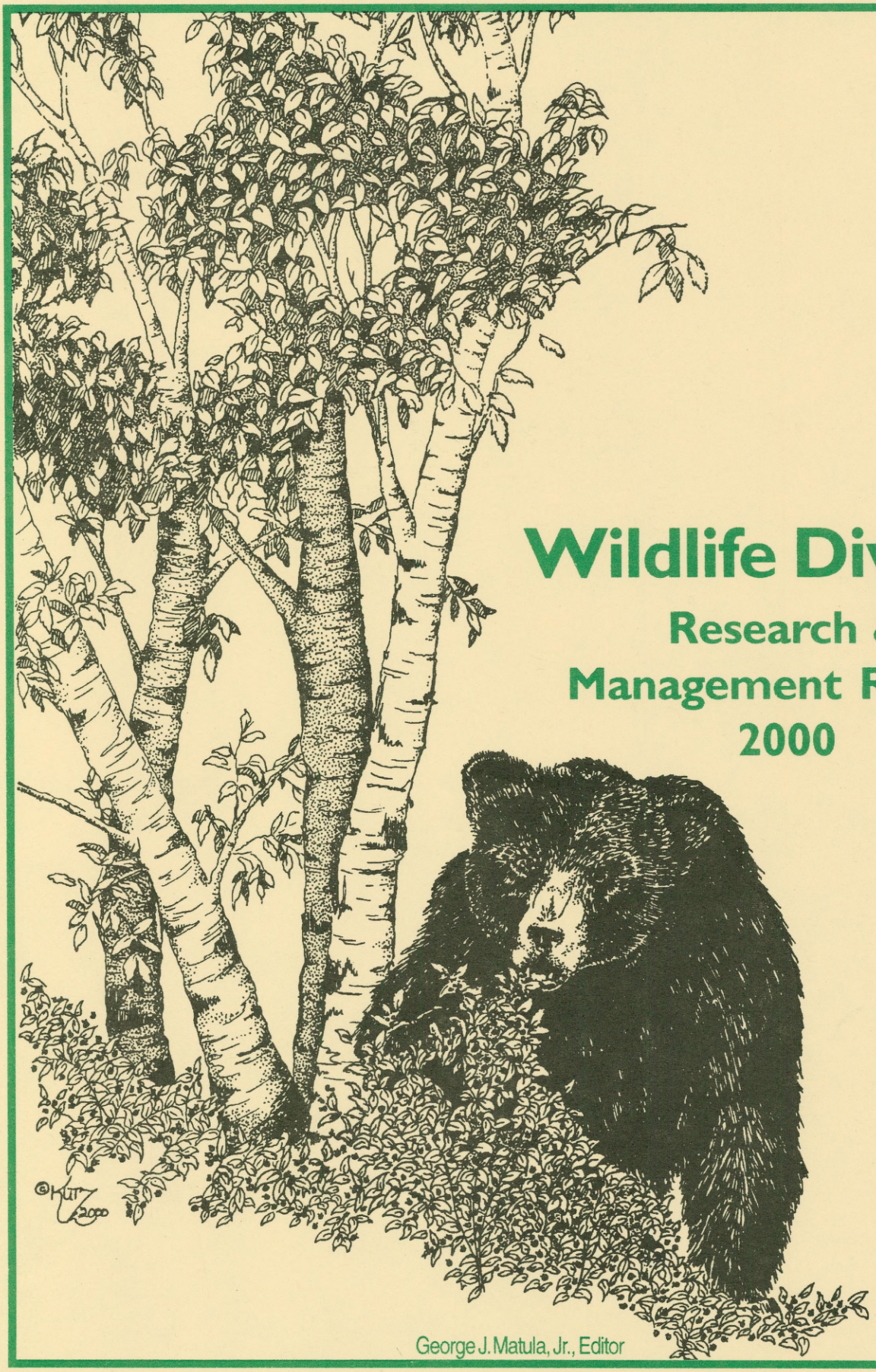
Maine Department of Inland Fisheries & Wildlife

Lee E. Perry, Commissioner



Wildlife Division

Research & Management Report 2000

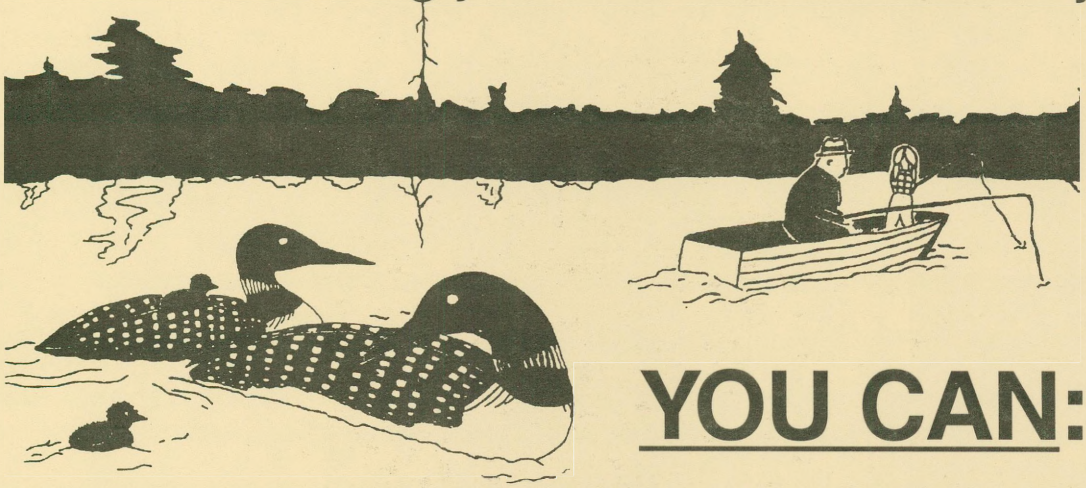
George J. Matula, Jr., Editor

LOONS & LEAD DON'T MIX

Lead tackle is deadly to waterbirds!

Lead sinkers & jigs cause fatal
lead poisoning in loons and other waterfowl.

Lead ingestion is the #1 killer of loons
in Maine, but any waterbird can die from
swallowing just one lead sinker or jig!



YOU CAN:

Use steel, tin, bismuth or plastic instead.
Ask local tackle shops to stock alternatives.
Properly dispose of old lead sinkers and jigs.

Maine Department of Inland Fisheries and Wildlife

INTRODUCTION

Welcome to the *2000 Wildlife Division Research & Management Report.*

The Wildlife Division continues to work hard for Maine's residents and visitors. Throughout this report you will read about the many and diverse wildlife management and conservation projects we've been working on this past year — our wildlife planning effort, our wildlife management programs, and our wildlife survey and assessment work.

In particular, I would like to mention the Division's wildlife planning program, which, with public involvement, will **establish and guide our wildlife management efforts through 2016** — I've resorted to bold print to denote the importance of wildlife planning and its far-reaching influence on the Division's work programs. At the end of the summer, three public working groups had drafted management goals and objectives for deer, bear, moose, coyote, wild turkey, least tern, piping plover, and shorebirds. There is more to come: the Wildlife Division and several public working groups will prepare new or revised species assessments and then management goals and objectives for more than forty species or species groups during this several-year effort.

The Wildlife Division continues to be concerned about urban sprawl and its detrimental affect on wildlife habitat; and so, the conservation of our diminishing wildlife habitat is an important task. This past year, the Division and several partners, including the Maine Cooperative Fish and Wildlife Research Unit at the University of Maine, completed the design of an ecological model that guides the conservation of habitat at the *landscape* level. Currently, this landscape model is being tested by several land trusts; we plan to do additional testing with southern Maine municipalities over the next year.

Finally, in the most significant event in wildlife management since the Pittman-Robertson Act of 1937, the U.S. House of Representatives endorsed the Conservation and Reinvestment Act. This legislation, if approved by the Senate later this summer, would provide state fish and wildlife agencies with funds from federal offshore oil and gas revenues. This funding would allow the Wildlife Division to support wildlife conservation, primary directed at non-game species, and ensure funding for wildlife education and wildlife-associated recreation.

In closing, I would like to thank you for your interest, support, and participation in the conservation of Maine's wildlife resources; the Wildlife Division looks forward to working with you in the coming years.

Here's to informative, and I trust, enjoyable, reading!

--G. Mark Stadler, Director
Wildlife Division

These studies are financed in part through Federal Aid in Wildlife Restoration Funds under Projects 81D, 82R, and 83C, and through the Endangered Species Conservation Act.

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SPECIES PLANNING

One of the best expressions describing the need for planning was posted several years ago outside a local Laundromat: "Plan ahead - remember it wasn't raining when Noah built the Ark!!" Sound advice, however, long-range planning in the Department of Inland Fisheries and Wildlife had a much more humble beginning.

Maine's geographical location, topography, and present and past land use practices result in a diversity of vegetation and climatic conditions, and a diverse and unique array of wildlife. One has only to review the list of over 375 species of birds, mammals, reptiles and amphibians, and countless invertebrates found in Maine to appreciate the diversity of wildlife in the State and the wide range of habitat to support it.

Wildlife are enjoyed in one fashion or another by a vast majority of the citizens of the State, as well as the thousands of visitors who annually come to Maine. A University of Maine Study in 1996 estimated hunting, fishing, and wildlife-associated recreation generate over 1 billion dollars in economic activity in Maine providing a source of jobs, income, and other benefits.

Wildlife resources, however, are frequently taken for granted. They are considered products of nature, the supplies of which are relatively stable over time. Nothing can be further from the truth. The distribution and abundance of Maine's wildlife populations is ever changing due to a variety of factors. Changes brought about by fire, land clearing, development, abandonment of agricultural land, timber harvesting, and the defoliation of forest by insects, such as the spruce budworm, have had, and will continue to have, a dramatic impact on the amount and type of wildlife resources we have in Maine.

Future changes in the type and amount of habitat and associated living conditions will continue to affect the distribution and abundance of wildlife. Tomorrow's wildlife resources will be determined by what is happening today. Well-planned management of the state's wildlife that balances the needs of wildlife with the needs and desires of Maine's citizens will ensure that continued supplies of wildlife are available for generations to come.

In 1968, Maine was one of the first states to venture into the unknown world of planning: a process that has evolved greatly over the years. Today, the Department is knee-deep in a major planning effort that will result in new or revised management goals and objectives for more than 40 species and groups of species, from box turtles to black bear and moose to Tomah mayflies. The last time MDIFW conducted a major species plan update was in 1985; however, it represented a third of the number of species being addressed today.

A meaningful evolution and integral component of this process has been an expansion of public involvement in the development of management goals and objectives. MDIFW manages fish and wildlife resources for the benefit of its customers: those that hunt or trap wildlife, as well as those that marvel at the opportunity to view wildlife. As such, our customers play an important role in determining management direction, within the biological parameters of a species assessment.

An assessment, prepared by Department biologists, is a compilation of everything that we know about a particular species: where it lives, its habitat requirements, interactions with other wildlife and humans, reproduction, behavior, and survival. We also critically review current and past management, goals and objectives, habitat, population size, and use and demand for hunting, trapping, and other wildlife-associated recreation. Finally, the assessment discusses future projections for habitat, population size, and use and demand for the resource.

After the species assessment is prepared and reviewed by Department staff, a public working group, comprised of a variety of interests as well as a geographical mix, develops the species management goals and objectives which are ultimately voted on by the Fish and Wildlife Advisory Council. We make every effort to ensure balanced representation on the working group; in fact, the Department often makes a special effort to include outspoken critics of its management or regulatory actions on a particular species.

To date, we have assembled working groups to develop management goals and objectives for deer, bear, moose, coyote, wild turkey, least tern, piping plover, and shorebirds for the next 15 years. If approved by the Advisory Council, these goals and objectives will, in part:

- Provide increased hunting and viewing opportunity for deer, while preventing over-browsing of deer wintering habitat in northern, western, and eastern Maine;

- Balance the desire for deer hunting and viewing opportunity in central, southern, and coastal Maine with the need to reduce negative impacts of deer from browsing damage, collisions with motor vehicles, and potential risk of Lyme disease;

- Provide increased hunting and viewing opportunity for moose, while maintaining the availability of mature bulls;

- Address concerns for moose/vehicle collisions in some parts of the state;

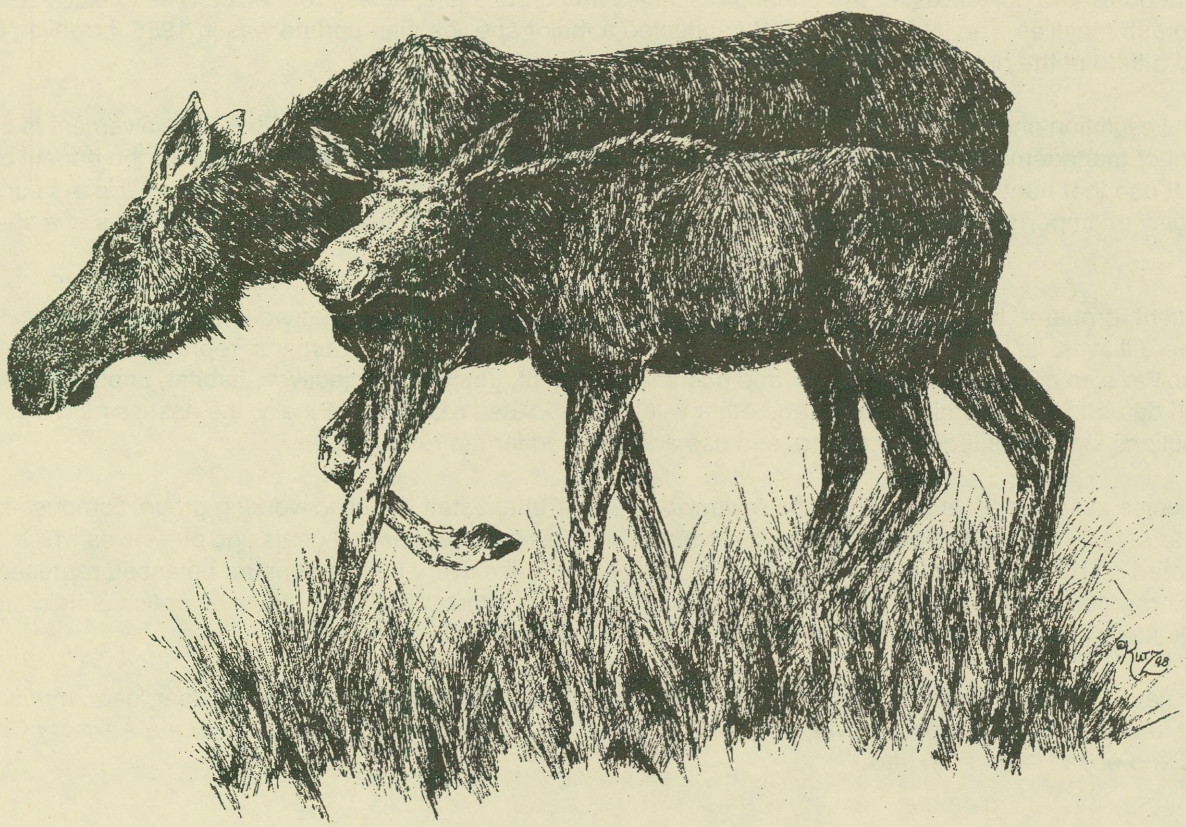
- Increase the size and distribution of the wild turkey population within all suitable habitat in Maine, and provide additional spring hunting opportunity, as well as a limited fall season in the future; and

- Increase the least tern and piping plover (both Endangered) populations, and the number and quality of nesting sites in Maine.

During the next year, at least 12 additional working groups will develop management goals and objectives for more than 30 other species and groups of species.

The species planning process is the foundation of the Wildlife Division's work program. Public participation sets the direction for future management of many wildlife species. Not everyone will agree with the species plans, but the Department believes that the approach is sound and necessary if we are to provide maximum use and benefits of the state's wildlife resources for Maine's citizens and visitors, both now and in the future.

--Sandy Ritchie,
Wildlife Resource Planner



REGIONAL WILDLIFE MANAGEMENT

The regional wildlife management staff of biologists is best described as the Wildlife Division's wildlife *generalists* or the "jack of all trades". The eighteen wildlife biologists who staff the Department's seven regional field offices constitute the majority of the Regional Wildlife Management Section (WMS). Their breadth of knowledge, activities, and job responsibilities range far and wide - often requiring the regional staff to juggle numerous public requests, inquiries, and wildlife management projects at the same time. In essence, the regional wildlife biologist represents the Department in a multitude of public participation arenas and serves as the "state's wildlife expert" within their assigned regional geographic area (see Figure 1). They are responsible for implementing the Wildlife Division's management program within those regions.

The Regional Wildlife Management Section also employs and assigns a wildlife biologist to the Bureau of Parks and Lands (BPL). He works with the Bureau's regional managers to implement wildlife habitat management on the state's 482,000 acres of public reserved lands and on an additional 95,000 acres of state park land. He also assists MDIFW with forest management issues on the Department's wildlife management areas.

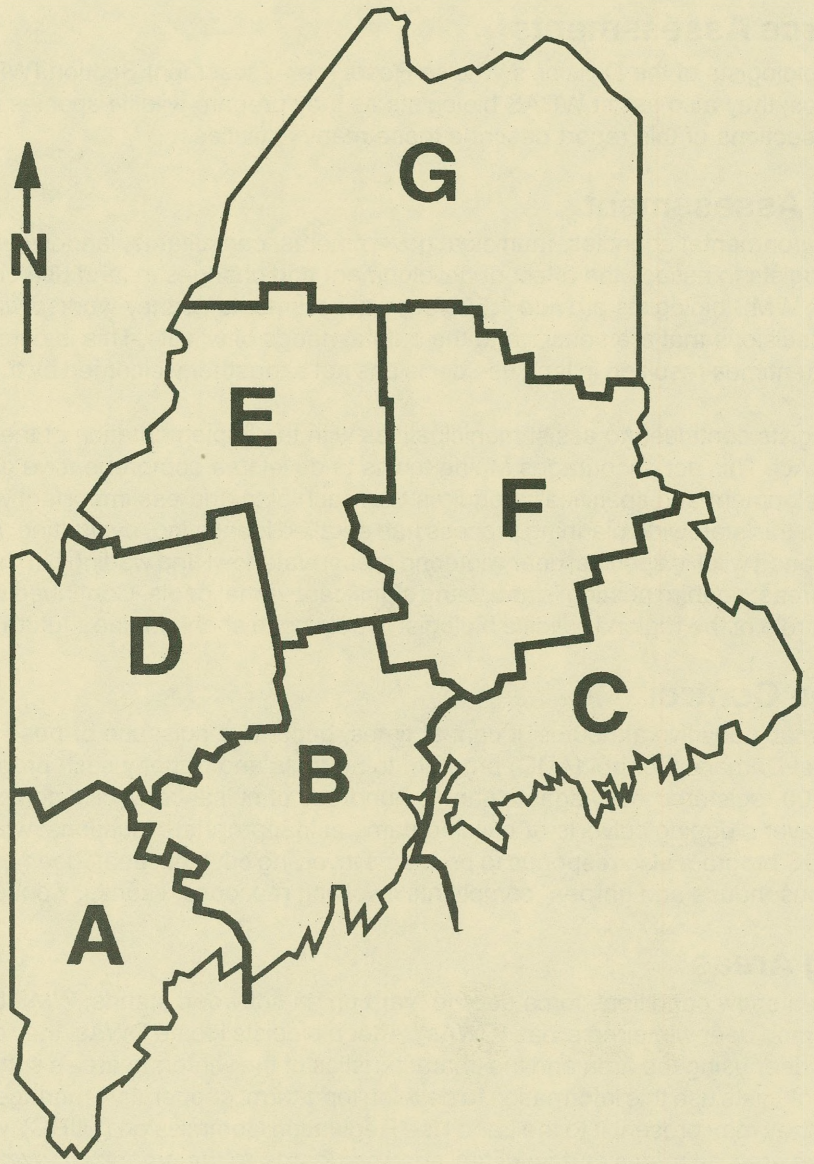


Figure 1. Maine Department of Inland Fisheries and Wildlife Bureau of Resource Management Administrative Regions

REGIONAL WILDLIFE MANAGEMENT SECTION ACTIVITIES - AN OVERVIEW

Wildlife Management Areas

MDIFW owns or has agreements on approximately 100,000 acres. The Department acquired much of this acreage (140 properties and 300 coastal islands and ledges) for wildlife management and has designated the parcels as Wildlife Management Areas (WMAs). Regional staff maintains existing developments and structures on the wildlife management areas, such as roads, trails, bridges, buildings, signs, boundary lines, fences, and gates. The Division's dams, dikes, and levees also require periodic maintenance if they are to continue to provide high quality wetland habitats for a variety of wildlife. Regional biologists also maintain several hundred waterfowl nest boxes on the WMAs.

Regional staff maintain small fields on the WMAs to set back succession and to maintain habitat diversity; plant grasses and clover for wildlife food and cover; release and prune wild apple trees or plant apple trees; and maintain goose pastures. They also plan and conduct annual timber management activities on the Division's WMAs to enhance or improve upland wildlife habitat.

Wildlife Resource Assessments

WMS staff work with biologists of the Division's Wildlife Resource Assessment Section (WRAS) to conduct population surveys and inventories; they also assist WRAS biologists as they prepare wildlife species assessments and management systems. Other sections of this report describe these many activities.

Environmental Assessment

State and Federal environmental agencies, municipal governments, consultants, landowners, and businesses regularly ask regional biologists to assess the effect of development and changes in land use on wildlife or wildlife habitat. Over an average year, WMS biologists provide 1,500 such assessments as they worked with these various entities to encourage land-use decisions that are sensitive to the habitat needs of wildlife. This is demanding and sometimes controversial work - oftentimes resulting in land use decisions not altogether welcomed by the landowner.

Regional wildlife biologists continued to assist municipalities with the implementation of the state's Comprehensive Growth Management Act. This act encourages Maine towns to develop a comprehensive growth management plan to guide their future development and specifically requires that each plan address important wildlife habitats. Wildlife Division involvement in this statewide planning process has entailed identifying, evaluating, and mapping habitats of Endangered or Threatened wildlife species; deer wintering areas; waterfowl and wading bird habitats; shorebird nesting, feeding, and staging areas; seabird nesting islands; and significant vernal pools. Continued work in this area **just may be** the most important role of the regional wildlife biologist in helping to shape Maine's future wildlife habitat landscape.

Animal Damage Control

Although wildlife has many positive attributes, it can, at times, become a nuisance or pose a hazard. It is the function of the Division's Animal Damage Control (ADC) program to address and remedy such problems. Wildlife biologists, game wardens, and 200 registered ADC agents handle hundreds of nuisance wildlife complaints annually. Many complaints involve beaver plugging culverts or building dams at inappropriate locations, which flood roads or other developments. The ADC program also responds to problems involving coyotes, bear, deer, moose, turkey, Canada geese, and to numerous "house and garden" complaints involving raccoons, skunks, woodchucks, and squirrels.

Deer Wintering Areas

During the winter, when snow conditions force deer to "yard up" in softwood stands, WMS biologists conduct aerial surveys to locate and map deer wintering areas (DWAs). After biologists locate DWAs, they conduct ground surveys to assess the number of deer using the area and the characteristics of the wintering area's softwood cover. In Maine's unorganized towns, biologists use this information to develop long-term, cooperative management agreements with forest landowners; or they may present it to the Land Use Regulation Commission (LURC), which has the authority to zone the deer wintering area if it meets certain established standards. In the organized towns, wildlife biologists provide the municipalities with maps showing DWA locations. The state's Comprehensive Growth Management Act encourages municipalities to consider these DWA locations in their comprehensive plans.

Many land-use activities within zoned DWAs in unorganized towns, such as timber harvesting, require review and comment by MDIFW. This past year, WMS biologists helped various private landowners, including large industrial forest landowners, develop prescriptions for land-management activities on several thousand acres within zoned DWAs.

Wildlife Introductions

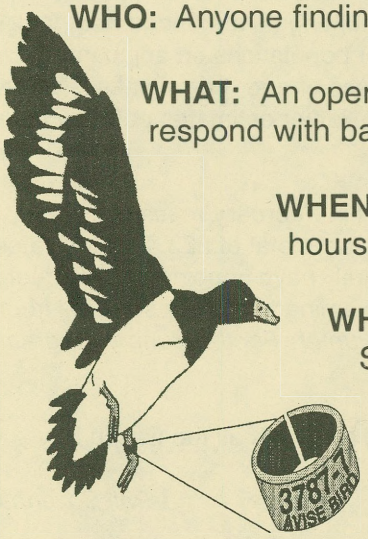
Regional biologists continued their successful efforts to reintroduce the wild turkey to its historical range and beyond in Maine. In addition, they monitored existing flocks of wild turkeys established by earlier releases and administered the spring turkey hunt.

--Eugene A. Dumont
Supervisor, Regional Wildlife Management Section

WANTED

Band Recovery Reports

New Reporting Procedures Now Available
CALL 1-800-327-BAND(2263)



WHO: Anyone finding a band or recovering one while hunting.

WHAT: An operator will take the band report, and the bird banding laboratory will respond with banding information much faster than previously.

WHEN: Weekdays between 7:00 a.m. and 5:00 p.m. Eastern Time. After hours and weekend calls will be handled by voice mail services.

WHERE: The new number is effective anywhere in Canada, the United States, and most of the Caribbean.

WHY: Studies have proven this method significantly improves the reporting rate over previous methods. Results will provide better estimates of survival and harvest rates and will reduce high costs associated with banding studies.

Supported by state fish and wildlife agencies, the United States Fish and Wildlife Service, and the United States Geological Survey.

WILDLIFE MANAGEMENT SECTION HIGHLIGHTS

Bureau of Parks and Lands (BPL)

Changes to the Bureau's rules relating to hunting and trapping on BPL land, was undertaken this year with the goal of insuring visitor safety while maximizing the area available for these activities, except where hunting and trapping were prohibited by statute, deed, or local ordinance. BPL held seven public hearings throughout the state to receive public comment on the proposed rule amendments. As a result of this public input, and the development of the proposed rule changes, a number of state parks, or portions thereof, were opened to hunting. Hunting is now permitted on 98.3% or 559,963 acres of the lands managed by the Bureau. Legislation passed in 2000 insures that any public land designated as an ecological reserve would remain available for traditional sporting pursuits.

In addition, BPL and MDIFW are continuing their efforts to complete an agreement that would guide the management of softwood habitat for deer and other wildlife on the Bureau's overall land base. We anticipate about 16,000 acres in T13R12 WELS (Round Pond) and T6R11 WELS (Telos) will be managed to provide sustainable, critical winter habitat for deer through the cooperative agreement, with additional areas to be added in the future. However, the designation of some Bureau lands as ecological reserves would likely preclude all forest management practices currently used to manage wildlife habitat.

--Joseph Wiley

Region A—Gray

Over the past six years, Regional A, staff has been working with representatives from several islands in Casco Bay and the City of Portland to address concerns about overabundance of deer. Most recently, the Department has been meeting with representatives of Peaks Island and the City of Portland to try to reduce the exploding deer population on the island, and to create a management plan that would keep deer at reduced levels. Concerns included habitat and property damage and the potential threat of Lyme disease. After several meetings to discuss their options, the island community voted to support the use of a sharpshooter to reduce deer numbers.

Of all the Casco Bay Islands, Peaks is, by far, the most populated with a year-round population of 1,000 people. A large portion of the island is developed, which severely limits the use of recreational hunting as a management tool. In past years, controlled hunting, and the use of depredation permits, have reduced deer populations on adjacent islands; however, no control had been initiated on Peaks Island. Past ingress and egress of deer from Peaks Island to some of the other islands had negated deer reduction efforts on the adjacent islands. Earlier estimates put the Peaks Island deer population at over 100 deer per square mile.

Deer reduction efforts took place in February and March 2000. The first four-day effort in February resulted in 172 deer being removed. The second four-day effort in March removed 51 additional deer for a total of 223. This indicates that the pre-removal population was in excess of 250 deer per square mile and would likely have beeb nearly 400 deer per square mile this summer without the reduction effort. Department staff biologists examined and took samples from all deer that were removed. The meat was then processed and distributed through the *Hunters For the Hungry Program* in Cumberland County.

Current population estimates are 15 to 20 deer on the island, and meetings are being held with all the Casco Bay Islands to try and institute a deer management plan for all affected islands.

--Phil Bozenhard

Region B—Sidney

After reading the highlights from each region, you'll probably agree that wildlife management work covers a wide spectrum of possibilities. During a typical day's work, regional biologists might relocate a "lovesick" moose from a dairy farm before 10:00 am, review development proposals until noon, and work on wildlife management area plans for the remainder of the day (between coordinating nuisance beaver work and returning phone messages). Clearly, many of our activities could be lumped into the "response" category; that is, our services are requested and we respond. Of course, we also have a full schedule of planned work that needs to be accomplished during each season. So, having the proverbial 10 pounds of potatoes to fit into a 5-pound sack, we enthusiastically take advantage of opportunities to work more efficiently and proactively.

Our ongoing work with the Maine Department of Transportation (MDOT) provides a good example. Region B is experiencing rapid development that creates ever increasing work for our staff in the form of requests for habitat information and technical recommendations. Among the hundreds of requests we receive annually, we recently processed several that were associated with airport expansions. This piqued our interest, because, from a wildlife biologist's perspective, most airports share some common concerns and areas of interest (e.g. nuisance animals, grounds maintenance, potential grassland habitat) that are closely related. Traditionally, our staff provided input regarding issues such as airport nuisance wildlife on a case-by-case basis - usually after a problem situation was well underway. We now wonder if Department recommendations wouldn't be more effective if used early in the planning stages of airport development, rather than attempting to provide guidance in a piecemeal fashion. MDOT agreed that the new approach had merit, and both Departments quickly began work to incorporate wildlife-related guidance into airport vegetation management plans.

With the addition of these habitat management guidelines, airport managers will continue to retain the flexibility required to address site-specific issues, but, they will also have a better sense, up front, of what management practices will deter use by geese, gulls, deer, and other species, which constitute a collision or airstrike risk. For instance, mowing grassed areas later in the season, and in some cases every second, or third year, is often enough to deter some unwelcome bird species. Under such a management regime, less money is spent on grounds maintenance. But the benefits don't stop there. By addressing wildlife conflicts at the habitat level, airports and MDIFW may save additional money and work-hours because costly, time-consuming deterrence methods are less necessary. Finally, delayed mowing is also advantageous to declining grassland bird populations, which need additional habitat but represent little risk to aviation because of their low flight profile and relatively solitary behavior.

Overall, the results of this initiative are expected to benefit MDOT, airport managers, MDIFW, and most importantly, Maine's wildlife. We consider these efforts an excellent example of state agencies working in concert to achieve compatible objectives, with the added benefit of saving tax dollars! However, there is still much work to do, and we'll continue to explore better ways to resolve old issues and respond to emerging developments with creativity and forethought.

--Slade Moore

Region C—Machias

Over the past year, Region C staff worked extensively with a number of coastal communities to address deer management problems. Several coastal islands in Hancock and Waldo Counties have been closed, by legislation, to deer hunting since the late 1940s. Deer populations on these islands have burgeoned in response to mild winters, minimal predation, and the lack of legal hunting. Similarly, municipal ordinances prohibiting the discharge of firearms in some mainland communities, have limited hunting opportunities, resulting in high, local populations of deer.

In the past, many coastal residents have enjoyed the viewing opportunities provided by an abundant deer population, and have generally accepted the liabilities deer can present. More recently, however, deer populations have surpassed the limits of this tolerance. Concerns about the growing number of vehicle collisions, disease transmission, the loss of native flora, damage to shrubs and gardens, and the poor condition of the deer themselves have prompted residents to seek assistance from the Department to reduce deer populations.

Reestablishing hunting on inhabited islands, or expanding opportunities in municipalities, is the first step in effecting long-term population control. Most affected landowners agree that deer numbers are too high, but they also have concerns about the safety of opening their communities to hunting. Many fear that a high number of deer will attract an undesirably large number of hunters.

We are trying several approaches to reduce deer numbers while minimizing conflicts between hunters and landowners. In the southern portion of Castine, for example, an existing firearms discharge prohibition will continue, but hunting opportunity is being increased by including part of the town in the expanded archery season. The goal is to realize a gradual reduction in deer numbers over several years. To encourage hunting and minimize landowner conflicts, Castine residents have developed maps for hunters showing which properties are available for hunting and those that are posted. On the Cranberry Isles, an initial reduction of deer numbers will be achieved by a depredation hunt conducted by island landowners and their designees. In the fall of 2001, those islands will come under the same regulations as Wildlife Management District 30.

Regional wildlife biologists are working on deer population issues with several other coastal communities; all of which are closely following the efforts mentioned above and their outcomes. These newly opened areas offer some unique hunting opportunities, but they also present public relations challenges to the hunter. We encourage all hunters in these areas to seek landowner permission and to contact the town about municipal ordinances. Ultimately, the success

of these efforts to control deer populations through expanded hunting opportunities will depend on a positive relationship between hunters and island landowners.

--Tom Schaeffer and Dwight Welch

Region D—Strong

There's a saying coined long ago by ranchers and land managers in the West that goes, "First in time, first in line." They are referring to water rights, a critical or ***"limiting"*** commodity if you happen to be human, cattle, or wildlife residing in one of America's four western deserts. To appreciate this in the extreme, just imagine living where the mighty Colorado River "empties" into the Pacific Ocean. Empty is the key word here. For by the time the Colorado reaches Baja California, every drop of water has already been claimed. Now that's one tough place to be a trout or a teal!

Habitat is the, **food, water, shelter, and space** wildlife requires to survive. Luckily, water is not a rare commodity in Maine. Though dry spells and flooding can cause temporary problems, these extremes do not hinder wildlife's long-term prosperity. Water is not a ***"limiting factor"*** for wildlife in this part of the world. However, availability of ***food, shelter, and space*** are frequently limiting. Habitat needs vary by species. To complicate this further, most wildlife require more than one type of habitat, depending on season, sex, or age. You can be a wildlife manager if you provide or enhance one or more components of habitat.

We manage various wildlife habitats in Region D. There are specific management goals for each of our Wildlife Management Areas (WMA). At the Mercer Bog WMA, we control and manipulate water levels to optimize aquatic plant communities that will benefit waterfowl and other waterbirds. The right mix of emergent (surface) and submergent (underwater) plants creates the ***food*** base and ***aquatic shelter*** for young and adult waterfowl. Wood duck boxes provide ***nesting shelter*** for cavity-dependent species such as American goldeneyes, hooded mergansers, American kestrels, as well as the box's namesake. Nesting waterfowl probably occupy all of the available wetland ***space*** when 75% of the nest boxes are used.

Fields at the Strong WMA are maintained to provide quality nocturnal ***space*** for woodcock. They roost on the ground. These fields also provide essential habitat for singing males to display during the breeding season. The alders at Strong are managed to provide ***daytime (diurnal) shelter***, and are a habitat for the woodcock's prey. Adult woodcock feed almost exclusively on earthworms. They thrive where alders grow on well-drained soils. We also work with industrial forest landowners, developing and implementing management plans that will conserve and enhance the long-term viability of ***forested winter shelter*** for deer. This habitat is as critical to Maine white-tailed deer as a long drink of water is to mule deer in Arizona.

--Charles T. Hulsey

Region E—Greenville

As the fall colors leave our forests and early winter snow begins to fall, white-tailed deer in the Moosehead Lake Region start an annual trek from their spring, summer, and autumn haunts to special areas commonly known as deer yards or Deer Wintering Areas (DWAs). This annual movement may be as little as several miles, but is more commonly 15-25 miles in this part of the state. Deer Wintering Areas are usually comprised of dense softwood or softwood dominated mixed wood stands, and they are frequently located near streams, rivers, or lakeshores. The interconnected crowns of large coniferous trees provide a "microclimate" where snow depths and penetrating winds are less than in more open types of habitat (e.g. newly cut areas, young regenerating stands, or stands dominated by deciduous tree species).

Our Department has long recognized that DWAs are critical to the survival of deer in the state, especially in north-central and northern Maine. In fact, records of DWAs contained in a number of our regional offices date back to the early 1950's. Does show their fawns where these special habitats are during the first winter of the fawns existence, and deer tend to go back to the same general area nearly every winter.

Winters can be severe in our part of the white-tailed deer's range, and the carrying capacity of the deer herd is largely determined by the number of DWAs and the quality of shelter in these areas. As wildlife biologists, one of our important goals is to attempt to manage deer numbers in balance with available winter habitat. Too few deer in a wintering area will not allow for optimum use of food resources and escape cover, and too many deer will cause excessive losses to malnutrition and predation. In recent years, wildlife staff in the Moosehead Lake Region has been concerned about, what appears to be, an increase in winter deer numbers on shrinking acres of winter habitat. To

evaluate this, we first selected several of the large deer wintering area complexes located in different parts of our region. We felt that these areas could be used as "indicators" of what the deer population was doing over a larger area. Second, we established a two-fold survey. One method evaluates the level of browsing on the foods preferred by deer, while the second method estimates the actual number of deer residing in a deer wintering area as well as the winter mortality rate of deer. Both measures will increase our understanding of the carrying capacity of these wintering areas and their ability to support wintering deer in the future.

After the first year of data collection in a 11,000 acre deer wintering area northwest of Moosehead Lake, we decided to increase the number of any-deer permits to "put the brakes on" the deer population growth in our area. Although we expected to collect data in other parts of our region for at least 3 more years, we felt it would be prudent to stabilize herd growth in the interim. This decision was also influenced by our previously conservative approach in issuing permits to kill antlerless deer, in most of our region, for at least 10 years.

Since the time of that first survey in 1997, we have completed additional work in 3 different areas in as many winters. We still need to analyze much of this data before making a decision on the management direction of the herd in the northern portion of our region.

--Doug Kane

Region F—Enfield

As wildlife managers, we are responsible for Department owned-lands within our region. Wildlife Management Areas (WMAs) have approved plans that identify species and management goals for the areas, and may have specific focus areas and/or species. At the Leavitt Wildlife Management Area (located in Charleston, Dover, and Garland), a focus area was identified by Regional Biologist, Kevin Stevens along Route 15. A specific plan for a 60-acre stand of alders was developed and implemented in 1984. A sign next to Route 15, on the north side of Charleston Hill, identifies this alder management area.

The fascinating focus animal is the woodcock. Along with the crocus, as harbingers of spring, hardy male woodcocks arrive early to set up mating territories and perform courtship displays. Their unique peent (call) and aerial display at dusk provides entertainment for people as well as the female woodcock. Population studies conducted from the mid to late 1960's determined that eastern woodcock populations slowly declined. Part of the management strategy to reverse this trend included implementation of reduced bag limits and season length. Habitat loss can be another key factor in this trend of declining populations.

The 60-acre woodcock focus area at Leavitt WMA addresses the habitat issue. Adult woodcock use alder stands for diurnal (daytime) cover. Woodcock are adapted to hunting earthworms which comprise more than 90% of their diet, long beak with flexible tip (for grabbing earthworms) and forward shifted ear holes for listening: observe that the robin has to turn its head sideways to listen when hunting worms. Earthworms (and other critters) thrive in the moist shaded areas of bare ground located in vigorous younger stands of alders.

We are now 17 years into the 30-year, long-term management scenario. Yearly, from 1984 through 1993, six acres of older growth alders were cut in one-acre blocks in a checkerboard fashion to regenerate alders from stump suckering. Yearly, since 1994, three acres of 10 year, or older, regenerated alders were cut in one-acre blocks. At the end of the 30 year plan (2013), the alders will be established in a 20 year rotation, meaning that all alder blocks will be 20 years or less in age. Each year thereafter, cutting three, 20 year-old, one-acre blocks will result in continuous regeneration of young stands of alders.

The young regenerated alder stands are prime woodcock habitat. Following a scheduled plan results in new stands continuously entering this important habitat phase. Although woodcock are the focus species, many other species of animals benefit from the habitat management work including: amphibians residing in the woody debris of the shaded moist conditions, various songbirds requiring a more open brushy habitat, and deer that travel through the cover afforded by the alders.

Woodcock and other critters need habitats that may appear to have little value to people. If you have an acre or two (or more) of alders on your property, please recognize the importance of maintaining and managing this habitat type. Next spring listen for the distinctive peent (call) of the amazing woodcock.

--Buster Carter

Region G—Ashland

This past winter, the Department of Inland Fisheries of Wildlife closed T13 R12 WELS (Round Pond) to coyote snaring. Round Pond is an unorganized 36 square mile township located west of Ashland. MDIFW initiated this snaring closure to prevent accidental deaths of Canada lynx, which are known to exist within and around this township. Snares set to control or reduce coyote predation on white-tailed deer usually kill any medium-sized animal that becomes entangled in them. At times, T13 R12 WELS has upwards of 1,000 deer wintering in and around the area. Many people became concerned that the Department's ban on snaring in T13 R12 WELS would cause a large number of deer to die in this town. Traditionally, regional wildlife biologists hire and deploy trappers, trained in the use of snares, to kill coyotes to reduce the number of deer lost to predation over the winter.

Some people also believe that the Department is opting to save a few lynx, which have always been relatively rare in Maine, for the lives of white-tailed deer, which support so many hunting-related businesses throughout northern Maine. This is not the case at all. The Department is committed, and mandated, to protect and appropriately manage populations of lynx, deer, and many other species of wildlife in Maine. First, and foremost, is the welfare of all wildlife species within the state.

Lynx are relatively common throughout much of Canada and Alaska. These northern cousins of our familiar bobcat, live in forests with deep snow, and feed primarily on snowshoe hare. Lynx populations have declined in several states, but they are still reported in Washington, Montana, Minnesota, and Maine along with a few other western states. Since 1991, several environmental groups have pressed for legal protection with lawsuits enacted in the 90's. In 1997, a district court judge ordered the United States Fish and Wildlife Service (USFWS) to develop a proposal to list lynx in the lower 48 states by 1998. In 1998, a proposal to list lynx as Threatened under the Endangered Species Act was published. On March 21, 2000, the USFWS listed Canada Lynx in the contiguous United States as Threatened under the Endangered Species Act, while including a special regulation that allows for the take and export of lawfully obtained captive-bred lynx. A species is listed as Threatened when it is likely to become endangered throughout all or a significant portion of its range in the foreseeable future.

The Department of Inland Fisheries and Wildlife began protecting lynx over 30 years ago by closing the hunting and trapping season in 1967. Since then, the Department has increased educational awareness through publications to hunters and trappers. The Department also required trappers, during fall trapping season, to tend traps every 24 hours, thus increasing the likelihood that any accidentally caught lynx can be released unharmed. And lastly, the Department addressed known locations of lynx (records of lynx sightings or observed tracks over the last 10 years) by prohibiting snares to be set within a 4-mile radius of these locations. Due to present Canada lynx management in Maine, the Department feels assured that recreational activities from hunting, trapping, and controlled snaring for coyotes will continue, because the Department has demonstrated that it has reasonable safeguards in place to protect lynx from unnecessary losses. The Department is committed in maintaining these traditional recreational uses of wildlife.

Management authority of lynx by the state will be permitted by the USFWS through a special exclusion within the Federal Endangered Species Act. This exclusion will require us to be held accountable for continuing to safeguard lynx through reports that will demonstrate the efficiency of the Department's lynx protection program. This will assure the USFWS that all reasonable safeguards are in place to minimize the likelihood of incidental deaths of lynx in Maine. Without this special exclusion for hunting, trapping, and animal damage control activities, the state might not be able to permit trapping or hunting of several furbearer species, nor conduct the controlled snaring of coyotes, in much of northern and western Maine where lynx are known to occur.

Although the Maine Department of Inland Fisheries and Wildlife is fully committed to the continued protection of Canada lynx, the Department did not support the federal listing of Canada lynx. The Department believed that the federal listing proposal contained factual errors, and it did not demonstrate that lynx would benefit from additional protection under the federal law. The closure of T13 R12 WELS to the snaring of coyotes was needed to ensure that the Department meets both obligations of working cooperatively with the USFWS to secure the future conservation of lynx, and to assure that other traditional uses of wildlife and the land are not unfairly restricted.

--Rich Hoppe

WILDLIFE RESOURCE ASSESSMENT SECTION

Wildlife has been an important natural resource in the history of North America. Native Americans depended heavily on the rich wildlife resources for food, raiment, shelter, tools, and more. Early European settlers also depended on these resources. Some derived a living from wildlife by providing buffalo meat to railroad crews, and selling furs, feathers, and meat to Eastern and European markets.

Today, few people depend wholly on wildlife for food in Maine. However, many of us derive some or all of our income by trapping, guiding, or catering to those who like to hunt, photograph, feed, or observe wildlife. We are willing to spend millions of dollars each year to pursue our particular passion for wildlife.

The economic impacts of these activities in Maine are staggering. A University of Maine Study in 1996 estimated hunting and wildlife-associated recreation generated $444.5 million in retail sales, $197.3 million in wages and salaries, $631.7 million in total economic output, and supported 10,310 full-time and part-time jobs! This surpassed the combined contribution of the potato ($99 million), blueberry ($20 million), dairy ($105 million), poultry ($114 million), and apple ($10 million) industries!

However, the value of our wildlife resources is more than the economics of hunting, trapping, and observing wildlife. How can we place a price tag on the sight of a fawn taking its first awkward steps: the spectacle of an eagle chasing a thermal: or the joy in a child's eyes when proudly displaying a turtle she found?

If our wildlife resources are so important to us that we are willing to spend valuable time and money to derive some level of pleasure from them, then certainly they are worth managing and conserving, and someone should be responsible for:

- determining the status of Maine's wildlife populations;
- identifying their biological needs and habitat requirements;
- spotting potential threats to their well-being, such as disease and pollutants; and
- managing their populations.

In Maine, MDIFW has been charged with these responsibilities. It is an awesome charge, because it involves over 400 species of vertebrates, and innumerable invertebrates, living on approximately 33,000 square miles of habitat, including over 3,000 coastal islands.

Many of the responsibilities have been assigned to the Wildlife Resource Assessment Section (WRAS). WRAS has 20 dedicated biologists who serve as the Department's wildlife species experts. As such, they design, conduct, and interpret wildlife surveys and research studies; compile species assessments and management systems; issue Scientific Collection and Bird Banding Permits; maintain major wildlife databases; analyze and interpret harvest data; and, in concert with the regional biologists, make season recommendations to the Commissioner.

MDIFW is committed to conserving Maine's wildlife resources and thus, Maine's quality of life. The following is a summary of what WRAS biologists are doing to help ensure that MDIFW meets that commitment.

--George J. Matula, Jr.
Supervisor, Wildlife Resource Assessment Section

BLACK BEAR

The 1999 bear season

The 1999 general bear hunting season opened August 30 and closed November 27. Hunters were allowed to hunt bears near natural food sources or by still-hunting throughout this 3-month period. Hunting over bait was permitted from August 30 through September 25. The hound season overlapped the bait season, opening September 13 and closing October 29. The bear trapping season opened September 1 and closed October 31.

Table 1. Bear harvest in Maine during 1999 by Wildlife Management District and method of take.

Wildlife Management District	Method of Take				Total Harvest in District	Assisted by			
	Hunting with bait	Hunting with dogs	Trapping	Unknown		Archery	Guide	Residents	Nonresidents
1	199	1	0	4	204	32	192	7	197
2	196	2	2	8	208	20	187	22	186
3	141	13	2	30	186	34	115	66	120
4	217	1	0	12	230	21	196	21	209
5	234	5	0	6	245	27	217	22	223
6	260	19	6	27	312	52	200	90	222
7	126	32	9	13	180	25	117	55	125
8	181	42	8	7	238	15	172	73	165
9	147	0	2	3	152	21	100	45	107
10	139	6	1	14	160	11	101	48	112
11	247	29	7	15	298	25	157	77	221
12	74	54	4	19	151	19	66	76	75
13	35	18	3	3	59	4	35	21	38
14	94	15	1	7	117	10	76	37	80
15	20	16	9	21	66	8	15	51	15
16	0	0	0	2	2	0	0	2	0
17	32	5	2	16	55	2	16	33	22
18	168	9	2	17	196	21	84	86	110
19	96	29	0	8	133	7	108	29	104
20	2	2	0	4	8	0	2	6	2
21	1	0	0	1	2	0	0	2	0
22	0	0	0	0	0	0	0	0	0
23	0	0	0	1	1	0	0	0	1
24	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0
26	27	0	0	5	32	8	7	28	4
27	54	1	1	0	56	12	17	45	11
28	114	21	5	4	144	13	67	63	81
29	35	7	1	5	48	5	11	32	16
30	0	0	0	0	0	0	0	0	0
State	**2,839**	**327**	**65**	**252**	**3,483**	**392**	**2,258**	**1,037**	**2,446**

The 1999 harvest of 3,483 bears in Maine (Table 1) exceeded the 1998 harvest (2,618 bears) by nearly 33%. Hunters benefited from the combination of 3 favorable conditions: a large bear population, scarce berry crops, and excellent hunting weather early in the bear season. As a result, fully half of the record harvest (1,790 bears) was taken during the first week of the season! Following this dramatic start, the harvest pattern during the remaining 12 weeks of hunting returned to levels experienced in recent seasons. Beechnuts were scarce during 1999, and many bears entered their dens by mid-October. Consequently, only 104 bears were taken during November by the large number of hunters afield during the firearms deer season. This low harvest is in stark contrast to the 429 bears killed during November 1998, when beechnuts were abundant and bears remained active well into late November. During the past

decade, bear harvests have ranged from 1,825 to 3,483 (in 1999). The Department has maintained a conservative stance on bear harvests to promote population growth, with season lengths set to restrict harvests to 2,300 bears annually. The bear population has responded, and bear harvests are now increasing, despite stable numbers of bear hunters throughout the 1990s. There were approximately 23,000 bears statewide in the spring of 1999 and the bear population should remain at that level in the spring of 2000.

Geographic distribution of the harvest

Bears were harvested in 12 of the State's 16 counties in 1998. Most bears (1,220) were registered in Aroostook County, which yielded 35% of the statewide harvest, followed by Piscataquis County with 479 bears (14%). No bears were taken in Kennebec, Knox, Lincoln, or Sagadahoc counties. Bears were harvested in 24 of the 30 Wildlife Management Districts (WMD). WMDs in eastern Aroostook County had the highest bear kills: WMD 6 accounted for 312 bears, followed by WMD 11 with 298 bears and WMD 5 with 245 bears (Figure 2). Only WMDs 22, 24, and 25 in southcoastal Maine, and WMD 30, representing offshore islands, did not produce a harvest of bears.

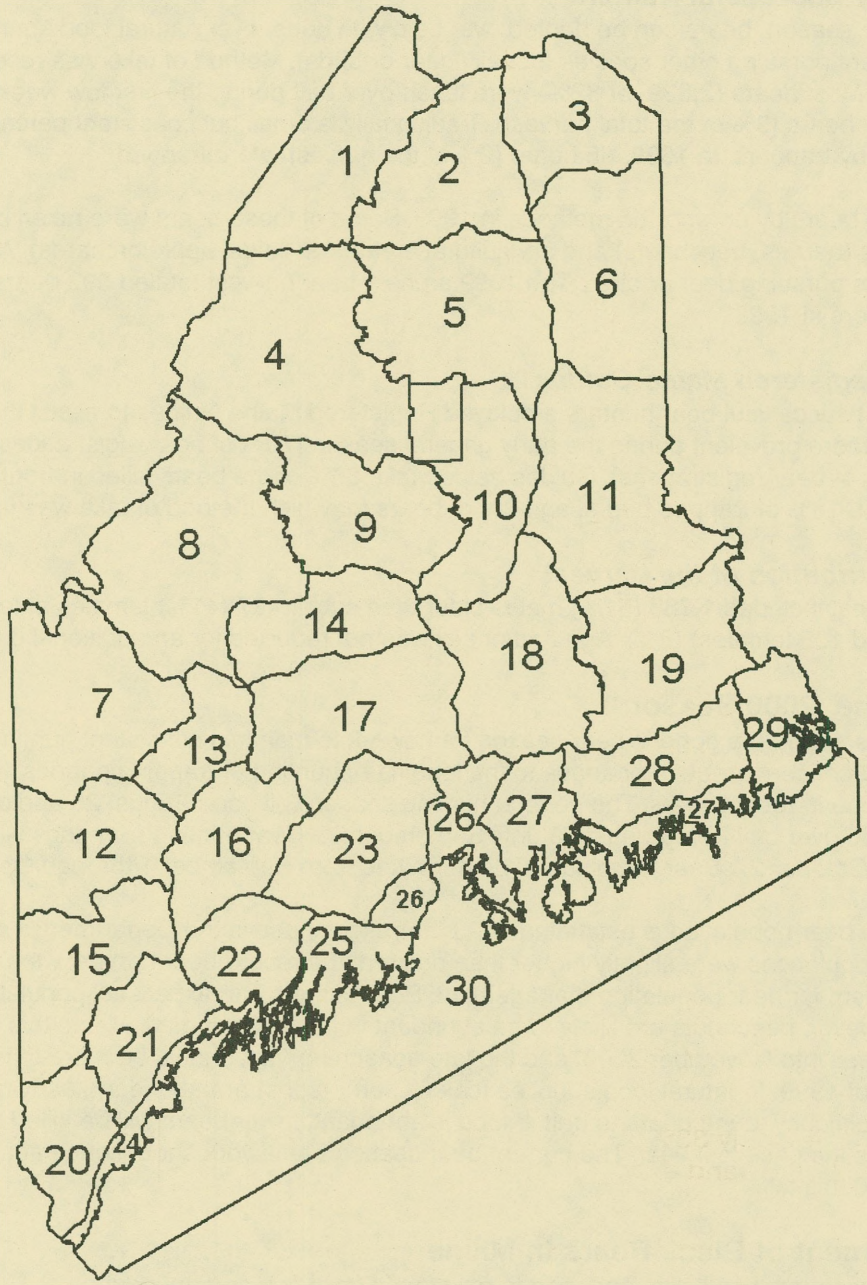


Figure 2. Maine's Wildlife Management Districts (WMDs).

Timing Of The Harvest

Most bears (3,314) were taken by hunters prior to the opening of firearms deer season on October 30; an additional 104 bears were registered in the remaining 4 weeks of bear season. Trappers reported 65 bears during the 8-week trapping season.

Residence Of Successful Hunters

Maine's reputation for producing high-quality bear hunting is reflected in the harvest distribution by hunter residency. Of the 3,483 bears tagged during 1999, visitors to Maine killed 2,446 (70%). Nonresident hunters accounted for 72% of the harvest prior to the opening of the firearms deer season, but only 35% of the bear kill during the November period. Most bears taken over bait (74%), or in front of hounds (78%), were killed by nonresident hunters. Maine residents tagged 72% of the bears taken by unreported methods, and resident trappers accounted for 83% of the trapped bears.

Methods Used By Successful Hunters

Depending upon the season, bears can be hunted over bait, with dogs, over natural food sources, trapped, or taken incidentally by hunters pursuing other species (usually deer or birds). Method of take was recorded for 3,231 bears, or 93% of the harvest. Most bears (2,839 or 82%) were taken over bait during the first few weeks of the season. Hunters using dogs took 327 bears (9% of the total harvest). Traditionally, a small but consistent percentage of the bear harvest is recorded by trappers. In 1999, 65 bears (2% of the harvest) were trapped.

Hunters tagged 252 bears by unreported methods in 1999. Some of these bears were taken by hunters waiting near natural food sources (berries, beechnuts) and agricultural areas (oat fields, apple orchards). Additional bears were harvested by hunters pursuing deer or birds. The 1999 archery bear harvest totaled 392 bears, nearly twice the 221 bears taken by archers in 1998.

Assistance By Registered Maine Guides

Overall, 2,258 (65%) successful bear hunters employed Registered Maine Guides to assist them during their hunts. Guided hunts were more prevalent during the early general season (70% of bear registrations), than during the late general season (3% of bear registrations). Guides helped take 86% of the bears killed in front of hounds, 68% of all bears killed over bait, 18% of trapped bears, and 8% of bears for which method of take was unreported.

Sex and Age Distribution of the Harvest

The 1999 bear harvest included 1,788 (51%) males older than cub, 1,427 (41%) females at least 1 year old, and 262 cubs (157 males and 105 females) (8%). Age and/or sex was not reported for an additional 6 bears.

Prospects for the 2000 Season

The Department has adopted a generic bear season framework to maintain consistent hunting periods in future years, unless management concerns require changes to the lengths of hunting or trapping periods. In 2000, the season will remain similar to those in recent years. The general hunting season will open August 28 and close November 25. Bears may be hunted over bait from August 28 until September 23. Bear hunting with dogs will be permitted from September 11 until October 27. Bear trapping will be permitted from September 1 through October 31.

Maine's spring 2000 bear population is estimated at 23,000; slightly above the Department's objective level of 21,000 bears. Since bear populations were slightly higher than desired, the record bear harvest we experienced during 2000 did not pose a problem for bear population management. Bear hunters can expect fall populations this year to be similar to 1999. However, beechnuts are likely to be abundant in the woodlands of Maine this year. As a result, bears may remain active well into November 2000, and the late-season harvest should be more than double the 104 bears taken in November of 1999. If natural food supplies (chiefly berry crops) are abundant, early fall bear hunters may experience greater difficulty luring bears to bait. If food is abundant, fewer bears will be killed during August and September than was the case last year. The current bear season framework should once again restrict the harvest to about 2,300 to 3,000 this fall.

Future Management of Black Bears in Maine

Maine's black bear resource has been managed to maintain distribution and abundance at 1985 levels, but new management directives are being developed. The Department's bear management goal is based on Maine's capacity to produce bears, as well as input from several public interest groups concerned with bears. Sportsmen, registered guides, landowners, and others interested in the welfare of the State's bear resource have assisted in maintaining a

strong bear population for all who enjoy Maine's forests. These interests have improved the Department's bear management system by communicating their viewpoints on the usefulness of bear harvest regulations and on animal damage control policies. Their support for current management has ensured successful population expansion, and should continue to provide responsible management of the resource in the future.

The Department reassessed the status and use of bears, and bear habitat, in 1999. Early in 2000, a public working group began deliberating to develop new management goals and objectives to guide bear conservation for the next 15 years. The working group was comprised of representatives with diverse interests, and used the Wildlife Division's assessment, summarized below, as a basis for its recommendations. The assessment contains information on the natural history of bears, and the past, present, and future management, habitat and population status, and the public's use and demand for bears in Maine. As the Department finalizes bear management goals and objectives during 2000, we will rely heavily upon the working group's recommendations.

Natural History

Black bears are widely distributed in Maine, occurring in all but the extreme south-central and southwestern portions of the State. Bears use large areas, and are usually associated with expansive tracts of forestland. They are omnivores, and although most of their diet is vegetation, bears will eat a variety of animal matter. Their movements and activities revolve around the distribution and abundance of foods. Bears restrict their movements when food is abundant, but often travel up to 50 miles in summer or fall to take advantage of berry or nut crops. Studies elsewhere have shown that black bears can be important predators on newborn deer and moose, but their impact on Maine's deer and moose populations is not known.

Although bears are long-lived, they are slow to reproduce, and have a low reproductive potential. Females do not produce cubs until 4-6 years of age in the State, and normally produce litters of 1-4 cubs at 2-year intervals. Cub production is strongly influenced by beechnut abundance in the expansive forests of northern Maine. Alternate-year beechnut crop failures have synchronized the reproductive cycles of most females in the population. Consequently, cub production in the region occurs as strong, alternate-year pulses. Fall food abundance influences the timing of den entry, which varies from mid-October when food is scarce to late November in years of abundant nut crops. Bears spend up to 6 months of the year in dens in Maine.

Cub and yearling bears die primarily from natural causes, including starvation and disease, and are occasionally killed by larger bears. Deaths of most subadults and adults are hunting related, and a few die from collisions with vehicles. Disease does not appear to play a significant role in the regulation of bear populations. Instead, bears seem to be regulated by food abundance, which influences reproductive success and survival.

Management

Bear management in Maine reflects the species' rise in status from a pest to big game species. Concurrently, they have received increased protection and monitoring over the last hundred years. Bear were hunted year round for much of the first half of the century, and were bountied until 1957. Bear seasons were shortened to a 6-month period in the 1960s. Since 1982, a 3-month, fall-only season has been in place, and additional restrictions on the periods that individual harvest methods are permitted within the fall season were enacted in 1990. These restrictions are designed to maintain bear populations in the face of escalating interest in bear hunting and rising harvests. Since 1990, hunting over bait has been allowed for 4 weeks, and houndsmen have been restricted to a 6-7 week hunting period. Trapping was expanded from a 1-month to a 2-month period during the 1990s, and still-hunting and stalking is now permitted for the entire 13-14 week season. Hunters are restricted to taking one bear per year, regardless of method. A bear hunting permit is required of hunters who pursue bears during the first 2 months of the season.

The first bear management goal in 1975 was to maintain bear abundance, distribution and use at pre-1974 levels. Harvests were to be maintained at 800-1,000 bears per year. This goal and objective remained unchanged in 1980. In 1985, the Department's bear management goal was changed — to maintain the distribution and abundance of bears at 1985 levels. The associated population objective was to maintain the population at about 21,000 bears, with a harvest objective set at 1,500-2,500 bears per year. This goal and objectives have guided bear management through 1999. Since 1990, an interim harvest objective of maintaining the harvest at no greater than 2,300 was used to ensure positive population growth.

The Department began monitoring bear harvests in 1969, and began the bear study in 1975. Harvests escalated in the 1970s, exceeding the 1,000 bear objective and resulting in the closure of spring bear hunting season in 1980-1981. Harvests were initially curtailed to less than 1,500 bears, but soon rose rapidly in the late 1980s, and exceeded

the 1985 management objective (1,500-2,500) in 1988 and 1989. Additional restrictions on hunting opportunity were implemented in 1990. Harvests were curtailed once again, but soon began to rise. Since 1990, harvests have exceeded the management objective twice (1995 and 1998), despite stable hunting effort during the period.

Bear Habitat

Land clearing for agriculture reduced bear habitat to the northern half of Maine by the turn of the century. Since then, bear range has expanded with the regrowth of forests on previously-farmed areas in much of eastern, central, and western portions of the State. The amount of bear habitat has remained relatively static over the past 20 years, and is currently estimated at 26,973 mi^2. Maine has sufficient habitat to support about 36,000 bears.

Population Status

The bear population has been estimated several times over the past 50 years. Improved monitoring techniques and knowledge of bear ecology resulted in rising population estimates between 1950 and 1985. Estimates of the statewide bear population rose from 5,000-7,000 bears in 1950 to 21,000 bears in 1985, then declined to 18,500 in 1990. With restricted hunting seasons during the 1990s, the population has been growing, and numbered about 23,000 bears by spring 1999, slightly over the management objective of 21,000 bears. Given no change in habitat conditions, harvest regulations, and hunter participation, the population should continue growing at about 2-3% annually for the next few years.

The future productivity of bears in northern Maine is expected to track the availability of mature, nut-producing beech trees. It is uncertain whether a catastrophic loss of beech trees will occur in the region; many stands are heavily infected with beech bark disease, and mature beech trees continue to be removed through timber harvests. If a region-wide loss of beech does occur, productivity of the area's bear population, and its capacity to sustain hunting harvests, will probably decline precipitously. In western, central, and eastern Maine, bear productivity will be less affected by a loss of beechnut crops, because they have alternate fall foods. This region is likely to continue to undergo residential development, and, as human populations rise, bear-human conflicts will increase. Bears in this region will likely be limited by the public's tolerance of them.

Use and Demand

Since the early 1970s, demand for bear hunting opportunity by nonresidents has fueled a commercial guiding industry that concentrates on providing hunts over bait and behind hounds. Since 1990, sales of bear hunting permits have allowed the Department to monitor hunting pressure; between 10,000-11,000 hunters purchase permits annually, and 8,000-9,000 permit buyers actually hunt bears. Most permit buyers are residents of Maine, but more nonresidents are successful in taking bears. About 60% of recent bear harvests were taken by nonresidents. Harvests averaged 2,408 bears during 1990-1998, and increased despite a steady level of hunting effort. Maine continues to offer considerably more hunting opportunity for bears than other eastern States, with longer seasons and a greater variety of legal hunting methods. The bear season currently extends from late August through November. Hunters may take 1 bear per year; bait, hounds, still hunting, stalking, and trapping are legal methods of take. About 60% of recent harvests have been taken over bait, 15% over hounds, and 2% by trapping. The remainder (23%) are taken by hunters who still hunt or stalk bears, often taking them incidentally while hunting other species. The number of bears taken during the November deer season fluctuates about 3-fold, from about 150-450 bears, depending upon the timing of den entry by northern Maine bears. This late fall harvest is less predictable than earlier harvests by bait, hounds, or trapping, but it has contributed less to the overall harvest in recent years, as early season harvests increase in size.

Demand for hunting opportunity is expected to continue at current levels into the near future. Hunting has been used as the primary tool to regulate bear numbers, but in the future, public debate about the ethics of hunting bears, primarily with bait and hounds, may complicate bear management and force changes in bear seasons and policy regarding nuisance bears. If hunting over bait is outlawed in the future, and current habitat conditions and productivity continue, substantial liberalization of hunting seasons and/or bag limits will be required to maintain bear harvests large enough to control population growth. The uncertainty of widespread loss of beech trees in northern Maine further complicates the projection of bear supply and demand. Given the potential for less flexibility in harvest methods, and a potential change in bear productivity, future bear management systems need to improve monitoring of the population and habitat, and incorporating harvest controls at a regional scale.

--Craig McLaughlin

FURBEARERS AND SMALL GAME MAMMALS

Furbearers include all mammals harvested primarily for their pelts. In Maine, these include coyote, red and gray fox, bobcat, fisher, marten, raccoon, skunk, short- and long-tailed weasels, mink, otter, beaver, muskrat, and opossum. Although Canada lynx are an important furbearer in Canada and Alaska, they are listed as a Threatened species in Maine and are protected year-round in Maine. All other furbearers may be trapped during trapping season. Pelts of all furbearers, except weasel, raccoon, muskrat, skunk, and opossum must be tagged by an MDIFW agent. The annual number of pelts tagged (i.e., harvested) is one of the primary indices used in our furbearer management systems. Both furbearers and small game mammals can be taken by hunting. Hunted furbearers include: fox, coyote, bobcat, raccoon, and skunk; while hunted small game include: snowshoe hare, New England cottontail, gray squirrel, woodchuck, porcupine, and red squirrel.

1999-00 Fur Harvest and Hunting Seasons

Trapping in 1999-2000 for all furbearers, except beaver, began October 31 and ran through December 31. Maine has two special trapping seasons that start earlier than the general trapping season. These are the special fox and coyote trapping season which started October 17 and ran through October 30, and the early muskrat season (WMD's 1, 2, 3, 4, 5, 6, 9, 10, 11 only) which opened October 24 and closed October 30. Last year's beaver season ran November 1 through March 31 in WMD 1; from December 1 through March 31 in WMD's 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 18, 19; from December 15 until February 28 in WMD's 12, 15, 16, 17, 23, 25, 26, 27, 28, 29, 30; and from January 1 through February 28 in WMD's 20, 21, 22, 24.

Hunting Seasons were as follows: October 1 through December 31 for raccoon; October 1 through December 31 for gray squirrel (season was lengthened 1 month last year); October 1 through March 31 for cottontail and snowshoe hare (except on Vinalhaven [Oct. 1 - Feb. 28]); October 18 through December 31 for skunk and opossum; October 18 through February 28 for fox; and December 1 through February 15 for bobcat. The Department extended the bobcat hunting season an additional 15 days this year to increase hunting opportunity while the bobcat population is high. Hunting was allowed year-round for coyote, woodchuck, porcupine, and red squirrel. All Sundays are closed to hunting of any species in Maine.

The New England cottontail is still a hunted species in Maine. In the 1999-2000 hunting season, the daily bag limit on cottontails was reduced from 4 to 1. In 1999, a brochure was distributed to rabbit hunters to inform them of the rare status of the animal and encouraging them to focus their hunting on the abundant snowshoe hare.

The 1999-2000 fur harvest was similar to the 1998-99 season (Table 2). Notable exceptions were the fisher harvest, which increased by 43% over last year's harvest, and the bobcat hunting harvest, which increased by 65%. The increase in fisher harvest, especially in northern Maine, appears to be related to higher numbers of fisher in the area. Snowshoe hare, an important prey item for fisher, are currently very high. This increased prey availability appears to have allowed the fisher population to rapidly increase. Similarly, bobcat are highly dependent upon snowshoe hare. High snowshoe hare numbers, and relatively mild winters the past few years, have allowed a slow increase in the bobcat population. The marten harvest increased substantially this past season; however, this increase was expected. Marten harvest rates usually double during years of poor beechnut crops (which occurred last year), making marten more vulnerable to bait sets (Table 2). Next year's beechnut crop should be good, consequently, we expect the marten harvest rate to decrease substantially this fall.

Table 2. Furbearer harvests in Maine, Spring 1994 - 2000.

	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
Beaver	15,251	7,336	16,640	10,547	10,432	9,789
Bobcat	157	175	128	205	150	194
Coyote	1,647	1,440	1,587	1,987	2,376	2,207
Fisher	1,546	1,756	1,886	2,827	1,807	2,576
Red Fox	2,186	1,993	1,599	1,894	1,533	1,236
Gray Fox	50	104	25	92	75	82
Marten	2,199	4,478	2,208	5,736	2,160	4,395
Mink	1,549	1,341	1,365	1,177	1,518	1,543
Otter	1,324	760	1,237	876	836	737

On the negative side of the 1999-2000 fur harvest, red fox, beaver, and otter harvest levels were down. Poor pelt prices for beaver early in the season (Table 3), plus an unusually mild December, kept the harvest of beaver and otter low this year. The red fox harvest decreased to its lowest level since the Department started keeping pelt tagging records in 1975. This decrease represents a 19% decrease from the 1998-99 season and a 31% decrease from the average harvest over the last 10 years. Pelt price often has a large influence on the number of animals harvested for their fur. However, a low pelt price for fox cannot entirely explain this year's low harvest (Table 3). Raccoon rabies, which fox are also susceptible to, is spreading northward through the state. Trappers in central Maine, where raccoon rabies was prevalent this year, reportedly had a difficult time catching fox. Therefore, one explanation for the low fox harvest is that fox were less abundant in areas of the state where raccoon rabies was common. A more likely explanation for the low fox harvest is that there were fewer trappers targeting fox in 1999. The number of fox trappers slipped to the lowest level in 13 years.

Table 3. Average prices paid for pelts, 1994-1999 trapping seasons.

Species	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
Beaver	$17.00	$22.00	$27.00	$23.00	$13.00	$15.00
Bobcat	30.00	25.00	25.00	35.00	28.33	30.00
Coyote	16.00	12.00	20.00	17.00	9.00	12.00
Fisher:						
Male	14.00	15.00	22.00	25.00	21.00	15.00
Female	30.00	27.00	40.00	34.00	22.00	15.00
Fox, Gray	8.00	-	12.00	11.00	7.25	8.00
Fox, Red	16.00	16.00	20.00	17.00	10.50	14.00
Marten	24.00	21.00	29.00	23.00	12.50	17.00
Mink:						
Male	22.00	16.00	24.00	15.00	10.00	13.00
Female	11.00	14.00	16.00	9.00	6.20	8.00
Muskrat	2.00	2.00	4.14	3.00	1.18	1.65
Otter	52.00	42.00	46.00	43.00	31.83	36.00
Raccoon	9.00	10.00	17.00	14.00	7.38	5.00

Management and Research

Marten Research

Our Department continues to cooperate with Dr. Dan Harrison, at the University of Maine - Orono, on marten research. Dr. Harrison is currently investigating whether marten can be used as a tool for landscape-scale habitat planning. Objectives for this project include building and testing a habitat based model for predicting marten population levels; determining the extent that marten habitat requirements meet the habitat needs of other species in Maine's northern forests; and investigating the feasibility of whether a forest management program, at the landscape scale, can be developed around the habitat needs of marten.

New England Cottontail

The New England cottontail, or coony as it is sometimes called, reaches the northern limit of its range in southern Maine. It has become a rare animal in New England and was a former candidate for the federal endangered species list. New England cottontails live in the brushy, scrubby areas that often result from fire, forest cuttings, or farmlands being abandoned. Such areas are becoming rare in southern Maine. This habitat was abundant 50 years ago, but most has reverted to forest or has been developed. The remaining habitat fragments are widely separated. New England cottontail numbers, like those of other animals, are closely tied to the amount of habitat they have to live in. When habitat conditions were excellent the first half of this century, cottontail populations expanded. With the loss of shrubby habitat in recent years, the population of coonies has declined.

A shortage of suitable habitat is not the only challenge New England cottontail face. In most of their range, they compete with the eastern cottontail, which was introduced into southern New England early in the century. The eastern cottontail uses a wider variety of habitats and are better adapted to living in suburban areas.

During the winters of 1996-98, cottontail surveys were conducted in southern Maine. Thirty-five of 43 known sites were surveyed for two winters. Cottontail tracks were found at only 16 of these 35 sites. Most habitat patches coonies occupied were less than 5 acres, and most sites would probably not sustain a population without dispersal from nearby patches. In 1998, 14 cottontails were captured on 8 sites and all were identified as New England cottontails. Tissue samples were collected for DNA analysis.

In fall 1999, MDIFW began a cooperative study on New England cottontail with Dr. John Litvaitis and his graduate student Brian Johnson at the University of New Hampshire. The objectives of this study were to develop techniques for monitoring populations of New England cottontail, determine the current distribution of cottontails in Maine, and further characterize their habitat. During the winter of 1999-2000, Brian and his field crews found additional cottontail sites in southwestern Maine bringing the current total of known sites to 40. Brian did not find any eastern cottontail during his trapping efforts last winter. Hopefully, this is a good indication that eastern cottontails have not become established in Maine.

Brian is currently trying to develop a technique, using protein extraction and DNA, for distinguishing snowshoe hare fecal pellets from those of New England cottontail. If successful, this technique will allow biologists to efficiently survey sites for New England cottontail without relying on snowtracks. Currently, MDIFW and others rely on snowtrack surveys to distinguish between New England cottontail and snowshoe hare. Although snowtracking is an effective technique when proper conditions exist, infrequent snow and poor tracking conditions in southern Maine make this technique impractical to use on a regular basis.

--Karen Morris and Wally Jakubas

Strategic Planning

As part of the Department's strategic planning process, species assessments for furbearers continue to be written and reviewed this year. The coyote assessment was reviewed by a public working group this past winter. Management goals for coyotes were based on the status of the deer population in a given Wildlife Management District (WMD). If the deer population was at or above long term management goals, the public working group recommended the coyote population be allowed to fluctuate naturally while maintaining coyote hunting and trapping opportunities. For WMDs in which the deer population was below management goals, the coyote goal again was to provide hunting and trapping opportunities. However, in areas where coyote predation may be preventing deer from reaching long-term population goals, local coyote control efforts (e.g., snaring) would be implemented. Most species of furbearers are scheduled to go through an assessment process, similar to what was done for coyotes, within the next 2 years.

Trapping - Best Management Practices

The Department continues to work with Maine trapper's on addressing concerns about animal welfare and the public's perception of trapping. In 1997, Maine was invited to cooperate in a nationwide research program to determine best management practices (BMPs) for trapping. The BMPs that result from this research will likely be in the form of recommendations that are nonregulatory in nature. In Maine, BMPs will primarily be used to inform trappers about the best available traps, and how to modify existing traps, to limit injury to animals or improve trap efficiency. The initial phase of the BMP research program is scheduled to last 3 to 5 years and will meet the obligations outlined in the 1997 understanding between the U.S. and the European Union for trap research. Thereafter, BMP research will be ongoing and scheduled on an as needed basis.

This past fall, Maine cooperated again in the northeast regional trap testing program along with Vermont and Pennsylvania. Three trap types wee tested including the No. 2 Bridger with offset, laminated jaws; the No. 3 Soft Catch; and the Belisle Foot Snare. In Maine, 4 BMP trappers caught 53 coyotes, 71 fox, 22 raccoon, and 5 skunks in Fall 1999. Trap related injuries to coyotes and fox are being evaluated by veterinary teams in Wyoming. Overall, the study went well. The same trappers have participated in the BMP study for 2 years in a row, and appear to be looking forward to next fall's assignment.

Currently, we are working with the other furbearer biologists and administrators in the northeastern United States to come up with the format in which BMPs will be presented. This is a difficult task, since how these BMPs will be used varies considerably from state to state. Massachusetts, for example, does not allow the use of foothold traps. Their biologists are hoping that by adopting BMPs as regulations, the people of Massachusetts will support the use of

foothold traps again and reverse the current trapping ban. In Maine, we are viewing BMPs as nonregulatory and may not necessarily want the same wording that Massachusetts wants. Current plans are to have a draft BMP ready by December 30, 2000 and a published version ready by Fall 2001.

Maine plans on participating in this fall's regional trap testing program. We will be testing 4 versions of the No. 1.5 coil-spring trap on fox this fall. Versions include traps modified with padded jaws, laminated jaws, and Humane Hold pads.

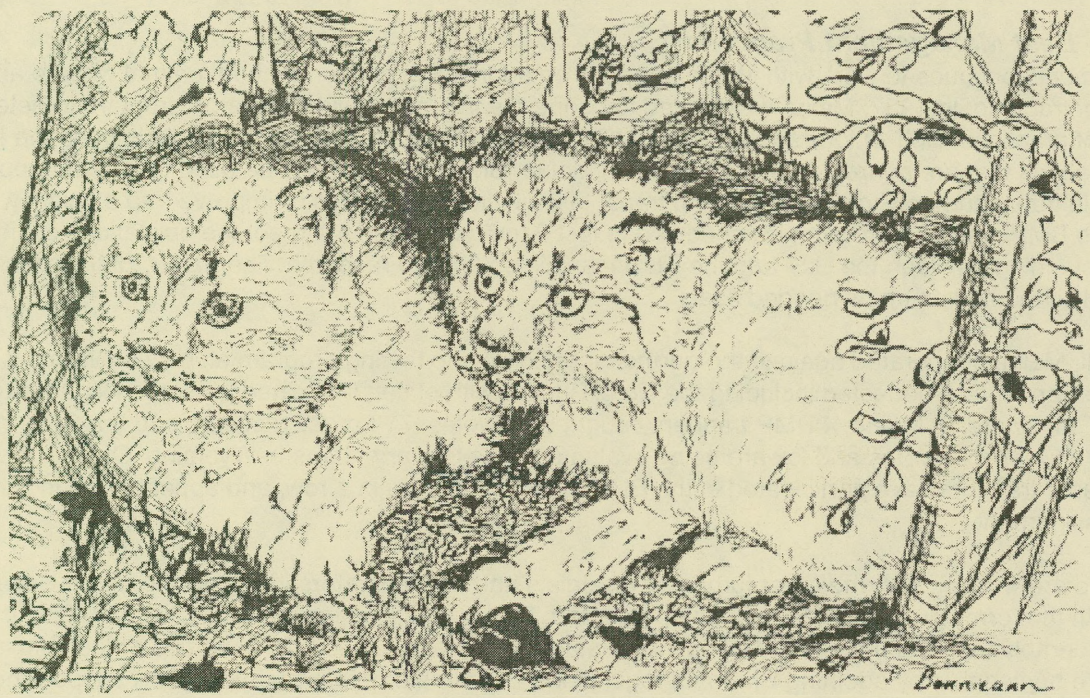
Part of the BMP research program includes public education on trapping, BMPs, and animal welfare issues. As in the past, MDIFW will be involved in this public education program. Overall coordination of BMP research and public education at the national level is being handled by the International Association of Fish and Wildlife Agencies.

--Wally Jakubas

CANADA LYNX

The Canada lynx has long been a rare carnivore in northern and western Maine. Until recently, its status was largely unknown and was based on anecdotal reports - an occasional animal caught in a trap or snare, or a track in the snow. The lynx is a medium-sized cat that averages 22 pounds for males and 19 pounds for females. Its general appearance is similar to the bobcat in that it has ear tufts, a short black-tipped tail, and fur that is tawny-gray. However, the lynx has noticeably larger paws, longer legs, and tends to be a little lighter in weight than the bobcat. Lynx are associated with boreal environments (northern forests), and their populations are largely dictated by the numbers and distribution of their primary prey - snowshoe hare. Lynx are capable of moving extremely long distances in search of food or to establish new home ranges.

The U. S. Fish and Wildlife Service has listed the lynx as Threatened in the lower 48 states under the Federal Endangered Species Act. Maine, Washington, and Montana are the only states, outside of Alaska, where lynx currently have resident populations. The reasons given for listing the lynx are complex and include range restrictions and habitat concerns. In western states, lynx are associated with old growth forests at high altitudes, which are being cut for timber, and environmental groups have advocated greater restrictions on land use to protect western lynx habitat. In the East, lynx occur in large tracts of woodlands, including areas of young forests that supply habitat for snowshoe hares. Maine's lynx are found across the northern part of the state, with a few reports from Down East. They are rarely encountered, and little is known about the status of the population. Historical records suggest lynx have persisted in low numbers in Maine throughout the past century; they apparently were more common during the 1800s, according to fur trapping records. Although lynx may have lived as far south as Pennsylvania in colonial times, Maine is currently at the extreme southern edge of the species' range. Current land use practices on industrial forest lands in northern Maine, which include areas of regenerating clear-cut stands that are prime snowshoe hare habitat, may be beneficial to lynx.



The Department has conducted track surveys each winter since 1995 to detect lynx and other furbearers. MDIFW has received funding from the USFWS, the Outdoor Heritage Fund, National Fish and Wildlife Foundation, National Council of the Paper Industry for Air and Stream Improvement, and the Wildlife Conservation Society to study lynx in northern Maine. In 1999, snow track surveys began in a 4-township area near St. Pamphile, and no tracks were observed over 629 km of survey route. Subsequently, tracks were encountered in a 4-township area near the Musquacook Lakes, and capture efforts began in March. One adult female was captured in 633 trap-nights of effort. The female's movements were monitored through late May when it denned, and two kittens were found in June; the first lynx kittens documented in the State since 1964. Fall capture began in mid-September, and 3 adult lynx (1 male, 2 females) and 1 male kitten were trapped in padded foothold traps. An additional male lynx was incidentally captured by a coyote trapper. This lynx was radio-collared in October. In addition to lynx caught by trapping, field crews crew used dogs to tree and radiocollar another adult male lynx in December. Trapping resumed in June, 2000, and 2 additional female lynx have been captured. Through mid-June, 2000, 8 lynx have been radiocollared and monitored to document movements and habitat use, and 10 additional lynx kittens have been captured. These kittens were too small to carry radiocollars, but 7 of them have been identified with numbered ear tags. We are already learning about some of the different mortality factors lynx face in Maine. Three of the 8 lynx, plus one uncollared juvenile, were killed this past fall and winter. Although these mortalities are still under investigation, it appears as if another predator killed 3 of the lynx, and that the other was human related. If adequate funding is obtained, the study will continue for the next 3 to 5 years.

The Department is cooperating with the University of Maine's Cooperative Fish and Wildlife Research Unit on a GIS-based assessment of potential lynx habitat in northern Maine. This is a Masters level research project being conducted by Chris Hoving under the direction of Drs. Bill Krohn and Dan Harrison. The University of Maine, the U.S. Fish and Wildlife Service, and MDIFW also collaborated to reconstruct a historical analysis of lynx records in Maine. In a study closely associated with MDIFW's lynx field study in northern Maine, investigators at the University of Maine are studying the primary prey of lynx — snowshoe hare. Jessica Homyack, working as a Masters student under Dr. Dan Harrison, is studying habitat use by snowshoe hare in relationship to intensive forest management practices.

--Craig McLaughlin

GRAY WOLF

Wolves are listed as a federal Endangered Species in Maine. Although wolves have been extirpated in the state since the early 1900's, recent occurrences in 1993 and 1996 suggest that occasional animals may be dispersing into the state. The nearest wolf population is in Quebec, only 75 miles from the Maine border. During the winter of 1998-99 and 1999-2000, Wildlife Division biologists continued their efforts to detect the presence of wolves in the State. Although several credible reports of sightings and tracks were received, none has yet provided indisputable evidence of these large canids. MDIFW maintains contact with state, provincial, federal, and non-governmental biologists to stay current with issues surrounding wolves in the Northeast. In addition to the wolf sighting database, we coordinate winter snow-track surveys (now in conjunction with lynx surveys) to detect the presence of wolves, and examine any unusual canid specimens brought to our attention. During the winter of 1998-99, surveys covered 1,296 km of transects in 33 townships. Large canid tracks were observed on two occasions. One set of tracks was determined to be a domestic dog. Infrared cameras were set at a bait site near the other set of tracks, but no wolves were photographed. Two individuals searched for wolf sign at 7 locations in June and July, 1999. No definitive tracks or scat were found along 800 miles of road surveyed. Eight howling surveys were conducted with limited response by coyotes. Late in 1999, an experienced federal animal damage control agent, who was vacationing in northern Maine, reported hearing a large canid howling, and seeing tracks and scat. This site was targeted for snow track surveys in the winter of 1999-2000, but poor snow conditions limited survey work, and no large canid tracks were found.

In 1998, the USFWS announced its intent to remove wolves in the Great Lakes Region from the federal endangered species list. As part of this process, the USFWS intends to classify wolves in the Northeast (including Maine) as Threatened. This category enables federal Endangered Species Act protection to be maintained on any wild wolves that may travel into Maine, but would provide MDIFW with more flexibility to address wolf and coyote management issues. Wolves, and other wildlife species for which no open hunting or trapping seasons exist, are fully protected under State law. If the proposed reclassification of wolves occurs, a federal recovery plan will be drafted for the Northeast to establish recovery goals and options.

There has been considerable interest in wolf recovery in Maine (both pro and con!). A wolf conference, sponsored by National Wildlife Federation, held in January, 2000 was well-attended, and the speakers provided valuable scientific information to biologists and the public. Wolf recovery has many complex biological, sociological, and economic implications, and MDIFW plans to explore these issues carefully by producing a "white paper" on wolves in 2000.

--Craig McLaughlin

MOOSE

1999 Moose Season

Maine's 1999 Moose Season was held from October 4 through October 9. The hunters were assigned to one of seven zones (Figure 3). The six inches of snow in the first part of the week was only one of several unusual features of the season. We had expected the 1999 season to follow the same regulations as in 1998. However, an emergency bill passed by the legislature resulted in some major changes for the 1999 season. In past years, hunters had to bring out all of the moose except the viscera. To make it easier for hunters to hunt away from the road, they may now leave the head, hide, rib cage, and lower legs in the woods. In addition, the number of permits was increased from 2,000 to 3,000. Five hundred of the additional 1,000 permits allowed hunters to shoot any sex or age moose (the same type of permit that has been issued since 1980). The other 500 additional permits were a new type for Maine hunters (Table 4). Hunters with these permits were only permitted to shoot moose with no antlers or with antlers shorter than its ears. The increase in the number of permits, and the addition of antlerless-only permits was, in part, in response to citizens' concerns about high numbers of moose/vehicle collisions.

Figure 3. Moose Hunting Zones.

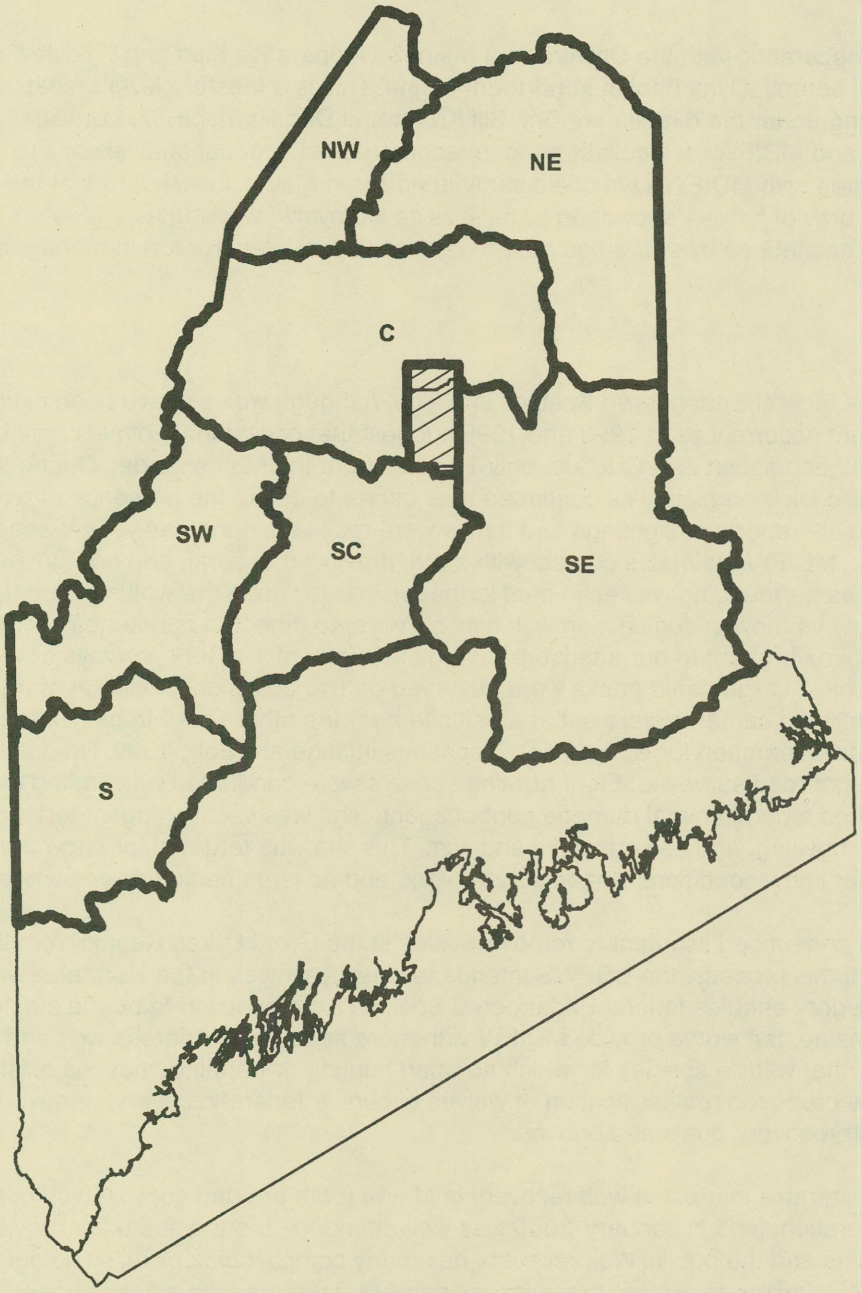


Table 4. 1999 Moose permit allocation, registration, and success rate.

Zone	Number of Permits: Any Moose	Number of Permits: Antlerless	Number of Permits: Total*	1999 Harvest: Male	1999 Harvest: Female	1999 Harvest: Total*	% Success: Any Moose	% Success: Antlerless
NW	175	0	175	114	25	140	80%	N/A
NE	520	250	770	406	262	668	93%	74%
CE	525	0	525	372	88	460	88%	N/A
SW	410	250	660	335	264	600	95%	84%
SC	185	0	185	149	28	177	96%	N/A
SE	530	0	530	341	90	431	81%	N/A
SO	155	0	155	119	24	143	92%	N/A
ALL	**2,500**	**500**	**3,000**	**1,836**	**781**	**2,619**	**89%**	**79%**

*Includes animals for which the sex or age was not recorded.

A regulation that encourages hunters to shoot female moose may seem odd, at first. After all, we are use to regulations designed to protect breeding-age females. However, if we wish to stabilize or reduce the number of moose, as is the case in several areas of Maine, we need to remove more adult females. Because Maine hunters are very selective, almost all moose killed under any moose permits are adult bulls. Under this scenario, merely increasing the number of permits will have little impact on the number of cows killed.

A large moose population made up mostly of cows and small bulls is unlikely to satisfy any of the groups with concerns about the moose population, including motorists, hunters, moose watchers, and the tourist industry. The number of mature bulls can be maintained by limiting the bull harvest through the number of any-moose permits. The size of the moose population can be controlled by issuing antlerless-only permits. In addition to increasing the harvest of cows, antlerless-only permits increase the harvest of calves and yearling bulls. Any-moose permit holders generally do not shoot these moose. Shifting more of the harvest to young animals will make it possible to allow a higher harvest while maintaining many mature bulls in the population.

Hunters reported seeing fewer moose in 1999, as compared to other recent seasons, and considerably fewer than 1998, which had the second highest sighting rate on record (Table 5). The sudden drop, and the fact that sightings were down in all zones, including the very lightly harvested South zone, suggests that some factor(s) other than a sudden decline in moose numbers reduced the hunters ability to find moose. Likely reasons include the large number of leaves still on the hardwoods and the unusual weather. In addition, many hunters commented on the crowded conditions, and felt that the large number of hunting parties on the roads were interfering with their ability to find moose.

Table 5. Average number of moose seen/10 hours hunted in Maine by hunting zone by year.

Year	Opening Day	Zones: Northwest	Northeast	Central	Southeast	South Central	Southwest	South[2]	All
1980	9/22	No Zones							1.7
1982	9/20	0.8	1.4	2.2	1.0	3.8	2.2	-	1.7
1983	9/19	0.7	0.7	1.2	0.7	2.0	2.4	-	1.1
1984	10/8	0.7	1.0	1.6	1.0	3.3	3.1	-	1.4
1985	10/21	1.4	1.9	2.7	1.3	4.4	3.1	-	2.2
1986[1]	10/20	0.9	1.5	3.0	1.0	4.5	6.4	-	2.2
1987	10/18	0.8	2.0	3.9	1.1	7.5	4.8	-	2.7
1988	10/17	2.2	3.2	5.3	1.3	5.3	8.8	-	3.8
1989	10/16	2.4	3.4	5.5	2.1	11.0	10.7	-	4.5
1990	9/24	1.1	1.5	2.4	0.9	4.0	4.2	-	2.0
1991	10/7	1.2	4.1	4.8	1.7	9.6	10.3	-	4.5
1992	10/5	2.4	2.9	3.7	1.5	7.9	7.7	-	3.5
1993	10/4	1.9	3.5	4.2	1.8	7.7	8.2	-	4.0
1994	10/3	2.3	5.0	5.0	2.4	12.8	9.8	-	5.5
1995	10/2	2.1	4.3	3.0	2.2	10.4	6.8	-	4.3
1996	10/7	2.1	4.3	3.4	2.0	8.0	8.1	-	4.2
1997	10/6	2.8	4.0	3.8	2.1	7.3	5.9	4.8	4.2
1998	10/5	2.7	5.9	4.2	3.1	9.8	7.6	6.3	5.1
1999	10/4	1.6	3.0	2.1	1.3	5.6	3.5	3.3	3.1

[1]The SW, SC, and SE zones were expanded in 1986.
[2]The south zone was opened in 1997.

Many hunters with an antlerless-only permit commented that they saw many bulls but had trouble finding a cow. This was not merely the perception of hunters frustrated by having an antlerless-only permit. Hunters reported seeing 130 bulls for every 100 cows, the second highest ratio ever reported.

The 2000 Season

In 2000, the permit allocation and hunting zones will be the same as in 1999 (Figure 3, Table 4). However, the season will be held the second week of October (9th - 14th), rather than the first full week. The change in season timing is to avoid concurrent openings for moose and grouse seasons.

2001 and beyond

Moose management is expected to be quite different in the next 10-15 years than it was during the past 15. Reasons for the changes include new management guidelines and new laws.

Management decisions are guided by goals and objectives developed by a public working group and are updated every 10-15 years (please see *Species Planning* section for details). We have just completed this process for moose. The new population objectives are different than ones that were in place from 1985-2000. In 1985, the group suggested that the number of moose should be kept about the same as it was in all areas of the state. In 2000, another working group suggested more complex goals. The 2000 working group put each WMD into one of three broad categories (Figure 4). These are a recreation area, a road safety area, and a compromise area. In the Recreation Management Area, hunting, and usually viewing, were the most important goals. In the Road Safety Area, reducing the number of moose/vehicle collisions was the only goal. In the Compromise Management Area, the goal was to balance recreation and safety concerns.

These different goals can best be met at different population levels. For WMDs where recreation (hunting and viewing) is most important, we want to have many moose, but not so many that the forest is damaged or animal health is compromised. In this case, the objective population size is expressed relative to the capacity of the land to produce food for moose. For most of these WMDs, we expect the moose population will be kept about the size it is now or allowed to increase. For WMDs where highway safety is equally or more important than recreation (Compromise Management Area), the working group recommended that the moose population be reduced below current levels. For these areas the objective population is expressed relative to current population. In the Compromise Management Area the population is to be reduced by about 1/3. In the Safety Management Area, it was suggested that the population be reduced to a very low number. In WMDs in the Recreation Management Area, and some of the Compromise Management Area, it was also considered important to maintain large bulls in the population.

Not only have the goals and objectives for moose management changed, but laws controling moose hunting have also changed. Through 2000, an upper limit on the number of permits limited our ability to harvest enough moose to meet the 1985 population goals. The law that will go into effect in 2001 does not have an upper limit on the number of permits that can be issued; therefore it will make it possible to meet the new population objectives. The size and composition of moose populations will be managed by adjusting the number and type of permits. The availability of mature bulls will be controlled by adjusting the harvest of bulls. Population size will be controlled by regulating the cow harvest.

Until now, the limited number of permits allowed by law, and the objective of maintaining moose populations at 1985 levels, meant there was very little risk of harvesting too many moose. This made it possible for us to set moose seasons a year in advance with a limited amount of information. We now have the authority to issue enough permits to meet population goals. With this comes the possibility of issuing too many permits and reducing the moose population below objectives. To avoid this, we will need better estimates of population size, birth rates, and mortality rates. Until these studies can be completed, we will use a conservative approach in issuing permits. In addition, we will need to analyze the previous season's data before final allocations are made. This will mean that application forms will be printed before permit allocations are made.

In much of southern Maine, the working group recommended that the number of moose should be decreased to reduce the number of moose/vehicle collisions (Figure 4). At first, it would seem the most reasonable response to this recommendation would be to open this area to hunting as soon as possible and issue a large number of permits. However, the recommendation to reduce the number of moose is expected to be controversial. In addition, most of this area has not yet been opened to moose hunting. We expect people will have concerns about an additional season and when the season will occur. Therefore, we are recommending that WMDs 15, 16, 17 and 20-27 remain closed to moose hunting until there is an opportunity for additional public input.

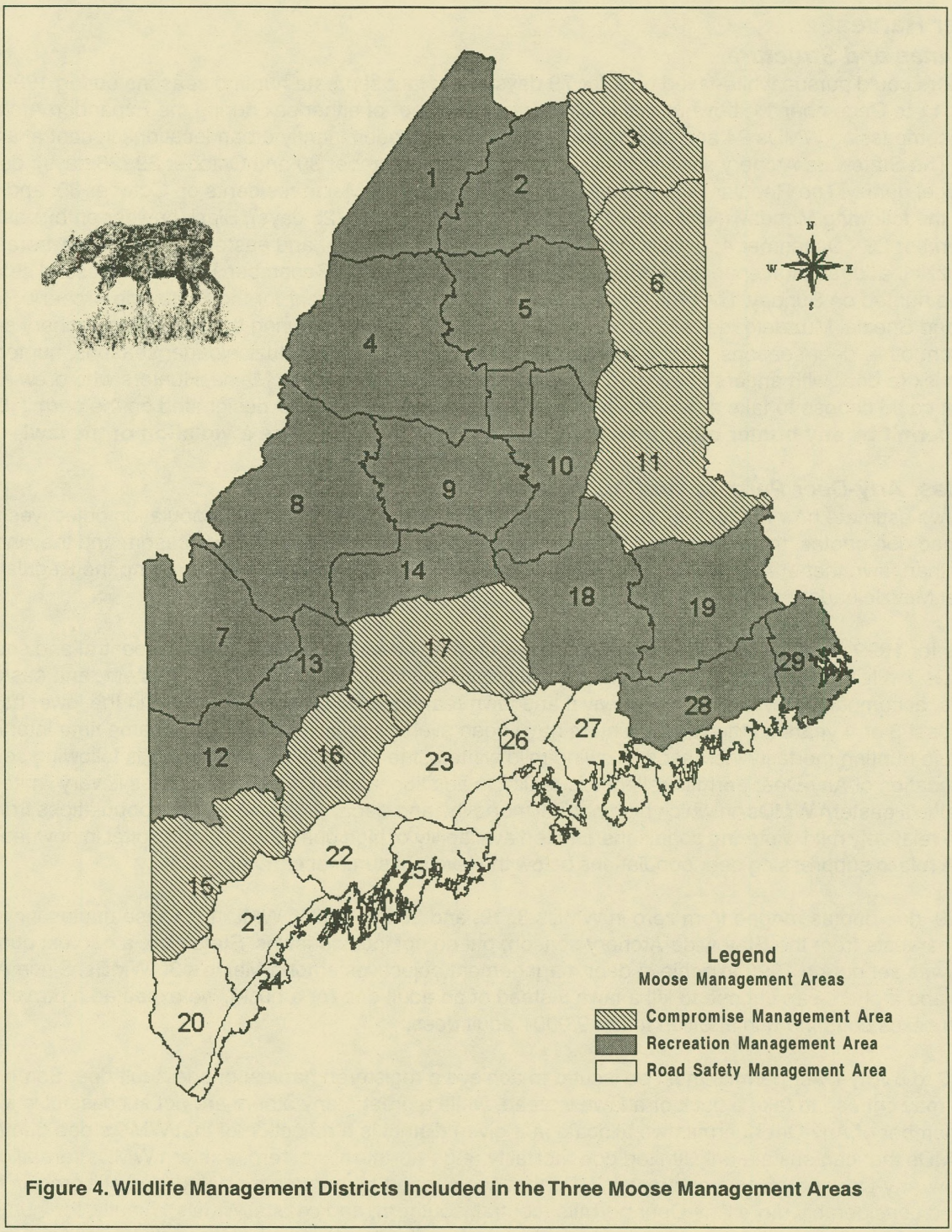


Figure 4. Wildlife Management Districts Included in the Three Moose Management Areas

Another law change will eliminate the requirement that the season be limited to 6 days. We can now have longer seasons, split seasons, or different season frameworks in different parts of the state. Given the population objectives, there is no season framework that is needed for moose management, so season frameworks must be decided by social rather than biological reasons.

The timing of the moose season has been controversial since the season was reopened in 1980. In a series of public meetings this spring, it became clear this has not changed. Reasons for preferring different season structures revolve around such diverse issues as temperature, weight loss in bulls, the availability of meat cutters, and avoiding conflicts with a vast array of groups. These groups include landowners, leaf peepers, bird hunters, bear hunters, moose watchers, guides, fisherman, hikers, trappers, camp and hotel owners, and other moose hunters. The season framework for 2001 and beyond is still undecided.

--Karen Morris

DEER

1999 Deer Harvest

Season Dates and Structure

Maine hunters could pursue white-tailed deer for 79 days within four separate hunting seasons during 1999. From September 11 to December 11, bowhunters could harvest two deer of either sex during the Expanded Archery season, encompassing WMDs 24 and 30 (Figure 2) and 7 other predominantly urban locations in central and southern Maine. The Statewide Archery season took place between September 30 and October 29 (26 days); deer of either sex were legal quarry. The Regular Firearms season, which began for Maine residents on October 30, and for all hunters on the following Monday (November 1), ended on November 27 (25 days). Black powder enthusiasts had 6 days (November 29 - December 4) to hunt white-tails in northern, western, and eastern WMDs. Elsewhere, the Special Muzzleloader season spanned a total of 12 days (November 29 - December 11). Regardless of season, deer could not be hunted on Sunday. The limit on deer was one per hunter per year for the Statewide Archery, Regular Firearms, and Special Muzzleloader seasons combined. The two-deer limit during the Expanded Archery season was separate from other deer seasons. During the Regular Firearms and Special Muzzleloader seasons, hunters could harvest a buck (a deer with antlers three or more inches in length) anywhere in Maine. Hunters who drew an Any-Deer permit could choose to take a doe or a fawn instead, but only in the WMD designated on the permit. **Use of an Any-Deer permit by any hunter other than the one who drew that permit, is a violation of the law!**

Doe Quotas, Any-Deer Permits, and Applicants

Each year, we estimate how many does would need to be harvested to achieve deer population objectives in each WMD. Termed doe quotas, these desired doe harvests are calculated prior to the deer season, and they include all does older than fawn that are legally registered during both Archery seasons, as well as during the Regular Firearms and Special Muzzleloader seasons on deer.

Doe quotas for 1999 were set at levels that would slow the rate of deer population growth in central and southern Maine WMDs, while stabilizing or encouraging modest population increases in northern, western, and eastern WMDs. Mild winters, accompanied by high winter survival and fawn rearing success, have prevailed in the lower half of Maine during the past 3 or 4 years. In the North, winters have been average or severe during the same time interval. Generally, allowable hunting mortality increases following mild winters; the opposite situation prevails following severe winters. Allocation of Any-Deer permits reflect this reality. In addition, allowable harvest of does is very limited in areas, such as Maine's eastern WMDs, in which high natural mortality (and illegal kill) prevents deer populations from expanding, despite relatively mild wintering conditions. Limited availability of high quality wintering habitat in downeast WMDs also plays a role in suppressing deer populations below the levels of summer carrying capacity.

During 1999, doe quotas ranged from zero in WMDs 3, 19, and 28 to 1,500 in WMD 17. These quotas include anticipated doe harvests from the Statewide Archery season, but do not include fawns. Statewide, a harvest quota of 9,013 adult does was set during 1999 to achieve deer management objectives among Maine's 30 WMDs. Since Any-Deer permittees and archers can choose to kill a fawn instead of an adult doe (or a buck), we expected a harvest of 5,400 fawns (both sexes combined) in addition to the 9,000+ adult does.

Generally, 3 to 8 Any-Deer permits must be issued to achieve a registered harvest of one adult doe. Some Any-Deer permittees may choose to take a buck or a fawn instead, while a great many others are not successful in killing any deer. The number of Any-Deer permits we allocate in a given district is a reflection of that WMD's doe quota. Consequently, WMDs that can sustain only limited doe mortality (e.g., northern, western, eastern WMDs) are allocated relatively few Any-Deer permits. In contrast, WMDs that can support higher doe mortality (and still grow in herd size) are allocated considerably more Any-Deer permits (central, southern, and coastal WMDs). Finally, the number of does taken in our statewide archery hunt counts against doe quotas. This tends to reduce the number of Any-Deer permits that can be issued to meet adult doe quotas.

Statewide, we issued 53,231 Any-Deer permits in 1999, or 22% more than were allocated during 1998 (43,826). Any-Deer permit allocations ranged from as few as 26 or 27 in WMDs 2 and 29 to as many as 8,885 to 9,097 in WMDs 23 and 17. On a density per square mile basis, we issued the most Any-Deer permits for WMDs 23 and 24. During both 1998 and 1999, there were more Any-Deer permits available in WMD 24 than there were applicants willing (or able to find hunting access) to apply for one.

Any-Deer permits are allocated to qualified applicants in a random computer lottery. Both the application and the Any-Deer permit are free. During 1999, 90,642 applicants vied for a chance to draw an Any-Deer permit. Of these, 88% (80,384 applicants) were Maine residents. Among the 10,258 nonresident applicants were individuals who reside in 43 states and 5 Canadian provinces. In keeping with our landowner recognition program, 9,051 (17%) of the 53,231 total

Any-Deer permits were issued to qualifying landowners (people who own 25 or more acres of land in Maine, which is kept open to hunting). Maine residents were issued 47,838 (90%) Any-Deer permits, and nonresidents received 5,393 permits (10% of total). It is worth noting that only about one-half of our resident deer hunters, and less than 40% of our nonresident hunters, apply for an Any-Deer permit each year.

Statewide Statistics for 1999

Overall, 31,473 deer were registered during 1999, of which 1,453; 659; 28,753; and 608 were taken during the Expanded Archery, October Archery, Regular Firearms, and Special Muzzleloader deer seasons, respectively (Table 6). Statewide deer harvest increased by 3,232 deer (12%) in 1999, compared to the previous year. Among seasons, deer harvest increased for the Expanded Archery season (+225%), the Regular Firearms season (+9%), and for the Special Muzzleloader season (+21%) during 1999. Deer harvest declined 18% for the October Archery season between 1998 and 1999. Hunting conditions during both the 1998 and 1999 Regular Firearms seasons were not considered favorable. November of both years was warm, rainy, often windy, and almost totally lacking in tracking snow nearly statewide. In both years, Thanksgiving week offered particularly unfavorable hunting conditions, resulting in below-average hunter effort and low deer harvests.

Table 6. Sex and age composition of the 1999 deer harvest in Maine by season type and week, statewide[1].

	Sex/Age Class					Total	Percent by Season & Week		
	Adult		Fawn		Total	Antlerless		Adult	
Season	Buck	Doe	Buck	Doe	Deer	Deer	Total	Buck	Antlerless
Archery	**766**	**868**	**238**	**240**	**2,112**	**1,346**	**7**	**4**	**11**
Expanded	499	613	167	174	1,453	954	5	3	8
October	267	255	71	66	659	392	2	1	3
Regular Firearm	**18,209**	**6,649**	**2,110**	**1,785**	**28,753**	**10,544**	**91**	**94**	**87**
Opening Saturday	2,096	885	286	243	3,510	1,414	11	11	12
November 1-6	4,369	1,802	559	484	7,214	2,845	23	23	23
November 8-13	4,002	1,387	399	361	6,149	2,147	20	21	18
November 15-20	4,201	1,136	375	291	6,003	1,802	19	22	15
November 22-27	3,541	1,439	491	406	5,877	2,336	19	18	19
Muzzleloader	**314**	**192**	**54**	**4**	**608**	**294**	**2**	**2**	**2**
November 29-December 4	173	81	23	16	293	120	1	1	1
December 6-11	141	111	31	32	315	174	1	1	1
Total	**19,289**	**7,709**	**2,402**	**2,073**	**31,473**	**12,184**	**100**	**100**	**100**

[1] Sex/age data were corrected for errors in the deer registrations.

Buck Harvest

The statewide harvest of antlered bucks was 19,289, the 3rd highest buck kill in Maine history. Buck harvest was expected to exceed that for 1998 (17,925), possibly even breaking the 20,000 mark for the first time ever. The latter outcome did not materialize. As expected, the buck harvest declined in most northern WMDs. Following severe winters, fewer bucks are available to hunters. However, the buck kill again failed to meet expectations in central and southern WMDs, where deer populations have been growing. Despite the lower buck harvest achieved in 1998 and 1999, recent buck harvests (1995-1999) now average 50% higher than during the final years of either-sex hunting in Maine (1978-1982). During 1999, the top 5 buck-producing WMDs were (in descending order): WMDs 24, 23, 22, 21, and 17, all in central and southern Maine.

Among the 19,289 antlered bucks taken statewide during 1999, roughly 9,278 (48%) were 1½ year-olds sporting their first set of antlers, while nearly 2,700 (14%) were mature bucks 4½ to 15½ years of age. Button bucks (male fawns) are not included here: they are reported as antlerless deer, since their velvet-covered nubbins (pedicles) never attain legal length (3").

Maine is nationally known for producing trophy bucks (age 4½ and older). This is possible because, unlike the situation in many other states, Maine's bucks are subjected to relatively light hunting pressure. In our state, a healthy number of bucks annually survive to older (mature) age classes. In more heavily hunted states, yearling bucks comprise as much as 70%-90% of the bucks available, and in those states, bucks rarely survive beyond 3½ years! A cautionary note: Maine's bucks are also vulnerable to increasing hunting effort. There is already a substantial difference in availability of trophy bucks in heavily-hunted southern Maine (10% trophy bucks) vs. lightly-hunted northern Maine (30% trophy bucks). Increases in any combination of hunter numbers, season length, or effort per hunter (which increases total hunting pressure on the herd) anywhere in Maine will inevitably reduce the older buck population.

Antlerless Deer Harvest

The magnitude of Maine's harvest of does and fawns depends on the number and success rate of archers, the number of Any-Deer permits issued to firearms deer hunters, and hunting conditions, such as the availability of tracking snow. The statewide harvest of adult (older than fawn) does during 1999 was 7,709, or 15% below the preset quota (9,013). Since doe harvests during both archery seasons increased, the failure to meet doe quotas is due to hunting conditions or hunter behavior during the regular firearms and muzzleloader seasons. Although these seasons were dominated by warm, often wet conditions, doe populations were certainly high enough to sustain a harvest approaching 9,000 adult does. This was the second consecutive year in which we failed to achieve pre-determined doe harvest quotas.

In no WMD were adult doe harvests sufficient to prevent deer populations from increasing (given adequate winter survival in 2000). Among WMDs, doe harvest ranged from 2 in WMD 3 to 1,292 in WMD 17 (Table 7). On a per square mile basis, the top 6 WMDs supporting doe harvests were (in decreasing order), districts 24, 23, 16, 22, 21, and 17. It is noteworthy that these, and several other southern Maine WMDs, support higher doe harvests today than during the 1970's, when deer of either-sex regulations were in place. This is possible because overall deer populations have increased markedly in the past 15 years. As deer populations increase, so too do allowable harvests of bucks and does. In addition to adult does, 2,402 buck fawns and 2,073 doe fawns were legally taken in Maine during 1999. Overall, the antlerless deer harvest totaled 12,184 (Table 7).

Table 7. Sex and age composition of the 1999 deer harvest in Maine by Wildlife Management District[1].

	Adult		Fawn		Total		Harvest Per 100 Adult Bucks		Harvest Per 100 Sq. Miles Habitat	
					Antlerless	All				
WMD	Buck	Doe	Buck	Doe	Deer	Deer	Adult Does	Anterless	Adult Bucks	All
1	357	28	13	8	49	406	8	14	25	29
2	90	7	0	0	7	97	8	8	8	8
3	92	2	3	0	5	97	2	5	10	10
4	300	39	11	6	56	356	13	19	15	18
5	401	59	12	13	84	485	15	21	26	31
6	274	45	11	8	64	338	16	23	20	25
7	492	94	35	25	154	646	19	31	36	47
8	564	113	40	27	180	744	20	32	28	36
9	169	42	11	8	61	230	25	36	18	24
10	156	39	10	13	62	218	25	40	18	25
11	518	73	31	23	127	645	14	25	31	39
12	471	152	56	51	259	730	32	55	50	78
13	475	177	50	46	273	748	37	57	84	132
14	273	33	15	10	58	331	12	21	34	42
15	1,215	405	126	98	629	1,844	33	52	122	185
16	1,240	642	215	182	1,039	2,279	52	84	173	317
17	2,541	1,292	409	368	2,069	4,610	51	81	186	338
18	632	154	52	37	243	875	24	38	49	67
19	190	9	0	0	9	199	5	5	16	17
20	788	341	122	103	566	1,354	43	72	131	225
21	916	435	160	151	746	1,662	47	81	188	341
22	1,145	593	194	136	923	2,068	52	81	220	397
23	2,174	1,133	388	335	1,856	4,030	52	85	238	441
24	888	574	164	154	892	1,780	65	100	322	645
25	831	395	87	81	563	1,394	48	68	172	288
26	1,090	605	133	136	874	1,964	56	80	176	317
27	550	79	21	14	114	664	14	21	67	81
28	143	4	0	0	4	147	3	3	17	18
29	124	6	2	5	13	137	5	10	25	28
30	190	139	31	35	205	395	73	108	-[2]	-[2]
Statewide	**19,289**	**7,709**	**2,402**	**2,073**	**12,184**	**31,473**	**40**	**63**	**66**	**108**

[1]Sex/age data were corrected for errors in the deer registrations.
[2]Area of deer habitat in WMD 30 has not been determined.

Harvest by Season and Week

Of the four separate deer hunting seasons, Maine's Regular Firearms season attracts the most hunters (nearly 176,000), and accounts for the greatest share of the total harvest. In 1999, 91% of the total deer take occurred during the four-week firearms deer season (Table 6). Within that season, after a strong initial burst of hunting pressure on opening Saturday for residents (which accounts for 11% of the firearms harvest), hunter effort and deer harvest remained remarkably stable during each week. Normally, there is a tendency for hunter effort to spike during the final (Thanksgiving) week. Many hunters attempt to "cash in" on their Any-Deer permit during this final firearms week, after concentrating on trying to kill a buck earlier in the season (Table 6). In 1999, that week was marred by warm, rainy weather, which depressed hunter participation and led to lower harvests of bucks and antlerless deer.

Continually gaining in popularity, archery hunting for deer now accounts for 7% of the total deer harvest in Maine (Table 6). Black-powder hunting is also growing in popularity. Yet, our one to two week late Special Muzzleloader deer season accounted for only 2% of the 31,473 deer tagged in Maine during 1999. The relative contribution of firearm vs. archery vs. black powder seasons to total deer harvest noted in 1999 is typical of long-term trends in harvest distribution by season.

Harvest by Hunter Residency

Maine residents claimed the lion's share (86%) of the deer harvest in 1999 (Table 8). Among seasons, the proportion of deer harvest registered by Maine residents was highest for the Archery seasons (97%), followed by the Special Muzzleloader (94%), and Regular Firearms (85% residents) seasons. During the past 5 years, the proportion of the deer harvest tagged by Maine residents has been increasing. Formerly, residents' share of the deer kill had consistently averaged 80%.

Table 8. Deer registrations by Wildlife Management District (WMD) and Hunter Residence, 1999.

	Deer Registered By:				
	Residents		Nonresidents		
WMD	Number	Percent	Number	Percent	Total
1	150	37	256	63	406
2	60	62	37	38	97
3	85	88	12	12	97
4	170	48	186	52	356
5	239	49	246	51	485
6	306	91	32	9	338
7	408	63	238	37	646
8	388	52	356	48	744
9	135	59	95	41	230
10	166	76	52	24	218
11	448	69	197	31	645
12	650	89	80	11	730
13	599	80	149	20	748
14	200	60	131	40	331
15	1,644	89	200	11	1,844
16	2,114	93	164	7	2,278
17	3,907	85	705	15	4,612
18	742	85	133	15	875
19	154	77	45	23	199
20	1,219	90	135	10	1,354
21	1,616	97	46	3	1,662
22	2,000	97	68	3	2,068
23	3,515	87	514	13	4,029
24	1,714	96	66	4	1,780
25	1,339	96	55	4	1,394
26	1,862	95	102	5	1,964
27	620	93	44	7	664
28	138	94	9	6	147
29	129	94	8	6	137
30	374	95	21	5	395
Statewide	**27,091**	**86**	**4,382**	**14**	**31,473**

Regional differences occurred in the distribution of the harvest by residents and visitors to Maine (Table 8). In the more populous central and southern WMDs, most successful deer hunters were residents. However, in the largely unpopulated "North Woods" of Maine, nonresidents accounted for a much larger share of the deer harvest. At one extreme, 63% of the deer harvested in remote, unpopulated WMD 1 were registered by nonresidents (primarily Canadians from Quebec). At the other end of the spectrum, 97% of the deer killed in heavily populated WMDs 21 and 22 (primarily Androscoggin and Cumberland Co.) were registered by Maine residents (Table 8).

A substantial number of Maine residents typically travel to hunting areas outside their home WMD. Many residents pursue deer within two or more WMDs during the course of Maine's four deer seasons. Typically, one-quarter of the statewide deer harvest is registered by Maine residents who traveled to a WMD away from their home WMD.

Hunter Participation and Success Rate

During 1999, roughly 231,600 licenses that permit deer hunting were sold in Maine; 84% were bought by residents. License sales in 1999 were similar to sales recorded in 1997 (231,640). Not all hunters who purchase big game hunting licenses actually pursue deer. According to recent (1988 and 1996) and past surveys (1970 to 1984), about 15% of these license buyers typically chose not to hunt deer. When these non-participants are subtracted from total sales of deer hunting licenses, the estimated number of hunters who actually pursued deer in Maine during 1999 was approximately 177,300. Hunter density, therefore, averaged nearly six per square mile, statewide, and this hunter force expended an estimated 2.08 million hunter-days effort pursuing deer during our 79-day hunting season. Hunting pressure on deer has steadily increased since the 1970s, when deer of either-sex seasons were the norm. During 1976-82, deer hunting effort averaged 1.57 million hunter-days, statewide. In contrast, effort during 1990-97 has averaged 2.05 million hunter-days, despite a marked drop in hunter numbers (about 180,000 deer hunters today vs. 207,000 hunters in the late 70s to early 80s). Individual hunters today spend about 3 to 4 more days pursuing deer than they did 20 years ago. Prior to 1981, we offered no separate black powder season, no expanded archery season (just the October hunt), and we limited the firearm deer season to 3 weeks in about one-half of the state. Overall, we offered only 48 days of hunting opportunity in the late 1970s vs. 79 days in 1999! Clearly, hunter effort is cumulative; adding new deer seasons, and more hunting days, results in higher pressure on the deer herd. This fact has consequences regarding maintenance of trophy buck availability, and the relative allocation of Any-Deer permits vs. either-sex archery hunts.

Deer hunting pressure varies dramatically between northern and eastern WMDs relative to central and southern WMDs. The more lightly-hunted northern and eastern WMDs accommodate only 3 to 5 hunters per square mile over Maine's 79 day deer seasons; hunters there expend only 14 to 31 hunter-days per square mile of effort on the deer herd. In central and southern WMDs hunter density ranges from 10 to 18 hunters per square mile, and hunting pressure ranges from 80 to nearly 225 hunter-days of effort per square mile on the herd. Since there is 5 to 10 times as much hunting pressure on central and southern Maine deer populations, hunting there exerts a much greater influence on deer population dynamics than in the north woods, or Downeast.

In its third year, the Expanded Archery season attracted 5,044 participants (98% residents). Hunter participation in the Expanded Archery season has doubled each year, since its inception in 1997. As noted earlier, this season was limited to WMDs 24, 30, and 7 smaller sites in southern Maine. Also, 10,534 residents and 1,012 nonresidents bought licenses that permitted them to hunt deer during the Statewide Archery season in October. Since 1983, sales of archery licenses have more than quadrupled, reflecting a strong trend toward greater participation in the sport of bowhunting for deer. In that time, the archery deer harvest has climbed from about 100 to 2,112 deer (1999 harvest).

Compared to the regular firearms season, which attracts at least 175,500 participants, relatively few deer hunters currently participate in Maine's late Black Powder deer season. Sales of Special Muzzleloading season permits totaled 11,053 during 1999, slightly less than Special Muzzleloader permit sales during 1998 (11,790). Undoubtedly, the addition of an extra week to the black powder season in 1995 has sparked additional participation in this primitive firearm hunt. Muzzleloader license sales increased by >50% when we changed the Black Powder season from one to two weeks in 1995. Since its inception in 1981, the Black Powder deer season has drawn a steadily increasing number of participants. In its first year (1981), only 415 hunters purchased a muzzleloading permit. The number of deer registered during Maine's Muzzleloader season has grown from 7 in 1981 to 608 in 1999. This hunting season is expected to continue to grow in popularity.

Undoubtedly, participation in our Muzzleloader deer hunting season would be substantially greater if the season preceded the Regular Firearm season and if that season had a separate deer limit (as in neighboring New Hampshire). There, fully one-third of all deer hunters take advantage of the N.H. Black Powder season. If this were the case

in Maine, we would field nearly 60,000 muzzleloader hunters, instead of the current 11,000. These additional hunters would certainly have a negative impact on the availability of Any-Deer permits and antlered buck survival over time (deer harvest administrators in New Hampshire are now facing this reality).

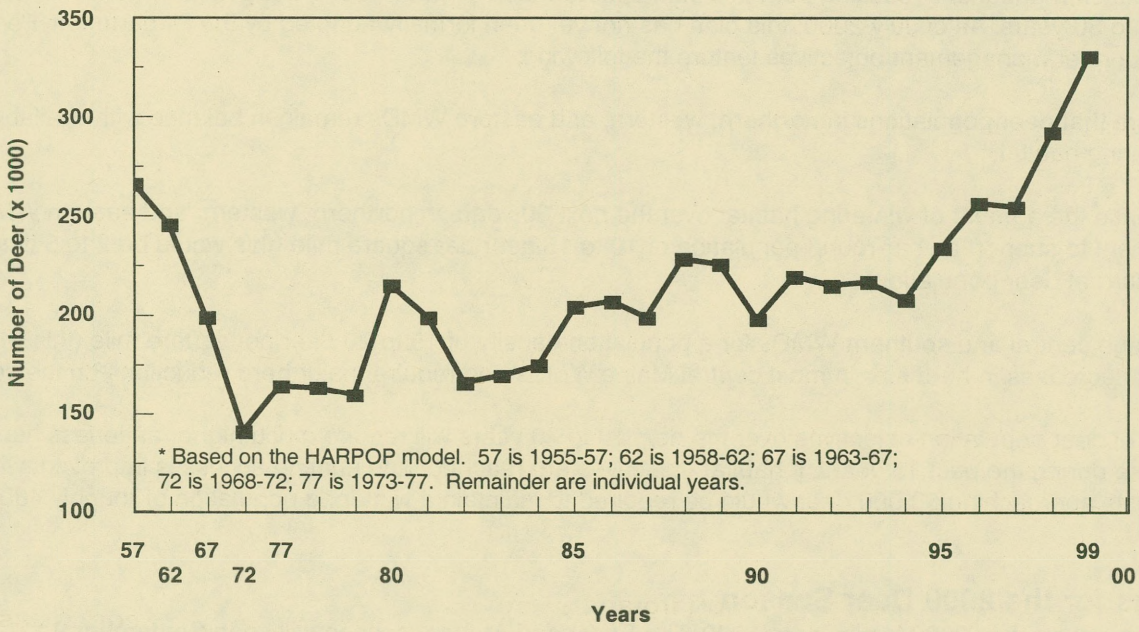
Deer hunting success in Maine averaged 17.8%, overall, during 1999. Success rate among nonresidents (15.8%) was slightly lower than success rate experienced by residents of Maine (18.1%). Apparent success rate among hunters who drew an Any-Deer permit (30.2%) was considerably higher than among hunters who were restricted to "bucks-only" (12.7%) during the Regular Firearms season. Any-Deer permittees could harvest either a doe, a fawn, or a buck, hence they would be expected to achieve higher success. In addition, though, some hunters evidently pool their antlerless deer kill with Any-Deer permittees, which is illegal. Success rate among bowhunters differed markedly between the Expanded Archery season (29.4%), and the October Archery season (5.7%). Deer are very abundant in much of the Expanded Archery hunt area; this accounts for the exceptional degree of success hunters enjoyed during this archery season. Our least successful hunter group are the Black Powder enthusiasts. Success rate during the Special Muzzleloader season averaged 5.6% in 1999, which is typical of long-term success rates.

Overall success rate among deer hunters varies among WMDs, and is influenced by the number of Any-Deer permits we issue, as well as availability of deer. Success rates in 1999 were lowest in northern Maine's WMD 10 (6%); they were above-average in central and southern WMDs 15 to 17 and 20 to 24 (15 to 33% success rate). Highest apparent success rate, overall, occurred in coastal island WMD 30 (48% success), although the quality of this estimate is poor.

Maine's Deer Population

Since 1980, we have been striving to increase deer populations in Maine. Our objective was to reverse a statewide decline in deer numbers which began in the early 1960's (Figure 5). Our primary strategy was to balance doe losses from all causes with fawn production, by more efficiently regulating the legal harvest of does. We suspected that we would be more successful in achieving herd increases in those WMDs in which: 1) hunting was a major mortality factor, 2) wintering habitat was adequate to accommodate higher deer populations, and 3) severe winters were infrequent.

FIGURE 5. MAINE'S STATEWIDE WINTERING DEER POPULATION



The Deer Strategic Plan, implemented in 1986, called for increasing deer populations to 50% or 60% of the maximum supportable population in each WMD. Based on current data, we believed this would amount to a wintering herd of 270,000 to 330,000 deer in Maine (9 to 11 deer per square mile). If anything, however, this population estimate may have been an underestimate of actual biological carrying capacity, particularly for central and southern sections of Maine.

During the past 15 years, Maine's wintering herd has increased from a mean of 160,000 to more than 331,000 deer (Figure 5). During the past 6 years alone, our wintering herd has increased from roughly 208,000 to its current maximum of 331,000. During the past 5 years, we restricted availability of Any-Deer permits in most central and southern Maine WMDs to a much greater degree than we had done during the 8 previous years under the Any-Deer permit system. These harvest restrictions, combined with high deer survival during recent very mild winters, provided the impetus for very strong herd growth (averaging 15% per year) since 1994. That level of herd growth continued during 1999 in the southern half of Maine, but populations have declined or stabilized in the north.

Within individual WMDs, wintering populations now range from as low as 2 deer per square mile in WMD 3 to nearly 40 per square mile in WMD 24. Generally, northern and eastern WMDs average less than 8 deer per square mile, while central and southern WMDs range between 15 and 25 deer per square mile. Several locations within WMDs 24 and 30 (in which hunting access is severely restricted or denied) currently carry populations of 50 to more than 100 deer per square mile. These populations are far in excess of 60% of biological carrying capacity, and we more frequently receive complaints of excessive browsing, road kills, and Lyme Disease risk in these areas than elsewhere. For central and southern Maine WMDs, a density of 25 deer per square mile may not yet represent 50% of maximum biological carrying capacity. Yet, browsing pressure, and landowner conflicts with deer, do tend to increase dramatically at densities higher than 25 deer per square mile.

Within northern and eastern WMDs, harvest restrictions implemented during the past 15 years have helped to stabilize a declining herd, but we have made little progress toward significantly increasing these deer populations. In these WMDs, the summer range far exceeds the ability of the winter range to support deer. The long-term prescription here is to increase the quantity and quality of wintering habitat available to local deer herds. We are actively pursuing that approach, as noted in the Wildlife Management section of this bulletin. In the interim, doe harvest opportunity may remain limited, as we strive to balance what are typically large and frequent winter losses against the variable fawn production, which annually must replace losses among deer in northern and eastern Maine. Over time, as the winter range situation improves, deer populations and harvest opportunities should both increase above current levels in Maine's industrial timberland.

The Strategic Plan for white-tailed deer was reassessed during 1999-2000, with the able assistance of a dedicated group of stakeholders representing hunters, landowners, conservation groups, economic interests, and wildlife watchers. Recommendations resulting from this plan update will help guide deer management priorities in Maine over the next 10 to 30 years. As of July 2000, this plan has not yet been formally adopted by the Department. Pending approval, our deer management objectives feature the following:

1. ensure that deer populations in northern, western, and eastern WMDs remain in balance with available wintering habitat,

2. increase the amount of wintering habitat over the next 30 years in northern, western, and eastern WMDs sufficient to support a year-round population of 10 to 15 deer per square mile (this would be 2 to 5 times the current deer population).

3. manage central and southern WMDs for a population density of 15 to 20 deer per square mile (this will require slight decreases in herd size in most central Maine WMDs and require major herd reductions on the coast).

Attainment of deer population objectives over the next 10 to 30 years will require much higher antlerless harvests than was the case during the past 15 years. If habitat objectives are reached, and hunting access is improved, we anticipate harvests approaching 50,000 deer would be required to maintain a wintering population of roughly 480,000 deer in Maine.

Prospects for the 2000 Deer Season

Deer season structure in 2000 is similar to 1999. The Expanded Archery season will span September 9 to December 9; the limit will be 2 deer of either-sex. In addition to WMDs 24 and 30 (Figure 2), this hunt will take place in eight smaller locations in central and southern Maine, where firearms ordinances and/or intensive housing developments make firearms hunting impossible or impractical. The October Archery season will, as always, be statewide in scope, and will span September 28 to October 27. The residents-only opening of the Regular Firearms season on deer will be Saturday, October 28; all hunters may participate from October 30 to November 25. Finally, the Special Muzzleloader season will begin in all WMDs on November 27, but will end on December 2 in WMDs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 19, 27, 28, and 29. Elsewhere, the Special Muzzleloader season will continue until December 9.

During 2000, we will issue nearly 75,525 Any-Deer permits, 22,300 more than were issued in 1999, and the highest allocation of antlerless deer hunting opportunity in the past 18 years. High survival among wintering deer in most WMDs accords us the opportunity to allow higher doe harvests while limiting herd growth, where feasible. Any-Deer permits were not issued for WMDs 19 and 28 this year. Allocations in northern Maine are intended to stabilize deer populations in WMDs 1 through 10, where we are examining whether winter deer concentrations have reached optimum carrying capacity. Elsewhere, despite markedly higher allocations of Any-Deer permits, local deer populations should continue to increase, but at a slower pace. However, in WMD 24, we have decided to attempt to reduce deer populations by maximizing archery hunting opportunity and availability of Any-Deer permits.

Hunters pursuing deer in most northern WMDs may see a slight improvement in deer sightings this year. Winter severity was milder than average in all WMDs south of WMDs 1-3 (where winters were about average). In central and southern WMDs, deer should be noticeably more abundant. Four or five consecutive easy winters, along with light doe harvests, have recently resulted in sustained deer population increases of 15% per year or more. Recent, mild winters have even contributed to a slight increase in harvestable deer downeast (WMDs 27 and 29), after 15 years of "bucks-only" regulations.

Our allocations of Any-Deer permits, combined with the either-sex archery hunts, should yield about 11,500 adult does and 7,000 fawns. Antlered buck harvests (21,300) are projected to top 20,000 for the first time ever this year, if optimum hunting weather materializes during November. Young bucks should be plentiful due to excellent winter survival of last year's fawn crop. However, trophy-age bucks will be very much in evidence in central, eastern, and northern Maine WMDs. Statewide deer harvest in Maine may approach 40,000 during 2000, if we are blessed with normal hunting weather in November.

--Gerry Lavigne

BIRDS

UPLAND BIRDS

Wild Turkeys

A Brief History of Maine's Wild Turkey Restoration Project

A review of historical information on wild turkeys in Maine reveals that wild turkeys appeared in significant numbers in York, Cumberland, and Oxford Counties, and perhaps in lower numbers eastward to Hancock County. Reductions in the amount of forest land due to intensive land clearing for farming and unrestricted shooting, were probably the two most important factors leading to the extirpation of native wild turkeys in Maine in the early 1800s. The reversion of thousands of acres of farmland back to wooded habitat, and present day agricultural practices, have enhanced prospects for reestablishment of wild turkeys into, and perhaps beyond, their former range.

Attempts to reintroduce turkeys to Maine began in 1942 when the Department of Inland Fisheries and Game released 24 captive-reared birds on Swan Island, in Sagadahoc County. These birds were supplementally fed in the winter, and the last bird was reported seen in 1946. In the 1960s, fish and game clubs in Bangor and Windham made similar attempts to reestablish turkeys into their areas using imported birds raised from part wild and part game-farm stocks. Neither of these attempts resulted in a good population of wild birds.

In Maine, we have had the benefit of work done by biologists in other states to reestablish wild turkeys into former and new ranges of suitable habitat. Researchers in these states discovered the key to each success was to remove a small number of wild birds from one site and release them, as soon as possible, into suitable, unoccupied habitat.

Responding to requests from fish and game clubs and individual Maine sportsmen, and encouraged by successful reintroduction programs in Vermont and New Hampshire, MDIFW began planning it's own turkey program in the mid-1970s. The goals of this program were twofold; to establish turkeys in the coastal part of the state where they historically occurred, and to establish a big game species for hunters in Maine.

The first step was to locate a source of birds. Vermont biologists, who had extraordinary success with their turkey program, were willing to supply Maine with birds from their wild flocks. The next step was to select a release site. York County was chosen as the initial release site because of its large area of wooded habitat, a good supply of mast-producing trees (beech and oak), and its mild winters with fewer than 60 inches of annual snowfall.

In 1977 and 1978, Vermont Fish and Game biologists trapped 41 turkeys, which MDIFW biologists released in the towns of York and Elliot. By the early 1980s, the York County population had become large enough to serve as a source of birds for new release sites in Maine. In the spring of 1982, 33 birds were captured in York County and released in Waldo County, in an attempt to establish a turkey population in the mid-coast region. In the winter of 1984, 19 additional birds were captured in York County and released in Hancock County, but poaching was believed to be the demise of these birds. During the winters of 1987 and 1988, MDIFW biologists, with the help of individuals from the Maine Chapter of the National Wild Turkey Federation (NWTF) and Connecticut Department of Environmental Protection, trapped 70 wild turkeys in Connecticut and released them in Maine to augment Maine's turkey population.

Since 1990, in-state trapping and transfer by regional biologists occurs each year and has expanded the range of the wild turkey in Maine to the east and north. Today, reports of wild turkeys well inland of the coast and eastward into Washington and Hancock Counties, particularly in towns adjacent to the Penobscot River, are common as birds crossed this major river on their own in the mid 1990s.

Wild turkeys are ground feeders and eat a wide variety of grasses, seeds, fruits, and insects. In the Northeast, turkey populations reach their highest densities in areas with agricultural activities, particularly dairy farms. These sites enable the birds to get through the toughest of times during the winter months. Here farms are an abundant source of food in the form of silage corn and undigested grains in manure, which is either spread on fields or stored where the birds can get to it. Further, hay fields associated with farms also provide good habitat for young turkeys. MDIFW biologists believe that snow depths may be a limiting factor for turkeys in Maine. For this reason, future turkey releases will be in areas with dairy farms and a large amount of land in hardwoods, particularly mast-producing trees, such as beech and oak. Ultimately, the department's goal is to have a viable wild turkey population wherever suitable wild turkey habitat exists.

Hunting Seasons

The restoration of wild turkey populations in North America is truly a modern wildlife management marvel. The wild turkey's adaptability to a variety of climate and habitat conditions has resulted in burgeoning populations capable of supporting considerable spring hunting opportunies. By 1985, sufficient numbers of wild turkeys occurred in Maine to support a limited (bearded turkeys only) spring hunting season. Wild turkeys, like white-tailed deer, are polygamous, meaning that only dominant males in the population mate with females. Courtship activities for wild turkeys in Maine begin in April and last into May. The spring hunting season is timed to begin after most breeding is over. Experience has shown that spring turkey hunting provides a quality big game hunting opportunity without jeopardizing restoration efforts. Therefore, in 1986, Maine held it's first hunting season in York County when 500 hunting permits were issued. During that season, 9 male turkeys were harvested.

Since 1986, MDIFW, with considerable input and help from the state chapters of NWTF, has increased the size of the turkey hunting zone and the number of permits issued in a conservative, although steady, process to assure a quality hunting opportunity (Table 9). The largest change occurred in 1996 when the hunting zone was expanded eastward to the Penobscot River and two zones (north and south) were created. In 1999, the hunting zone was expanded again; the two-zone concept was dropped; and the hunting zone was defined by Wildlife Management Districts (WMDs).

Table 9. Wild turkey hunting effort and harvests, 1986-2000.

Year	Number of Applicants	Number of Permits	Wild Turkeys Harvested	Season Notes
1986	605	500	9	York County
1987	536	500	8	York County
1988	355	355	16	York County
1989	464	463	19	York County
1990	500	499	15	York County
1991	508	500	21	York County
1992	886	500	53	York/Cumberland County
1993	1,079	500	46	York/Cumberland County
1994	1,185	500	62	York/Cumberland County
1995	1,712	750	117	York/Cumberland County
1996	3,952	1,250	288	North/South hunting zones
1997	5,091	1,750	417	North/South hunting zones
1998	6,449	2,250	594	North/South hunting zones
1999	9,294	3,000	890	1 Zone, WMDs 15,16,17,20-26
2000	14,909	4,000	1,559	1 Zone, WMDs 15,16,17,20-26

This past spring, 4,000 hunters were permitted to hunt wild turkeys in Maine, beginning on May 1st and continuing through 11 a.m. on May 31st in WMDs 15-17 and 20-26. Maine's 2000 wild turkey season ended with a record harvest of 1,559 birds registered at area tagging stations (Table 9). Part of the increase is attributable to an increase (+1000) in the number of hunters afield in 1999. But, more importantly, turkey populations have increased significantly over the last few years. Expanding turkey populations have occurred because of favorable weather (mild winters resulting in fewer winter losses, and dry and warm nesting and brood-rearing conditions in 1998 and 1999 that resulted in excellent poult survival) and the Department's aggressive trap and transfer activities.

As interest and participation in turkey hunting increases, hunters must be especially sensitive to issues of safety and hunter interference. We receive input from turkey hunters through MDIFW's annual Turkey Hunter Questionnaire. Results tabulated from these questionnaires give us information on hunting effort, harvests, and trends in turkey populations (Table 10). We now have 15 years of wild turkey hunting behind us in Maine, and the turkey population continues to increase and expand its range. These facts, and the relatively low hunter succes rates, are testament to the adaptability and wariness of this magnificent bird.

IMPORTANT!!

Raising and releasing "game-farm" strains of wild turkeys will negatively impact the future success of this program, and it is not allowed by the MDIFW law. Birds from these strains do not survive or reproduce well in the wild, and they introduce inferior breeding stock into natural populations.

Table 10. Trends in turkey hunter questionnaire results, 1993-1999.

	YEAR						
	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Permits Issued	500	500	750	1,250	1,750	2,250	3,000
Questionnaires Received	417	424	s628	1,075	1,546	1,961	2,517
# Hunted	303(73%)	332(78%)	452(72%)	876(82%)	1,341(87%)	1,684(85%)	2,164(86%)
Hours Hunted	7,031	7,690	9,743	18,116	31,489	34,588	46,913
Gobblers Seen	513	815	1,202	3,586	5,548	7.587	11,043
Hens Seen	923	960	1,624	5,174	7,175	10,747	13,499
Turkeys Seen	1,436	1,775	2,826	8,760	12,723	18,334	24,542
# Shot At	78	107	154	406	581	758	-
Used Shotgun	283	305	429	825	1,260	1,564	-
Used Bow	32	42	24	39	52	41	-

Management and Research

During the last decade, emphasis was placed on the introduction of wild turkeys into all suitable habitat between York and Waldo Counties. A "leap frog" trap and transfer technique was utilized with a goal of eventually joining these two populations. This goal was attained in the mid-1990s, and future restoration will be directed to suitable habitat primarily north and east of existing populations.

During the winter of 1999-2000, wildlife biologists in Regions A and B trapped and moved 111 wild turkeys and released them at 5 new locations. MDIFW biologists, working with turkey enthusiasts from various Maine Chapters of the National Wild Turkey Federation, continue to monitor these birds, and strive to improve habitat for all wild turkeys in Maine with dollars generated through banquets and other fund-raising activities. Today, management efforts focus on programs designed to improve habitat conditions for wild turkeys throughout their reoccupied range in Maine. Initial efforts at habitat improvement in southern and central Maine have already been effective.

We remain optimistic that our program to increase the size and distribution of the wild turkey population within all suitable habitat in Maine will be realized. We are indeed thankful for the cooperation, financial support, and hands-on participation we've received from the public, L.L. Bean Inc., and especially the State Chapters of the National Wild Turkey Federation. Individuals interested in becoming involved in wild turkey management are encouraged to contact the Maine State Chapter of the National Wild Turkey Federation, South Windham, Maine 04082, or one of the local chapters.

--R. Bradford Allen and Andrew Weik

Ruffed Grouse

Hunting seasons

The ruffed grouse, or partridge, is considered by many to be the premiere game bird in Maine. In 1987, approximately half of all licensed hunters in Maine hunted grouse and/or woodcock. Maine data from early 1980s show an estimated 100,000 hunters harvested over 500,000 grouse annually. Although no data exist on recent harvests except by moose hunters (see below), successful bird hunters reported grouse in excellent (1995), fair (1996-97), and good (1998-99) numbers in recent years.

Grouse Reports From Maine Moose Hunter Survey

For the last seven moose hunts (1993-1999), moose hunters were asked to report the number of grouse they and their party sighted or harvested during the moose hunting season (Table 11). In general, 45-50% of all moose permit holders reported they hunted grouse during their moose hunt. In addition, over 80% of all moose hunting parties include individuals other than the moose permittee and the sub permittee. Many of these individuals also hunted grouse during the moose hunt. Results of the survey indicate that slightly more than half of all grouse taken by moose hunting parties during the moose season are shot by moose hunt permittees and sub-permittees, and the other half are taken by others in the moose hunting party.

Beginning in 1994, MDIFW has calculated the number of grouse seen per 100 hours of moose hunting effort. That year, moose hunters saw an estimated 35 birds per 100 hours of moose hunting. In 1995, a banner grouse year in industrial forests by all accounts, the average of 107 grouse seen per 100 hours of hunting was nearly three times that of the previous year. In 1996, data suggests the population was below average and the number of grouse seen

per 100 hours was 20. The trend has generally improved each year since 1996 (Table 11). The drop in 1999 may reflect reduced observability caused by poor weather in the beginning of moose week and persistent foliage still on roadside trees and shrubs.

The average grouse harvest by moose hunters and their hunting parties over the six year period was 3,920 (Table 11). The number of grouse killed in recent years reflects an apparent increase in grouse populations coupled with an increase in the number of moose hunters since 1993.

The last statewide grouse harvest estimate was reported for the 1988 hunting season. That year, an estimated 579,100 grouse were taken in Maine. If we assume that harvests are similar today as were estimated in the late 1980s, then the average total grouse harvest by moose hunting parties is less than 1% of this total.

Table 11. Grouse harvests by moose hunters and others in their hunting party, 1993-1999.

	1993	1994	1995	1996	1997	1998	1999
Permit holders reporting	888	1,069	1,252	1,321	1,323	1,739	2,542
Number of grouse seen	4,624	5,804	18,069	4,880	6,868	11,604	17,754
Grouse seen/100 hours of hunting	-	35	107	20	25	43	37
Grouse taken by permit holders	1,039	1,432	4,160	871	1,268	2,424	3,268
Grouse taken by others in party	1,022	1,146	3,779	836	1,024	2,182	2,990
Total grouse taken	2,061	2,578	7,939	1,707	2,292	4,606	6,258

Management and Research

Despite its importance as a quality game bird in Maine, little management and research efforts are devoted to this species because of limited dollars and personnel time. The Bird Group would like to change this, and will pursue research grants to do so. While this species appears to have done well despite a lack of management attention, there are a number of important grouse population and management issues facing wildlife managers today as more hunting pressure is directed toward grouse in Maine's vast, but increasingly accessible, industrial forests. Further, annual information on the status of the statewide grouse population, hunting pressure, and harvests is needed. Over the last two years we have increased hunting opportunity for ruffed grouse by extending the hunting season through December in most Wildlife Management Districts. To do this we have had to rely on information provided by wildlife agencies in other northern states that have invested more in research and monitoring of their ruffed grouse resource.
Ruffed grouse are a product of the forest. The amount and quality of Maine's forest is constantly changing, and the impact of these changes as they relate to statewide grouse numbers are difficult to predict. Fortunately, however, the future for ruffed grouse appears bright. Although maturation of forest stands likely represents a decline in the quality of grouse habitat, timber harvesting can revitalize grouse habitat. Harvest practices that favor sapling and pole stands of early successional hardwoods, such as aspen and birch, as well as mixed wood stands, will improve or sustain habitat for ruffed grouse and other wildlife species that use young forests.

--R. Bradford Allen and Andrew Weik

SPRUCE GROUSE

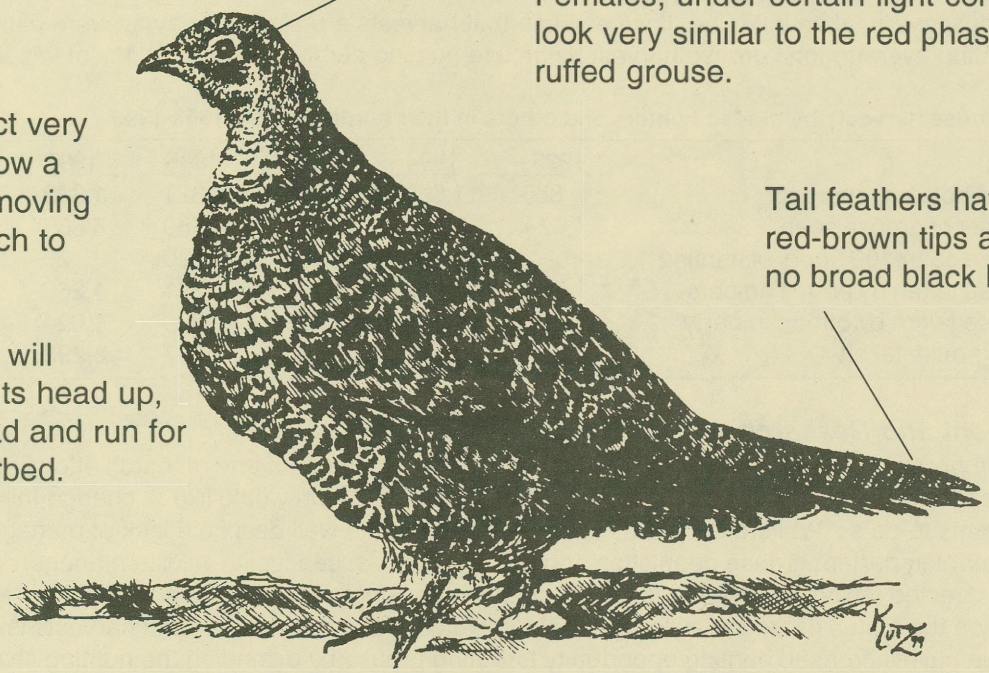
Males will often have an unfeathered red patch of skin above the eye.

Females, under certain light conditions, look very similar to the red phase of the ruffed grouse.

NOTE:
Spruce Grouse act very tame and may allow a hunter or a slow moving vehicle to approach to within a few feet.

A Ruffed Grouse will frequently "perk" its head up, then lower its head and run for cover when disturbed.

Tail feathers have red-brown tips and no broad black band.

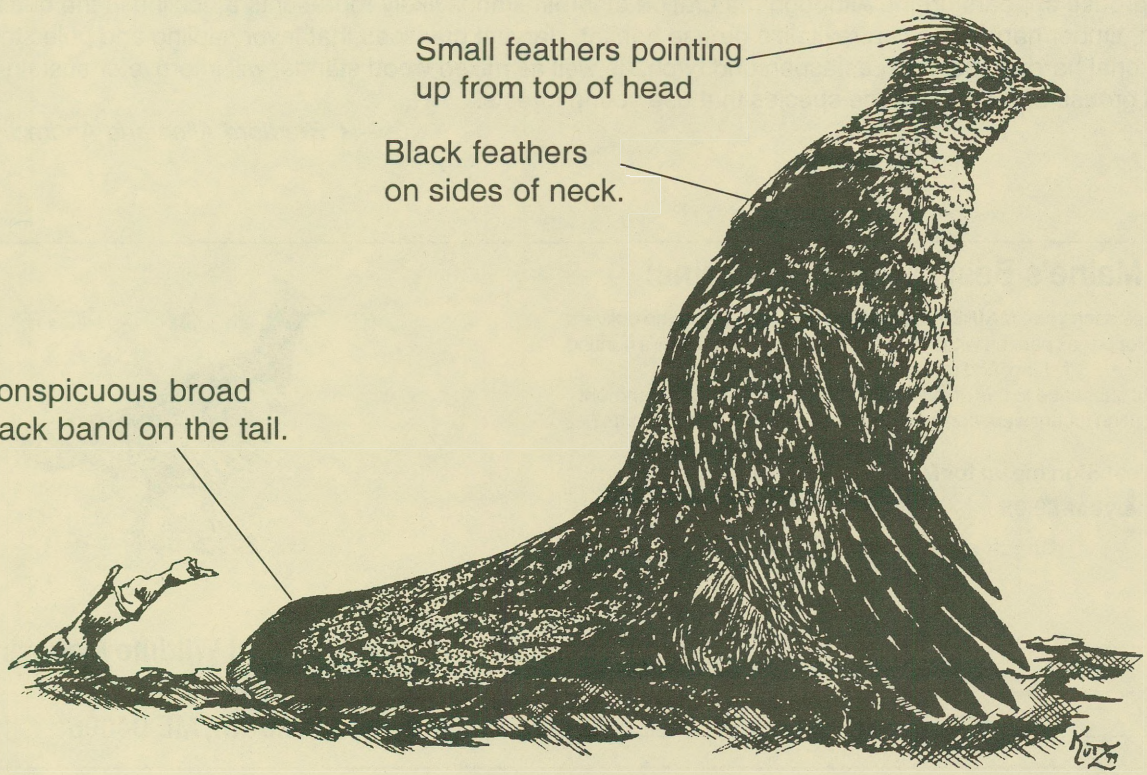


RUFFED GROUSE

Small feathers pointing up from top of head

Black feathers on sides of neck.

Conspicuous broad black band on the tail.



GAME BIRD HUNTERS!!

Can you distinguish between the legally hunted ruffed grouse (partridge) and the spruce grouse, for which there is no open season?

SPRUCE GROUSE

Behavior

- generally act very tame; may allow a hunter or a slowmoving vehicle to approach to within a few feet
- will often "crouch" low to the ground when approached
- when finally ready to move, will often run only a short distance, or fly only to a nearby tree

Physical Characteristics

- tail feathers have red-brown tips and lack the broad black band of the ruffed grouse
- male spruce grouse are slate gray and black above (considerably darker than ruffed grouse), with a characteristic unfeathered red patch of skin above the eye
- female spruce grouse are gray and brown above and white and brown below; under certain light conditions, they may look similar to the red phase of ruffed grouse

RUFFED GROUSE

Behavior

- when approached by someone on foot or in a vehicle, frequently "perk" head up like a chicken
- commonly flush and take flight when disturbed
- may also lower head, with neck extended, and run for cover

Physical Characteristics (spruce grouse lack all of these features)

- conspicuous, broad black band on the tail
- black ruff feathers on sides of neck
- small feathers pointing up from top of head

Spruce and ruffed grouse can and do occur in the same areas of Maine. In certain light conditions, they may look similar. Nearly half a million ruffed grouse are harvested here annually. Although the Fish and Wildlife Department does not have a population estimate for spruce grouse we do know that they are rare and far less numerous than ruffed grouse.

Currently there is NO OPEN SEASON on spruce grouse in Maine. As in any hunting situation, it is imperative that the hunter be certain of his/her target before discharging a firearm.

Woodcock

Hunting seasons

A range-wide decline in woodcock numbers since 1968 resulted in restrictive hunting regulations in the east in 1985, and again in 1997, when all eastern states were required to shorten their woodcock hunting seasons further (to 30 days) and select opening dates no earlier than 6 October. Researchers with the U. S. Fish and Wildlife Service (USFWS) report that, despite these hunting restrictions, the range-wide woodcock population is still at a relatively low level compared to populations in the 1960s.

Until recently, there existed no method whereby those hunters who pursued woodcock could be identified and surveyed for harvest information. To correct this deficiency, the USFWS and state wildlife agencies established the Migratory Bird Harvest Information Program (HIP). First year results from the HIP were encouraging and indicated that Maine has an estimated 8,300 woodcock hunters and, in 1996, harvested an estimated 26,000 birds. Unfortunately, because of programming errors in Maine in 1997 and personnel shortages at USFWS, no HIP data have been available to managers in Maine since 1996.

Management and Research

Woodcock researchers in the East report conditions on the 1999-2000 wintering grounds for this bird were again favorable. Following the relatively mild winter, birds migrated to Maine this spring as much as two weeks earlier than normal but experienced periods of prolonged cold and damp weather conditions after they arrived. Early indications are that the number of male woodcock on singing grounds in Maine this spring were slightly higher than the previous years index, but lower for the Eastern Region when all eastern states data were pooled.

When Maine's statewide singing-ground survey data were tallied, the overall male population index revealed a 7.2% improvement over last year's number. However, the most recent ten-year trend (1991-2000) reveals essentially no change in the male woodcock population index.

Maine's adult woodcock population remains below average. The reduced population can, to some extent, be replenished with a banner production year. This past April (the early arrival resulted in several reports of woodcock broods as early as April 23) and May, researchers believe nesting and hatching conditions were only fair for female and newly-hatched woodcock. Intermittent precipitation and cold weather through May likely resulted in less than optimal survival of young. Fall woodcock population predictions can only be considered "fair" at this time.

Most woodcock biologists suspect that losses of woodcock habitat to urban and industrial development, and maturation of forests beyond stages suitable to woodcock, are the primary causes of the woodcock population decline. The Department is very concerned about the status of woodcock and their habitat throughout their range. During the last 25 years, interest in woodcock hunting has remained high. In the Northeast, this interest in hunting woodcock comes at a time when the amount and quality of woodcock habitat is declining. For these reasons, the USFWS maintains that some type of conservative harvest management strategy is still warranted.

Since woodcock population indices reveal a long-term decline in eastern region woodcock numbers, wildlife biologists in Maine believed there was an immediate need to determine the effects of harvest on woodcock populations in the east. We perceived this lack of information was the highest priority research need for woodcock in Maine, so we partnered with several wildlife agencies to investigate the issue. Researchers with U.S. Geological Survey (USGS), USFWS, MDIFW and biologists in New Hampshire, Vermont, and Pennsylvania are in the final year of a study to investigate the effects of hunting on woodcock survival on hunted and non-hunted sites in these 4 states. Dan McAuley, a woodcock expert with Biological Resources Division of USGS, reports that autumn (September-November) survival rates on hunted sites averaged 71 percent in 1998 and 70 percent in 1999. Survival rates on nonhunted sites were slightly lower; 69 percent in 1998 and 67 percent in 1999. Mortality on nonhunted sites was due primarily to predation. It appears, at least in the East where woodcock hunting seasons are very conservative, mortality caused by hunters appears to be low. We are pleased to have several partners on this project. In addition to the government agencies listed above, Champion International, Inc., Ruffed Grouse Society, and Maine's Outdoor Heritage Fund provided either logistical or financial support.

Suitable habitat is the key for healthy wildlife populations. Regarding woodcock habitat, biologists in Maine have turned their attention to the industrial timberlands as the bright spot for improvements in woodcock habitat conditions. Although the soils may not be as productive as abandoned farmland, the vast acreage of young forests created by industrial forest activities warrants attention. Further, our research shows that these timberlands offer a great opportunity for large-scale woodcock management in Maine. The next step is integration of cost-effective wildlife management

into timber management plans, because maintenance and creation of woodcock habitat are critical if woodcock populations are to be maintained at, or improved beyond, current levels.

--R.Bradford Allen and Andrew Weik

WATERFOWL

Current Waterfowl Populations

Last winter, to assist the department's Bird Group and continue a 25-year trend, retired wildlife biologist Pat Corr was recruited to conduct the Mid-winter Waterfowl Survey with USFWS pilot John Bidwell. They surveyed coastal waters and estuaries from Kittery to Cobscook Bay between January 5 and January 13. The team counted a total of 79,247 ducks, 3,139 geese, 51 bald eagles and 185 loons. As expected, waterfowl totals were considerably lower than last year's record breaking numbers. Because of unusually mild temperatures in December and early January, many inland wetland habitats were ice-free and available to ducks and geese. Black duck and mallard numbers recorded along the coast were lower than last year because, undoubtedly, many ducks were still on inland wetlands. Given such conditions, the 20,666 black ducks observed this year compares favorably with the most recent 10 year average of 18,700 black ducks. Once again, the most frequently observed duck was the common eider. This year, 38,000 eiders were counted, a figure only slightly less than the 10 year average of 41,800 (Table 12).

Table 12. Mid-winter Waterfowl Survey data for Maine, January, 1995-2000.

	Total Recorded by Year					
Species	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Mallard	1,248	480	556	995	1,849	892
Black Duck	20,379	15,848	14,597	24,027	32,600	20,666
Green-winged Teal	0	0	0	0	0	0
Total Dabblers	**21,627**	**16,328**	**15,153**	**25,022**	**34,449**	**21,558**
Scaup	860	1,052	1,175	581	1,830	1,790
Common Goldeneye	6,424	3,776	5,429	4,543	7,416	3,392
Bufflehead	6,383	2,613	3,175	9,270	7,099	3,252
Common Merganser	3,624	1,244	1,662	4,028	5,451	4,948
Total Divers	**17,291**	**8,685**	**11,441**	**18,422**	**21,796**	**13,382**
Common Eider	49,003	35,716	39,001	31,809	38,735	38,351
Scoter	2,467	5,134	2,804	2,755	3,198	4,611
Oldsquaw	2,058	954	1,797	1,739	2,861	1,120
Harlequin	0	3	24	0	0	15
Total Sea Ducks	**53,528**	**41,807**	**43,626**	**36,303**	**44,794**	**44,097**
Unidentified Ducks	141	12	90	246	254	210
TOTAL DUCKS	**92,587**	**66,832**	**70,310**	**79,993**	**101,293**	**79,247**
Canada Goose	2,280	1,090	1,911	1,986	3,071	3,139
Brant	0	13	15	0	21	0
Total Geese	2,280	1,103	1,926	1,986	3,092	3,139
GRAND TOTAL	**94,867**	**67,935**	**72,236**	**81,979**	**104,385**	**82,386**

Mid-winter Waterfowl Surveys are conducted at the same time each winter in each state in the Atlantic Flyway. Overall flyway status of winter waterfowl populations is determined when Maine's information is combined with the other states' numbers.

North American duck populations in 1999 and 2000 remain at high levels for most of the species annually counted by USFWS biologists. Population declines noted during the 1980s have been reversed since 1994 with the return of water to the U.S. and Canadian prairies. Improved habitat conditions have allowed most waterfowl populations to rebound. Currently, only scaup and pintail numbers remain below goals established by the North American Waterfowl Management Plan.

Population surveys and habitat inventories completed during 1999 showed marked improvements in both mid-continent duck breeding populations and habitat quantity and quality. These data supported continued liberal harvest regulations during 1999, and Atlantic Flyway waterfowl hunters were again offered a framework which allowed a 60 day season and a 6 bird daily bag limit.

Statewide surveys of waterfowl production are also continuing to provide an index to the status of our populations. These long-term brood count surveys have provided a means of following trends in waterfowl breeding populations since the mid-1950s. The proportion of broods observed during brood counts in Maine has changed over time (Table 13). One goal of the state waterfowl management plan is to restore the relative proportions of species found breeding in Maine to historical levels.

Table 13. Species frequency found in brood counts for Maine, 1956-65, 1966-76, 1980-84, 1986-90, and 1991-95[1].

	Period 1 1956-65		Period 2 1966-76		Period 3 1980-84		Period 4 1986-90		Period 5 1991-95	
	Mean	%	Mean	%	Mean	%	Mean	%	Mean	%
Black Duck	74	44	37	29	34	19	56	24	50	24
Ring-necked Duck	28	17	31	24	44	25	49	21	39	19
Wood Duck	33	20	15	12	24	13	38	17	43	21
Goldeneye	13	8	23	18	36	20	39	17	31	15
Hooded Merganser	13	8	10	8	19	11	26	11	24	12
Green-winged Teal*	1	<1	1	1	2	1	1	1	1	<1
Blue-winged Teal	5	3	5	4	4	2	1	1	1	<1
Common Merganser	1	<1	4	3	11	6	12	5	8	3
Mallard	1	<1	1	1	5	3	7	3	11	5
Total Observed	**169**	**100**	**127**	**100**	**179**	**100**	**229**	**100**	**208**	**100**

*Known breeder: assigned 1 brood during 1956-65 and 1966-76 even though not observed in brood counts.
[1]Mallard x black duck hybrids and Canada geese were excluded from analysis.

Hunting Seasons

Waterfowl harvests in the United States have declined since 1978 when 15.1 million ducks were recorded in federal harvest surveys. This has been partly by design as regulations became more restrictive, but it also reflects declining hunter numbers and lower waterfowl populations during the 1980s. The estimate of Maine's waterfowl hunters also declined since 1978, when the high of 18,650 federal migratory bird hunting stamps were sold. The average number of stamps sold to Maine hunters has changed from 14,545 (1981-85) to 11,612 (1986-90) to 9,908 (1991-95) to 10,662 (1999). Recent estimates indicate that the number of waterfowl hunters in Maine remains below 10,000.

In response to dry habitat conditions in the U.S. and Canadian prairies, season lengths were shortened significantly between 1985-1993 (from 50 days to 30 days in the Atlantic Flyway); this, in concert with declining numbers of hunters, led to a plunge in the estimated number of hunter days afield. Since 1994, the federal framework for duck seasons has increased to 40 days in 1994 and 1995, 50 days in 1996, and 60 days in 1997, 1998, and 1999.

Restrictions in harvest regulations also resulted in reduced daily bag limits of 5 birds to 3 per day; species restrictions for black ducks, pintails, wood ducks, and hen mallards; and curtailed framework opening and closing dates (from October 1 to October 5 and from January 15 to January 5). These flyway restrictions between 1988 to 1993 essentially continued the harvest reduction strategy for black ducks through 1993. Framework opening dates were moved back to October 1st in 1994, and bag limits were increased to 4 per day in 1994 and 1995, 5 per day in 1996, and 6 per day in 1997,1998, and 1999.

In addition to recent extended season lengths, 1997 marked the first time that states with Sunday hunting prohibitions mandated by state law, were allowed additional week days to compensate for lost opportunity. The 51 day, 1998 season in Maine was the most liberal available to our hunters since 1958, when a 60 day Federal framework also allowed 51 days of hunting.

Waterfowl Harvest Management

Black duck population declines, measured by the Mid-winter Waterfowl Survey since the mid-1950s, led to a harvest reduction plan in the United States and Canada. Between 1983 and 1987, black duck harvests were reduced in the U.S. by 42% (compared to the 1977-81 average). This figure now serves as the harvest goal for black ducks in the Atlantic Flyway. Reductions in Canada's black duck harvests have also been achieved since 1984. Our challenge will be to maintain a reduction in harvest of Maine black ducks while providing additional waterfowl hunting opportunity for our duck hunters via longer hunting seasons.

Although restrictive regulations continued in the Atlantic Flyway between 1988-1993, Maine hunters actually had expanded hunting opportunity for black ducks during this period relative to 1983-1987. In 1988, the state-imposed

prohibition on black duck hunting in early October, was eliminated. From 1988 to 1995, Maine duck hunters had the same opportunity to kill black ducks as hunters in other states. In fact, the Maine harvest of black ducks was higher during the period of 30 day seasons (1988-1993) than levels attained between 1983 and 1987. A delayed opening for black ducks was used again with the return to longer seasons in 1996, 1997, 1998, and 1999.

The return to 40, 50, and now 60 day duck seasons since 1994 has challenged Atlantic Flyway waterfowl managers, because the need to maintain low black duck harvests still exists. However, recent seasons, which maintain black duck harvest reductions while allowing additional hunting opportunity for hunters, have been successful. Maine's estimated annual black duck harvest since 1988 has been maintained at approximately 51% below those measured prior to black duck harvest restrictions. In fact, black duck kill estimates in the Atlantic Flyway during this latest period (1994-1996) were 16 percent lower than those measured during 30 day seasons (1983-87) and 58% below those measured prior to 1983.

A review of waterfowl hunter and harvest statistics provides an interesting comparison of Maine's waterfowlers and their success. Study of these figures will reveal that the average Maine duck hunter today is doing quite well. This may surprise many of you who have listened to stories extolling the great old days of duck hunting. The number of hunters in the field today, as indicated by the 10,662 duck stamps sold in 1999, is close to the number commonly measured in the early 1960s. This is, however, much lower than the average number sold during the 1970s.

The average Maine waterfowl hunter in 1998 spent 7.52 days afield per season which was higher than the same measure from the 1960s (6.24 days). They were nearly as successful as their 1960s counterparts (0.93 ducks per day compared to 1.01 in the 1960s).

A 30-year perspective of the waterfowl species composition in the Maine harvest shows that the relative importance of some ducks has dramatically changed over this period (Table 14). Harvests of mallards have increased from less than 1,000 birds per year (1961-65 mean) to nearly 12,000 birds in 1999. The common eider is another bird that has shown dramatic increases in the annual Maine kill. Showing sizable declines in the Maine harvest in recent years are black ducks, blue-winged teal, and scoters.

Reasons for these changes in species composition are variable and in many cases different for each species. Some explanations for these changes include duck population increases and decreases, duck population center shifts, changes in the number of duck hunters, hunter effort shifts from one waterfowl species group to another, and specific regulatory management designed to restrict harvest opportunity on some species or allow more on others. All of these causes, and others, have resulted in the observed changes in the Maine waterfowl harvest.

Table 14. Maine dabbling and diving duck harvest statistics, 1961-1998.

	Mallard	Black Duck	Green-winged Teal	Blue-winged Teal	Wood Duck	Greater Scaup	Lesser Scaup	Ring-necked Duck	Buffle-head	Common Goldeneye
1961-65 (mean)	960	21,080	5,960	840	4,500	125	50	950	1,780	2,240
1966-70 (mean)	2,360	32,060	12,000	4,460	5,500	220	100	1,100	1,980	2,380
1971-75 (mean)	4,600	32,680	13,340	4,640	7,660	200	160	1,550	3,340	2,040
1976-80 (mean)	5,040	23,580	9,620	2,740	9,880	260	360	2,620	6,240	3,040
1981-85 (mean)	4,660	12,740	8,700	1,380	11,240	220	300	2,620	4,340	4,040
1986-90 (mean)	4,700	8,280	7,100	640	6,840	100	180	2,750	2,240	2,940
1991-95 (mean)	7,960	11,040	5,080	400	8,000	60	120	1,680	3,100	1,720
1996	7,100	7,800	6,200	1,600	10,300	0	100	2,100	3,500	2,000
1997	9,360	9,380	11,720	600	6,220	90	0	1,540	2,180	830
1998	10,761	9,481	13,330	549	9,732	205	124	2,175	1,227	775
1999 (preliminary)	11,959	10,382	11,562	858	7,281	123	245	1,049	2,439	888

Sea Duck Management and Conservation Concerns

Common eiders, scoters, and old squaws are members of a diverse group of waterfowl known as sea ducks. In comparison to other ducks, the life histories of sea ducks are characterized by: sexually mature at 2 or 3 years (versus 1 year in dabblers) small clutch sizes, low rates of annual recruitment of young-of-the-year-birds into breeding populations, non-breeding of adult females in some years, and high rates of adult survival under natural conditions. As a result, the health of a sea duck population is controlled more by survival rates of adults than by annual production of young. These characteristics make long-lived sea ducks well suited to the northern marine

environments they frequent. However, they also make their populations particularly sensitive to slight increases in adult mortality, and their populations slow to recover from declines. Because their life history characteristics differ from those of most North American ducks, effective management requires specific research and monitoring, and directed conservation programs to collect and assess essential data to maintain healthy populations.

Concern over the status of sea ducks in Maine has increased over the last two decades as some populations appear to be declining. In Maine, over the last 50 years, sea duck bag limits and season lengths have been considered liberal and relatively unchanged. But, historically, hunters tended to pursue inland ducks, and reported annual harvests of sea ducks were low. Major shifts in hunting effort occurred in the 1980s when populations of inland ducks (particularly black ducks) and Canada geese were low, and hunting seasons for these species were restricted. However, a short time later, concerns over the status of scoters (black, white-winged, and surf) in the Atlantic Flyway led to a reduction in the daily bag for the group from 7 to 4 a day, beginning in 1994. Despite this change, hunting pressure on sea ducks, particularly on common eiders, continued to increase in eastern North America. In Maine, hunter interest in eiders continues to increase. The percentage of eiders in Maine's waterfowl harvest has increased from 3-4% in the mid-60s, to over 20% in the mid-80s, to a recent high of 29% in 1996 (Table 15). There are indications that harvest of eiders in Nova Scotia and the New England States have doubled in recent years to levels that may no longer be sustainable. For this, and other reasons, Nova Scotia, Newfoundland, and Rhode Island proposed and adopted changes in their 1998 hunting seasons designed to reduce the eider harvest between 15-25%. Maine and Massachusetts reduced their daily eider bag limit to 5 and 4, respectively, beginnning with the 1999 hunting season.

Table 15. Sea duck harvest statistics 1961 - 1999.

	Common Eider	Old Squaw	White-winged Scoter	Surf Scoter	Black Scoter
1961-65 (mean)	1,360	280	1,660	1,060	560
1966-70 (mean)	2,800	1,520	3,120	4,000	1,580
1971-75 (mean)	8,820	1,080	4,160	4,440	1,460
1976-80 (mean)	7,580	1,300	2,020	2,980	1,680
1981-85 (mean)	11,980	1,520	2,340	1,880	740
1986-90 (mean)	13,680	2,360	1,500	1,980	400
1991-95 (mean)	14,840	2,420	1,460	1,412	372
1996	21,100	800	1,100	3,800	300
1997	19,340	530	1,450	3,040	520
1998	9,019	2,917	685	4,604	421
1999 (preliminary)	15,996	1,092	740	2,936	1,329

Research and Management

Since the 1985 species assessment was completed, the switch from a harvest oriented goal to a breeding population oriented goal has resulted in a more responsive program for waterfowl management in Maine. Waterfowl are now being managed to increase certain breeding populations. Low populations of black ducks caused major changes in regulations since 1983, which have altered traditional seasons enjoyed by Maine waterfowl hunters.

One method used to increase breeding populations in Maine has been to eliminate, where and when possible, significant forms of non-hunting mortality. Lead poisoning of waterfowl is an example of this type of mortality. This national problem affects many thousands of birds annually, and lead shot use for duck and goose hunting has been banned nationally since 1991. Maine hunters were required to use steel shot statewide in 1988, three years ahead of the deadline required by USFWS's National plan. Maine hunters have accepted the facts and shouldered the responsibility for using the latest in shot-shell technology. Many have been pleasantly surprised with their results.

Habitat protection and enhancement efforts are another form of management that the Department is using to increase waterfowl breeding populations. Revenues generated from the sales of state waterfowl hunting stamps and art prints have been dedicated to acquisition and development of wetland habitat and coastal nesting islands.

Current waterfowl research efforts are aimed at measuring and tracking trends in breeding populations and the harvests they support. A statewide survey of waterfowl pairs was initiated in 1990 as part of a larger study designed and funded by the North American Waterfowl Management Plan's Black Duck Joint Venture. Twenty-five randomly located plots were surveyed annually between 1990 and 1994 by Maine biologists using a USFWS helicopter flown slowly at 100 to 150 feet above ground level. Evaluation of this 5-year experimental helicopter plot surveys proved to be too expensive for continued annual surveys. Population trends are now measured by more economical surveys

flown in airplanes, which the USFWS has expanded into eastern North America, including Maine and the eastern Canadian provinces. As data from these additional areas are evaluated, the results will be used to establish harvest regulations for the Atlantic Flyway. When these surveys are fully integrated into the regulation setting process, eastern waterfowl frameworks will be derived independently of results of mid-continent surveys.

--R. Bradford Allen, Lindsay Tudor, and Andrew Weik

North American Waterfowl Management Plan

Coordination of Maine habitat protection efforts among several state and federal agencies, and private organizations, has resulted in many key land purchases which benefit Maine waterfowl now and in the future. The stimulus for this coordinated effort has been implementation of the North American Waterfowl Management Plan and its various Joint Ventures.

The Atlantic Coast Joint Venture area includes all of Maine's inland and coastal wetlands. The emphasis for habitat protection in this Joint Venture is on significant waterfowl migration, wintering, and production areas. Efforts to secure protection are being directed toward the most significant and vulnerable areas.

The Cobscook Bay focus area, and the Merrymeeting Bay — Lower Kennebec River focus area - are two priority regions selected for projects in Maine to date. Efforts in these areas have resulted in a coordinated plan to secure protection for these important ecosystems. As of 1999, the Department and its partners have received more than $1.9 million from grants provided by the North American Wetlands Conservation Act. These funds have allowed coordinated habitat conservation projects through purchase of fee title or conservation easements in Cobscook Bay and the lower Kennebec River region. More than 20 organizations, working through the Maine Wetlands Protection Coalition, have identified priorities and worked to conserve the most significant properties in these focus areas.

A coordinated approach to habitat conservation in the three remaining focus areas, the east coast region (Penobscot Bay east), west coast region (west of Penobscot Bay), and inland wetlands focus areas, is planned as implementation of the North American Waterfowl Management Plan proceeds. Personnel and funding limitations have, to date, slowed progress on habitat initiatives in these focus areas. Money from two other programs, the Loon License Plate and the Outdoor Heritage Fund, are now available and can be used to continue and expand these efforts.

Harvest Information Program

Maine entered the Harvest Information Program during the 1996 hunting season. Hunters are now required to indicate on their Maine hunting license that they are a migratory bird hunter. This item must be checked on the license to legally possess ducks, geese, woodcock, snipe, rails, gallinules, and moorhens in Maine. This list of hunters is used to select a representative sample of hunters for harvest surveys. All states were required to participate in this program by 1998. Unfortunately, Maine experienced technical difficulties and was unable to provide USFWS with name and address databases prior to the hunting season, therefore no surveys were conducted for Maine hunters in 1997. Personnel shortages at USFWS have caused delays the production of harvest estimates for the 1998 and 1999 hunting seasons. Once the "bugs" are worked out, this initiative will, for the first time, provide migratory bird managers and wildlife administrators with statistically valid estimates of migratory bird harvests in the United States.

OTHER BIRD GROUP ACTIVITIES

In the late 1980s, the Legislature passed the Natural Resources Protection Act (NRPA). The act consolidated several state laws pertaining to protected natural resources as being of state significance. In an effort to protect significant wildlife habitat, and the birds that use these habitats, the Bird Group is developing species assessments for many coastal birds. The major groups of species we are concentrating on are island-nesting seabirds, waterfowl, wading birds, and shorebirds. Island-nesting seabirds, waterfowl and wading birds, and shorebirds represent a large and diverse group of species, some occur in Maine in small numbers and others number in the thousands.

Maine Colonial Waterbird Inventory

Nineteen species of island nesting wading birds, seabirds, and eiders nested on approximately 10% of Maine's coastal islands in 1999. These birds are extremely vulnerable to human disturbance during the spring and early summer nesting season. For these reasons, close monitoring of nesting colonies is warranted and survey results from 1976-77 (for comparison) and the period between 1994-1999 are provided in (Table 16).

Table 16. Nesting waterbirds, seabirds, and eider populations and number of colonies occupied, 1976-77 and 1994-99.

	1976-77		1994-99	
	Pairs	Colonies	Pairs	Colonies
Arctic Tern (ARTE)	1,640	9	4,943	11
Atlantic Puffin (ATPU)	125	1	348	4
Black-crowned Night Heron (BCNH)	117	8	118	7
Black Guillemot (BLGU)*	2,668	115	12,273	166
Cattle Egret (CAEG	0	-	0	0
Common Eider (COEI)*	22,390	241	29,000	321
Common Tern (COTE)	2,095	24	7,402	24
Double-crested Cormorant (DCCO)*	15,333	103	19,680	125
Glossy Ibis (GLIB)	75	3	182	3
Great Black-backed Gull (GBBG)*	9,847	220	15,800	231
Great Blue Heron (GTBH)	903	18	644	14
Great Cormorant (GRCO)	0	-	150	8
Great Egret (GREG)	0	-	1	1
Herring Gull (HEGU)*	26,037	223	28,290	183
Laughing Gull (LAGU)	231	6	1,627	4
Leach's Storm-petrel (LHSP)	19,131	17	10,370	35
Little Blue Heron (LBHE)	4	2	8	2
Razorbill (RAZO)*	25	2	299	3
Roseate Tern (ROST)	80	3	288	5
Snowy Egret (SNEG)	90	4	213	5
Tricolored Heron (TRHE)	1	1	0	0

* Black Guillemot and Razorbill numbers are total counts of adult birds around nesting islands. Common Eider nesting data are an amalgamation of nesting records collected over several years. Herring and Great Black-backed Gull and Double-crested Cormorant numbers were derived from aerial counts, nest counts on selected islands, and by photo interpretation.

Migratory Shorebird Surveys

Shorebirds are represented in Maine by sandpipers, plovers, turnstones, godwits, curlews, dowitchers and phalaropes. Thirty-six species of shorebirds have been reported along the coast of Maine. Along with the Bay of Fundy, the Maine coast is recognized as a critical staging area for migratory shorebirds. Many of these migrants depend on staging areas to accumulate the fat necessary to fly a nonstop, transoceanic flight to their South American wintering areas.

Shorebird staging habitat consists of discrete coastal areas that provide both tidal mud flats rich in invertebrates for feeding, and areas, such as gravel bars and sand spits, that remain above high tide for roosting. Such areas are susceptible to degradation from disturbance, development, and environmental contaminants.

Bird Group personnel have compiled a computer database of over 400 shorebird feeding and roosting areas coast wide, which are mapped and entered into a Geographic Information System (GIS). The Shorebird Staging Habitat Management System outlines criteria used to select a subset of shorebird feeding and roosting areas that is critical to migratory shorebirds in Maine. Presently, 96 roosting areas and 120 feeding areas qualify as "Areas of Management Concern". Management recommendations are also prescribed to help biologists and landowners cooperatively protect and enhance shorebird habitats.

To fill in the gaps where information was lacking, 1999 field surveys focused on selected shorebird areas in York, Hancock, and Washington counties. This final endeavor completed an eight year effort to identify and assess shorebird roosting and feeding areas coast wide. In early September, the field crew took a couple of days off from surveying shorebirds to try their hands at capturing and banding semipalmated sandpipers and semipalmated plovers. The crew

experimented with different strategies and capture techniques, twenty-five birds were captured and banded with an USGS metal band and red and green plastic leg bands. The unique red and green band combination will allow biologists from Canada to South America to easily identify these birds as banded in Maine. A greater banding effort is planned for the 2000 field season.

The final draft of the U. S. Shorebird Conservation Plan (USSCP) was completed in April. The USSCP is a partnership involving organizations throughout the U. S. committed to the conservation of shorebirds. The purpose of the USSCP is to provide an overview of the current status of shorebirds, the conservation challenges, establish broad goals for the conservation of shorebird species and specific programs necessary to restore stable self-sustaining populations. As a member of the North Atlantic Shorebird Working Group, Bird Group personnel participated in the development of regional goals and objectives, population assessments, research and management needs, and identification of priority habitats for the region. This information was compiled into a regional shorebird plan and submitted for inclusion in the USSCP.

--Lindsay Tudor

Marshbird Surveys

Several species of wetland-associated birds are found in Maine, yet their distribution and population status remain poorly understood because their presence is not easily detected. But, by broadcasting tape recordings of their vocalizations, the presence of many of these species in a marsh can be confirmed. In 2000, we continued surveys (as part of the Ecoregional Survey conducted in cooperation with the Maine Natural Areas Program) to further evaluate the distribution and relative abundance of 10 wetland bird species in approximately 20 wetlands in the South Coastal and Southwestern Interior regions of Maine. Target species include least and American bitterns, sora, Virginia rail, common moorhen, and pied-billed grebe, among others. Because the distribution and habitat requirements for these species are not well known, current habitat protection efforts may be inadequate to ensure long-term population viability, especially for the less abundant species. Furthermore, least bittern and common moorhen are currently listed as Special Concern in Maine and information about these species would help clarify their status and may lead to habitat management strategies to aid in their conservation. Some species may prove to be so rare that they warrant the special protection afforded threatened and endangered species.

--Thomas P. Hodgman

Riparian Forest Warblers

In 2000, also as part of the ecoregional survey, MDIFW began to examine the population status of the bird communities using floodplain forests in the South Coastal and Southern Interior regions. This survey effort began by focusing, for the first part of the breeding season (i.e. late April through mid May), on Louisiana waterthrush along approximately 40 headwater streams. We used standard point count methods followed by a brief broadcast of a tape-recorded vocalization to stimulate response. Louisiana waterthrushes were detected on roughly half of these streams often associated with small floodplains along an otherwise "tumbling" stream. Our data indicate that this species was most frequently encountered in the foothills of southern Oxford County, but was not abundant anywhere in our southern Maine study area.

We also will examine the bird community using the extensive floodplain forests along the upper Saco and Ossippee Rivers, among others. This survey will target yellow-throated vireo and possibly cerulean warbler. The latter is not known to breed in Maine, but suitable habitat may be present along these rivers. Approximately 15 sites have targeted for this survey. Point counts will be used, often from canoe, or in large tracts of forests, points will be established towards the interior of these sites.

--Thomas P. Hodgman

Blue-winged and Golden-winged Warblers

A brief survey effort was directed at blue-winged and golden-winged warblers in southern York County, during 2000. Blue-winged warblers have a patchy distribution in southern Maine, often associated with shrubby powerline corridors and abandoned fields. We followed the protocol established by the Cornell Lab of Ornithology for their Golden-winged Warbler Atlasing Project. This involved point counts, in combination with, playbacks of tape-recorded vocalizations of each species. To supplement these data, we also recorded all shrubland- or edge-associated species (e.g. prairie warbler, eastern towhee, etc.) that occupied each site. Point counts were conducted at approximately 25 sites, of which, only 7 sites were occupied by blue-winged warblers; no golden-winged warblers were detected during this limited survey. Several sites that were historically occupied by blue-winged warblers appeared to have been altered, either naturally by forest encroachment or by humans through residential development. Powerline corridors, if allowed to develop a sufficient shrub layer, may provide suitable habitat over the long term for this species.

--Thomas P. Hodgman

Sharp-tailed Sparrows

The sharp-tailed sparrows inhabiting Maine's tidal marshes are of management concern throughout the Northeast. Maine hosts both species (Nelson's and saltmarsh sharp-tailed sparrows) and nearly all the sites where these two species co-occur. These small birds are of concern because they are restricted to coastal marshes for every aspect of their life cycle, their habitat is somewhat restricted and fragmented, and they nest within inches of the ground making them vulnerable to flooding by high tides and during heavy rain storms.

As a logical follow-up to our Saltmarsh Bird Surveys (1997-99), MDIFW, in cooperation with the U.S. Fish and Wildlife Service and a graduate student, Greg Shriver, have begun a detailed study of the nesting ecology of both species in Scarborough Marsh Wildlife Management Area. During the 2000 nesting season, we hope to attach radiotransmitters to 50 sparrows to learn more about their behavior, nest success, home range, and habitat use. We anticipate finding and monitoring the nests of 50 females to determine what factors influence nest site selection and ultimately nesting success. Our findings also should help estimate population size and further evaluate their status as breeding species within Maine.

--Thomas P. Hodgman

Harlequin Duck

The brilliantly-colored harlequin duck nests on rivers in Labrador, Quebec, and Greenland and spends its winters on the Maine coast. It is seldom observed, because it winters along remote rocky shores on outer islands, including Isle au Haut, west of Acadia National Park. The eastern North American population of harlequins is currently estimated at 1,500 individuals and may be increasing. More than half of that population winters in Maine. Hunting harlequin ducks on the east coast was curtailed in the late 1980s.

Work focusing at several objectives relative to the conservation of the harlequin duck was conducted in 1999. Those objectives included 1) ascertaining the status of the wintering population of harlequins on the Maine coast; 2) developing and testing appropriate inventory techniques for assessing winter populations; and 3) working to coordinate regional and national survey, management, and research activities with Canadian and other U.S. interests.

MDIFW listed the harlequin duck as Threatened in 1997 based on: 1) the small number of harlequins occurring in Maine; 2) the small size of the eastern North American harlequin population and the substantial portion of that population (estimated as 50%) that winters in Maine; and 3) because more than 90 percent of those harlequins wintering in Maine are located at fewer than five locations.

The USFWS was petitioned to federally list the harlequin as Endangered or Threatened several years ago, but the petition was denied. In Canada, the eastern North American harlequin population, of which Maine's birds are part, was designated as Endangered in 1990 by the Committee on the Status of Endangered Wildlife in Canada.

It is not easy to survey this species because of difficulties in accessing Maine's offshore island locations during winter. However, since 1970, harlequins have been periodically counted along Maine's coast. Unfortunately, these surveys were not designed to obtain a coast-wide estimate of Harlequins wintering in Maine or to accurately measure changes in populations, because birds were surveyed during December-March, which includes the migration periods; only limited areas were regularly surveyed; and a variety of survey methods have been used (ground, aerial, boat). The first attempt to conduct a coast-wide estimate of Maine's wintering population was initiated during a 4-day period in February 1995. An estimate of at least 655 harlequins wintering along the coast of Maine was derived, with 86% occurring around Isle au Haut and adjacent islands in Jericho and Penobscot Bays. Boat surveys during the winter of 1999-2000 yielded a single high count of 952 harlequins!

In 1997, MDIFW and the University of Maine received an Outdoor Heritage Fund grant to study the movements, behavior, and habitat use of harlequin ducks wintering in Maine. Graduate student Glen Mittelhauser is conducting this research. In 1998, he pioneered a new technique for using floating mist-nets to capture harlequins among the pounding surf and rocky coast of Isle Au Haut. During the last 3 winters, Glen and colleagues captured and marked over 350 birds. Resightings of marked birds in Labrador, and other Canadian locations, are helping to determine the origin of harlequins that winter off our coast. Some birds, radio-tagged at nesting areas in Labrador, have also been monitored off the Maine coast in the winter.

--Lindsay Tudor and Mark McCollough

Barrow's Goldeneye

We surveyed 229 sites from Union River Bay near Ellsworth to the Piscataqua River in Kittery, Maine for Barrow's Goldeneye during January 9 to March 1, 2000. We focused our efforts on coastal habitats, in which we surveyed 172 sites. In addition, we also visited 57 sites along ice-free portions of inland rivers. Despite this considerable level of field effort, we observed only 50 Barrow's Goldeneye for all sites combined. Numbers of Common Goldeneye observed during the survey (max. = 4,511), however, were comparable to estimates from the annual mid-winter inventory, indicating that our survey effort was adequate. These data, together with data collected in 1999, indicate that no single large concentration of Barrow's Goldeneye occurs in Maine at present, rather that this bird winters in small numbers scattered along the Maine coast and at a few inland sites. However, we have identified approximately 5 areas where Barrow's Goldeneye occur in slightly larger numbers (5 - 30 individuals) and for extended periods during winter (2 - 8 weeks duration). More work is needed to document annual site fidelity; the extent of movement of individuals between occupied sites; and the distribution, and hence vulnerability, of Barrow's Goldeneye during the fall hunting season.

--Thomas P. Hodgman

Partners In Flight

In the early 1990s, a coalition, known as Partners In Flight, was formed between federal and state natural resource agencies, educational institutions, and private conservation groups to focus their collective efforts on the most important issues facing landbird conservation in the western hemisphere. Those species that winter in Central and South America and breed in North America, were of primary concern, having experienced population declines in parts of their ranges as evidenced by the North American Breeding Bird Survey (Table 17). As such, Partners In Flight has worked to prioritize species of conservation concern for each state and region in the U.S. Beyond that, several physiographic areas have been identified in each region as units for a planning process that have begun to identify research, management, monitoring, and outreach needs necessary to implement effective bird conservation strategies from coast to coast.

Table 17. Estimated population trends for selected songbird species (% change per year) observed in Maine according to the North American Breeding Bird Survey.

Species	Habitat	1966-98	1966-79	1980-98
Red-winged Blackbird	Marshes Wetlands	-3.8*	-2.6	-1.3*
Tree Swallow	Fields and Marshes	-0.6	+5.4	-2.0*
Savannah Sparrow	Fields and Pastures	+1.2	+5.4	+1.5
Bobolink	Fields and Pastures	-1.6	+3.3	-4.4*
Eastern Meadowlark	Fields and Pastures	-6.6*	-8.3*	-6.1*
Eastern Bluebird	Fields and Orchards	+11.3*	-4.6	+10.4*
Chestnut-sided Warbler	Brushy Areas	-2.2*	+3.4	-2.4*
Gray Catbird	Brushy Areas	-2.4*	+0.8	-3.1*
American Robin	Yards and Edges	-0.4	-1.7	-0.1
Baltimore Oriole	Forest and Edges	+2.0	+8.2	+0.4
Wood Thrush	Forest	-1.3	+8.3*	-3.3*
Blue-headed Vireo	Forest	+5.2*	+18.8*	+1.9
Ovenbird	Forest	+1.2*	+5.5*	+1.1
Scarlet Tanager	Forest	+3.3*	+14.1*	+3.1
Black-capped Chickadee	Forest	+2.8*	-4.6	+2.8*

* Denotes statistically significant trend (Sauer et al. 1999. The North American Breeding Bird Survey, Results and Analysis 1966 - 1998. Version 98.1; for more information, go to: **www.mbr.nbs.gov/bbs**).

Over time, the focus of Partners In Flight has broadened to include birds other than just long distance migrants. This approach helps ensure that the conservation status of "all birds/all habitats" will be included in decision-making processes. Recently, the idea of further integrating bird conservation, that is hunted and nonhunted species alike, has risen to the forefront. At present, Partners In Flight is working closely with the Atlantic Coast Joint Venture to better integrate the conservation of all birds. Within North America, 37 bird conservation regions have been identified to facilitate delivery of conservation projects for all bird species.

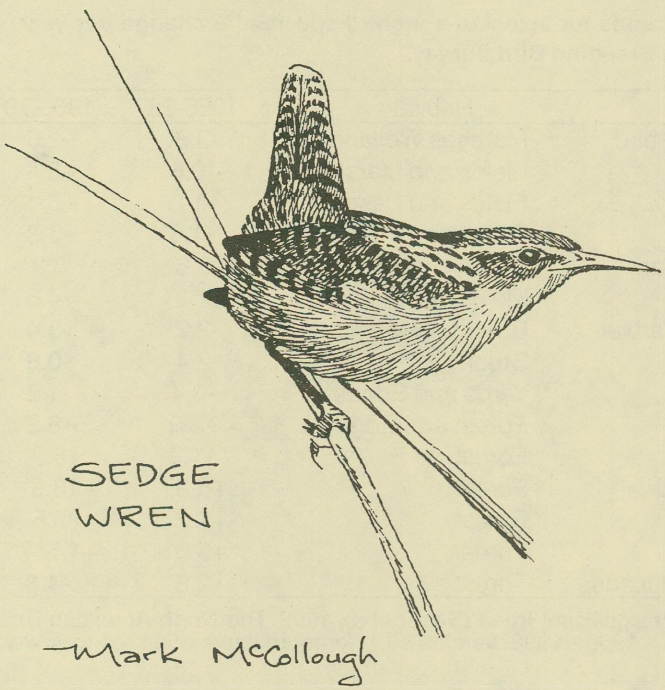
Each state, or group of states, has a working group comprised of individuals dedicated to conserving bird populations. Maine Partners In Flight is a working group assembled to address issues within the state of Maine. Nearly 70 individuals, representing over 40 agencies, institutions, and organizations, have participated in Maine Partners In Flight meetings and activities. Coordination of the Maine Partners In Flight working group resides within the Bird Group at

IFW's Resource Assessment Section. Bird Group personnel serve as Maine's representative to the regional Partners in Flight Working Group. Partners In Flight, at the regional and national levels, has encouraged state working groups to take responsibility for priority species within their borders, before they become rare, by using cooperative management approaches based on the best scientific data available.

Within the Maine working group, members are developing a mountaintop forest bird monitoring program, working to improve monitoring of Maine's owls, and expanding participation in International Migratory Bird Day, the North American Migration Count, and Maine Audubon's Spring Bird Festival, as well as other bird outreach activities statewide. More information about Partners In Flight activities in Maine is available on our department's website **(http://janus.state.me.us/ifw/wildlife/pif/index.htm)**.

--Thomas P. Hodgman

Finally, Bird Group personnel have become involved in a number of other projects to broaden our participation in bird conservation and management activities. We participate in Breeding Bird Surveys, mourning dove surveys, seabird censuses and management activities, Partnerships for Wildlife in Maine, and various bird research and habitat protection initiatives. Bird management activities in Maine continue to be both challenging and rewarding.



ENDANGERED AND THREATENED WILDLIFE

What makes Maine such a special place to live, work, and recreate? Ask Maine residents and visitors, and our abundant and diverse wildlife and natural areas would undoubtedly be near the top of the list. Maine's wildlife heritage is priceless; 60 species of mammals, 226 species of birds, 17 species of reptiles, 18 species of amphibians, 69 species of fish, 500+ species of spiders, 110 species of mollusks, and 15,000+ species of insects! Fortunately, most of these species are still abundant and widespread, but a few populations are small, vulnerable, and in need of conservation measures if they are to remain a part of Maine's natural heritage. Some, like the Katahdin arctic butterfly, Clayton's copper butterfly, and Tomah mayfly, are called endemics - they are found nowhere else in the world but Maine! Our state is all the poorer for having lost spectacular animals like the woodland caribou, sea mink, Labrador duck, and great auk. It is the Maine Department of Inland Fisheries and Wildlife's responsibility to ensure that no further losses occur and that our wildlife resources remain viable for future generations.

The year 1999 brought an end to a successful decade for nongame wildlife management in Maine. After 15 years of nongame wildlife programming, many species are responding to increased management attention and have reached record highs (e.g. bald eagles, roseate terns, piping plover, Atlantic puffins). Although state and federal funding for

Table 18. A history of income derived from the "Chickadee Checkoff," Loon Plate, and Maine Outdoor Heritage Fund to benefit nongame and endangered wildlife programs.

Year	Chickadee Checkoff				Loon License Plate		Maine Outdoor Heritage Fund	
	Total Given	Number of Givers	Average Donation	Percent of Taxpayers Giving	Income to MDIFW	Number of Registrations	Income to MDIFW	Number of Projects Funded
1984	$115,794	25,322	$4.57	5.3%				
1985	$129,122	29,200	$4.42	6.0%				
1986	$112,319	26,904	$4.17	5.4%				
1987	$114,353	26,554	$4.31	5.2%				
1988	$103,682	24,972	$4.15	4.8%				
1989	$93,803	20,322	$4.62	3.6%				
1990	$88,078	18,332	$4.80	3.2%				
1991	$92,632	19,247	$4.81	3.4%				
1992	$95,533	18,423	$5.18	3.2%				
1993	$82,842	15,943	$5.20	2.8%				
1994	$84,676	10,863	$7.79	2.0%	$335,042	59,829		
1995	$81,775	10,014	$8.17	1.8%	$457,307	81,662		
1996	$90,939	11,024	$8.25	2.0%	$535,679	95,657	$112,232	3
1997	$77,511	8,686	$8.92	1.5%	$588,364	105,065	$133,971	5
1998	$48,189	4,065	$11.85	0.7%	$617,484	110,265	$184,109	7
1999	$47,908	3,775	$12.69	0.7%	$569,610	101,716	$121,436	5

nongame declined, there was also hope for solutions for substantial, long-term funding. Canada lynx and Atlantic salmon listing proposals, reclassification of the Endangered status of wolves, federal delisting of peregrine falcons, and recovery measures for right whales dominated media attention in 1999. While these species garnered front-page status, Maine Department of Inland Fisheries and Wildlife (MDIFW) staff and cooperators continued to make progress on a variety of nongame and endangered species planning, recovery, management, and surveys. This report, provided to the Maine State Legislature and the public, provides the results of the year's work.

Endangered species programs are sometimes likened to the functions of an emergency room: these species need urgent and critical care to ensure their survival. As important as it may be for hospitals to provide emergency care, preventative care is preferable. To fulfill its legislative mandate, MDIFW has developed both endangered and nongame (or wildlife diversity) programs to address the growing needs of state Threatened and Endangered species and those species that are still common, but could become endangered in the future. "Keeping common species common" is the hallmark of wildlife diversity programs across the country. It is far easier and more efficient state policy to invest in our wildlife resources and their habitat **before** they decline to the point of requiring listing under the state or federal endangered species acts. Addressing needs of rare species at an early stage of decline, often promotes partnerships among public agencies and private interests and provides opportunities to explore innovative solutions. Last minute attempts to save a species may not offer many alternatives.

Adequate funding to address these and other wildlife programs is desperately needed. Unfortunately, there has never been a stable and secure source of funding for nongame and endangered wildlife programs. The Nongame and Endangered Wildlife program began in 1983 with establishment of the Nongame and Endangered Wildlife Fund and which is based on the "Chickadee Checkoff;" a voluntary tax check-off on the state income tax form (Table 18). This was followed in 1993 by the Loon License plate; a voluntary vehicle plate registration. Finally, the Maine Outdoor Heritage Fund, established in 1996, allocated proceeds from a lottery ticket sale to conservation, including 15% allocated to endangered species. Unfortunately, these sources of funding have been inconsistent or have declined because of competing check-offs, placement on tax forms, or competing license plates, prompting many to wonder whether it is prudent to fund resource conservation in this way. A legislative Futures Committee, established in 1999, is doing just that; assessing MDIFW's unmet needs, threats, and documenting the resources that MDIFW needs to achieve their mandates and public expectations. Furthermore, the Conservation and Reinvestment Act made a major breakthrough in Congress in 1999 when it passed the House Resources Committee. If passed, this legislation would allocate $21 million to Maine annually for conservation-related programs, including $2.2 to 3.5 million to MDIFW for wildlife diversity programs. As welcome as these funds would be, they would meet only a portion of the resource needs. Other sources of state-funding, including General Funds, need to be invested in Maine's wildlife resources. Wildlife belongs to all of the people of the state, and sportsmen's dollars can't be expected to do it all.

Given our limited resources, Maine can be proud of the accomplishments made for nongame and endangered wildlife in the last 15 years. We thank those of you who buy a Loon Plate, participate in the Chickadee checkoff, or purchase a Maine Outdoor Heritage Fund lottery ticket. Your voluntary support and generosity deserves a special "thank you." Our success is also attributed to our many willing partners and cooperating organizations, including the U. S. Fish and Wildlife Service (USFWS), National Park Service, U. S. Forest Service, Maine Audubon Society, University of Maine, The Nature Conservancy, and the Maine Natural Areas Program. Also, it cannot be overemphasized that the entire Wildlife Division and every bureau of the Maine Department of Inland Fisheries are deeply committed and involved in nongame and Threatened and Endangered species conservation. We are all working hard to keep Maine a special place. As you read this, take pride in your accomplishments - and please, as you fill out your tax return next year or register your car, join with us again in conserving Maine's wildlife diversity!

FUNDING

Despite the tremendous contribution of wildlife to the state's economic, ecological, and aesthetic health, and MDIFW's broad mandate to "protect all wildlife and the ecosystems upon which they depend," there are no General Fund contributions made to MDIFW for nongame wildlife. All funding for species that are hunted and fished comes from dedicated revenues; license revenues and federal aid (Pittman-Robertson and Wallop-Breaux). Nongame (non-hunted) wildlife programs in Maine are funded by an assortment of funding sources: income tax check-off, proceeds from the sale of the Loon License plate, Outdoor Heritage lottery, grants, and federal funds (USFWS, Endangered Species Office, and Pittman-Robertson). In 1983, the Legislature created The Maine Endangered and Nongame Wildlife Fund by adding a checkoff option to the Maine income tax form. In 1994, the "Loon License Plate" was initiated. Also, fifteen percent of lottery ticket revenues from Maine's new Outdoor Heritage Fund are earmarked for Endangered and Threatened species projects and another 60% are available for nongame management and habitat protection. All three programs allow people to voluntarily donate to nongame and endangered wildlife management programs.

Income from the Chickadee Checkoff dropped dramatically (40-50%) in 1998, because the check-off was unexpectedly moved from the primary tax form to a supplemental form. The checkoff remained on a supplemental form in 1999. Income in 1999 remained at a reduced level and was $47,908 (down about $300 from 1998) (Table 18). Only 0.65% of taxpayers contributed. Participation rates have steadily declined from highs of 5+% in the mid-1980s to 1.5-2.0% just prior to moving the tax form to a supplemental form. However, average donations have increased steadily from $4-5 in the 1980s to $12.69 in 1999. Efforts are needed to correct this problem with the Bureau of Taxation. If contribution levels could be increased to the 3-4% range, income from the checkoff would increase to $221,098 to $294,408 at current average levels of giving. This could provide substantial increases for nongame and endangered programs.

The Loon License plate has been very successful, but competition with the free, general issue Chickadee Plate, introduced in July, 1999, may reduce this important level of funding. Loon plate sales rose from nearly 60,000 in 1994 to over 110,000 in 1998, providing MDIFW with up to $617,000 annually for nongame and endangered wildlife projects (Table 18). Residents pay a $15 annual renewal for this conservation plate, of which $5.60 is returned to MDIFW and $8.40 to the Bureau of Parks and Lands. Maine has one of the highest participation rates nationally for conservation license plates with about 13% of eligible vehicles registered as Loon Plates. Analyses of new and re-registrations of Loon Plates between July (introduction of the Chickadee Plate) and December, 1999 document a 19% decline in Loon

Plates. If these trends continue during the first two quarters of 2000, revenue to MDIFW will drop by about $123,000. An even greater threat looms ahead as many other groups have asked to have their own license plate. A one-year moratorium on new plates ends in July, 2000. In other states (e.g., PA), additions of new plates, some with wildlife designs, have resulted in diminished sales of conservation plates.

In 1999, MDIFW received $121,436 from competitive grants from the Outdoor Heritage Fund. Sales of Outdoor Heritage Fund lottery tickets have fluctuated, but annual income generated to the Fund is approximately $1.5 - 2 million annually. In general, available funds were fewer and competition was greater for Outdoor Heritage funds in 1999. Fifteen percent of the revenues are dedicated to endangered species projects. This important new source of funding is benefiting many nongame and endangered species.

These voluntary means of contributing provide the core funding for Maine's nongame and endangered species programs. All money donated, whether through the tax checkoff, vehicle registrations, grants, or direct gifts, are deposited into the Maine Endangered and Nongame Wildlife Fund - a special, interest-bearing account from which money can only be spent for the conservation of Maine's nongame and endangered species. A nine-member citizens advisory council monitors the fund and the programs it supports.

ENDANGERED SPECIES LISTING

Since European settlement, at least 14 species of wildlife are known to have been extirpated from Maine. To prevent further losses, the Maine Endangered Species Act was enacted in 1975. In 1986, Maine's first list of 23 Endangered and Threatened species was adopted. After MDIFW reviewed the status of many of Maine's wildlife species in the mid-1990s, 20 new species were added to the list in 1997. Present information does not indicate an extinction crisis, but considering the number of species for which we have no information, the growing number of rare species (Table 19), the relative absence of managed and protected ecosystems, and the growing threats to wildlife habitat do not suggest that we should be complacent.

Table 19. Maine and Federally listed Endangered and Threatened species (as of June 10, 1997).

Maine Endangered Species

Golden Eagle - *Aquila chrysaetos*
Peregrine Falcon - *Falco peregrinus**
Piping Plover - *Charadrius melodus*** **B**
Roseate Tern - *Sterna dougallii**
Least Tern - *Sterna antillarum*
Black Tern - *Chlidonias niger*
Sedge Wren - *Cistothorus platensis*
American Pipit - *Anthus rubescens* **B**
Grasshopper Sparrow - *Ammodramus savannarum*
Blanding's Turtle - *Emydoidea blandingii*
Box Turtle - *Terrapene carolina*
Black Racer - *Coluber constrictor*
A Flat-headed Mayfly - *Epeorus frisoni*
Ringed Boghaunter (dragonfly) - *Williamsonia lintneri*
Clayton's Copper (butterfly)- *Lycaena dorcas claytoni*
Edwards' Hairstreak (butterfly)- *Satyrium edwardsii*
Hessel's Hairstreak (butterfly)- *Mitoura hesseli*
Katahdin Arctic (butterfly)- *Oeneis polixenes katahdin*

Maine Threatened Species

Bald Eagle - *Haliaeetus leucocephalus***
Razorbill - *Alca torda*
Atlantic Puffin - *Fratercula arctica*
Harlequin Duck - *Histrionicus histrionicus*
Arctic Tern - *Sterna paradisaea*
Upland Sandpiper - *Bartramia longicauda*
Northern Bog Lemming - *Synaptomys borealis*
Spotted Turtle - *Clemmys guttata*
Loggerhead Turtle - *Caretta caretta***
Swamp Darter (fish) - *Etheostoma fusiforme*
Tidewater Mucket (freshwater mussel)- *Leptodea ochracea*
Yellow Lampmussel (freshwater mussel)- *Lampsilis cariosa*
Tomah Mayfly - *Siphlonisca aerodromia*
Pygmy Snaketail (dragonfly) - *Ophiogomphus howei*
Twilight Moth - *Lycia rachelae*
Pine Barrens Zanclognatha (moth) *Zanclognatha martha*

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Federally Listed Endangered or Threatened Species, currently or historically occurring in Maine but not listed under Maine's Endangered Species Act

Eskimo Curlew - *Numenius borealis**/?
Gray Wolf - *Canis lupus**/?
Eastern Cougar - *Felis concolor couguar**/?
Right Whale - *Eubalaena glacialis**
Humpback Whale - *Megaptera novaeangliae**
Finback Whale - *Balaenoptera physalus**
Sperm Whale - *Physeter catodon**
Sei Whale - *Balaenoptera borealis**
Leatherback Turtle - *Dermochelys coriacea**
Atlantic Ridley Turtle - *Lepidochelys kempi**
Shortnose Sturgeon - *Acipenser brevirostrum**
American Burying Beetle - *Nicrophorus americanus**/?
Karner Blue - *Lycaeides melissa samuelis**/?

note: * = Federally listed Endangered Species; ? = current presence uncertain in Maine.
** = Federally listed Threatened Species; **B** = breeding population only.

(For the companion list of Endangered and Threatened Plants in Maine, contact the Maine Natural Areas Program, Dept. of Conservation, 93 State House Station, Augusta, ME 04333-0093)

What follows is a summary of the programs and major accomplishments for nongame endangered wildlife in 1999 that have not already been covered under "MAMMALS" and "BIRDS" sections in this research and management report. More information on Maine's endangered species and nongame wildlife projects can be found on MDIFW's web site at **http://janus.state.me.us/ifw/index.htm**

HABITAT MANAGEMENT AND PROTECTION

Regulation is one of many tools that can be used to protect wildlife habitat. The Maine Endangered Species Act enables the Department to designate Essential Habitat for threatened and endangered species. This is not mandatory, and to date, has been applied only to bald eagles, roseate terns, piping plovers and least terns. In 1999, MDIFW developed a proposal to update Essential Habitat designations for bald eagles and piping plovers. Twenty-five new eagle nests were designated as Essential Habitat and 7 previously designated sites no longer meeting the criteria were deleted from the rule. One new piping plover nesting area and one new roseate tern nesting area were also designated as Essential Habitat. All landowners were notified of this process, a public hearing was held, and the changes became effective October 1, 1999. Final notification, updated maps, and Essential Habitat Handbooks were sent to all affected municipalities. The *Atlas of Essential Wildlife Habitats for Maine's Endangered and Threatened Species* was updated and mailed to state agencies and cooperators in early 2000.

--Mark McCollough

ENDANGERED AND THREATENED SPECIES STUDIES

Bald Eagle

1999 was a year of continued recovery for bald eagles in Maine. Following an unprecedented 12% decline of the nesting population in 1997 (caused by an unusually high number of adult eagles found dead), eagles rebounded to 202 pairs in 1998 and 216 occupied nests in 1999 - a new record. A total of 207 eaglets were produced in Maine during 1999; a new record for the population during 35 years of monitoring.

All 5 state recovery objectives for bald eagles are attainable in 2000. Two population criteria have already been achieved. In 1999, the U. S. Fish and Wildlife Service announced their intention to remove the bald eagle as a Threatened species from the federal Endangered Species List, likely in 2000. Assuming that Maine continues to build a safety net of habitat protection for eagles, continuation of the favorable trends in population growth and productivity, and federal delisting, MDIFW will subsequently propose that the state legislature remove the bald eagle's status as a Threatened species under the Maine Endangered Species Act in 2001.

Until recently, poor nesting success has typified Maine's eagle population, slowing the rate of recovery. Environmental contaminants, such as organochlorine chemicals (especially DDE, a byproduct of the insecticide DDT, and industrial pollutants such as PCB's) and heavy metals (notably mercury) have impaired reproduction of bald eagles in Maine, resulting in slow population growth. These chemicals break down very slowly in the environment, and Maine eagles continue to accumulate them through dietary exposure. Research recently completed by the University of Maine, and federal wildlife officials, identify 3 lingering problem areas: mercury (northern interior), dioxins (Penobscot River), and PCB's (Frenchman Bay area). As Maine's bald eagle population approaches a level of recovery that may merit delisting, state and federal biologists will have to design safeguards to protect the future of bald eagles, especially their habitat along Maine's coastline, rivers, and lakes.

--Charlie Todd

Peregrine Falcon

The peregrine is also on the way back in Maine and throughout the U.S., wherever reintroduction efforts have been undertaken. In fact, restoration programs for this species have been conducted in more than 35 countries following a worldwide decline of peregrines in the mid-twentieth century. Like bald eagles and many other birds of prey, peregrines were the victims of DDE in the environment. A traditional resident of mountainous cliffs and coastal headlands in Maine, nesting peregrines were absent from the state for more than 25 years. The last residency of peregrines in the eastern U.S., prior to recent restoration programs, was documented in Acadia National Park during the early 1960s.

Since 1984, MDIFW has worked with the USFWS to reintroduce peregrines to Maine using a process called "hacking." During this process, young peregrines, raised in captivity, are taken to historic nesting areas when they are 4-5 weeks of age. After acclimating to their new surroundings, they are released at 6 weeks of age, but field technicians stay on duty for another 5 to 6 weeks to provide food and make sure the birds make a successful transition into the wild. A total of 144 young peregrines were successfully released at 8 different locations in Maine during 1984-1997.

More than 93% of young peregrines released in Maine have successfully made the transition into the wild. In 1999, peregrines nested at only 5 cliff-sites in coastal and western Maine (down from 8 pairs in 1998). Successful nesting occurred at all 5 sites, and a total of 11 young falcons were naturally produced.

In 1998, the USFWS delisted the peregrine falcon from the federal endangered species list. Although recovery efforts have been extremely successful in the western U. S., only about 120 pairs of peregrine falcons currently exist in the East. With only 5 pairs of peregrines in Maine, MDIFW is taking a more cautious approach to species recovery and has no plans to remove the peregrine from our state list.

--Charlie Todd

Golden Eagle

The golden eagle continues to bear the unfortunate distinction as the rarest breeding bird in the eastern U.S. It once inhabited mountainous cliffs along the Appalachian Mountains from the mid-Atlantic states to Labrador. Only one nesting pair remains in Maine, and it is the only breeding record for the species currently documented in the northeastern United States. Sightings are occasionally reported from Maine's western mountains or northern interior. These goldens may be migrants from Quebec, but they also offer hope that additional nests may be discovered.

Unfortunately, Maine's single breeding pair has failed to nest successfully for 15 consecutive years, and, in 1998 and 1999, did not attempt to nest at all. Sadly, only a single adult was observed at the eyrie. Eleven golden eagle eyries are historically known in Maine, but only three have been inhabited by goldens during the last 25 years. Only 3 young golden eagles have been produced by resident pairs in Maine in the last 20 years.

Certainly, the outlook is discouraging for the golden eagle. There are natural habitat limitations on the species in the East, which have made them rare throughout recorded history. Golden eagles are relatively numerous in the West, where open terrestrial habitats favor their normal lifestyle of preying upon small mammals. The extensive forest lands in Maine cannot be used as hunting areas by golden eagles. Goldens in Maine traditionally preyed on wading birds (such as herons and bitterns) in open wetlands. Such a diet would have made them particularly vulnerable to environmental contaminants, which took their toll on reproduction of bald eagles and peregrine falcons in Maine. Great blue herons, apparently a mainstay food for golden eagles in Maine, contained some of the highest DDE residues ever found in wildlife. Apparently, contaminants have brought the few golden eagles of the northeastern U.S. to the threshold of extinction. Two unhatched eggs were recovered from Maine's failed golden eagle eyrie in 1996. Chemical analyses of the egg contents confirmed biologists' suspicions: high concentrations of organochlorine chemicals (DDE, PCB's, dieldrin) and mercury similar to 1970's levels in bald eagle eggs that resulted in reproductive failure.

--Charlie Todd

Grasshopper Sparrow and Grassland Bird Surveys

Grasshopper sparrows are listed as Endangered by MDIFW because of low numbers and declining nesting habitat. Maine is at the northeastern edge of the range of this species, and they nest at only four locations in the southern part of the state. Grasshopper sparrows inhabit large sandy grasslands and blueberry barrens that are vegetated with sparse bunch grasses. These grassland habitats are also rare in Maine, and require special vegetation management.

The largest nesting population of grasshopper sparrows in Maine occurs on 600 acres of blueberry barrens and sandplain grasslands on the Kennebunk Plains in West Kennebunk. This site annually supports 30-60 percent of the statewide breeding population. The 1999 census identified 33 singing males (up from 18 in 1998), the best indicator of territorial pairs. The number of grasshopper sparrows found at 3 other locations increased from 12 pairs in 1998, to 23 pairs in 1999. This year's 56 pairs reversed a dramatic drop in grasshopper sparrow numbers in 1998, which was likely because of above normal rainfall prior to the bird census.

The Kennebunk Plains was purchased by Lands for Maine's Future and The Nature Conservancy, and it is now a Wildlife Management Area managed by MDIFW and The Nature Conservancy. Prescribed burns have been conducted to maintain suitable habitat for grasshopper sparrows and other grassland birds. MDIFW is also working with the U.S. Navy and the City of Sanford to maintain grasshopper sparrow habitat at the Brunswick Naval Air Station and Sanford Municipal Airport, respectively.

Regional declines are increasingly evident in a variety of grassland nesting birds. MDIFW secured support from Maine's Outdoor Heritage Fund to conduct a two-year study of grassland nesting birds during 1997-1998. The survey focused primarily on 4 species of state and regional concern - the grasshopper sparrow (Endangered), upland sandpiper (Threatened), vesper sparrow, and Eastern meadowlark (special concern). During May-July 1997-98, over

1,400 point counts were conducted on 330 grassland/barren sites in 12 counties. Line transects were used to inventory grassland birds at 8 additional airfields.

Sixty-five species were tallied during the 1997-98 surveys. The savannah sparrow was the most frequently encountered species, occurring in all counties in which sites were surveyed. Upland sandpiper, vesper sparrow, and northern harrier were most frequently tallied in Washington County blueberry barrens. Bobolinks were present in grasslands statewide, while Eastern meadowlarks were largely absent from the north. Sedge wrens (Endangered) were encountered in 3 wet meadow sites, and 1 nesting pair of short-eared owls was recorded. One loggerhead shrike (Endangered) was observed.

Information from the 1997-98 surveys, and concurrent surveys in New York and other New England states, show that Maine, especially Washington County, is particularly important to the conservation of upland sandpipers and vesper sparrows in the northeastern United States. During 1999, MDIFW (with support from Massachusetts Audubon Society) conducted further grassland bird surveys in eastern Maine. Results from the 1999 surveys enabled MDIFW biologists to design a strategy to monitor population trends among upland sandpipers and vesper sparrows.

Survey data are being used to build a computer database to track grassland bird populations. These data have also added substantially to the Biological Conservation Database maintained by MDIFW to track rare and endangered species and have been instrumental in consultations with managers of airports and military installations.

--Charlie Todd and Andy Weik

Piping Plover

Piping plovers are small, sand-colored shorebirds, which nest on sandy beaches and dunes along the Atlantic Coast from South Carolina to Newfoundland. The piping plover is Endangered because of its extreme rarity in the state and the threats it faces during the nesting season. Maine's population of piping plovers has been monitored annually since 1981. During this period, the number of pairs reported has fluctuated between a low of 7 pairs at 4 sites in 1983, to a high of 60 pairs at 19 sites in 1998. In 1999, 56 pairs of piping plovers nested in Maine. The overall population trend has been one of increase, due largely to intensive management at nesting sites and the cooperation of private landowners and municipalities.

Productivity of piping plovers in Maine, measured as number of chicks fledged per nesting pair, has ranged from a low of 0.9 chicks per pair in 1981 to a high of 2.5 chicks per pair in 1991. Statewide productivity since 1984 has been among the highest documented in any Atlantic Coast state or province. Productivity in Maine has exceeded 1.7 chicks per pair in 10 of the past 12 years. Productivity in 1999 was 91 young or 1.6 chicks/pair.

Monitoring and management of piping plovers in Maine has been conducted by Maine Audubon Society, The Nature Conservancy, and U.S. Fish and Wildlife Service biologists, with financial support from MDIFW. Biologists complete annual surveys of abundance and reproductive success and determine factors limiting productivity. Nests are protected from human disturbance, pets, and natural predators (such as foxes, skunks, and crows) by wire enclosures. Nesting areas are fenced and signed to diminish human disturbance. In 1999, MDIFW and the U. S. Fish and Wildlife Service met extensively with the town of Wells to develop a beach management plan for Wells and Drakes Island beaches. Agreement on all issues was reached, a volunteer coordinator was hired, and over 20 Wells residents volunteered to monitor their beach to protect the nesting plovers.

--Mark McCollough

Least Tern

Least terns are the smallest of four species of terns that nest along the coast of Maine. These Endangered birds nest on the same sandy beaches used by piping plovers in southern Maine. Nesting colonies of least terns in Maine are monitored and protected by Maine Audubon Society and The Nature Conservancy biologists. During the past 13 years, the statewide population has fluctuated from a low of 39 pairs at 3 sites in 1982, to a high of 125 pairs at 4 sites in 1993. Since 1979, total productivity in Maine has ranged from 12 to 123 young fledged annually. In 1999, 60 pairs (down from 86 in 1998) nested at 4 sites and produced 65 fledglings (only 12 were produced in 1998). This was the best fledgling rate recorded in years and could be attributed to night vigils by Audubon biologists to guard nesting areas from foxes. This management technique will be repeated in 2000, and, if it works, may be successful at reversing the trends that have halved Maine's least tern population in the last 5 years.

The erratic productivity of these birds in Maine can be attributed to human disturbance; destruction of nests or young by humans, foxes, skunks, raccoons, crows, dogs, and cats; and habitat alteration from coastal development. Produc-

tion of chicks in recent years has not been sufficient to maintain the population. Management of least terns in Maine includes placing fencing and signs around nesting colonies, and predator control. Public education, to inform recreational beach-goers and local residents about the conservation needs of least terns, is another important management activity. MDIFW and Maine Audubon are developing management recommendations for each of the nesting beaches to aggressively confront predation and disturbance problems.

--Mark McCollough

Roseate Tern

Roseate terns nest with common and arctic terns on coastal islands in Maine. The islands are critical to survival of the species, since they typically provide undisturbed, predator-free nest sites. With an increase of gull populations (a predator and competitor of the terns), and human disturbance on the islands, tern numbers and reproductive success have declined to where the species is now listed as Endangered. In the 1980s, 50-80 pairs of Roseate Terns nested in Maine. Their numbers have increased in response to management to 288 pairs - a record population - nested in Maine in 1999. In the 1930s, 200-300 pairs nested in the state.

Recovery of this species is a cooperative venture among the USFWS Petit Manan National Wildlife Refuge, National Audubon Society, Maine Audubon Society, College of the Atlantic, and MDIFW. In 1992, 21 nesting islands used by roseate terns were protected by Essential Habitat provisions of the Maine Endangered Species Act. An additional island was designated Essential Habitat in 1999. In 1994 and 1995, new tern restoration projects were initiated to benefit roseate terns on Pond Island at the mouth of the Kennebec River, and Ship and Trumpet Islands in Blue Hill Bay. Populations of common terns and arctic terns are also benefiting from these and other seabird restoration efforts. Common terns have increased from 4,361 pairs in 1994 to 7,402 in 1999, however, arctic terns have declined during the same time period from 5,029 to 4,943 pairs. A Gulf of Maine arctic tern study is underway with the University of New Brunswick to determine why arctic terns are not increasing in response to management.

--Brad Allen and Mark McCollough

Partners in Amphibian and Reptile Conservation

MDIFW is now actively involved with a new initiative entitled Partners in Amphibian and Reptile Conservation (PARC). Modeled partly after the successful Partners in Flight (PIF) bird conservation program, PARC's mission is to forge partnerships among diverse public and private organizations in an effort to stem the recent declines of amphibian and reptile populations worldwide. MDIFW has participated in two Northeast Working Group PARC meetings designed to improve communication on efforts to conserve threatened amphibian and reptile species in the Northeast, and to identify new projects of regional priority for implementation. To date, PARC-Northeast has made progress on drafting model state herptile regulations and a list of regional species of conservation concern.

--Phillip deMaynadier

Maine Amphibians and Reptiles

From 1986-1990, MDIFW, in cooperation with Maine Audubon and the University of Maine, conducted the Maine Amphibian and Reptile Atlasing Project (MARAP). For a 4-year period, over 250 volunteers from around the state contributed approximately 1,200 records of observations of amphibians and reptiles. This initiative culminated in the 1992 publication of the book *The Amphibians and Reptiles of Maine.* The first edition sold out within two years of publication.

In 1998, UMaine Press expressed interest in publishing a second edition. Considerable new information had been compiled since publication of the first edition, and there was increasing demand for information on the state's amphibians and reptiles. Editors Malcolm Hunter, Aram Calhoun, and Mark McCollough greatly revised the text, incorporated 1,300 new records into the range maps, added a color photograph section, and a CD of the calls of the frogs and toads of Maine. *Maine Amphibians and Reptiles* was published in the spring of 1999. Over 2,000 copies were sold in 1999. Copies of the book can be ordered for $20.05 plus $3.50 S&H from the Information Center, MDIFW (207 287-8000).

--Mark McCollough

Blanding's and Spotted Turtles

Two of Maine's rarest reptiles, the spotted and Blanding's turtles, are semi-aquatic species preferring small, shallow wetlands. Spotted turtles are small (5 to 6 inches long) and have yellow spots on the head, tail, and legs and a slightly flattened, black, upper shell. Blanding's turtles are medium-sized turtles (7 to 10 inches long) with a yellow throat and light-colored flecking on a domed, helmet-shaped shell. Little was known about either of these species until the Maine

Amphibian and Reptile Atlasing Project (MARAP) was conducted in the 1980s. As a result of MARAP, spotted turtles were recorded at about 20 different sites from Kittery to Orrington. Blanding's turtles were known from only about 20 locations in Maine, all in York County. In 1990, MDIFW increased efforts to learn more about the distribution of these rare turtles. Sufficient numbers were discovered in York County to warrant additional studies of their abundance, movements, habitat use, and ecology. In 1995, University of Maine Wildlife Department graduate student Lisa Joyal completed a study of two populations of both species in the Mt. Agamenticus area. More than 80 turtles were marked or radio-tagged to gather information on nesting and hibernation sites, movements, and the types of wetlands being used. In 1994, the Environmental Protection Agency provided additional funding to MDIFW to continue systematic surveys of wetlands for Blanding's and spotted turtles in all of York and Cumberland Counties. Over 2,500 wetlands were surveyed, and approximately 100 new locations were discovered for these rare species.

In 1999, MDIFW completed a population viability assessment (PVA) for Blanding's and spotted turtles to determine the size of populations that should be conserved. Results from this PVA, combined with data on movements and habitat requirements, suggest that large blocks of relatively contiguous forested and wetland habitat must be conserved to successfully maintain viable populations of these rare turtles in Maine. Southern Maine's landscape is rapidly developing, and among the best remaining locations to achieve turtle conservation goals is on a 50,000 acre area surrounding Mount Agamenticus. MDIFW has begun working closely with a Mount Agamenticus Conservation Coalition - towns, land trusts, private landowners, and private conservation groups - to initiate planning for the conservation of the habitat of the rare turtles in the Mount Agamenticus region.

--Phillip deMaynadier

Wood Turtles

Wood turtles, a species of special management concern, are found throughout the state in streams and rivers with appropriate habitat. During summer months, they become increasingly terrestrial and inhabit adjacent riparian areas. Like several of Maine's reptile species, wood turtle population growth is constrained by the cold winters and short growing seasons characteristic of northern latitudes. Unfortunately, when human disturbances to the animals and their habitats are combined with climatic restrictions, the viability of local wood turtle populations is severely jeopardized. The greatest threat to Maine's wood turtles is illegal collection for the pet trade. Collectors can decimate local populations in a short period of time. Several instances of large collections of wood turtles have been investigated by the Warden Service in Maine in recent years.

In 1995, Central Maine Power initiated a study of wood turtles in western Maine. By following radio-tagged individuals, they were able to learn much about their movements and habitat use. From 1996-98, these studies were expanded by MDIFW and the University of Maine with the help of an Outdoor Heritage Fund grant. For the last two years, UMaine graduate student Brad Compton has tracked about 40 radio-tagged turtles, located nests, and documented their movements and habitat use. His study is the first to document nesting ecology of the wood turtle in the state. Brad was able to document how summer temperature influences hatching success of wood turtles - a critical factor influencing population viability at the northern edge of the species' range. Brad completed his master's thesis in 1999, and Dr. Judith Rhymer, a UMaine faculty member, will continue to study the conservation genetics of wood turtles in 2000.

--Phillip deMaynadier

Tomah Mayfly

The "Tomah" mayfly was first collected early in this century from a single location on the Sacandaga River in New York. Damming of the river, and associated construction, destroyed the sedge meadow habitat at this site in the 1930s. The species was assumed to be extinct for nearly 50 years until it was "rediscovered" in Tomah Stream (Washington County) in 1978 by UMaine entomologist, Dr. Cassie Gibbs. It has since been found at 12 other locations in Maine and at one new site in New York. Historically, it was also found in Labrador and Quebec.

This insect is unique in many ways. It is the only representative of the genus *Siphlonisca* in the world. Some have described it as a "living fossil," as it has large projections on the abdomen characteristic of ancient Carboniferous Period insects. The nymphal stage of the Tomah mayfly, unlike other species of mayflies, is carnivorous - preying largely upon other mayfly nymphs. This species depends on highly productive, seasonally-flooded, sedge meadows along large streams or rivers to complete its life cycle. Although sedge meadows are not an uncommon habitat type in Maine, the Tomah mayfly is found at only a very small number of sites. Finally, research suggests that a portion of the females may be able to successfully reproduce without males. Figure that one out!

During 1999, MDIFW conducted surveys for Tomah mayflies at 12 sedge meadow floodplain sites in eastern Maine. No Tomah mayfly nymphs were found; however, this species was found of one of these survey sites during investigations in 1990.

MDIFW has been cooperating with Dr. Alex Huryn at the UMaine to learn more about this intriguing insect and to ensure its conservation. Studies have focused on its distribution, population size, and habitat needs. MDIFW is also concerned about threats (damming, pollution, wetland alteration) that may alter the sedge meadows where this rare creature still exists. In 1999, Dr. Huryn focused studies on other rare invertebrates that may share this unique sedge meadow environment. The diversity of species of caddisflies at Tomah stream is almost unparalleled in North America and include several very rare species. Dr. Huryn also found a species of caddisfly new to science!

--Beth Swartz

Freshwater Mussels

Freshwater mussels are relatively sedentary, bottom-dwelling bivalves found in many of Maine's lakes, ponds, rivers, and streams. Often referred to as a "clam," the freshwater mussel's inconspicuous and seemingly drab life-style belies its importance. As filter feeders, mussels provide a valuable service to aquatic environments by filtering impurities from the water as they feed. In turn, mussels provide food for a variety of larger predators.

The life histories of these animals are unique and interesting. All freshwater mussels start life as free-floating larvae, vastly different in appearance from the adults. The young of most species must encounter, and attach to, a very specific fish host in order to mature into the more familiar adult form. Once the tiny mussels have dropped off their mobile nurseries (they do no harm to the fish!) and burrowed into the substrate, they typically remain in the same spot for their entire lives. For some species, a lifetime can span 100 years or more!

Freshwater mussels are also one of the most diverse groups of species in North America. About one third of the world's mussel species are found in the United States, and nearly all of those occur east of the Mississippi River. Maine is relatively poor in mussel diversity, with only ten species currently documented as living here. Although most of our mussel species are widely distributed throughout the State, each has a unique set of habitat requirements: some are found only in flowing water, others occur only in still water, some species prefer sand or mud substrates, and others succeed only on gravel or cobble bottoms. Flow rate, water depth, water chemistry and temperature, availability of fish hosts, and substrate type are some of the factors determining where each mussel species can survive.

Habitat integrity is an equally important component influencing mussel survival. Freshwater mussels are very sensitive to contaminants and changes in their environment - a vulnerability compounded by a filter-feeding strategy, specific habitat and fish host requirements, and an inability to leave their surroundings. Consequently, freshwater mussels are one of our most valuable indicators of water quality and ecosystem health. They are also one of the most imperiled groups of animals in the country. Approximately half of the species representing our uniquely diverse mussel fauna have already vanished, or are in danger of extinction. Of the nearly 300 species of freshwater mussels found in the United States, at least 21 are thought to be extinct, 56 are currently on the federal Endangered Species List, and an additional 74 are candidates for listing.

Freshwater mussels are in trouble nationally because of pollution, dams and other water control structures, channelization, dredging, and sedimentation of our once clean, free-flowing rivers and streams have all contributed to the degradation and loss of mussel habitat. In addition, poaching of shells for sale to the Orient's pearl culture industry, and the recent invasion of a prolific foreign competitor, the zebra mussel, are also jeopardizing some mussel populations. Too late for many species, efforts to maintain habitat quality for mussels and prevent further loss of species have now become a high priority for many state, federal, and private conservation agencies.

From 1992-97, MDIFW conducted a statewide survey to determine the status, abundance, and distribution of the State's rarer species of freshwater mussels. MDIFW surveyed more than 1,700 sites in rivers, streams, ponds, and lakes throughout Maine. As a result, we now know much more about the status of all our freshwater mussel species. Two species, the tidewater mucket and yellow lampmussel, were found to be very limited in range and distribution and occurred in abundance at only a few sites. Both species are now listed as Threatened in Maine. Three additional species - the brook floater, creeper, and triangle floater - were also found to be uncommon or of special management concern.

Compared to most states within the range of these species, Maine seems to have some of the best remaining populations and may be the last stronghold for these rare mussels. However, we are not immune to the problems of habitat loss and degradation, which have eliminated populations and extirpated species in other parts of the country. To ensure they remain a part of our natural heritage, MDIFW will continue to document the occurrences of the State's freshwater mussels; learn about their life histories, habitat requirements, and conservation needs; and conserve

habitat for Maine's rarer species. With so many species experiencing dramatic declines throughout the United States, including neighboring northeastern states, it is becoming more and more important to monitor the status of, and develop conservation plans for, our entire mussel fauna.

In 1999, Ethan Nedeau, Mark McCollough and Beth Swartz began writing a book, *The Freshwater Mussels of Maine,* which will summarize the information gathered during the past six years and provide a valuable reference to resource managers and the public. It will be available to the public by summer 2000.

--Beth Swartz

Rare Dragonflies

Maine's clean, free-flowing rivers may provide a last refuge for some of North America's rarest dragonflies. The pygmy snaketail dragonfly and the extra-striped snaketail dragonfly, once had wide distribution throughout eastern North America, but pollution, dams, and deteriorating water quality have resulted in the extinction of many populations. Entomologists in Maine recently discovered some of the largest known populations of these species in the Penobscot, Allagash, Aroostook, Saco, Machias, and St. Croix watersheds.

In 1996, MDIFW received an Outdoor Heritage Fund grant to conduct a statewide assessment of dragonflies and damselflies of Maine. Paul Brunelle of Halifax, Nova Scotia compiled a 6,210 record database of all of the historical data on these species and increased the state list to 155 species! He also produced fact sheets and a beautiful poster of the rare and endangered dragonflies and damselflies of Maine, which was made available to the public in 1999.

In 1998, MDIFW received a second Outdoor Heritage Fund grant to initiate the Maine Damselfly and Dragonfly Survey (MDDS). The purpose of this 5-year, volunteer-based atlasing initiative, is to improve our knowledge of the distribution, abundance, and status of damselflies and dragonflies in Maine. In 1999, over 120 people volunteered to participate in this project. Aware that few individuals have had experience in collecting these insects, MDIFW is providing volunteers with a collecting manual, workshops, newsletters, field trips, and aids in identification. Over 46 volunteers were trained at two weekend workshops held at Eagle Hill Field Research Station in Steuben in 1999, with further workshops planned for 2000. In turn, volunteers collected over 1,200 specimens including dozens of new county records, three new state records, and 1 national record (the globally rare Quebec Emerald). The data, in just one year, increased by 20% all of the records collected in the last century! To our knowledge, the MDDS is among the first state-sponsored atlasing project of its kind in North America. Those wishing to learn more about this project should and opportunities for participation should visit the MDDS website: **http://mdds.umf.maine.edu/~odonata/**

In 1995, one of the world's rarest dragonflies, the ringed boghaunter, was discovered in York County by MDIFW biologists. This dragonfly is known from fewer than 50 sites, mostly in the Northeast, and most with fewer than 50 individuals. In 1998 and 1999, MDIFW surveyed over 150 wetlands in York and Oxford Counties, and four new populations were discovered. From 1997-1999, Paul Brunelle captured several individuals in the Fryeburg area, providing evidence that yet other populations even further north remain to be discovered.

--Phillip deMaynadier

Black Tern

Most people think of terns as nesting on Maine's coastal islands and beaches. However, one species, the black tern, nests in colonies on freshwater wetlands in central and eastern Maine. Prior to 1990, it was believed Maine's population of black terns was relatively secure, as they were annually observed at traditional nesting sites. In 1991, students at Nokomis High School, under the direction of their student advisor, Don McDougal, and MDIFW biologists, initiated the first statewide census of the black tern in Maine. They found that the black tern was actually the rarest species of tern in Maine and made a strong case for listing this species as Endangered in the state. Black terns in New England nest only in New York, Vermont, and Maine. Their numbers are believed to have declined in North America in the last two decades.

Nokomis students have continued their annual survey of black terns, thus providing the state with valuable information on this species' status. In 1999, 83 pairs nested at 10 sites. In 1998, Dr. Fred Servello and graduate student, Andrew Gilbert, from UMaine Department of Wildlife Ecology, began a study of black tern ecology and populations in central Maine. In 1999, nests were located and observed from blinds to determine productivity. Twenty-six adults and 41 chicks were captured and color banded to determine survival rates, movements between colonies, and year-to-year fidelity to nesting areas. Andrew constructed exclosures at some nest to document chick provisioning and growth rates. He also used remotely controlled video cameras to document feeding rates and the kinds of foods eaten. Twenty broods at 5 clusters of nests were observed from towers constructed in the marsh to determine productivity.

Fifteen fledglings were recorded from 20 successful nests. Water levels and precipitation are being monitored at all sites to understand how fluctuating water levels affect nesting success. A statewide habitat assessment is being completed to guide future tern surveys and better understand whether habitat availability may be limiting these endangered birds.

--Mark A. McCollough

Vernal Pools

Many of Maine's amphibians use vernal pools as breeding habitat. Some, like spotted salamanders, blue spotted salamanders, and wood frogs, breed more successfully in these fishless habitats than in any other wetland type. In addition to providing habitat for small mammals, wading birds, waterfowl, and a diversity of invertebrates, several state-listed rare animal species in Maine are also closely associated with small woodland pools for breeding or feeding including Blanding's turtles (Endangered), spotted turtles (Threatened), wood turtles (special concern), four-toed salamanders (special concern), ribbon snakes (special concern) and ringed boghaunter dragonflies (Endangered). We have a great deal to learn about why some vernal pools receive greater wildlife use than others. These small, ephemeral wetlands can now potentially receive protection under new state and federal wetland laws.

Grants from the Environmental Protection Agency, the Nongame and Endangered Wildlife Fund, and the Outdoor Heritage Fund have been used to support a study of wildlife values associated with vernal pools in York County. UMaine graduate students Anne Perillo and Danielle diMauro recently concluded studies of invertebrate and amphibian use of vernal pools in southern Maine, and amphibian use of human created vernal pools (skidder ruts, roadside ditches, gravel pits) on industrial forest land in central Maine. In 1997 and 1998, MDIFW and Maine Audubon studied amphibian use of vernal pools in southern (York, South Berwick), central (Edinburg), and northern Maine. In 1998 and 1999, we continued studies to evaluate the effectiveness of using low-level aerial photography to locate potential vernal pools in hardwood and softwood dominated settings in forested areas west of Ashland.

At this time, MDIFW is seeking voluntary, not regulatory, protection of these valuable wildlife habitats. Workshops on vernal pools have been held throughout the state for land managers, educators, land trusts, and land owners. In 1999, a Maine *Citizen's Guide to Locating and Describing Vernal Pools* was updated and republished with help from EPA and is available from MDIFW and Maine Audubon. Best Management Practice guidelines for forest management were completed in 1999 and will be published in 2000. Guidelines for urban and residential development surrounding vernal pools are being developed and should be available in 2001. Finally, a vernal pool working group has been developing a definition for Significant Vernal Pools, a new Significant Wildlife Habitat by the state Natural Resource Protection Act.

--Phillip deMaynadier

Amphibian Monitoring

Since 1989, many herpetologists have been concerned that amphibian populations may be declining worldwide. Maine, like many other states, had little data to assess trends in amphibian populations. In 1996, MDIFW and Maine Audubon received an Outdoor Heritage Fund grant to initiate a statewide amphibian monitoring program, which was launched in 1997. Maine's new Calling Amphibian Survey is part of a nationwide survey organized by the U.S. Geological Survey - Biological Resource Division. Sixty-two frog and toad monitoring routes along roads were randomly established across the state. Each spring, volunteers drive their routes 3 times, recording the diversity and intensity of calling frogs and toads. MDIFW is seeking volunteers to conduct routes and will provide training materials and a cassette tape of the calling amphibians of Maine. Thus far, over 100 volunteers are participating, and nearly all of the 62 routes were run in 1999. Three years of data have been collected, and within 5 to 7 years, we anticipate being able to determine population trends for many of Maine's frog and toad species.

--Phillip deMaynadier

Champion Forester's Guide for Endangered Species

In 1999, listing proposals for the Canada lynx, gray wolf, and Atlantic salmon were controversial issues that pitted endangered species against forest practices in Maine. This is unfortunate, because in many instances, forestry practices can be compatible with endangered species recovery. In 1996, Champion International Paper Company natural resource managers approached MDIFW, Maine Natural Areas Program, and USFWS to work cooperatively on a pocket guide for foresters and loggers on managing lands for endangered and threatened species. Champion is producing similar guides in all states in which they have major land holdings.

Threatened and Endangered Species in Forests of Maine was completed in 1999. This 175-page pocket guide contains information on how to identify endangered and threatened plants and wildlife species and their habitat, where they are located in Maine, and it includes recommendations for forest management. Several other organiza-

tions have since joined to help produce and distribute the manual, including the U. S. Forest Service, Forest Society of Maine, National Fish and Wildlife Foundation, and University of Maine Cooperative Extension. The guide is available to land owners and managers for free, while supplies last, at all MDIFW offices, county Cooperative Extension Offices, or can be ordered by mail for $2.17 (to cover postage) from the MDIFW Information Center (207 287-8000).

--Mark McCollough

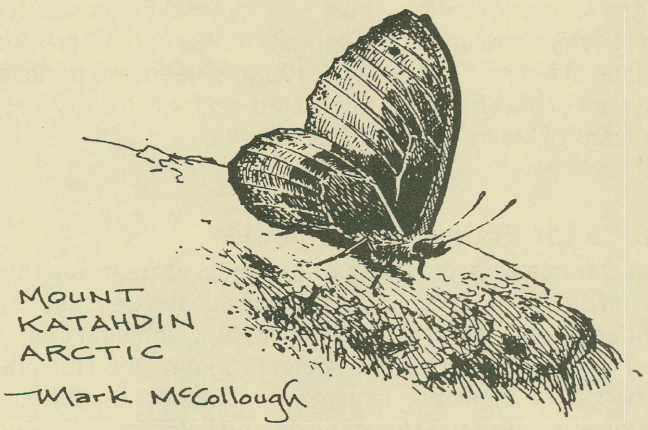
MAINE'S NATURAL HERITAGE PROGRAM

MDIFW is part of a cooperative national/international network of Natural Heritage Programs and conservation data centers. Natural Heritage Programs were created by The Nature Conservancy (TNC), an international nonprofit organization devoted to the conservation of biological diversity, to inventory and monitor the status of rare species and ecological communities, track their locations, and facilitate site protection programs and conservation planning. Today, Natural Heritage Programs exist in all 50 states, as well as many other countries, and most are now funded and managed by state or federal agencies, who operate cooperatively with TNC.

At the heart of every Natural Heritage Program is the Biological and Conservation Data System (BCD), a complex data management system designed to track information on the status, life history, conservation needs, and occurrences of rare species and natural communities. As a partner in the Natural Heritage network, MDIFW is responsible for maintaining the zoological portion of the BCD for Maine, while the Natural Areas Program (Maine Department of Conservation) maintains the rare plant and natural community components. MDIFW's zoological database currently contains information on nearly 900 animal species native to our state. It also tracks more than 2,000 known occurrences of rare species in Maine, ranging from bald eagle nest sites to rare freshwater mussel areas and roseate tern nesting islands. This information is invaluable to MDIFW for status assessment, species management, and habitat conservation for endangered, threatened, and other rare species. BCD data are also regularly provided to other state and federal agencies, municipalities, conservation organizations, and landowners, to assist with planning and conservation projects, and to ensure the most current information on Maine's rare species is available to all who need it.

In 1999, 74 new Element Occurrence Records were entered into the BCD bringing the total number of rare species locations tracked to 2,171. An updated GIS copy was provided to all seven MDIFW regional offices to assist with environmental permit review, information requests, habitat protection, and conservation planning initiatives. Statewide BCD data was also provided for the Department's *Habitat Conservation and Mapping Project* (HCAMP).

--Beth Swartz



WILDLIFE HABITAT

WILDLIFE HABITAT CONSERVATION IS ONE OF THE HIGHEST PRIORITIES OF THE WILDLIFE DIVISION. The Wildlife Habitat Group, based in our Bangor office, is the focal point for many of the Division's habitat initiatives, from the landscape planning effort for southern Maine to sensitive area identification for oil spill response. Our Wildlife Habitat Group staff continued to work on several other major wildlife habitat projects over the past year, including habitat data collection and analyses for input to species habitat assessments. Completion of these tasks required close coordination with wildlife biologists in the Division's seven regional offices and with the species specialists in the Wildlife Resource Assessment Section in Bangor. We also worked closely with many state and federal agencies, as well as landowners and private conservation groups.

CONSERVING WILDLIFE HABITATS AND OPEN SPACE IN SOUTHERN MAINE

MDIFW is moving forward with developing maps to identify habitats required to support wildlife species over Maine's diverse landscape. Based on these maps, our Department will be able to provide specific guidance to towns for developing open space plans to address the many concerns with the issue of "sprawl" (a pattern of development resulting from dispersed, uncoordinated commercial, residential, and transportation construction in less developed areas of the state). Sprawl usually results in a loss of wildlife habitat. Over the next year, the Wildlife Division will be finalizing this planning effort and working proactively with municipalities in southern coastal Maine.

We are also working with local land trusts to identify focus areas for conservation to prevent further loss of important wildlife habitats. Working cooperatively with Maine Natural Areas Program, Maine Coast Heritage Trust and Maine Audubon, MDIFW staff have identified focus areas for land trusts in the mid-coast area. We have also been providing guidance to a group of land trusts and conservation organizations in southern coastal Maine and in the Mt. Agamenticus area.

OIL SPILL RESPONSE AND PLANNING

Julie N Oil Spill Settlement Reached with State and Federal Trustees

A 1 million dollar settlement for the restoration of resources injured during the 1996 *Julie N* oil spill was received in May 2000. This settlement was based on efforts of Inland Fisheries and Wildlife staff and other trustee agencies to document damages to natural resources as a result of the 1996 spill. We also identified appropriate restoration projects to address these damages. A restoration project has been identified in the Scarborough Marsh area to compensate for the impacted wildlife (birds) and wetlands. The cost of this and other natural resource projects will be paid from the settlement reached with the owner of the *Julie N*.

Hope for the Best and Plan for the Worst!

Although we have been fortunate not to have a large spill since the *Julie N* hit the Million Dollar Bridge in Portland, oil spill response planning efforts at MDIFW continued over the past year. In coordination with wildlife species specialists and regional biologists, the Wildlife Habitat group has been working to improve oil spill response capabilities. Of highest priority is the identification of sensitive coastal wildlife habitats that will need protection in the event of a marine oil spill. MDIFW's staff has been working to identify specific habitats that should be protected from oil spills throughout the year. Our oil spill biologist has provided habitat updates to the Department of Environmental Protection (DEP) for a variety of coastal species (shorebirds, seabirds, waterfowl, wading birds, Endangered or Threatened species, etc.) to generate revised Environmental Vulnerability Index (EVI) oil spill response maps. Those areas identified will be given the highest priority during cleanup operations following an oil spill. We are continuing to collect and provide current coastal wildlife habitat information to periodically update these maps.

Another component of our oil spill planning efforts is wildlife rehabilitation. We are cooperating closely with DEP to implement the wildlife rehabilitation plan outlined in the Marine Oil Spill Contingency Plan for the State of Maine. A major component of this plan is training state/federal agency staff and volunteers to conduct wildlife rehabilitation. In coordination with the State wildlife rehabilitation contractor, International Bird Rescue and Research Center, we conducted an intensive 2-day training session for local wildlife rehabilitators in 1999. A 1-day training session was also held for volunteers in Augusta. In addition to training, we are continuing to procure rehabilitation materials and equipment in preparation for an oil spill response. We have a standing Memorandum of Agreement with the Maine National Guard to use their facilities for wildlife rehabilitation during an oil spill.

Wildlife deterrence equipment was tested over the past year at Eastport and in the vicinity of a southern Maine mussel farm. In both cases, the equipment effectively deterred birds from the area.

Finally, we have spent numerous hours in planning efforts at the state and federal level. We have provided comments and updates to the Maine Oil Spill Contingency Plan. Our staff has assisted in preparing and updating the Area Contingency Plan, a Federal effort coordinated by the U.S. Coast Guard. This plan addresses oil spill response efforts for the coast of Maine and New Hampshire. Inland Fisheries and Wildlife is represented by the Habitat Group on the Area Committee, a group of State and Federal agency representatives authorized to approve the Area Plan. We are coordinating with our neighbors, New Hampshire and New Brunswick, through Federal oil spill planning and exercise efforts. We are also working directly with the U.S. Fish and Wildlife Service to address oil spill-related issues of common interest - recently finalizing a Memorandum of Agreement for cooperation on oil spill response.

If you are interested in volunteering to help rehabilitate oiled birds and wildlife during a marine oil spill, please mail your name, address, and daytime phone number to:

Maine Department of Inland Fisheries and Wildlife
ATTN: Oil Spill Volunteer
650 State Street
Bangor, ME 04401-5654

UPDATE ON HABITAT CONSULTATION AREA MAPPING PROJECT (HCAMP)

HCAMP was implemented by MDIFW in 1998, in cooperation with the Maine Natural Areas Program (MNAP) in the Department of Conservation, and it continues to be an important tool for our regional staff. Each HCAMP map (1:70,000 scale), or a computer version, identifies known locations of all natural features and wildlife habitats that, because of species rarity or special habitat requirements, need to be addressed through regulation, landowner notification, or some level of cooperative habitat protection planning. Locations of these habitats are indicated on the maps by grid cells (roughly 0.24 mi square, or about 154 acres). Grid cells are "turned on" by:

- Endangered, Threatened, and special concern plants and wildlife;
- Essential Habitats for Endangered and Threatened species;
- Deer wintering areas;
- Waterfowl and wading bird habitats;
- Shorebird feeding and roosting areas;
- Seabird nesting islands; and
- Other plant and wildlife habitats of concern.

If a proposed project falls within a shaded grid cell on the map, indicating the presence of a habitat of concern, the applicant is encouraged to visit or contact MDIFW or MNAP. If a project is on or adjacent to any standing or flowing water, Regional Fisheries Biologists should be contacted.

MDIFW and MNAP annually update these maps, highlighting habitats for the public to facilitate, streamline, and provide predictability to the environmental permitting process; help landowners plan, in advance, for impacts of proposed projects on candidate Natural Resource Protection Act (NRPA) Significant Habitats, Essential Habitats for Threatened and Endangered species, and habitats for Threatened and Endangered plants; cooperatively work with landowners for land management or project modifications that will retain the value of important natural features and wildlife habitats; share knowledge of these special habitats with landowners for their information, appreciation, and planning; and standardize, on a statewide basis, permit reviews and comments on habitat issues to the public by MDIFW and MNAP.

Since many areas defined on the maps include unregulated habitats, the maps provide an opportunity to meet with landowners, notify them of special features of their ownership, and provide guidance on project planning and land management to avoid, or minimize, disturbance to these important areas. Although inventory of these habitats will never be complete, the information presented on the maps is the most current available to MDIFW and MNAP.

A final important note: THESE ARE INFORMATIONAL MAPS, NOT REGULATORY MAPS.

DEER, WATERFOWL, WADING BIRD HABITAT DATABASES AND MAPPING

Our Habitat Group, in cooperation with regional biologists, has developed computer database applications for Deer Wintering Areas (DWAs) and Waterfowl and Wading Bird Habitat (WWHs). These databases will allow more efficient tracking of these important habitats and will be installed in the Department's regional offices, Augusta, and Bangor.

With input from our regional wildlife biologists, our Habitat Group has been updating mapped DWAs and WWHs in the Geographic Information System (GIS). DWAs mapped in both Land Use Regulation Commission (LURC) jurisdiction and organized towns (candidate Significant Habitats) have been reviewed and updated by MDIFW regional biologists. During the last year, regional wildlife biologists have also been updating maps of WWHs. Many of these areas were included on maps provided to organized towns as part of the comprehensive planning process. Currently we are analyzing how WWHs are distributed over the landscape and updating the Habitat Consultation Areas maps with the new WWH information.

SPECIES HABITAT ASSESSMENTS - INPUT FOR PUBLIC WORKING GROUPS

Wildlife Division species specialists are continuing to update the species assessments for the current planning cycle. For each major species, we are documenting the current status of the population and habitat. The Habitat Group is providing support for this process by collecting and analyzing available habitat data (e.g., U.S. Forest Service's forest resurvey data for the State of Maine collected in 1994-95 at over 3000 plots throughout the state). We are converting these data into a useable form (by Wildlife Management Districts) for input to species habitat models. In addition, we are working closely with remote sensing experts from the University of Maine to utilize satellite data to map habitats at a statewide scale. Other available data on human population trends, agriculture, development, etc. are being assembled to assess effects of humans on the availability of wildlife habitat.

Work is continuing to collect more current data on the forest survey plots (see above). Our staff has provided input to the development and implementation of an annual survey. These surveys will result in a complete statewide survey every five years with more timely data for our wildlife habitat assessments.

WILDLIFE HABITAT CONSERVATION

Wildlife habitat conservation through acquisition, easement, etc. is occurring on many fronts in Maine. Within the Wildlife Division, the Acquisition Committee comprised of Regional and Resource Assessment staff has been reviewing many proposals and providing guidance on wildlife values of these proposals. Our Habitat Group has been supporting these efforts including developing a GIS analysis model to proactively identify areas of high wildlife value for future conservation.

OTHER IMPORTANT HABITAT PROJECTS

We are assisting in mapping habitats for protection under the Natural Resource Protection Act (NRPA). Criteria have been developed by Wildlife Division staff to define many of these habitats, and existing data are being analyzed in GIS to facilitate habitat mapping and conservation. As warranted, we will prepare maps and provide them to the DEP to implement habitat protection. Seabird Nesting Islands are currently the only habitat designated as Significant Habitat under NRPA.

In addition, we are continuing to build on our current knowledge of GIS and computer technology to provide the support needed to meet the goals and objectives identified for protection and management of wildlife habitats. We are planning for additional training and integration of new approaches, such as Global Positioning Systems, into our operation to provide support to Wildlife Division staff and gain a better understanding of wildlife habitats. Many challenges lie ahead as the Wildlife Division moves into a more active role of habitat conservation and management to maintain the wildlife populations of Maine. This will require a major effort for the Wildlife Division team.

USING CURRENT TECHNOLOGY-GEOGRAPHIC INFORMATION SYSTEM (GIS)

Using the GIS, the Habitat Group staff is able to track a wide variety of wildlife habitats with digital data, analyze these data, and generate maps of important habitats for protection and management. During the past year, we continued to enter mapped boundaries or point locations into the GIS. This process is referred to as "digitizing," or creating a computerized digital version of the hardcopy maps. Inland Fisheries and Wildlife is using standard base maps generated by the State Office of GIS (OGIS) on which to locate many of the wildlife occurrences and habitats. In addition to digitizing the mapped features or habitats (deer wintering areas, seabird nesting islands, bald eagle nests, etc.), information about these features or habitats is also being entered so we can determine how and when these locations are being utilized by wildlife. Using the GIS, maps can be produced for biologists in Bangor, biologists in our regional

offices, other agencies, landowners, conservation groups, etc. for general information, regulatory purposes, planning, and many other uses. Habitat Consultation Area maps (see previous description) is one example of such maps produced using the GIS.

Major projects (described previously) that required the use of GIS over the past year included development of HCAMP maps; continuing work on identification of sensitive coastal wildlife areas for marine oil spill response; entry of DWA regulated by LURC into GIS; digitizing DWA and WWH in southern and western Maine; tracking Essential Habitats for Endangered or Threatened species; and mapping locations of Endangered, Threatened, or special concern species being tracked in the wildlife portion of the Natural Heritage database.

--Richard Dressler

ALWAYS SEEK PERMISSION

Before engaging in any form of outdoor recreation on property which belongs to someone else. If you know you are welcome to use someone's land, don't abuse the privilege. If you don't know if you are welcome, find out. If the land is posted or you know you are not welcome, find another location. A hunting or trapping license does not give you the right - stated or implied - to go on another person's land against their wishes.

MAINE LANDOWNERS
LAND USERS

MAINE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE

LEE PERRY, COMMISSIONER
FRED HURLEY, DEPUTY COMMISSIONER

Members of the Commissioner's Advisory Council

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general information about fish and wildlife, licenses, and
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TDD # — 287-4471

For our automated line with seasonal information/updates
on hunting & fishing seasons and laws.....call **(207) 287-8003**

Check out our home page on the Internet at http://www.mefishwildlife.com

REGIONAL HEADQUARTERS
(Game Wardens and Biologists)

Ashland -- 435-3231
Gray -- 657-2345
Sidney -- 547-5300
Bangor -- 941-4440
Greenville -- 695-3756

ADDITIONAL REGIONAL BIOLOGISTS

Enfield -- 732-4131
Machias -- 255-4715
Strong -- 778-3324

If you cannot locate a warden at the above numbers,
contact either the Department office in Augusta (287-2766)
or the nearest State Police barracks:

STATE POLICE TOLL-FREE NUMBERS
Augusta 1-800-452-4664 / Houlton 1-800-924-2261
Skowhegan 1-800-452-4664 / Orono 1-800-432-7381
Thomaston 1-800-452-4664 / Gray 1-800-482-0730

The State Police numbers may be used to report a fire ONLY if a warden or forest ranger cannot be reached.

To report wildfire arson call
1-800-987-0257
Maine Forest Service
Department of Conservation

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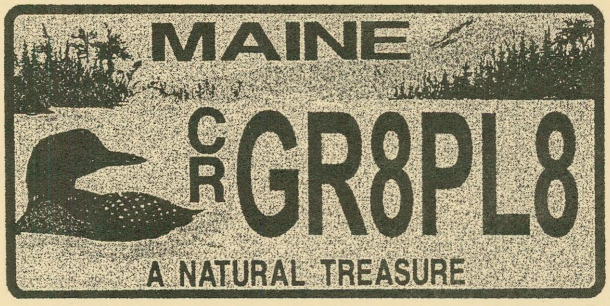

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