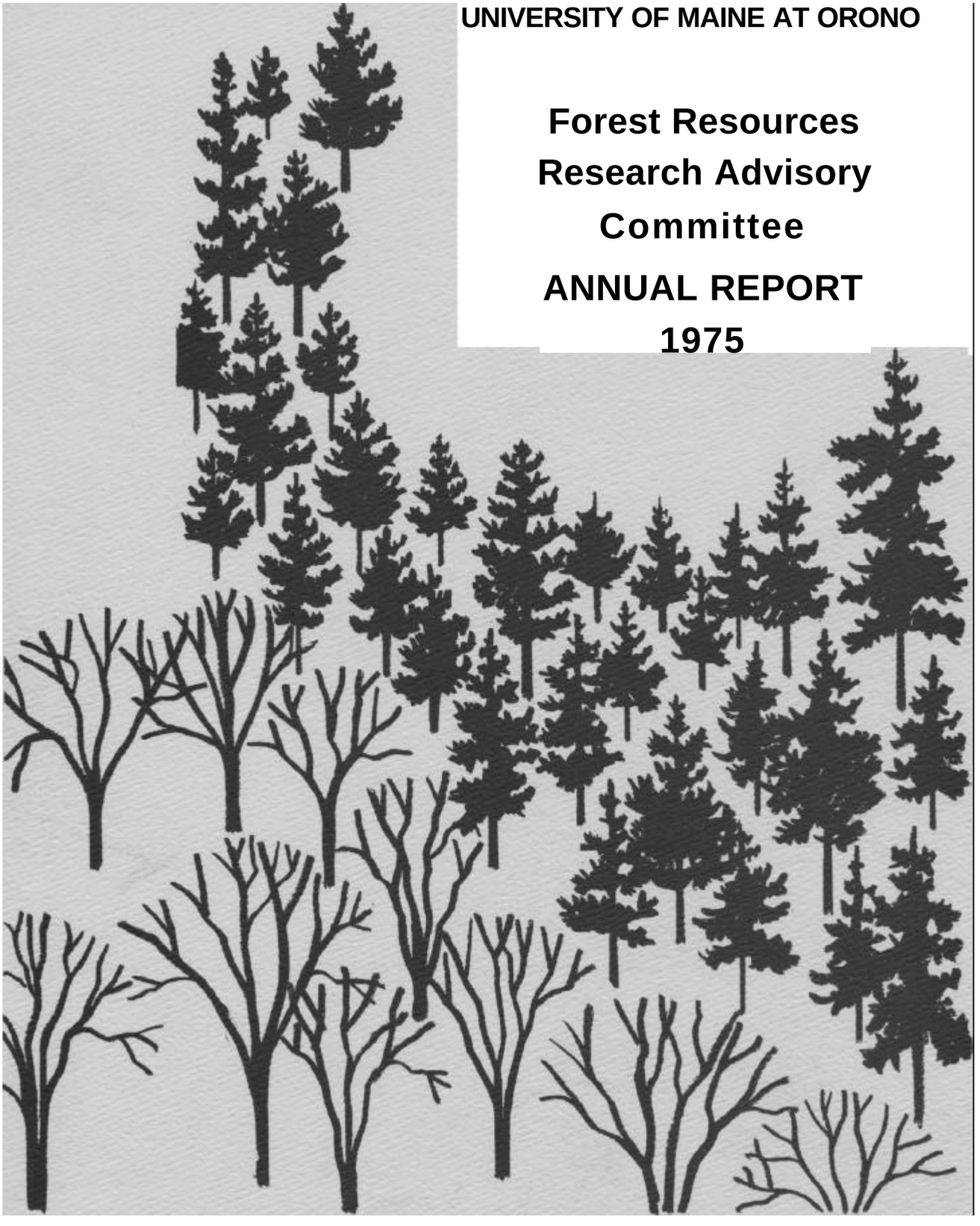
UNIVERSITY OF MAINE AT ORONO

Forest Resources Research Advisory Committee

ANNUAL REPORT 1975



UFE SCIENCES AND AGRICULTURE EXPERIMENT STATION
UNIVERSITY OF MAINE AT ORONO

FOREST RESOURCES

RESEARCH ADVISORY COMMITTEE

1975 ANNUAL REPORT

George W. Weiland, *Chairman*

Morris R. Wing, *Vice Chairman*

Keith E. Miller, *Secretary*

School of Forest Resources

College of Life Sciences and Agriculture

University of Maine at Orono

Orono, Maine

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FOREST RESOURCES
RESEARCH ADVISORY COMMITTEE
1975 ANNUAL REPORT

On January 28, 1974, President Howard Neville made the following comment in his convocation speech:

> "We tu£££ *eAtabLibh a Ce.nteA ^on the.* Advanced *Study o£ The. FoieAt lnduAt>u.eA which wWi* dtaw *fafiom c.uM.e.nt faculty o the, UniveAA-ity and ^lom tuchnicaZ and management i>ta^& hi faofieAt product* <i.nduAtsu.eA the. muJLti-di&cA.pLin&fiy -* t.e4eoAc/i *team** neceMa/u/ *to addneAA the. i.nteM.e£ate.d te-C-hnolog^Cjot,* economic, *e.nvJjLonme.ntat and management piobtem o*

This was a challenging mandate and the impact would be felt most heavily in the School of Forest Resources and in the College of Life Sciences and Agriculture Experiment Station.

Prior to, but supporting President Neville's emphasis on forest industry research, an ad hoc committee representing broad forest resources interests in Maine had been meeting in order to develop and implement a coordinated research effort.

A resolution of this emphasis and effort came about in April, 1974 when President Neville established the Forest Resources Research Advisory Committee with the following commitment to its members:

> "I *woutd hope, that Ln tone. the. Committe.e. wJJUL •fttgn 4,nfatu.e.ncLe. the. UniveAA-Lty -In netting pfu.o^itie^ to tliat ou/i fun,ejcuic.k e.^ofit& wWL &iu£y me.et the,* need* *oft the. State.. "*

The twelve-member committee of interrelated and varied interests was founded for the purpose of working with the Director of the School *of* Forest Resources to advise him on priorities related to his responsibilities as they broadly relate to all facets of forestry and wildlife research, including economic, social, biological, and managerial aspects. The Committee will also advise on research priorities for the State and will assist the Director in action programs to carry out objectives.

F.R.R.A.C.'s second year was one of action by individual members of the committee and of the sub-committees. Dr. Sam Butcher presented an excellent paper on the teaching loads in the School of Forest Resources and the College of Life Sciences and Agriculture. The paper shows a substantial increase in students per faculty member. The effects of such structuring has created some adjustment in the amount of time available for student-teacher conference and some changes in class sizes and programming.

One of the mandates of the committee was to set priorities to assure that the University research efforts will truly meet the needs of the state. Papers were prepared and presented on the Prospective Research Areas for the three main major areas of concern - Forestry, Wildlife and Wood Technology and Products Utilization.

The Committee decided to move ahead on developing a proposal for research on the Intensive Management of Forest Resources in Maine. This proposal covered several of the research areas recommended in the prospective research area reports. A full report on the status of this proposal is included in the feature article by George Weiland.

Mr. Lewis Bissell, Extension Agent, will be retiring in May 1976. The value of this service was reviewed and the committee passed the following resolution: *"The Advisory Committee supports the extension program and would recommend that the program ~be continued with two extension agents. "* It was also suggested that some review be made to determine what other efforts should be made in the area of extension service. Wildlife extension service possibilities were discussed.

Personnel highlights for the year included the election of Director Knight to the Mclntire-Stennis Advisory Board; resignation of Dr. Sanford Schemnitz who will become the Chairman of the Wildlife Department at New Mexico State University at Las Cruces; resignation of Dr. Michael Zagata who has become the Field Director of the Wildlife Society in Washington, D.C.; and, the selection of Dr. James Gilbert, University of Washington, and Dr. Terry May, University of Colorado as replacements. We were saddened by the death of Associate Professor Charles E. Schomaker and welcomed Dr. Robert Shepard to fulfill the responsibilities in that position.

The terms of four members of the staff expired on December 31, 1975. Three of these members were renominated: Maynard Marsh, George Carlisle and John Sinclair. Dr. Sam Butcher, Bowdoin, requested that he not be considered for renomination. Richard Barringer, Commissioner of the Department of Conservation was placed in nomination. President Neville has approved the nominations and appointed the members to the Committee. The Committee has found that it does have a challenge and can provide certain knowledge and advice to the School. It is our objective to continue to serve in this capacity and expand in those areas where we can be of service.

THE COOPERATIVE FOREST RESOURCES RESEARCH UNIT

—From Conception to Reality in 1975—

George W. Weiland
Chairman, FRRAC

The recognition of the need for a well coordinated and broadly supported capability for intensive forest management research was the prime motivation in the formation of the Forest Resources Research Advisory Committee. In 1975 this need found expression as a definitive concept, and the concept matured into a reality.

At the conclusion of FRRAC's 1974 Fall Meeting the main orientation of the Committee was one of developing general priorities in forest resources research within the established research programs at the School of Forest Resources and Experiment Station. The promotion of additional public and private support for research was being deferred until the Committee could gain the necessary understanding and build the appropriate framework for an expanded research effort. Fortunately certain events took place during the closing weeks of 1974 which provided the Committee with the opportunity to progress much more rapidly towards this objective.

Officials of the Great Northern Paper Company contacted Director Fred Knight and expressed that Company's interest in increasing its support for forest research at the University. This willingness for support was translated into action early in 1975 when Director Knight with the endorsement of his faculty members drew up the first draft of a proposal for a Cooperative Forest Resources Research Unit. Concurrently, a FRRAC subcommittee was formed to assist Director Knight in this work. This was not a simple task for there were many opinions expressed on funding, priorities, facilities, scientists, and administration. Following an intensive proposal development effort and a wide and careful review, a practical consensus was reached. The final proposal for the Cooperative Research Unit was adopted in August 1975. It is included in the Appendix of this report.

This proposal called for forest landowners to support a cooperative research unit at the rate of 3c per acre per year. The cooperative unit would be under the aegis of the School of Forest Resources and would complement existing research programs. Its main thrust would be to accomplish priority research within three broad program areas, namely protection, management, and utilization. The near-term goal would be to provide support for four scientists; the long-term goal would be to double the size of the unit in order to meet the forest resource research needs of the State.

Solicitation for funds began in earnest in the fall and the response was positive and significant. When it became evident that $180,000 had been pledged annually for five years, the Sub-committee recommended, subject to approval by the University, that three lead scientists be recruited for the Cooperative Unit.

Thus within the span of one year an idea was put forward, a concept developed, and support found to put in place a unique and stimulating new dimension to forestry research in Maine. Those involved can be proud of this progress all the while realizing the sizable challenge that lies ahead in completing the recruiting of scientists, determining research priorities, promoting and developing a cohesive and efficient working unit, and making known the research results for the fuller and more effective use of Maine's forest resources.

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MEMBERSHIP (1975) FRRAC SUBCOMMITTEE ON THE COOPERATIVE FOREST RESOURCES RESEARCH UNIT

The members of the subcommittee appointed or to be appointed to set priorities and review proposals for the Cooperative Research Unit are as follows:

Mr. Robert Bartlett, Great Northern Paper Company
Dr. Barton M. Blum, U. S. Forest Service
Dr. Fred B. Knight, School of Forest Resources
Mr. John Sinclair, Seven Islands Land Company
Mr. Morris Wing, International Paper Company
Mr. George Weiland, Dead River Company
Two Additional Members from Cooperators

FOREST RESOURCES RESEARCH ADVISORY COMMITTEE
1975-76 MEMBERSHIP

Richard Anderson, Director (1977)*
Maine Audubon Society 57 Baxter Boulevard Portland, Maine 04100

Richard Barringer, Commissioner
Department of Conservation (1978)
State Office Building Augusta, Maine 04330

Barton M. Blum, Project Leader
U. S. Forest Service (1976)
Northeastern Forest Experiment Station
U.S.D.A. Building
University of Maine
Orono, Maine 04473

George Carlisle, President (1978)
Prentiss & Carlisle, Inc. 107 Court Street Bangor, Maine 04401

Fred E. Holt, Director (1977)
Bureau of Forestry State Office Building Augusta, Maine 04330

Donaldson Koons, Professor (1976)
Colby College Waterville, Maine 04901

Maynard Marsh, Commissioner (1978)
Department of Inland Fisheries & Game
State Office Building
Augusta, Maine 04330

Keith E. Miller (1977)
Superintendent Acadia National Park Bar Harbor, Maine 04609

Henry W. Saunders, Vice President
Saunders Brothers (1976) 180 Forest Street Westbrook, Maine 04092

John G. Sinclair, President (1978)
Seven Islands Land Company 15 Columbia Street Bangor, Maine 04401

George W. Weiland (1977)
Chairman of Committee)
Vice President
Dead River Company
55 Broadway
Bangor, Maine 04401

Morris R. Wing, Regional Manager (1976)
Northern Division
Dept. of Woodlands, Maine Region
International Paper Company
Jay, Maine 04239

Ex Officio:

Malcolm W. Coulter, Associate Director
School of Forest Resources Nutting Hall, University of Maine Orono, Maine 04473

Edwin L. Giddings Assistant to the Director School of Forest Resources
Nutting Hall, University of Maine
Orono, Maine 04473

Fred B. Knight, Director
School of Forest Resources
Nutting Hall
University of Maine at Orono
Orono, Maine 04473

Albert D. Nutting Director
Emeritus School of Forest Resources Oxford, Maine 04270

Frederick E. Hutchinson, Vice-President
Research and Public Services
Coburn Hall
University of Maine at Orono
Orono, Maine 04473

*Appointment through December 31 of year indicated.

SCHOOL OF FOREST RESOURCES

STUDENT PROFILE

Year	Four-Year Undergraduates			Two-Year Forestry	Graduate	Others	Tota
	Freshmen	Soph. Forestry	Jr. Sr. Wildlife				
1964	71	108	42	0	9	5	235
1969	104	95	92	63	25	2	381
1973	150	160	130	81	37	36	594
1974	134	225	151	95	44	68	717
1975	147	247	196	111	53	114	868

FACULTY AND STAFF (January 1, 1976)

Fred B. Knight, Director and Dwight B. Demeritt Professor of Forest Resources Malcolm W. Coulter, Associate Director for Wildlife and Professor of Wildlife Resources Edwin L. Giddings, Assistant to the Director and Associate Professor of Forest Resources

*Richard J. Campana, Professor of Forest Pathology Thomas J. Corcoran, Professor of Forest Resources *John B. Dimond, Professor of Forest Entomology *Harold C. Gibbs, Professor of Wildlife Resources Ralph H. Griffin, Professor of Forest Resources Howard L. Mendall, Professor of Wildlife Resources and Leader of Cooperative Wildlife Research Unit James E. Shottafer, Professor of Wood Technology and Head, Forest Products Laboratory

*Roland A. Struchtemeyer, Professor of Forest Soils Harold E. Young, Professor of Forest Resources and Head, Complete Tree Institute Marshall D. Ashley, Associate Professor of Forest Resources and Director, Summer Camp Programs

Richard A. Hale, Associate Professor of Wood Technology Norman P. Kutscha, Associate Professor of Wood Technology Ray B. Owen, Jr., Associate Professor of Wildlife Resources Arthur G. Randall, Associate Professor of Forest Resources and Director, Associate Degree Program Voit B. Richens, Associate Professor of Wildlife Resources, and Assistant Leader, Cooperative Wildlife Research Unit Wallace C. Robbins, Associate Professor of Forest Technology

Faculty and Staff Continued

Craig E. Shuler, Associate Professor of Wood Technology
James C. Whittaker, Associate Professor of Forest Resources
Chester F. Banasiak, Assistant Professor of Wildlife Resources
David S. Canavera, Assistant Professor of Forest Resources
James R. Gilbert, Assistant Professor of Wildlife Resources
Carl E. Korschgen, Assistant Research Professor of Wildlife Resources
Terry A. May, Assistant Professor of Wildlife Resources
Robert K. Shepard, Jr. Assistant Professor of Forest Resources
Gary A. Simmons, Assistant Professor of Forest Resources
William D. Lilley, Instructor in Forest Resources
Lewis P. Bissell, Extension Forester
Timothy O'Keefe, Extension Forester
Andrew S. Clauson, Research Associate in Wildlife Resources
Roger F. Taylor, Superintendent of University Forest
Barton M. Blum, Project Leader, U. S. Forest Service and Faculty Associate
Hewlette S. Crawford, Research Wildlife Biologist, U. S. Forest Service and Faculty Associate Robert M. Frank, Research Forester, U. S. Forest Service and Faculty
Associate Howard E. Spencer, Jr., Leader, Migratory Bird Project, Maine Department of Inland Fisheries and Game and Faculty Associate
Robert I. Ashman, Professor Emeritus of Forestry Gregory Baker, Professor Emeritus of Forestry Frank K. Beyer, Associate Professor Emeritus of Forestry Albert D. Nutting, Director Emeritus Henry A. Plummer, Associate Professor Emeritus of Forestry

*Cooperating Faculty Member in the School of Forest Resources.

WILDLIFE RESEARCH

Malcolm W. Coulter

Wildlife research at UMO began in 1935 when the Maine Cooperative Wildlife Research Unit was organized in what then was the Department of Forestry. Staffed by two scientists (one federal, one university) and supported by the Maine Department of Inland Fisheries and Wildlife, U.S. Fish and Wildlife Service, Wildlife Management Institute and the University, this new partnership was one of 10 similar Units located in some of the major ecological zones across the Nation. The Research Unit provided the impetus for the first formal training programs at UMO. The degrees of B.S. and M.S. in Wildlife Management were authorized. By the summer of 1936, the two scientists, supported by two eager, new graduate assistants, were afield on their first research projects; at the same time the outlines and laboratory exercises for formal classes in wildlife were being prepared.

Early research highlighted studies of the life history and biology of game species as well as study of habitat needs. At that time even the basic details for many facets of the life history, food habits, reproductive potential and similar topics for some species were poorly documented.

Today—40 years and approximately 250 publications later—the wildlife research team at Orono totals 9 professional staff, 23 graduate assistants and 4 scientists from other agencies or departments who hold adjunct appointments in the School. The Cooperative Wildlife Research Unit that provided the nucleus for a program in 1935 is still active and intact and continues to function as an entity, but as an integral part of the whole effort. Since 1935, a total of 77 advanced degrees have been earned by students from many states, three provinces of Canada, Norway and Cameroon.

Pressures for admission to the program, at both undergraduate and graduate levels, is high. During the past few months, as an example, almost 100 applications for graduate study were received from undergraduates of many schools. In late March the number had been screened to 20 applicants, all with 4 year averages above 3.0 (B), competing for only two openings available this year to work on research projects.

The 16 current research projects are funded by a variety of agencies and organizations both within state and out-of-state. Much of the support is for study of particular problems important to the sponsor. Examples of these are: The Impact of Highways upon Wildlife, financed by the Department of Transportation; The Influence of Commercial Clearcuttings upon Wildlife, supported by U. S. Forest Service; and, a grant from the U. S. Fish and Wildlife Service for studies of colonial nesting seabirds along the Maine coast. In each of these examples the project has developed

in response to a contemporary problem. Need for the highway study has been heightened by recent requirements for environmental impact statements. Conflicting views about clearcutting together with a lack of long-term experience with the practice in this region in general led to the need to examine wildlife response to commercial clearcutting. And, the seabird project became a high priority topic with the increasing prospect of offshore oil exploration.

The outlook for new research in wildlife is excellent. Projected changes in forest land management offer many new opportunities for more effective forest-wildlife management. Rising demand for wood products means more intensive forest management. Implied are shorter rotations, more permanent road systems, fertilization, utilization of more native tree species or parts of species, and probably some concentration of effort on the more productive sites. Each of these directions offer certain advantages and opportunities from the viewpoint of wildlife management.

Research tends to reflect the concerns of the period. The greatest concern in wildlife three decades ago centered on the game species. Interest in and the need for research upon game species continues. But, there is increasing public concern about non-game and endangered or threatened species, and consequently more research everywhere is being directed to non-game species ranging from eagles and ospreys, to warblers and wolves.

At first glance one well may question the value or need (or priority) for such research. However, there are increasing pressures to alter land management strategies to benefit or safeguard threatened, rare or endangered species. The Kirtland warbler program in Michigan is a classic example. Recommendations for management of rare or endangered species need to be based upon solid information. Without such data we face the prospect of poorly based regulations or recommendations. Generally we know much less about some of these non-game species than of the game animals more intensively researched during the past several decades.

Here at Maine we are directing some research to eagles, coyotes and song birds. In the case of the latter, one project involves documenting the succession of bird species that follow forest harvesting methods. Early results are beginning to look rather fascinating and suggest that the commercial forest may be one of the best places for those interested in seeing a large variety of birds. Likewise, preliminary results of research with marten are raising questions about the animals presumed need for large blocks of mature spruce-fir forest. A mixture of types and age classes may be better—at least as judged now on the basis of 60 pine marten, each ear tagged, that graduate students have been following in northern Maine for the past year. Recommendations eventually coming from such studies likely will be far different than those based on the general information previously available; and, probably better for the species as well as the land managers concerned.

In the area of big game, I believe that we are long overdue in initiating a long-term research project concerning deer yard management and also moose management. Ideally the deer project should be carried out on public

lands where experimental management plans could be designed and executed over several years with the imput and expertise of scientists at the University, in the U. S. Forest Service, State Department of Inland Fisheries and Wildlife and from industry and others. Earlier research in Maine, plus experience working with deer yard management in Maine and New Hampshire, offers an excellent base of information for designing some problem oriented research relevant to Northern New England.

It seems highly probable that we will need much more research concerning moose. With rapidly expanding populations—apparently responding to the forest patterns that regenerate following the newer harvesting methods—this big game species is assuming a greater role as a definite influence in our forest ecosystem. In addition, it has tremendous appeal from an aesthetic viewpoint as well as from its values as a game species. I doubt that we can long afford to overlook the problems that loom on the horizon associated with a rapidly expanding herd of large herbivores.

There are many other problems too numerous to list here that also deserve careful review and study. The new research about moose, deer, and non-game species present challenging problems for the wildlife team. In trying to meet the many needs we look forward to working cooperatively with all interested groups.

CAPSULE COOP UNIT PROJECT REPORT - TREE IMPROVEMENT

David Canavera

The University of Maine at Orono, under the direction of Assistant Professor Dave Canavera, is presently involved in a comprehensive tree improvement program designed to develop the best possible planting stock for the State of Maine. Projects underway include provenance tests of black spruce, jack pine and white birch (to determine the best seed source for planting in Maine) and progeny tests of carefully selected white spruce, balsam fir and white birch.

The results of these studies will be used in the establishment of seed orchards and seed production areas both of which will provide the first genetically improved seed for reforestation in the State. For the future, plans are now being made to establish provenance tests of Scotch pine, Douglas-fir, Japanese and European larch, and Norway spruce. Arrangements have also been made to test various pine and birch hybrids along with several foreign birch species. All of the seedlings are being raised in a specially constructed greenhouse that provides optimum growing conditions to the seedlings. Using this system, seedlings can be grown to plantable size in a period of 16 weeks.

APPENDIX

PROPOSAL FOR RESEARCH ON THE INTENSIVE MANAGEMENT OF FOREST RESOURCES IN MAINE

SCHOOL OF FOREST RESOURCES
AND
FOREST RESOURCES RESEARCH ADVISORY COMMITTEE
UNIVERSITY OF MAINE AT ORONO

AUGUST 15, 1975

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SUMMARY OF A

PROPOSAL FOR RESEARCH ON THE INTENSIVE MANAGEMENT

OF FOREST RESOURCES

NEED; In view of recent increased use of timber from Maine lands and projected accelerating demands for forest products, it is incumbent on all forest landowners, forest managers, and the wood using industry of Maine that we strive to obtain maximum productivity of our greatest renewable natural resource. The potential for increased growth and utilization is well documented and offers a unique opportunity for economic growth and stability in Maine.

An important key to this realization is more quality research in forest protection, management, and utilization that will ensure the necessary technological advances and the basic understanding of our total forest resource.

SOLUTION; This proposal calls for the establishment under the aegis of the School of Forest Resources and within the Experiment Station of a Cooperative Research Unit for intensive forest resources protection, management, and utilization. Initially, the Unit will require a minimum of four full-time scientists, but it will have to be expanded to eight to ten scientists if current research needs are to be met.

The estimated average annual cost per scientist is $60,000 including salary, technical staff, travel, supplies and equipment, fringe and administrative costs. Thus the initial funding required for the project would be approximately $240,000 plus $24,000 overhead for the minimum number of four scientists. Presently, the facilities at the School of Forest Resources can accommodate up to four scientists. Expansion beyond this level will require additional facilities.

Control of the Unit will be the responsibility of the Director of the School of Forest Resources. All research will be done under an approved research plan. Scientists will prepare plans, the Director will endorse them, and a select sub-committee of the Forest Resources Research Advisory Committee will review and make recommendations within a priority system.

EMPHASIS; The thrust of the Unit will be to accomplish priority research under three broad program areas with emphasis on the following projects:

1. Forest Protection Program

    a. Spruce budworm research
    b. Other insect problems
    c. Fire research
    d. Forest diseases
    e. Animal damage
    f. Weather effects

2. Forest Management Program

   a. Spruce-fir silviculture
   b. Hardwood silviculture
   c. Conifer silviculture
   d. Regeneration
   e. Tree improvement
   f. Wildlife habitat management
   g. Fertilization

3. Forest Utilization Program

   a. Harvesting and transportation
   b. Erosion control
   c. Economics and marketing
   d. Wood products, technology and processing
   e. Non-wood products

PROPOSAL FOR

RESEARCH ON THE INTENSIVE MANAGEMENT OF

FOREST RESOURCES March 6,

1975

The need for more research on the Forest Resources of Maine has been expressed by many people. It is generally recognized that the work now in progress is providing answers to many pressing problems, but, in view of the significance of the Forest Resources to the economy of Maine it is generally felt that a substantial increase is needed.

The production, protection, and utilization of the forest resources of Maine depend upon strong technological advances and continuing development of the basic understanding of all aspects of the resource. The forest resources research would include reforestation and management of land for the maximum production of crops of timber and other related products; management of watershed lands to improve and protect resources against flood and erosion; protection of forest land and resources against fire, insects, diseases and other destructive agents; utilization of wood and other forest products for all productive reasons from energy needs to quality veneer; development of policies for management and harvesting based on sound principles; and other related studies that will lead to the fullest and most effective use of the forest resource (Appendix A).

There are many ways in which organizations could be formed to do research. Our belief is that the best way to accomplish this is through a single coordinated effort by all interested in the resource. We have jointly

come to the conclusion that Maine cannot afford a splintered effort but instead should expand from the organization already established. Thus, we propose that the research be done under the general direction of the School of Forest Resources and within the Experiment Station. Inter-disciplinary efforts would be encouraged as in the past so that a maximum benefit could be derived toward improved productivity and use of our resource.

Currently forestry research is supported largely by funds from the Federal Government and the State of Maine. Several individual projects are supported by private land owners and managers who have expressed a desire for greater support of research in a coordinated fashion. More must be done to assure that the pressing requirements on our Maine forests will be met. This can be accomplished only through a large effort by industry.

The overall program may be visualized better by an explanation done in a step-wise fashion as follows:

1. The Research Organization and Budget
2. The Supporting Requirements
3. Facilities
4. Research Proposals
5. Control of Operations
6. Relationship to Current Problems
7. Implementation

RESEARCH ORGANIZATION AND BUDGET - The industrial research funds would become a part of the current budget of the School of Forest Resources. The additional responsibility of this added restricted budget would require a much larger time contribution to research by the Director of the School of Forest Resources. Thus, the School's organization would require the reinstatement of an Associate Director for Forestry; a parallel position to the Associate Director for Wildlife position in the School.

The additional funding would come mainly from the forest industries of Maine. It would be logical to identify the support within the School by a specific name emphasizing the idea of intensive management and utilization of the resource.

> The identification could be - "Cooperative Unit for Research on the Intensive Management and Utilization of Forest Resources." Such a long title rather clearly expresses the purpose of the organization. A more concise title might be more appealing.

Major projects would be developed within the Cooperative Unit each with an overall program leader. Three suggested programs are listed in Appendix A. Program leaders would develop a comprehensive program analysis with a list of priorities for future research. Some projects might include one scientist with supporting help while others could

include several. For example, the scope would depend upon recommendations from the advisory committee to the School from various industry representatives, from private citizens and from scientists.

Scientists would be hired to do research and not as teachers and, therefore, would not have specific course teaching requirements at the undergraduate level. Some of the teaching staff from the School or other Administrative Units with partial research assignments might be active on projects and would draw support to do priority research. The Unit should have flexibility to accomplish the greatest good for the total forest industry of the State.

The minimum goal in terms of new scientists should be four. Presently, there are facilities available for this number at the School of Forest Resources. This would require a minimum of $240,000 per year plus overhead (estimated to be $24,000). This minimum is based on the idea of a viable research organization with an average cost of about $60,000 per scientist as illustrated in the following tabulation:

Scientist Salary	$20,000
Wages for Technician, Graduate Student, and Secretarial support	15,000
Travel	5,000
Supplies & Equipment	10,000
Fringe	7,000
Administrative	3,000
	$60,000

Expansion of the Unit could be accomplished by increments of this magnitude.

Current expressed research needs indicate a requirement for 8 to 10 scientists. This would double the size of the minimum starting Unit and cost approximately $500,000. Expansion of this magnitude should take place in an orderly, planned manner, possibly over a 10-year period, and will require additional facilities.

This total budget is not large compared to that being invested in other parts of the country, but it is enough to permit an effective research effort on the pressing problems ahead. There are several examples in other sections of the country of successful research organizations; two that are well known are the Georgia Forest Research Council and the Oregon State University Research Laboratories. Each differs from this proposal and from each other; both involve large amounts of funds and both have produced results of significance to the supporting industries.

SUPPORTING REQUIREMENTS - Supporting staff are a vital part of the research program and little can be accomplished if only scientists are hired. Thus, each scientist would have the assistance of at least one technician and one secretary would be needed by every five scientists. There would also be help in the form of summer aides and graduate students. All of these would require travel expenses, equipment, and supplies. Without such support, research cannot effectively be accomplished. Each project proposal would account for such support. The Director would be supported by administrative funds set aside to provide necessary travel and publication funds to assure that the supporting industries are well informed on the accomplishments of the Unit.

FACILITIES - The School of Forest Resources has space for the minimum additions (four scientists) but does not have room for the expanded Cooperative Unit. New specialized laboratories will eventually be required to house some of the scientists. The overall progress of the Unit would be held up if such facilities are not developed.

Several alternatives are available:

(1) A laboratory could be constructed behind the present facility. This would have the advantage of being closely integrated with all the research staff of the School and the Unit. This might be a direct addition to the present building or it could be separate.

(2) The laboratory could be built in the Demeritt Forest near the present forest buildings. The construction would possibly be less expensive though laboratory equipment costs would remain high.

(3) A year around field research center could be established on industrial land near a research location. This alternative has definite merits but it should be located within a reasonable driving distance of campus.

These alternatives are all expensive but must be viewed with decisiveness and very soon after the Cooperative Unit is established.

RESEARCH PROPOSALS - No research will be done by personnel of the Unit without an approved research plan. It is anticipated that such a plan would contain carefully defined objectives, detailed design for executing the work and an assessment of the capability of obtaining the results expected (Appendix C).

Scientists will prepare their detailed plans and will submit them to the Director for his endorsement. The Director will then forward them to an appointed sub-committee of the School of Forest Resources Research Advisory Committee for their recommendation.1 The scientist may be requested to appear before the sub-committee to present details of plans. After this

1 The sub-committee will be composed of members of the advisory committee and contributors to the Unit.

review the responsibility of the Director will be to forward the completed and approved proposal to the Experiment Station for additional approval or to return the rejected proposal to the scientist with an explanation of the action.

CONTROL OF OPERATIONS - The operations of the Unit will be under the control of the Director of the School of Forest Resources, within his assignment of responsibility to the President of the University via Director of Experiment Station and V. P. for Research and Public Services. All scientists and supporting help will report directly to the Director and will be responsible to him. All funds expended in the Unit will be under his control though other people in the University outside the School may request and receive support from the Unit. Scientists hired by the School for research in the Unit will generally not carry academic appointments.

RELATIONSHIP TO CURRENT PROGRAMS - The industry has current agreements with several faculty members on research. These have assurances of support for from three to five years based upon approved research proposals. These projects—Tree Improvement Project, Fertilization Project, and Spruce Budworm Remote Sensing Project—would be absorbed in the Unit with a written agreement that the research would be supported at least at assured levels for the time period guaranteed. Current funds available to the research program are presented in Section VII, 1974-75 Research Funds.

The Cooperative Unit is being developed to assure the accomplishment of priority research. We expect to use all available help in reaching our goals and thus, would invite research proposals from all sources. This authority to approve funds locally does not apply to Federal and State funds which require review of proposals by the Cooperative State Research Service of the U.S.D.A. Though these funds have a different process for approval the Unit will have a positive effect on expenditures of those funds as efforts on all of the forest resources research will be directed toward needs of Maine citizens. It will be the Director's responsibility to integrate the efforts so that the maximum benefit can be achieved for all aspects of the resource. An example of funding of research from three sources is presented in the flow chart, Appendix B.

IMPLEMENTATION - The basic outline has been provided, now we must start the programming. The following are suggested steps:

(1) Sub-Committee of School Advisory Committee, School Executive Committee, and Director of the Experiment Station review proposal. Director of School drafts revisions with compromises as required and agreed, and obtains approval from University administration.

(2) Sub-Committee recommends method of funding from cooperators and a procedure for assuring continuity.

(3) Industry sets up mechanism for implementation and provides funds to commence operations.

(4) University and industry leaders sign agreements.

(5) Proposals are presented to committee for approval.

EMPLOYMENT OF SCIENTISTS FOR THE COOPERATIVE RESEARCH UNIT

The initial funding proposed is $240,000 plus an estimated 10% overhead which equals $264,000 per year. This amount would include the support of research already committed to fertilization, tree improvement, and spruce budworm surveys plus an annual allotment for publications and expenses of the Director of the School.

The following project personnel will be hired as soon as possible:

1. Forest Protection Program - A forest scientist with experience in Forest Entomology will be hired to direct this program. His first responsibility will be to prepare a program analysis for the spruce budworm. This scientist should have one degree in forestry and a strong interest in the area of silviculture.

2. Forest Management Program - A forest scientist with experience in research on broad aspects of silviculture will lead this program area. This person would be expected to analyze the needs in the spruce-fir and hardwood forest types and to do research on the top priority needs identified.

3. Forest Management Program - The third scientist will be a member of the management team. This individual will work on regeneration problems that have been identified already as a high priority research need. These problems require close teamwork with the tree improvement and fertilization scientists already on the School of Forest Resources staff.

4. Forest Utilization Program - The fourth scientist will be the program leader in the Utilization area. His particular specialization will be in economics with special interest in marketing. The individual will work closely with the other scientists in the Unit and in the School of Forest Resources.

5. One secretary will be hired full time to work with the Unit personnel.

The above are the initial group of employees to work in the Cooperative Unit. All would be on the job within the first 12 to 18 months after the cooperative agreements for the Unit have been signed. Expansion of the research and the Unit personnel staff would depend upon further needs and progress of the overall program.

BASIS OF FUNDING

There are several bases and combinations thereof by which cooperators could raise supporting funds—land acreage, volume of timber production, volume of manufactured products, number of employees, etc. Because the initial emphasis of this research effort will be on protecting basic forest resources and increasing forest productivity, it has been concluded that the most equitable and rational basis for funding is on total forest land acreage.

There are approximately 7 million acres owned by pulp and paper companies and 3% million acres under large private and other forest industry ownerships. These lands are generally under planned management, and the owners and managers of these holdings have traditionally exhibited high interest in long-term protection and production of the resource. The initial funding is being sought from this class of ownership. The ones who are most likely to use the results of constructive research are being asked to support the research.

A figure of 3<: per acre per year is judged to be the rate necessary to meet the annual required funding of $264,000 for the first five-year period. At 3<? per acre, the 10*5 million acres theoretically would yield $315,000 and exceed the initial requirements. Realistically, a full and complete response is unlikely. However, to the extent the program is over-subscribed in any one year, a reduced amount will be requested in the subsequent year.

As this research program develops, it will undoubtedly become appropriate to expand the base of support and funds will be sought from others who have an interest in the forest resources of Maine.

RESEARCH PRIORITIES

An appointed Sub-Committee of the Forest Resources Research Advisory Committee (F.R.R.A.C.) working in conjunction with the Director of the School of Forest Resources and the Cooperative Unit scientists will establish research priorities for the Unit. This system will ensure that the broadest and most intensive consideration will be given to what is relevant in the protection, management, and utilization of forest resources of Maine.

One of the first tasks of the Sub-Committee, whose membership will be representative of supporting cooperators, will be to develop a specific method for priority establishment and review. As a first step in this direction, Sub-Committee member John Sinclair initiated a request to a broad representation of land management foresters to determine their priority recommendations. The following tabulation indicates the response to this request:

Program and Research Projects	Percent of Respondents Expressing Priority Interest
1. Forest Protection Program	
a. Spruce budworm research	67%
b. Other insect problems	30%
c. Fire research	26%
d. Forest diseases	15%
e. Animal damage	0%
f. Weather effects	11%
g. Water resources	7%
2. Forest Management Program	
a. Spruce-fir silviculture	41%
b. Hardwood silviculture	37%
c. Conifer silviculture	30%
d. Regeneration	11%
e. Tree improvement	19%
f. Wildlife habitat manipulation	41%
g. Fertilization	30%
h. Soil and site relationships	37%
i. Mensuration including growth and yield	22%
j. Public relations and law enforcement	8%
k. Fire as a management tool	7%
1. Thinning	15%
3. Forest Utilization Program	
a. Harvesting and transportation	56%
b. Erosion control	11%
c. Economics and marketing	33%
d. Wood products, technology and processing	41%
e. Non-wood products	37%
f. Complete tree and forest utilization	48%

Recently, a similar request for an expression of research priority interest was initiated by Barton M. Blum, Project Leader, Northeastern Forest Experiment Station. This request specifically left outSpruce Budworm and other forest protection concerns as this is not part of the work at the Orono Project. This information in detail will be made available to the Sub committee for its consideration. A summary of the results follows:

1. Forest Management Program	
a. Silviculture	35%
b. Soils and site relationship	25%
c. Economics of intensive management	8%
d. Mensuration including growth & yield	8%
e. Tree improvement	3%
2. Forest Utilization Program	
a. Harvesting and transportation	2%
b. Economics and marketing and complete tree and forest utilization	10%
c. Non-wood products	3%

APPENDIX

A

Research programs and projects that would be possibilities for consideration by the Unit:

1. Forest Protection Program

    a. Spruce budworm research
    b. Other insect problems
    c. Fire research
    d. Forest diseases
    e. Animal damage
    f. Weather effects

2. Forest Management Program

    a. Spruce-fir silviculture
    b. Hardwood silviculture
    c. Conifer silviculture
    d. Regeneration
    e. Tree improvement
    f. Wildlife habitat management
    g. Fertilization

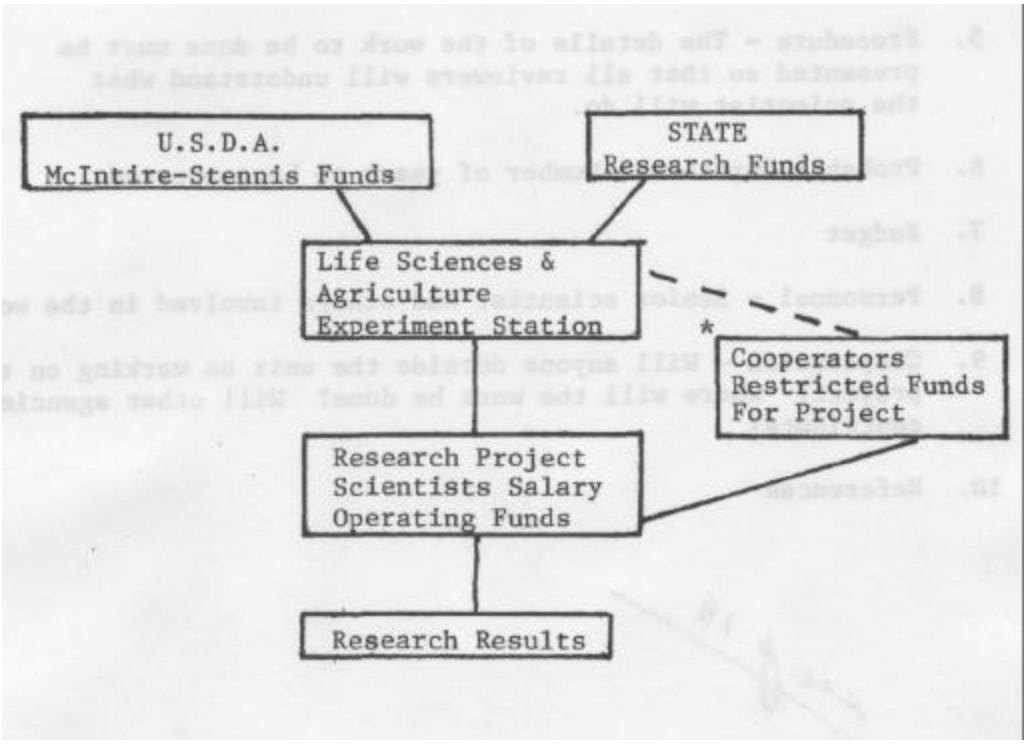
3. Forest Utilization Program

    a. Harvesting and transportation
    b. Erosion control
    c. Economics and marketing
    d. Wood products, technology and processing
    e. Non-wood products

APPENDIX

B

Flexibility to accomplish the priority research for the cooperators requires that we use the best talents available. This includes both the scientists hired directly for the project and those working on other projects on campus. This would involve projects supported entirely by the Unit and others partially supported in this way. Such projects, with funding from several sources, are already in existence in the School. The following is an example of the way in which funds might be utilized on a research project.



*Dotted line indicates approval of the Research by Station, Solid line indicates support for operation of the project.

APPENDIX

C

Format for proposals to do research in the Cooperative Unit.

1. Title - Concise and to the point.

2. Objectives - Research objectives should be concise and objective.

3. Justification - Why is the work needed?

4. Review of Literature - This should reveal that the scientist has made a thorough search and that the already completed work is thoroughly understood.

5. Procedure - The details of the work to be done must be presented so that all reviewers will understand what the scientist will do.

6. Probable Duration - Number of years to be supported.

7. Budget

8. Personnel - Senior scientist and others involved in the work.

9. Cooperation - Will anyone outside the unit be working on the project? Where will the work be done? Will other agencies contribute?

10. References