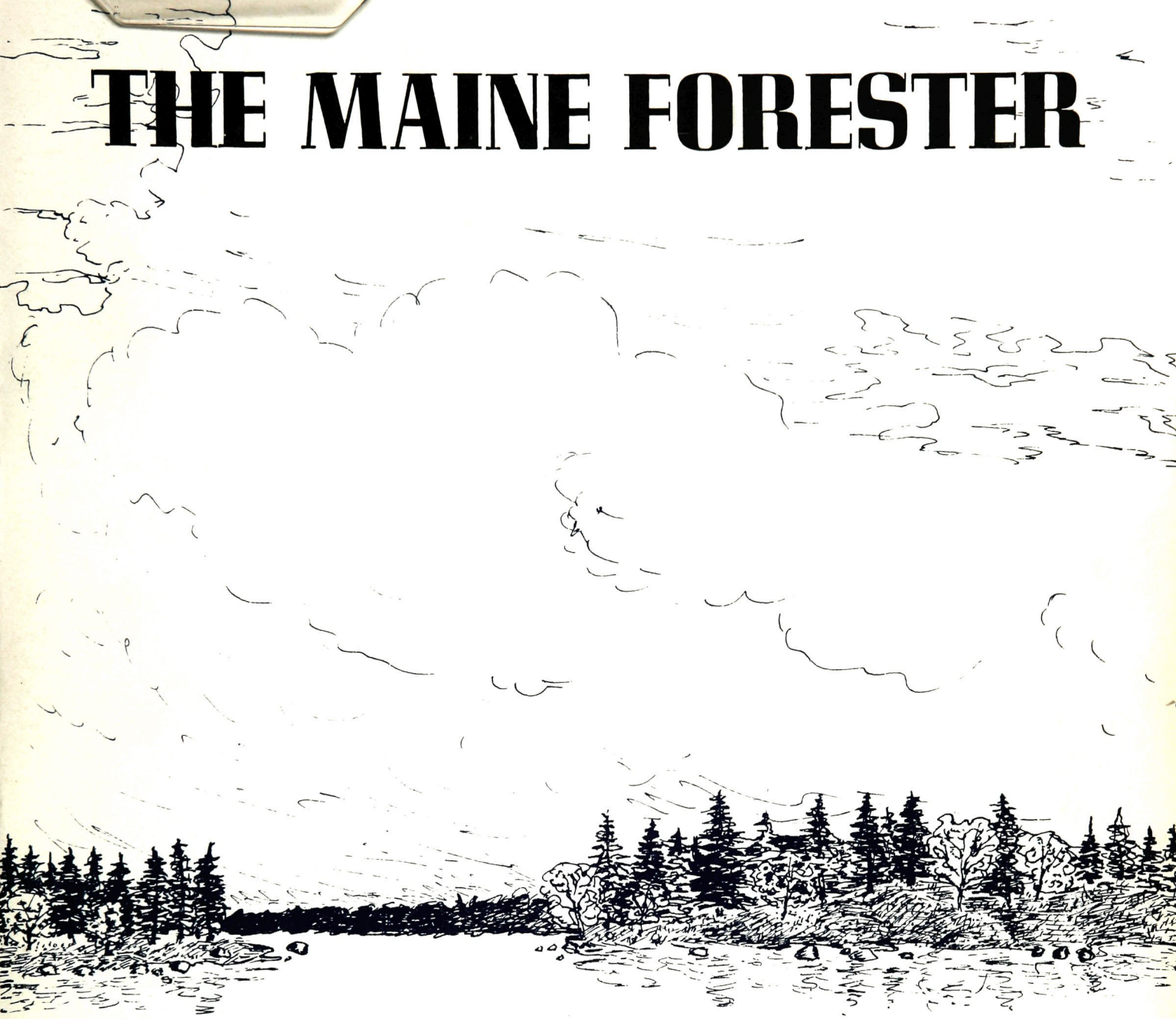
THE MAINE FORESTER



1979

Richard Hale

A Tradition
A Commitment
A Workforce

A Tradition of involvement in Maine since 1898 when International Paper Company was founded

A Commitment to Maine, the vastness of her forest resource, her communities and her people.

A Workforce of more than 1,500 dedicated and skilled employees growing with an industry and International Paper.

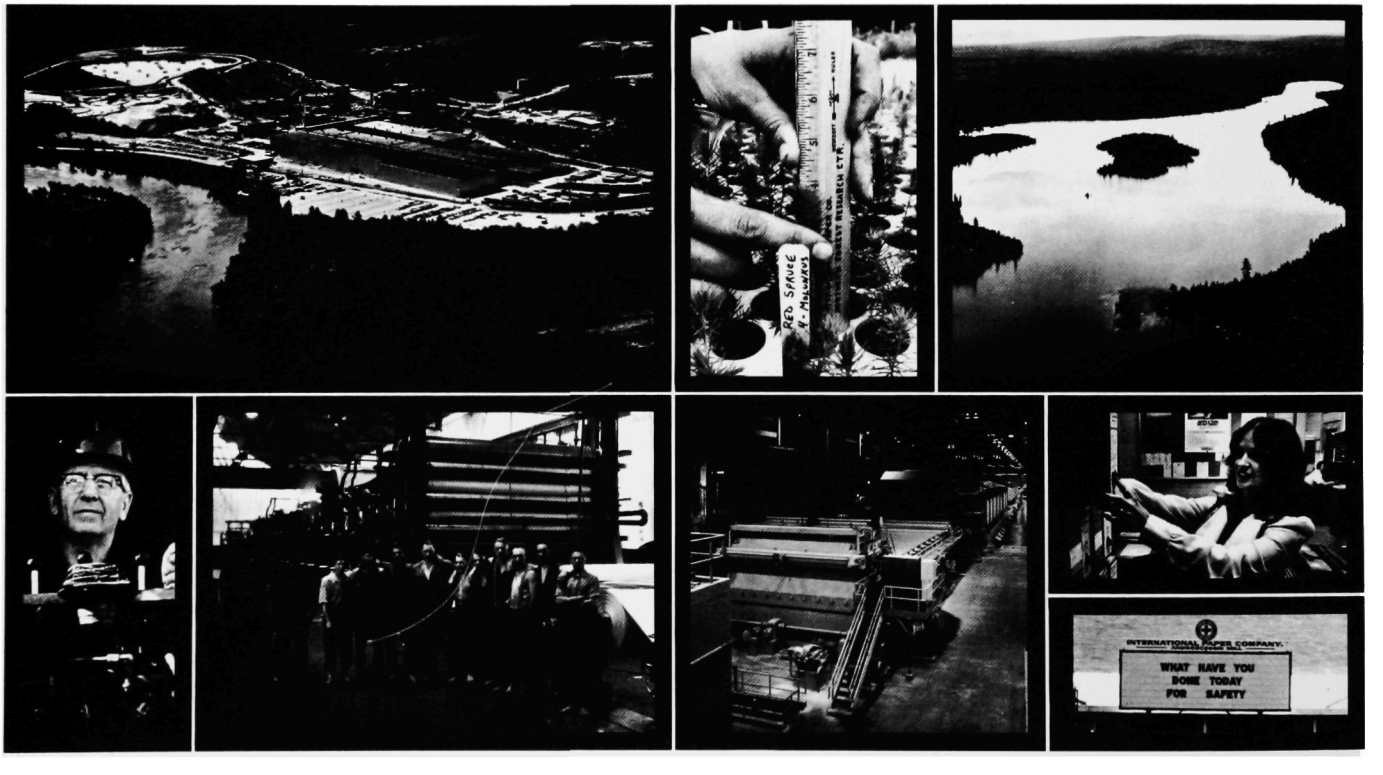
These are vital components upon which International Paper Company's operations in Maine depend.

— The Northern Forest Research Center, recently established in Bangor, to develop and test modern forest management systems and techniques suited to the climate and terrain of Maine's woods.

— IP's Region VI Woodlands Headquarters in Augusta, responsible for the management of more than 1.7 million acres of company-owned forest in the Northeast.

— The massive Androscoggin Mill in Jay, one of the largest fine paper mills in the world, producing nearly half a million tons of light-weight fine papers a year.

Together these facilities represent an investment of more than $300,000,000 in the last fifteen years alone — strong testimony of the Company's on-going commitment to the compatibility of industrial growth and Maine's environment.

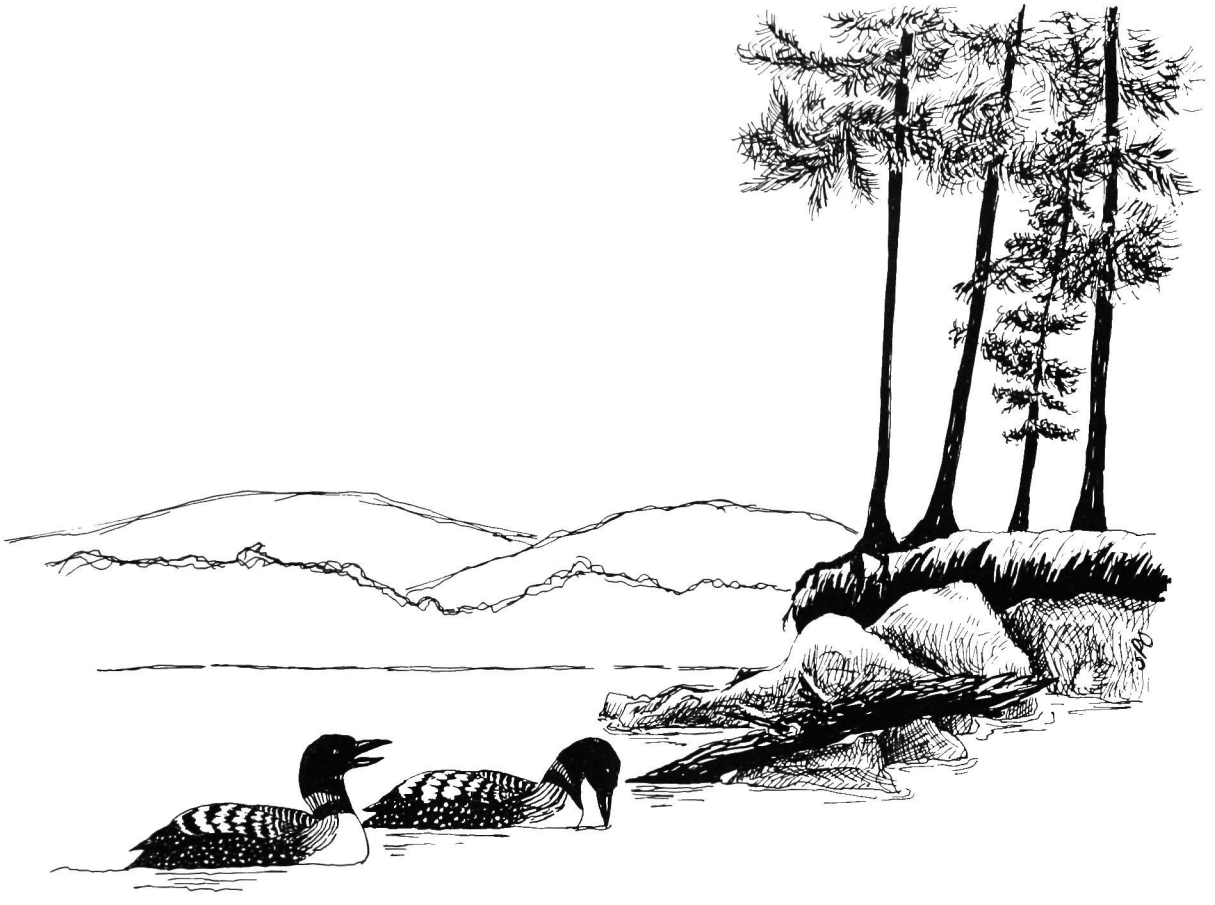


A tradition, a commitment, a workforce. Important elements of IP's past and the foundation of International Paper Company's future in Maine.

INTERNATIONAL PAPER COMPANY

JAY MAINE 04239

THE MAINE FORESTER



Published Annually By

THE STUDENTS OF THE

SCHOOL OF FOREST RESOURCES

UNIVERSITY OF MAINE

Cover drawing by Peter Dunn

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DEDICATION

MR. ROGER F. TAYLOR

It is a special pleasure to write a few words about Roger Taylor. Roger is an example of one of the finest professional foresters I have known. I first met Roger and Mary in 1947 when I was a student at Maine. We lived in the old South Apartments directly above them. Apartments were extremely scarce in Orono for both students and staff. We were all thankful that those plain, drafty old buildings were available.

Roger was born in 1918 in Amherst, Massachusetts and prepared for his career at the Stockbridge School of Agriculture in Massachusetts. Roger came to Maine in 1946 and has participated in about every aspect of the School's field operation since that beginning. He has been a friend to all students and a loyal professional. Roger is active in the Society of American Foresters and he and his wife are regularly in attendance at the national meeting as well as the New England section. He has been a regular attendee at the Eastern Maine Forest Forum since its earliest beginnings.

Roger is always available to help a student or another staff member. Students probably do not realize that he was the University Fire Chief for many years and has given much in other ways to the entire University. The most impressive evidence of his work is in the appearance of the Dwight Demeritt Forest and the qualifications of the students he trained there.

Once before, in 1963, the students dedicated the Maine Forester to Roger Taylor. I believe it is most appropriate that the 1979 volume be again dedicated to him.

Fred Knight

Roger Taylor is one of those people whom everyone likes to call a friend. He is respected by students and faculty, alike. I first met Roger when I was an undergraduate and had the good fortune to work for him on the University Forest. As I look back now, I wonder how he had the patience to explain, time and again, all of the things revolving around the work that was being done: how to safely use the crawler tractor, why an area was being cut the way it was, etc., etc. You were always left with the feeling that his work taught you a good deal about the "real world" and you had fun in the process.

Now, being a faculty member, I still find Roger to have an attitude about life and profession which you have to admire. He still has that same sense of humor and a desire to work with students. All of the faculty appreciate that the University Forest wouldn't be the wonderful teaching and research lab it is today without his dedication to maintaining it that way. Few people are a part of what appears to be an indispensable fiber which makes up an organization. Roger is one of those!

Marshall Ashley

Working for Roger F. Taylor for the last three years has been an experience that will always be with me. Roger's professional attitude is one of the most encouraging in the School of Forest Resources. There is more to be learned from him than simply the skills required to do the work, for Roger is a wealth of information about what forestry used to be like, and is like in Maine. He can also provide insight as to what forestry may well be like in the future.

Roger's patience and understanding when he is teaching someone to use the crawler or loader makes it that much easier to learn. He is such an effective instructor, it's hard to believe he has been doing it with the same enthusiasm for 32 years. I wonder how many times he has said to a cutter, "Well, you could have made a sawlog out of that". Roger has many qualities that make working in the Demeritt and Worthern forests most enjoyable. His dedication and help goes beyond that of his woodswork. As a member of the Woodmans team, I can honestly say we would find it very difficult to exist without Roger's help.

Charles Gadzik

I can remember Roger as a patient field supervisor, teaching students, such as I, the basic skills needed to establish and maintain the transportation system thru the University Forest at UMO. We rocked holes in the spring and plowed snow in the winter and Roger never complained of our crude efforts with machinery but only sought to teach us how to do the job more effectively. Over a period of more than twenty years now, working in forestry, it has been these same skills which time and again have provided a path of communication with a logger or contractor when words won't do but a little bit of practical know-how will. I would hope that the profession of forestry will always retain this balance of scientific education and basic professional skills which men like Roger Taylor do so much to provide.

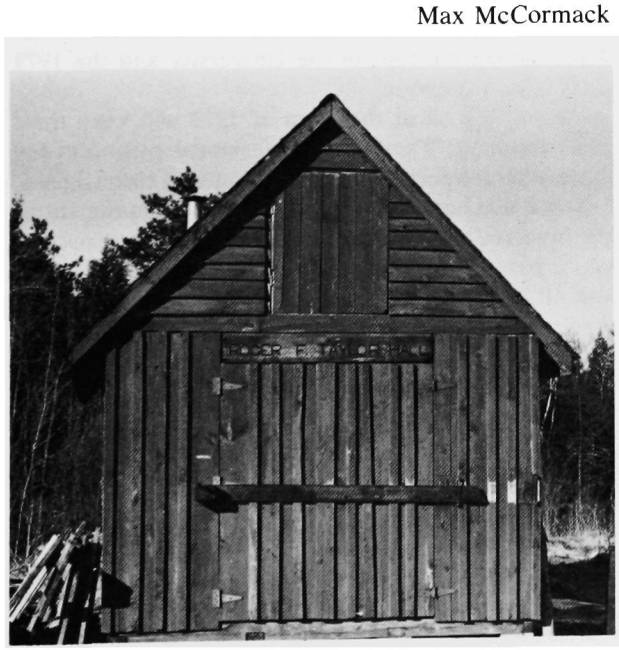
William H. German
Forester, USFS

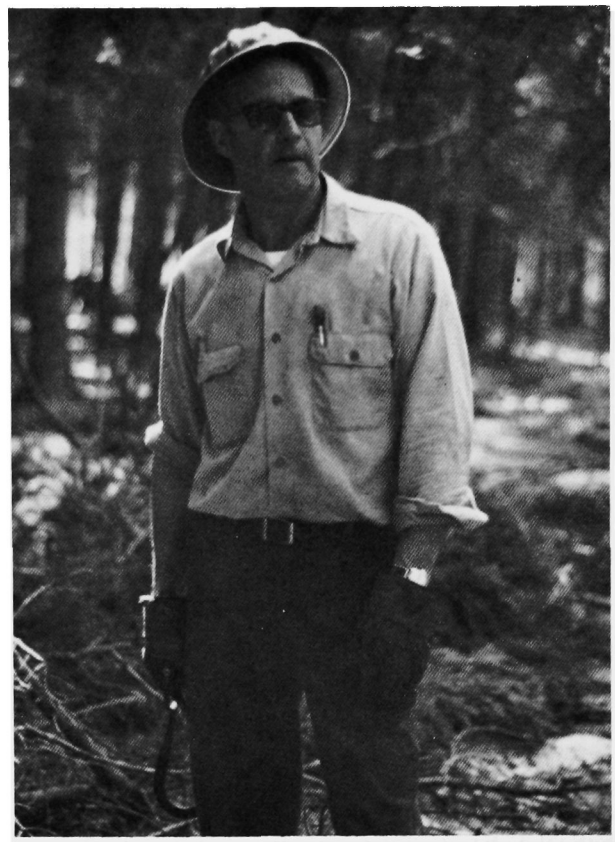
Roger Taylor is a significant stimulus to the continuity of respect, ethics, sincerity and practicality among students working on the forest and participating on Woodsmen's Teams. It was reassuring to me to return to Orono after 20+ years and see Roger still functioning effectively and interacting with students.

Classroom courses come and courses go; many are forgotten; but, Roger and his lessons are remembered by everyone with whom he has had contact — remembered well for valuable help, advice and practical learning.

The knowledge and unselfish values we carry through life come from special people who inpart a unique combination of knowledge and high principles. We have been extremely fortunate—an outstanding example of one of those rare, special people is Roger Taylor.

Max McCormack





There is no person any more deserving of the honor of having the Maine Forester dedicated to him than Roger Taylor. Roger has, over the years, provided guidance, leadership and training to thousands of Maine students. His integrity and sincerity have endeared him to all and have served as examples of the personal traits that students must emulate if they are to succeed in forestry, or any other vocation.

I first met Roger in the fall of 1955 shortly after attending the two week freshman forestry camp at Princeton. I was a "wet-behind-the-ears", urban person who had a great deal to learn about the woods. Roger's quiet, friendly manner and his great array of practical skills provided an unequalled opportunity for students such as myself to learn about forestry as it really was.

He had . . . and still has . . . a way of taking forestry out of the labs and the textbooks and getting it onto the ground, a skill that is most scarce in the educational systems of today, and one that leads us all to acknowledge that Roger has truly earned the reputation of . . Teacher/Practitioner.

Thanks Roger . . . from me and from all of the thousands of appreciative foresters who are all trying to keep up to your standards.

Temple Brown
Acting Director
Maine Forest Service

Greetings from the Director

It is a pleasure to make a few comments to the 1979 class and to give best wishes to all the students of the School of Forest Resources. We all can look back on 1978 as the year of our seventy-fifth celebration and a year of accomplishment.

We commenced the fall semester (1978) with some interesting differences to report in our student numbers. Our quota system that was designed to reduce numbers has after three years, had an effect. For the first time in several years both our sophomore and junior classes are smaller than either the freshman or senior classes. Our total number of students is reduced by almost ninety. This has been managed despite the pressure of numbers of applications which are still far beyond the number that can be admitted.

We have responded to accreditation recommendations in several ways.

1. We have requested additional teaching staff. The first would be in the forest policy position.
2. Through the use of quotas we have reduced the total number of students in the School.
3. In the research area, we have organized two additional sections of the faculty for research planning purposes.
4. We have reviewed the curricula and have added the mathematics requirements as recommended as well as other changes.

For the first time in several years, we have had little change in overall staffing. There were no retirements and no resignations of professional staff though there were changes in technologists and technicians. We did fill a position vacated in 1977 when Professor Mendall retired. Dr. James Sherbourne was selected as the new Unit Leader for the Cooperative Wildlife Research Unit. Late in 1978 Dr. John Litvay accepted a position with the Institute of Paper Chemistry in Appleton, Wisconsin. John will leave the University in the spring (1979).

The present students continue to show their outstanding talents whether on our special competitive teams or in other activities. The Wildlife Bowl team again won their contest and remain undefeated. The woodsmen's and woodswomen's teams were also very strong in competition. Scholastically we have had students among the tops in the University and the 1979 class is no exception.

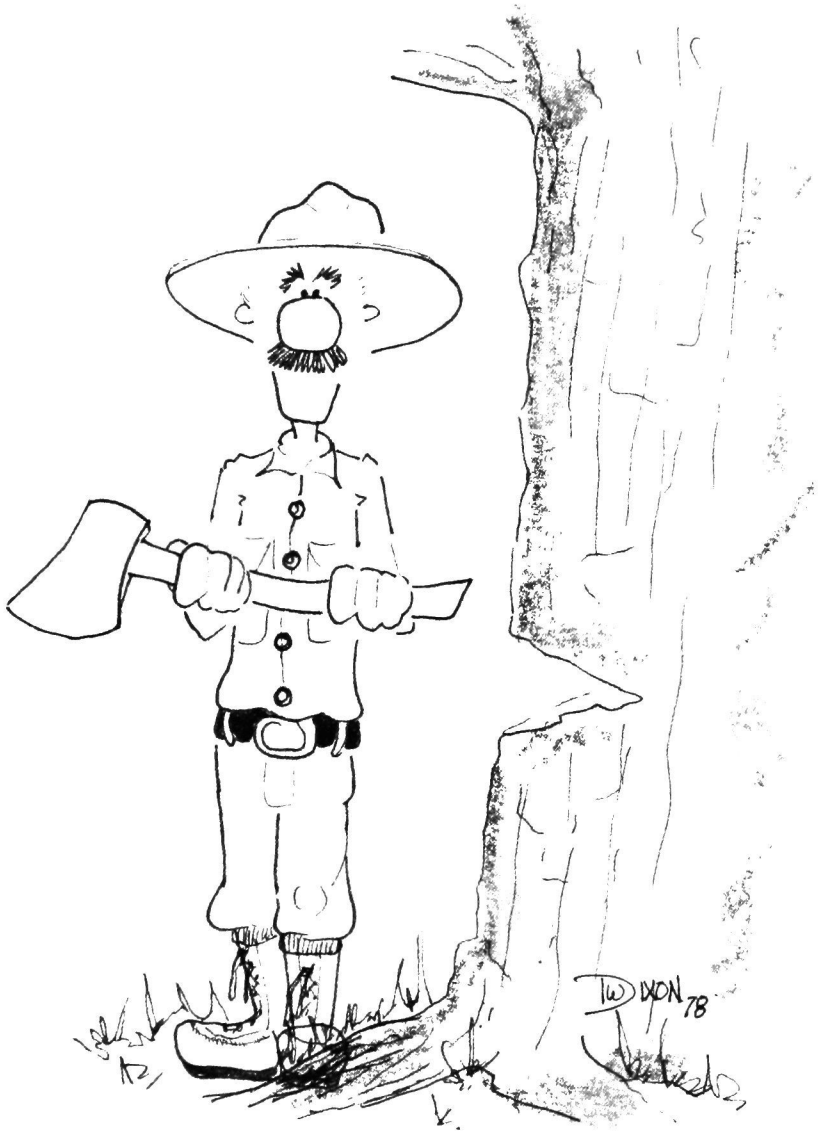
I hope that all of the class of 1979 will keep their goals in mind. There are professional positions for those who are persistent, competent and enthusiastic. I realize that some are not that interested in the struggle involved. That doesn't make those persons any less a part of our expression of affection. I congratulate all of you and wish you the greatest success in your future life. I hope that all of you will look forward to a lifetime of peace and improvement in living conditions for all people.

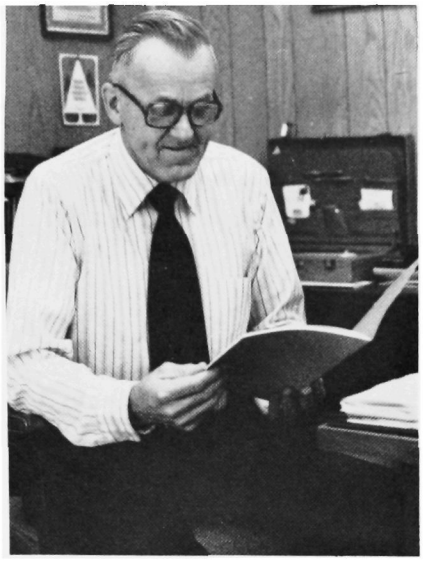
Sincerely yours,

Fred B. Knight

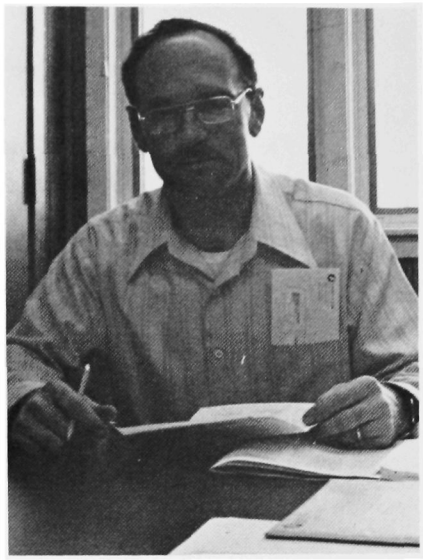
FRED B. KNIGHT
DIRECTOR

FACULTY

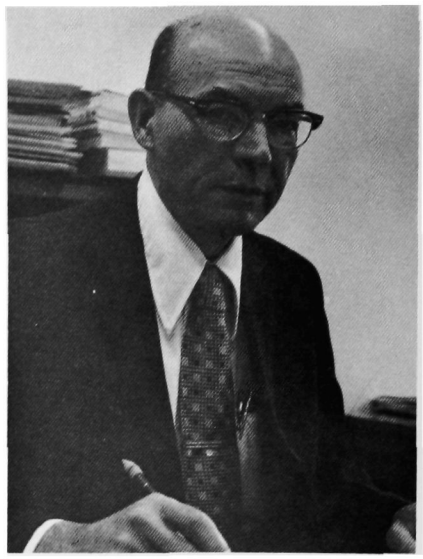




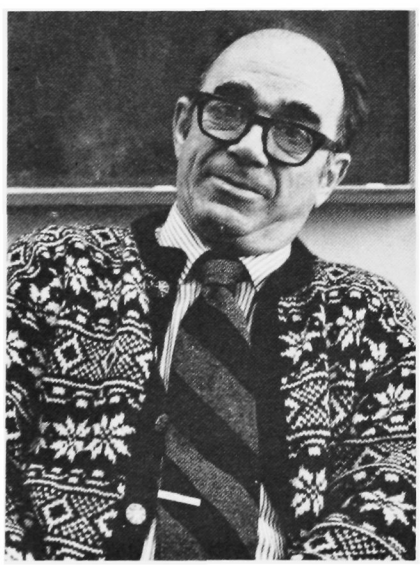
FRED B. KNIGHT
Director of the School of
Forest Resources
Dwight B. Demeritt Prof. of Forestry
B.S., Univ. of Maine, 1949
M.F., Duke Univ., 1950
D.F., Duke Univ., 1956
Management Problems
Honors Courses



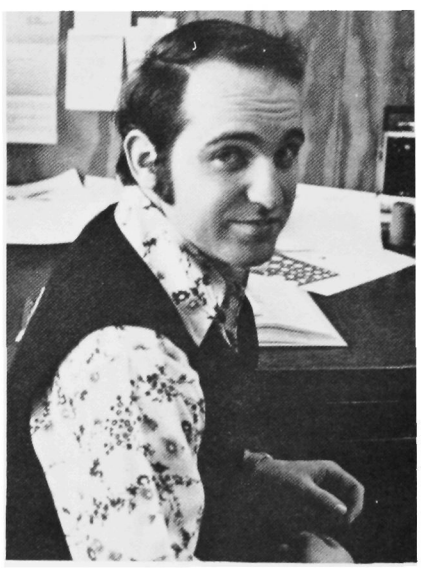
MARSHALL D. ASHLEY
Assoc. Director for Administration
Prof. of Forestry
B.S., Univ. of Maine, 1965
M.S., Purdue Univ., 1966
Ph.D., Purdue Univ., 1969
Photogrammetry and Remote
Sensing of Natural Resources
Forestry Summer Camp Director



RALPH H. GRIFFIN
Prof. of Forestry
B.S., Virginia Polytechnic Institute,
1943
M.F., Yale, 1947
D.F., Duke, 1956
Silvics-Forest Ecology
Silviculture
Advanced Silviculture
Forest Influences

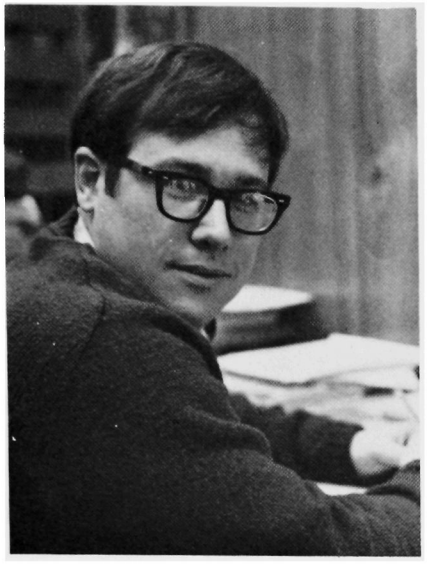


HAROLD E. YOUNG
Prof. of Forestry
B.S., Univ. of Maine, Forestry, 1937
M.F., Duke Univ., Biometrics, 1946
Ph.D., Duke Univ., biometrics and
Tree Physiology, 1948

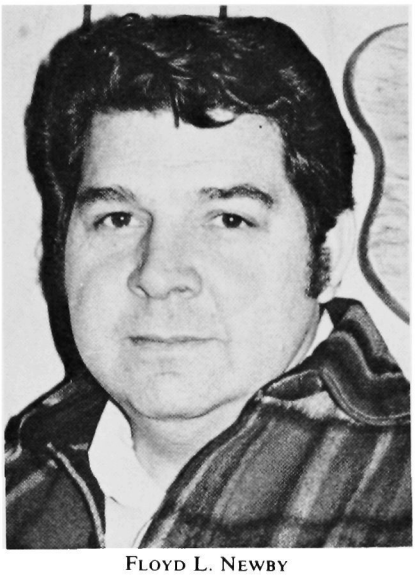


JEAN-LOUIS MORIN
B.S., Univ. of Maine, 1976
M.S., Univ. of Maine, Forest
Remote Sensing, 1978
Elementary Plane Surveying
Advanced Plan Surveying

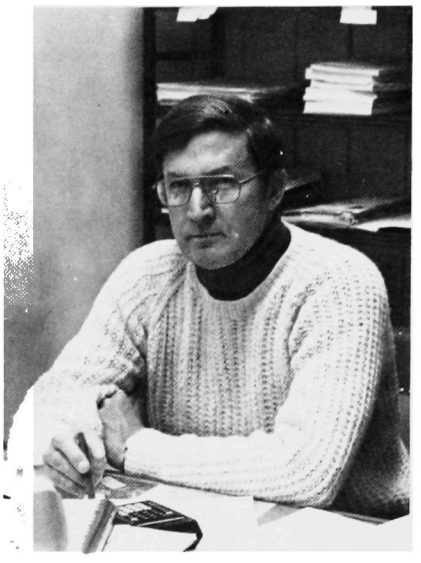
ROBERT KENT SHEPARD
Assist. Prof. of Forestry
B.S., Univ. of Michigan, Forestry,
1963
M.S., Duke Univ.,
Forest Entomology, 1964
Ph.D., Univ. of Michigan,
Forest Ecology, 1970
Watershed Management
Senior Seminar
Statistical Inference in
Forest Resources Lab



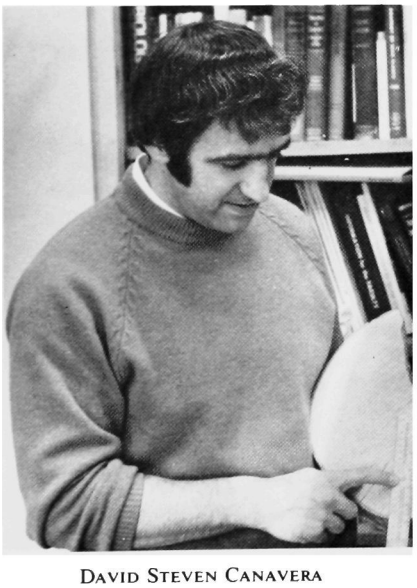
THOMAS B. BRANN
Assist. Prof. of Forestry
B.S., Univ. of New Hampshire
M.S., Univ. of New Hampshire
Ph.D., Virginia Polytechnic
Institute and State University
Statistical Inferences in
Forest Resources
Forest Biometry
Forestry Summer Camp



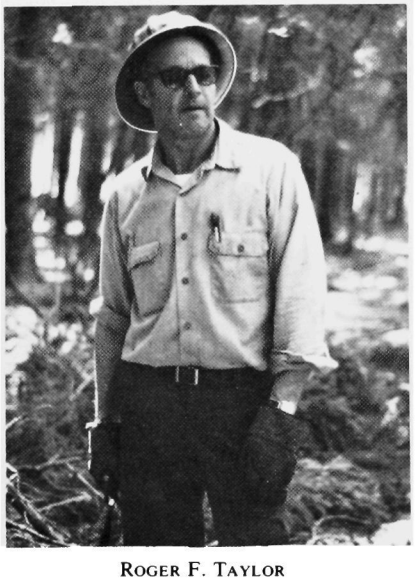
FLOYD L. NEWBY
Assoc. Prof. of Forestry
B.S., Utah State Univ.
M.S., Univ. of Michigan, Forest
Recreation, 1966
Ph.D., Univ. of Michigan,
Forest Recreation, 1971
Forest Recreation Management
Introduction to Forest
Resources Lab
Recreation and Park Management
Forest Policy and Administration



BENJAMIN F. HOFFMAN
Assoc. Prof. of Forestry
B.A., Univ. of Virginia, 1951
M.S., Yale Univ.—Forestry, 1957
Timber Management
Harvesting of Forest Crops
Senior Seminar

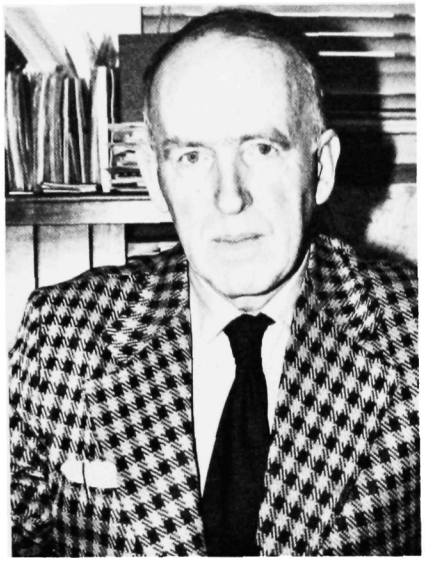


DAVID STEVEN CANAVERA
Assist. Prof. of Forestry
B.S., Michigan Technological
University, Houghton
Forest Management
M.S., Michigan State University
Forest Tree Improvement, 1967
Ph.D., Michigan State University
Forest Tree Improvement, 1969
Forest Planting

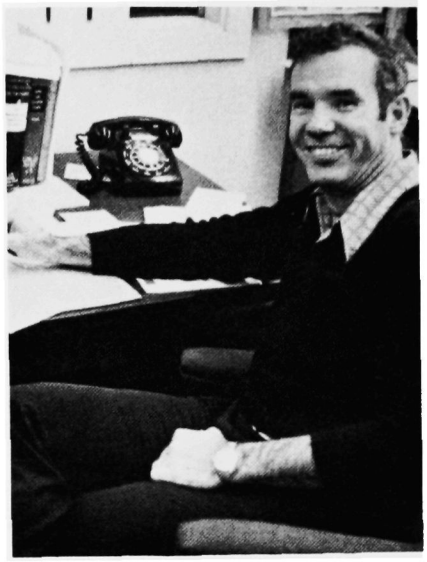


ROGER F. TAYLOR
Superintendent of Dwight B.
Demeritt and Harold W. Worthen
Forests
Univ. of Massachusetts

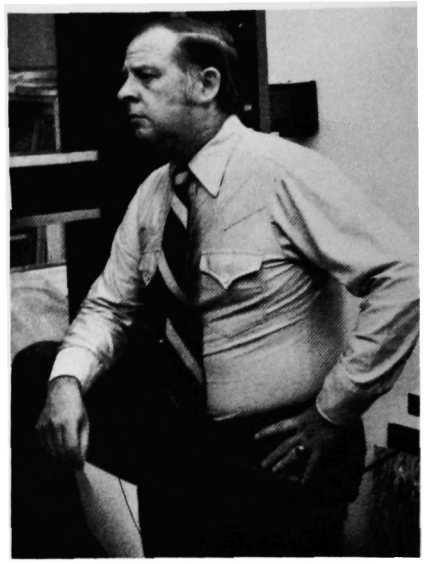
THOMAS J. CORCORAN
Prof. of Forest Economics
B.S., Michigan Technological
University, 1955
M.S., Purdue Univ., 1960
Ph.D., Purdue Univ., 1962
Forest Economics
Production Analysis in Forestry
Planning and Control of Forest
Operations
Research in Forestry Economics



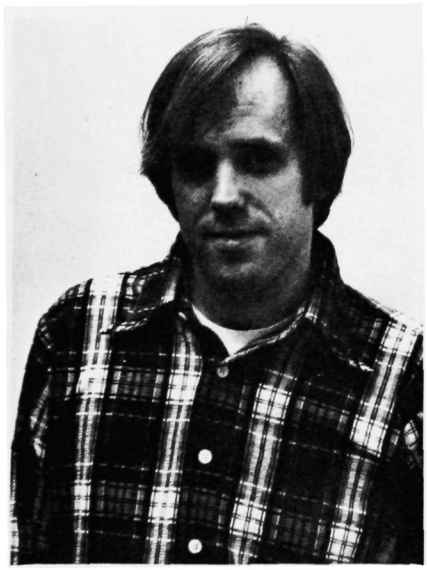
RICHARD A. HALE
Assoc. Prof. in Wood Technology
B.S., Univ. of Maine, 1949
M.F., Yale, 1950
Primary Wood Processing
Wood Preservation and Drying
Senior Seminar



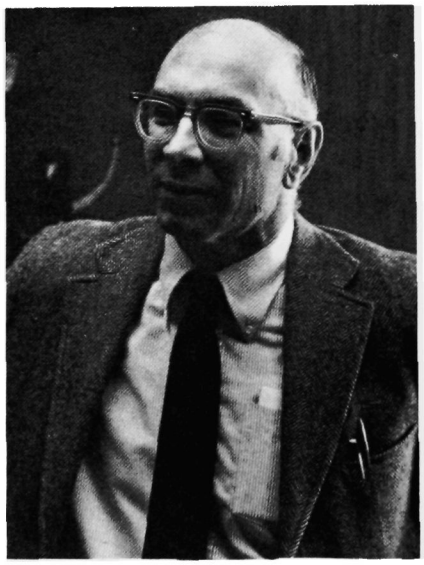
CRAIG E. SHULER
Assoc. Prof. of Wood Technology
B.S., Colorado State Univ., 1960
M.S., Colorado State Univ.,
Radiation Biology, 1966
Ph.D., Colorado State Univ., Wood
Science, 1969
Wood Technology I
Wood Physics
Senior Seminar
Freshman Seminar
Sophomore Seminar



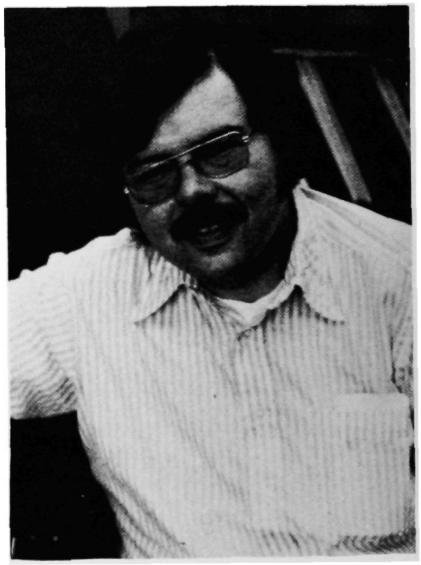
JAMES E. SHOTTAFER
Prof. of Wood Technology
B.S., State Univ. of New York, 1954
M.S., State Univ. of New York, 1956
Ph.D., Michigan State Univ., 1964
Analysis in Forest Utilization
Wood Technology II
Research Methods in Forest
Utilization



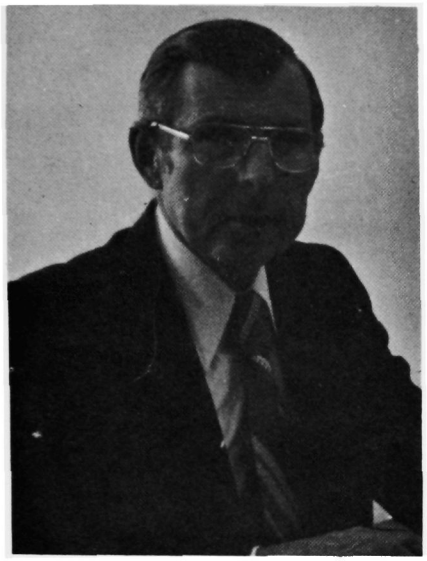
John D. Litvay
Assistant Professor of Wood Technology
B.S., Southern Illinois Univ., 1970
M.S., Oregon State Univ., 1973
Ph.D., Oregon State Univ., 1976
Introduction to Forest Resources Lab
Wood Technology Lab
Wood Anatomy
Research Techniques in Wood Anatomy



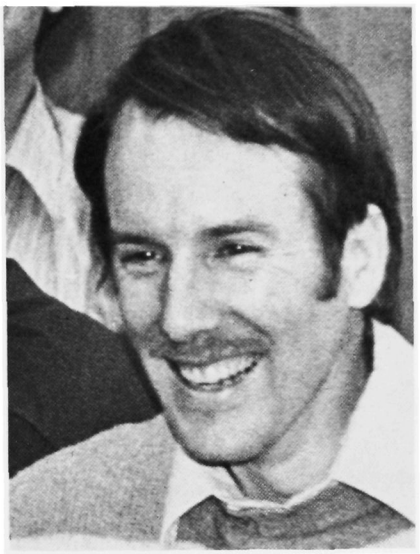
MARVIN W. BLUMENSTOCK
Forestry Specialist
Cooperative Extension Service
B.S., Rutgers Univ.
Agricultural Sciences, 1957
M.S., Yale Univ.
Forestry, 1959
M.B.A. Univ. of Maine, 1977



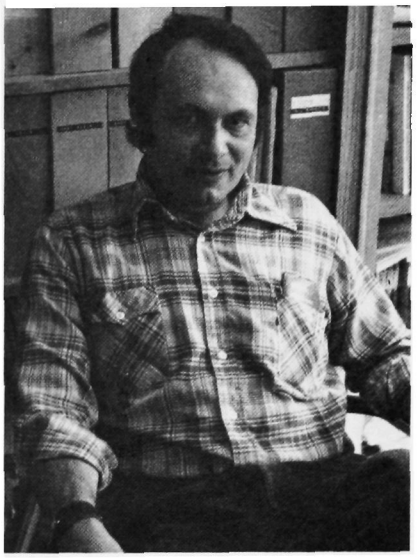
WILLIAM D. LILLEY
Extension Safety Specialist
Cooperative Extension Service
B.S., Univ. of Maine, 1970
M.S., Univ. of Maine, 1975



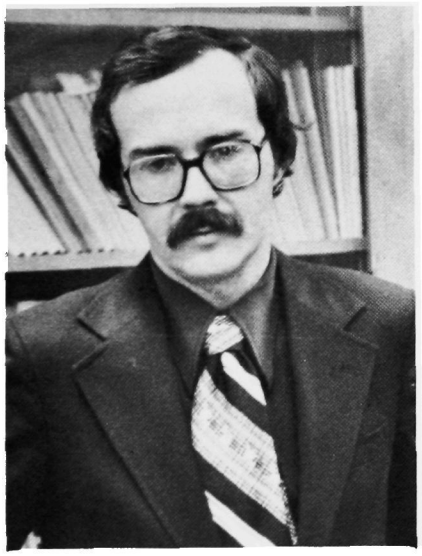
MALCOLM W. COULTER
Assoc. Director of Wildlife
Prof. of Wildlife Resources
B.S., Connecticut, 1942
M.S., Univ. of Maine, 1948
Ph.D., Syracuse, 1966
Ecology
Senior Seminar
Graduate Seminar



RAY B. OWEN, JR.
Assoc. Prof. of Wildlife
B.A., Bowdoin, 1959
M.S., Univ. of Illinois, 1966
Ph.D., Univ. of Illinois, 1968
Ecology
Senior Seminar
Ecological Energetics

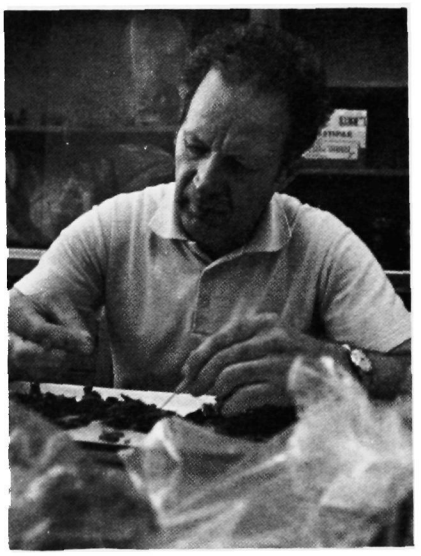


JAMES R. GILBERT
Assist. Prof. of Wildlife
B.S., Colorado State Univ., 1968
M.S., Univ. of Minnesota, 1970
Ph.D., Univ. of Idaho, 1974
Practice of Wildlife Management
Senior Seminar
Biological Characteristics of Game
Birds and Mammals
Wildlife Management

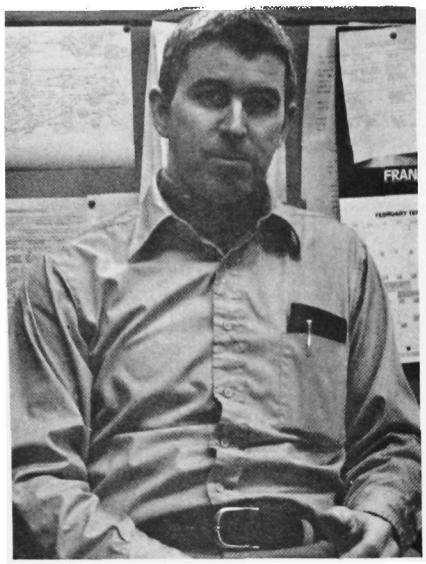


TERRY A. MAY
Assist. Prof. of Wildlife
M.S., Colorado State Univ., 1970
Ph.D., Univ. of Colorado, 1975
Biological Characteristics of Game
Birds and Mammals
Director-Wildlife Summer Camp

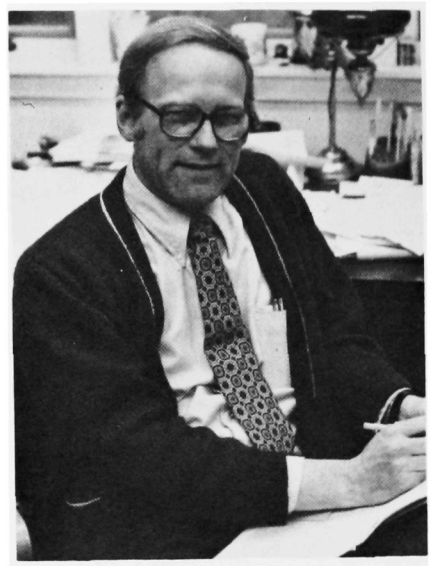
CHESTER F. BANASIAK
Assist. Research Prof. of Wildlife
B.S., Michigan State University
Forestry, 1948
M.S., University of Massachusetts
Wildlife, 1952
Ph.D., University of Maine
Forest Resources, 1974



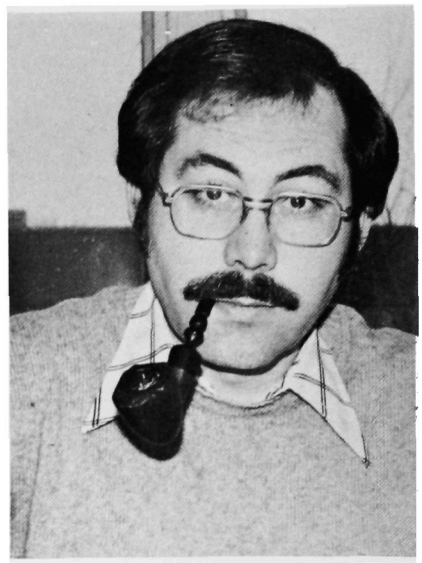
VOIT B. RICHENS
Assoc. Prof. of Wildlife
Acting Leader, Coop. Wildlife
Research Unit
B.S., Washington State, 1957
M.S., Utah State Univ., 1961
Ph.D., Utah State Univ., 1967
Wildlife Management
Wildlife Graduate Seminar



DAVID B. FIELD
Assoc. Research Prof.
of Forestry
Coop. Forestry Research Unit
B.S., Univ. of Maine, Forestry
M.S., Univ. of Maine, Forestry
Ph.D., Purdue University



MAXWELL L. MCCORMACK, JR.
Research Prof. of Forestry
Coop. Forestry Research Unit
B.S., Univ. of Maine, 1956
M.F., Duke Univ., 1959
D.F., Duke Univ., 1963



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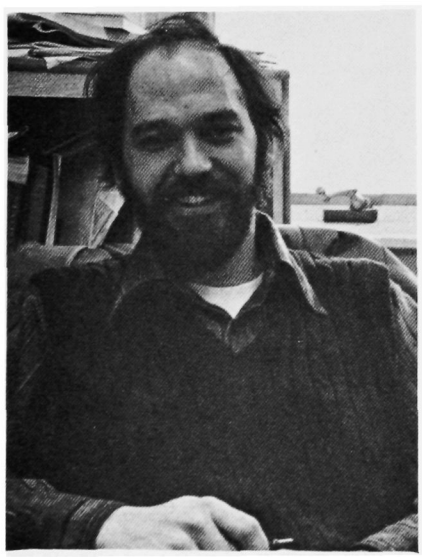

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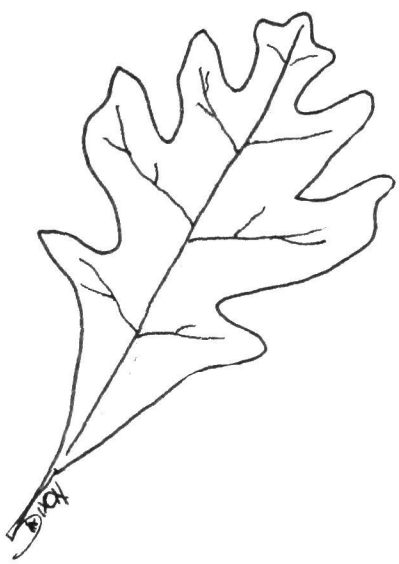

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Howard L. Mendall, Professor Emeritus & Leader of Cooperative Wildlife Research Unit
Albert D. Nutting, Director Emeritus
Henry A. Plummer, Associate Professor Emeritus of Forestry
Arthur G. Randall, Associate Professor Emeritus of Forest Technology

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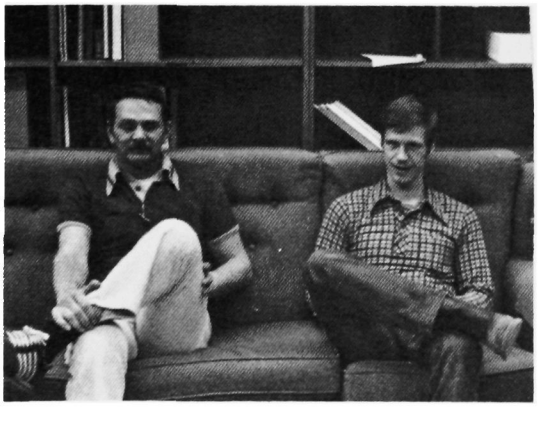
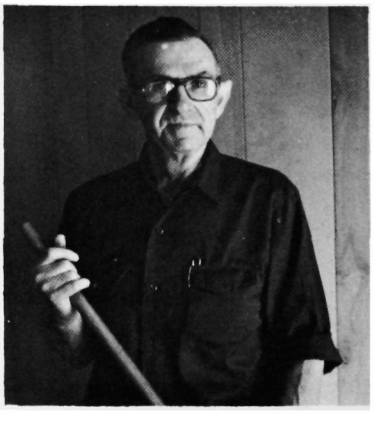
Maxine Horne
Nora Ackley
Janice Gifford, Ad. Asst.

Bottom Row, l to r:
Regina Pelletier
Amy Morin
Cynthia Paschal
Wanda Grenier

AND JANITORS



Dick Robichaud and John Ellis



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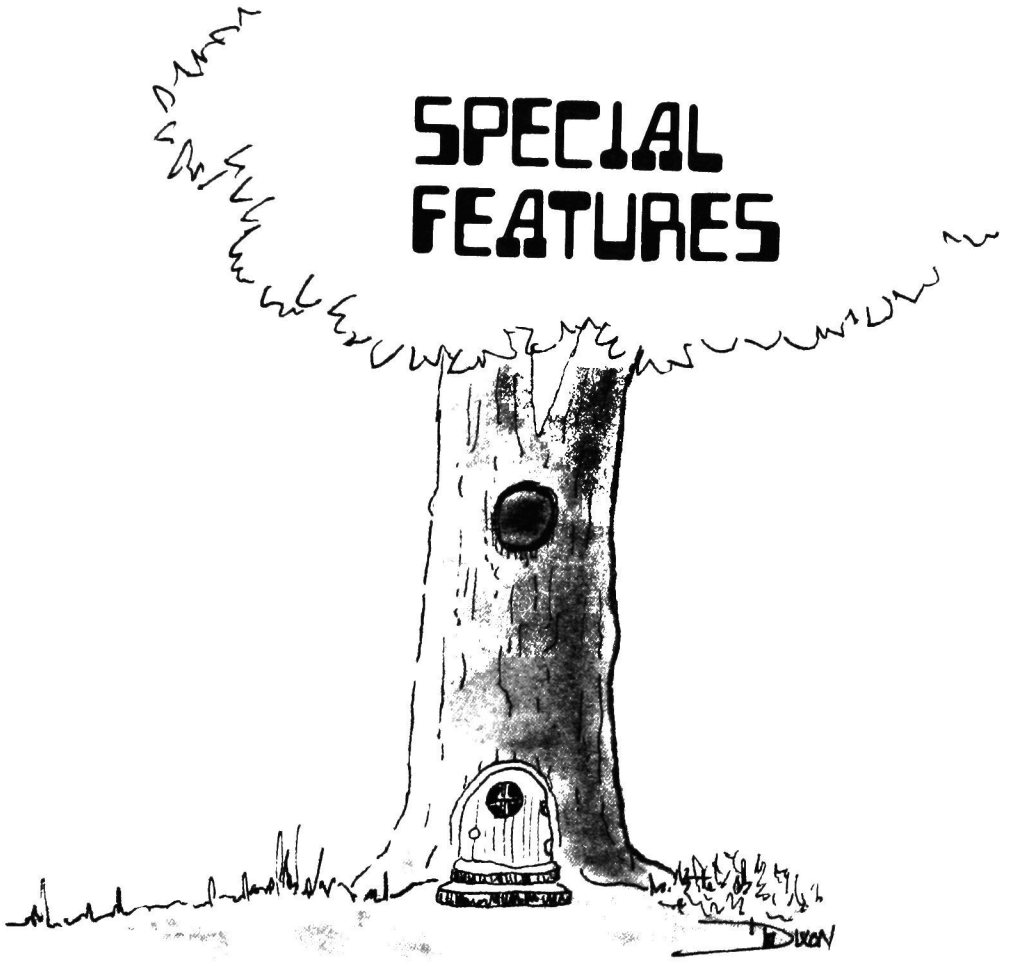

SPECIAL
FEATURES

The Use of Herbicides in Forestry

By
Michael Newton
Professor of Forest Ecology
Oregon State University

There has been quite a squabble in recent months about the use of herbicides in the forests of Maine. Foresters have recently begun using several herbicidal chemicals to try to reverse the steady trend in degradation of species composition, and are being beset by angry people demanding an immediate halt to all spraying. The paragraphs that follow will provide a brief perspective on the history of herbicide development, world wide, and provide some insight into the nature of forest chemicals, their uses and expectation of benefit and risk.

Herbicides have been around on a very limited scale for a couple of centuries. Common materials such as salt, various oils, arsenic compounds and other substances have been used for a long time where total riddance of vegetation was desired. The discovery of 2,4-D, in 1942, signalled the beginning of a whole new era in farming, because it marked the beginning of selective weed control with inexpensive, non-persistent chemicals.

Ever since man became a farmer in preference to hunting, the grower of crops has had to struggle incessantly with pests. The most important pests of all have been plants. Everyone knows that it is necessary to till, hoe, cultivate or otherwise remove unwanted weeds in order to grow virtually any crop. Weed control is the main reason for tilling today. There are still tens of millions of farmers practicing shifting agriculture in the tropics; they slash, hoe, dig and chop all year round to eke out a subsistence living. Nearly all their labors are for weed control of one kind or another.

Chemical weed control has truly been a bonanza in all crop production. Herbicides mean that the primitive farmer can think about some activity other than twelve hours of toil each day for his one acre of crop. They mean that the modern farmer can increase yields, acreages and reduce erosion.

Herbicides are now used everywhere. In this country, they are used in the production of every crop. They are used to keep rivers and waterways cleaned of various weeds. They keep trees out of power lines and brush away from roadways. They protect desirable tree species from competitive effects of brush in forests. They keep weeds from breaking up pavement. They are used to remove noxious and poisonous plants in pastures, ranges and recreation areas. Over all, 750 million pounds of herbicides are used in the United States, of which about 600+ million are applied to crops, 100 million to non-crop sites such as rights of way, 18 million on ranges and pastures, 2.5 million to water and about 2.5 million to forests.

The average acre of agricultural land receives about two pounds of herbicide per year. The average acre of forest receives about .005 pound. Most forests are never treated. Clearly, forests receive very little herbicide compared to virtually any other place. Yet forests are the focus of many bitter complaints about herbicides. Maine and Oregon are states with relatively little over-all herbicide use, and yet these states are the scenes of some of the most acrimonious disputes.

The complaints about herbicide use are based mostly on the assumption that they are harmful to people and to the general environment. The likelihood that they can or might injure someone may be viewed more easily after considering how they are used, and what sorts of materials they are.

The most common herbicides used in forests are 2,4-D and 2,4,5-T. Small amounts of picloram, atrazine, glyphosate, MSMA and others are in use, too. All are registered for use on food crops. All are in the range of moderately toxic to non-toxic to mammals; the most toxic require about two fluid ounces of the pure concentrate to threaten a human life, placing them in the same category as aspirin, or safer. No skull and crossbones is required on the container.

The herbicides are extremely toxic to *plants* of certain kinds. Some plants are resistant to each of them, however, and they may be used selectively to promote the development of certain species in the process of treating entire plant communities. For this reason, they are of great usefulness to the forester, who has thus far been frustrated in widespread management of species composition. In particular, the aforementioned herbicides may be used to control the woody and herbaceous weed species that compete most severely with spruces, fir and pines without injuring the conifers or actually eradicating any species. The most important for this purpose is 2,4,5-T.

Herbicides may be used for several purposes in forests. Every forester has been indoctrinated in the importance of *site preparation* before planting trees. Traditionally, this has been done poorly, or on too few acres, or has been done with a heavy hand by bulldozing all the residential vegetation and slash into piles. Burning is also popular in some places. The job can be done now with herbicides. Picloram, mixed with 2,4-D or 2,4,5-T will do an excellent job of site preparation without disturbing soil. It only takes about a half-pound of picloram and two pounds of 2,4,-D or 2,4,5-T to control most of the competitors adequately for a new planting. It leaves abundant herbage and browse while controlling the worst competitors. But picloram cannot

be applied over conifers without injury. If some conifers are present, 2,4,5-T is used alone at the rate of 2 to 3 pounds per acre for release. Glyphosate may also be used for site preparation on release, and is now undergoing intensive experimental testing, along with 2,4,5-T and other herbicides, at the Maine Cooperative Forest Research Unit by Dr. Max McCormack.

The author, Mike Newton, standing between a control plot and one sprayed with Glyphosate.

Herbicides used for site preparation or release are normally applied by helicopter. These aircraft are highly versatile in distributing the herbicide diluted in 5-10 gallons of oil or water per acre. Because they spray everything below them, they can't be used where some of the sensitive species are too desirable to risk injury. In these situations, other methods are used, or other chemicals are sought with different selectivity.

One of the principal methods other than aerial treatment is injection. Herbicides may be injected in very small amounts into stems of certain hard-to-kill species with good results and complete selectivity. They can also be used where the chemical would be harmful to crop species. Hardwood management, for example, is a natural place to use injection for stand improvement, because helicopters would not normally be selective enough.

But some hardwoods are very tolerant of certain herbicides, and may be managed with aerial applications. Sugar maple and white ash, for example, are highly resistant to 2,4,5-T. I visualize the use of an ash overstory to bring on a white pine shelterwood with little weevil injury as being an example of intensive silvicultural use of herbicides. Planted ash and pine would both tolerate dosages of 2,4,5-T needed for clearing. Such a treatment would make a technically difficult

insect and host management problem become easy while capitalizing on the value of the "nurse" crop. Even-aged ash and maple stands can also be kept clear of beech, red maple and striped maple with the same approach. Glyphosate controls ash, beech and other hardwoods; other herbicides control maple and ash but not beech. There's endless versatility. And each chemical does different things at different seasons, so there's versatility within chemicals, as well.

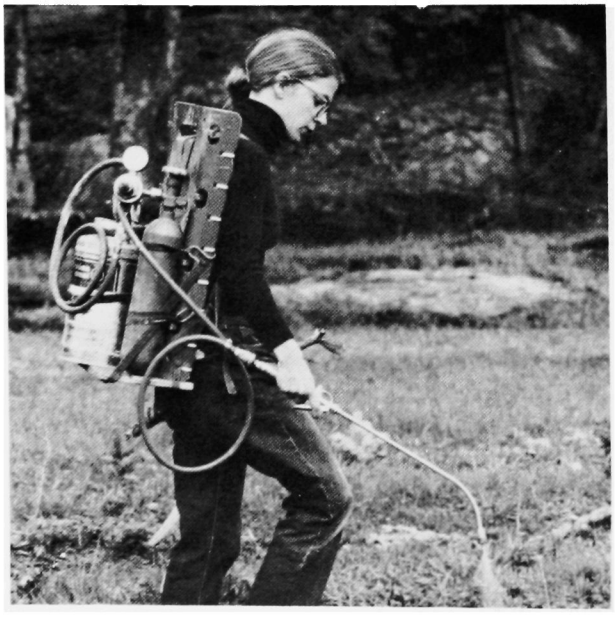
There are other silvicultural jobs that may be done with herbicides. It is possible to kill merchantable trees before felling to reduce haul weight and power requirements for machining. Trees so treated do not spoil quickly, because the insect vectors of fungi avoid the quick-drying phloem. MSMA or cacodylic acid is used for this purpose, primarily for conifers. Not surprisingly, these herbicides are also effective for controlling certain species of bark beetle. The same treatment of firewood trees greatly enhances their fuel value and reduces cost of handling.

Pre-commercial thinning hasn't really caught on in Maine. It will soon, as the premium on solid-wood products is more generally recognized. Pre-commercial thinning is normally done with a chain saw. The sudden release of a few hundred trees per acre in a stand of several thousand tends to leave the residual stand vulnerable to sunscald, windthrow and snow damage. The stand can be injected instead of felling, however, with the result that the dead trees support the living for a few years. Dead tree also provide the necessary degree of protection from sunscald while live trees respond to release. Chemical thinning is also less costly than saws in stands requiring treatment of up to 1,500 trees per acre. Above that, saws are more efficient.

Herbicides are used in relatively small quantities. They do not persist for long periods, and residues in the environment are of negligible biological importance for most products. Picloram is the one exception, in that there is a slight danger that stream contamination by direct aerial application could cause damage to irrigated potatoes or tobacco. So we recommend that aircraft applying picloram stay at least 100 feet away from water that may be used for irrigating these crops. None of the herbicides can get into water in concentrations high enough to cause injury to fish, aquatic insects or plants or humans that might drink from it. The safety factor for fish is at least 100:1; for all other forms, it is far greater. Also, the herbicides do not bioaccumulate or magnify. So there is not the food chain problem that was observed with organo-chlorine insecticides. And terrestrial wildlife especially birds, is highly tolerant of herbicides at conventional rates used in forests.

What about dioxon? Is there substance to allegations of birth defects and spontaneous abortions as the result of using 2,4,5-T? Dioxon, more generally known as TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxon), is a trace contaminant of 2,4,5-T and a closely related herbicide, silvex. Each *million tons* of 2,4,5-T contains 30 *grams* of TCDD (30 parts per billion in the undiluted pure 2,4,5-T). The amount that actually arrives on an acre sprayed with two pounds of 2,4,5-T is about 20 millionths of a gram, more or less. The amount that reaches the forest floor is seldom more than four of these micrograms.

TCDD is no doubt very toxic. So are many natural substances, but TCDD really is nasty stuff. Fortunately, it does take significant dosage to cause symptoms. The amount appearing in a forest doesn't approach harmful quantities, and there is no toxic hazard. We have examined wildlife in 2,4,5-T treated forests with equipment so sensitive that we could detect a few parts per *trillion* in livers, where TCDD would accumulate if present. But it wasn't present. More recently, it has been discovered that the dioxons, a whole group of chemicals of which TCDD is only one, are naturally occurring products of burning. Apparently, we have evolved with them over the millennia, and 2,4,5-T does not contribute significantly to the environmental load.



As a matter of interest, humans appear to be quite tolerant of TCDD, as mammals go. An industrial accident at a cosmetics plant in Seveso, Italy, released between 1.5 and 11 pounds of TCDD on about 250 urban acres two years ago. This may be compared with the 3 ounces released over 7 million largely uninhabited acres in the United States during a year's use of 2,4,5-T. The Seveso incident was in an area inhabited by 30,000 people. Remarkably, there were no fatalities. 143 children were afflicted with a skin rash known as chloracne, but there were no increases in spontaneous abortion or birth defects among 628 pregnant women. Dogs and cats died by the thousands, but adult humans were hardly affected even though they were not evacuated for two weeks.

Seveso was an incredible human exposure to TCDD, and it has been thoroughly documented. It should dispell any possible doubts about TCDD dangers from the routine use of 2,4,5-T. Fortunately, TCDD doesn't last more than a few hours when it is released with 2,4,5-T, and that does a great deal to eliminate any residual problem, even in the event of an accident. There are no plants in this country with the weaknesses of the Seveso plant and the likelihood of such accidents in manufacturing is remote. There are no other sources of significant exposure.

The introduction of herbicides has given the forester some new and professionally thrilling opportunities to meet resource management obligations. They can be applied quickly and cheaply. They release labor for far more important and safer tasks than cutting brush. They permit the salvage of stands that would be exterminated by brush or weed tree cover without attention. They reduce the destructive effects of harvesting and site preparation. Maine has many millions of acres of land that are potentially good for growing timber, wildlife and scenery. The development of herbicides for a variety of uses will permit the forester and wildlifer to get on with the management of the resources under his or her jurisdiction. Good management no longer need be limited to a few small demonstration plots. The modern forester should be familiar with these tools and use them wisely.

Editor's Note: On March 1, 1979, E.P.A. banned 2,4,5-T and Silvex for forestry and pasture use and for use on rights-of-way. The validity of this action by E.P.A. has been challenged in the Federal courts.


N2805B
Roundup

Maine's Critical Areas Program and White Pine

By

Harry R. Tyler, Jr. — Critical Areas Program Manager

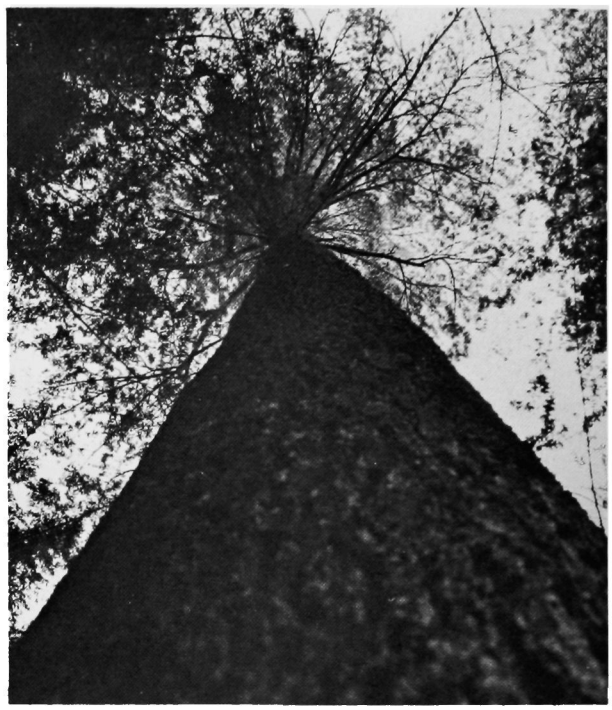
In 1974 the State Legislature directed the State Planning Office to conduct a comprehensive state-wide inventory for significant natural areas. The name "critical area" was assigned to natural features of state significance that are worthy of conservation. These include rare plants, unusual animal habitats, and outstanding geological formations. An eleven-person Citizen Advisory Board was established to advise the State Planning Office on the listing of areas on the Register of Critical Areas. Because the program is essentially non-regulatory, conservation of critical areas depends upon the cooperation of the landowners.

There are three main parts of the Critical Areas Program: 1) inventory, 2) registration, and 3) long-term protection. The program uses the topic approach to identify significant areas. The report, "A Preliminary Listing of Noteworthy Natural Features in Maine," lists suitable topics for the program to investigate. Once topics are selected, the State Planning Office contracts with professional geologists, botanists, or zoologists to prepare planning reports. In four years, 61 reports have been prepared on such topics as mountain-laurel, eider ducks, fossils, and white pine.

After areas are identified, the State Planning Office staff contacts landowners regarding critical area designation. The staff evaluates the site and draft descriptions and maps. The Critical Areas Advisory Board meets about every two months to approve areas for inclusion on the Register of Critical Areas. Since 1974, 203 areas have been designated, and an additional 200 areas have been inventoried. In addition, the Critical Areas Program has used the 1400 areas on the updated Natural Areas Inventory as resource material.

After designation, the Critical Areas Program works closely with landowners on the long-term conservation of some areas. Most areas, however, are well protected by their isolation. The program works closely with The Nature Conservancy and the Maine Coast Heritage Trust on the conservation of many of Maine's critical areas.

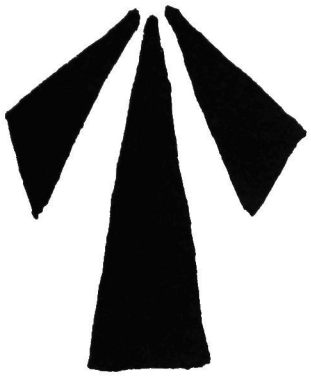
In June of 1977, the State Planning Office hired Philip Conkling, a consulting forester, to conduct a state-wide inventory to locate and evaluate significant old growth white pine stands. White pine was selected as a critical areas research topic because the species is the official State tree, and because it played an important role in Maine's lumbering industry. Also, many people place a high value on seeing large old growth trees.



When the first settlers explored Maine's river courses, they were overwhelmed with the abundance of large white pine. The steep-sided edges of ponds, lakes, rivers and streams provided suitable ecological situations for the growth of large white pine stands. In northern Maine, however, the pine was a scattered super dominant, with an estimated occurrence of one tree per twenty acres. The large pine crown would poke up above the spruce-fir forest. Because the pines were clustered along watercourses, the early lumberman greatly overestimated the abundance of large commercial white pine in Maine.

White pine was the mainstay of Maine's early economy. The first sawmill in the New World was built in Maine in 1623 at the foot of Asbenbendick Fall on the Piscataqua River in what is now South Berwick. The English were the first to recognize the importance of Maine's pine, which eventually provided the Royal Navy with superior white pine masts. In fact, the high quality of the Maine mast pine helped England maintain her naval supremacy. Ship timber exports to England and other European shipyards were the life blood of Maine's economy. At one time there were over fifty shipyards along the coast.

The diminishing supply of quality pine prompted the British government in 1691 to reserve all white pine trees greater than 24 inches one foot from the ground growing on lands not already granted to private persons. Royal Navy surveyors cut a "Broad Arrow" into trees reserved for the forest resources, and the Crown made it a crime to cut any white pine on ungranted lands.



The King's Broad Arrow

Maine's "pine era" existed from 1775 to 1850 when most of the accessible pine stands were depleted. By 1840 there were an estimated 1,400 sawmills on the major streams. The peak year of harvest was 1909 when 380 million board feet were harvested. By 1932, the total white pine inventory was ninety-one percent second growth, and nine percent old growth.

For Maine's Critical Areas Program, Philip Conkling conducted a state-wide inventory to locate the few remaining old growth pine stands. The criteria used for evaluating stands were: 1) individual trees of historical importance or large size, 2) stands over 100 years in age with 75% pine composition, 3) stands growing in typical pine type-well drained soils, 4) stands with different tree associations—spruce-fir, hemlock, hardwood, 5) genetically superior trees, and 6) stands with minimal human disturbance.

A total of 120 potentially significant stands were initially inventoried, and thirty-one were field checked. Eight stands were recommended for designation. Thirteen stands of known significance and 56 of unknown significance were recommended to be site evaluated.

The significant pine stands that were located in the study range from a single tree with a 49" d.b.h. and estimated age of 300 years to stands of several acres with trees 130 years to 185 years old. The Bowdoin Pine in Brunswick are only 120 years old. Two areas are in Falmouth; one along the Presumpscot River, and the other within one-quarter of a mile of the Maine Turnpike. The Norway Nature Club has been protecting a 200-year-old stand since 1931. The Nature Conservancy owns two old growth pine areas, the Hermitage and Mullen Woods. During the coming year, the Critical Areas Program staff will be visiting and evaluating other pine stands in order to determine if they qualify for critical area status.

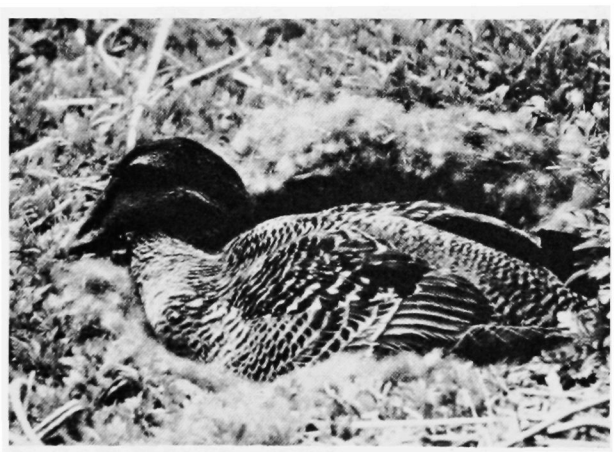
These old-growth stands, which are rare in Maine, serve as important ecological baselines. Further, they serve to give us a glimpse of the stature and aesthetic appeal of undisturbed, unmanaged woods. We hope that the landowners of these identified old growth areas will keep them as living reminders of Maine's past forest. Some of these areas are already owned by conservation organizations and government agencies dedicated to the stewardship of Maine's natural heritage. It is not asking too much to maintain these few remaining areas in a natural state with natural events taking place without man's interference. As time goes on, we will appreciate these areas more and more. Also, as more old growth inventory work is undertaken for the program, new areas will be identified, including, hopefully more significant old growth white pine stands.

Coastal Islands and Their Seabird Colonies

By
Alan Hutchinson
Wildlife Department
Maine Department of Inland Fisheries and Wildlife

The word "seabird" is a general term referring to a variety of birds associated with the marine environment. There are about 15 species in this group that hold special interest in Maine due to their traditional use — often in large numbers — of certain coastal islands for nesting. Seabirds found nesting on Maine islands include common puffins, razor billed auks, black guillemots, arctic terns, common terns, roseate terns, laughing gulls, great black-backed gulls, herring gulls, double-crested cormorants and Leach's petrels. Although technically not a true seabird, the eider duck is probably the best known of Maine's coastal breeding birds, and we include it in this group due to its colonial nesting nature and its association with coastal islands for nesting. Additionally, black-crowned night herons, great blue herons, snowy egrets and glossy ibis are wading birds that nest colonially on certain coastal islands.

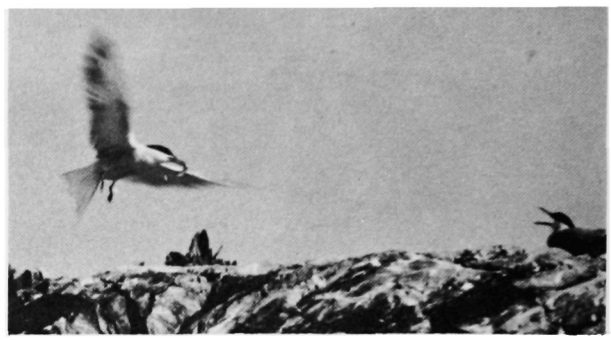
During the breeding season, starting in late March, these birds return to the islands for nesting and raising their young. These concentrations, called colonies, range in size from a few to over 1,500 nesting pairs. The seclusion offered by the island situation enables such concentrations to exist and is a major reason Maine's seabird colonies have survived. During this time of nesting, however, the birds, particularly the young, are extremely vulnerable, and any human disturbance can



Eider Duck on Nest

disrupt their normal behavior and result in a tremendous loss of hatchlings and eggs due to predation or exposure.

Historically, seabird populations on the Maine coast, as well as the entire east coast, have shown great fluc-



Arctic Tern

tuations. Changes are natural and expected in any biotic community, but the most dramatic changes in seabird population have resulted from man's interference. Judging from the available reports, it appears that by the late 1800's, seabird populations had been eliminated from the waters of New England. This decline from the great numbers present in colonial and pre-colonial years resulted from several factors. For many years, the eggs had been collected from the nesting islands for food and for several species the adults were avidly hunted for the "stew pot". A more serious threat resulted from the world of fashion in the late 1800's. At that time it was extremely popular for ladies' hats and headpieces to be decorated with bird feathers or an occasional whole, stuffed bird. The nesting colonies found on the coastal islands provided a ready source for this trade in millinery fashion. The combined effects of all these pressures proved too much, and the nesting populations disappeared. The advent of regulated hunting and legislation protecting the nesting birds in the early 1900's, stimulated a return of these nesting birds. This recovery has been documented quite well for several species and provides an excellent example of what proper management of our wildlife resources can accomplish.

With the objective of establishing an up to date information file regarding coastal wildlife resources and in particular these traditionally used islands, this office initiated a program in 1974; to identify the nesting islands, to inventory the seabirds using them, and to establish management goals.

Through a cooperative effort in 1976 and 1977, extensive information has been made available by the University of Maine's coastal nesting seabird inventory (a contractual agreement between the University of Maine at Orono and the Office of Biological Services,

U.S. Fish and Wildlife Service) headed by Dr. Carl Korschgen. With this information, steps are now being taken to establish Departmental management policies and to reassess island acquisition plans. The findings of this survey are summarized in Table 1.

Table 1
Summary of Coastal Bird Colonies in Maine, 1977[1]

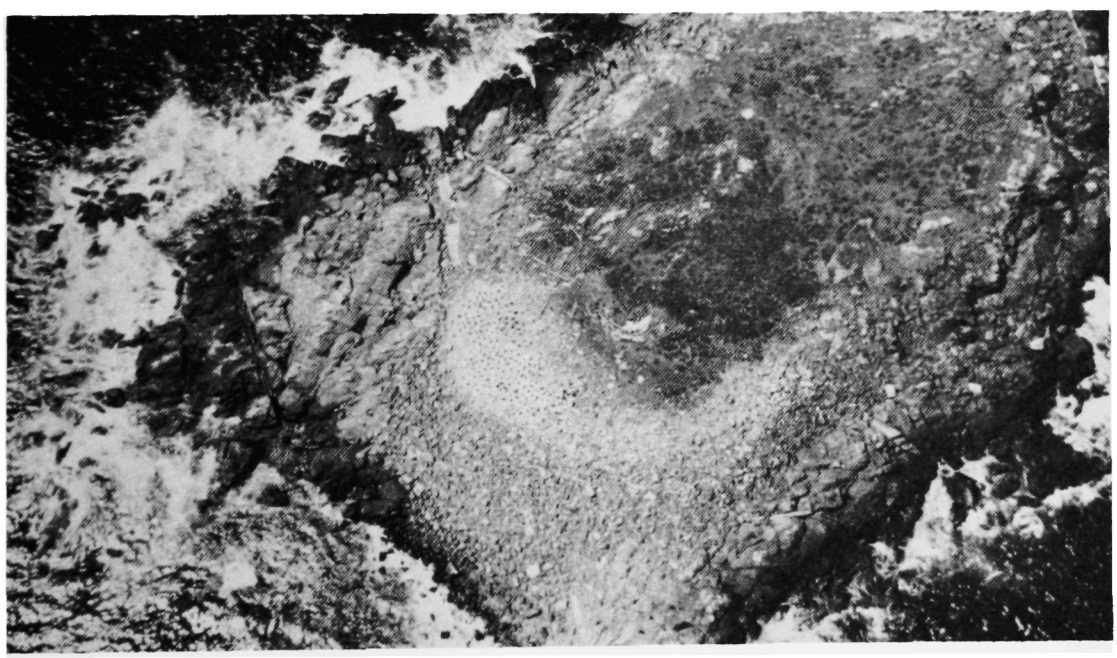
Species	Number of Colonies	Estimated Number of Breeding Pairs
Common Puffin	1	125
Black Guillemot	116	2,665
Razorbill	2	25
Great Black-backed Gull	223	10,009
Herring Gull	224	26,387
Laughing Gull	6	231
Common Tern	24	2,095
Arctic Tern	9	1,640
Roseate Tern	3	80
Least Tern	2	21
Leach's Petrel	17	19,131
Double-crested Cormorant	105	15,357
Common Eider	240	22,385
Great Blue Heron	18	903
Little Blue Heron	2	4
Snowy Egret	4	90
Louisiana Heron	1	1
Black-crowned Night Heron	8	117
Glossy Ibis	3	75

[1]from: Korschgen, C.E. 1979. Maine Coastal Waterbird Colonies 1976-1977. U.S. Fish & Wildlife Service, Biological Services Program, unpublished.

Common Tern

There are approximately 3,000 islands and major ledges on the coast of Maine. Of these, approximately 350 are used by nesting, "seabirds", with nesting populations ranging from one to over 1,500 pairs per island. These data indicate that a rather small percentage of Maine's coastal islands are responsible for supporting these seabird populations and that an even smaller percentage (those with the larger colonies) supports the major portion of the populations.

The majority of the nesting islands are currently under private ownership. It is largely a result of the care and stewardship shown by these owners that their is-



Cormorant nesting colony on Little Egg Rock