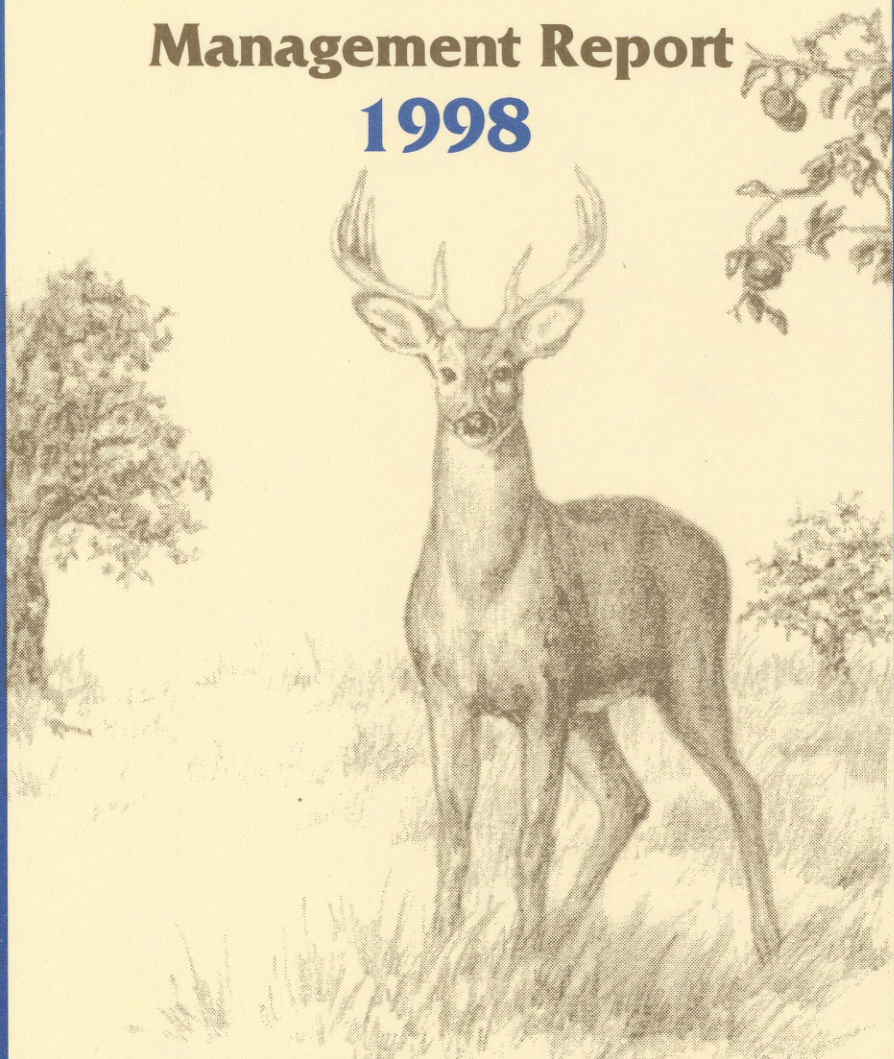


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Lee E. Perry, Commissioner

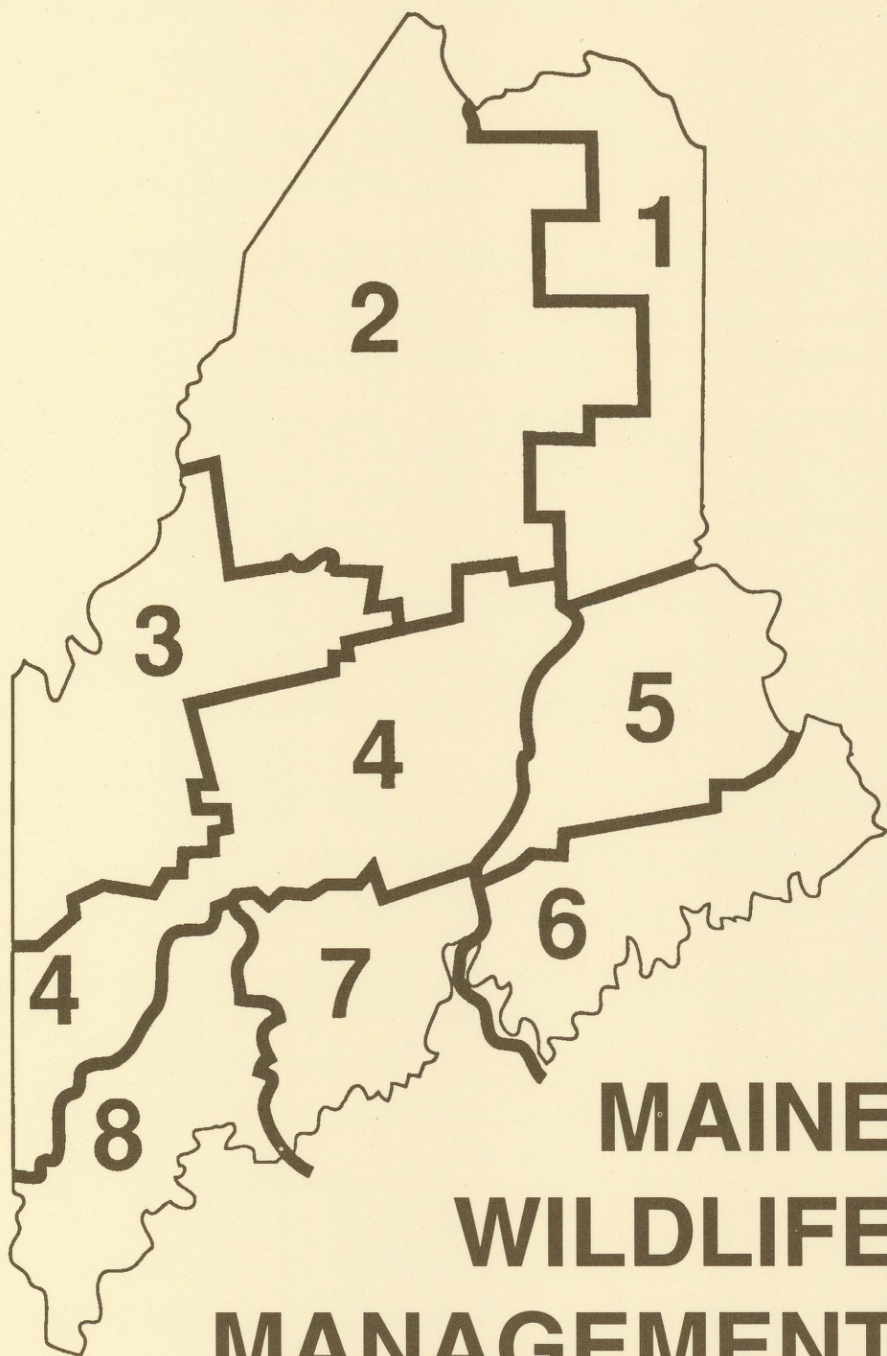
Wildlife Division

Research & Management Report

1998



George J. Matula, Jr., Editor



**MAINE
WILDLIFE
MANAGEMENT
UNITS**

INTRODUCTION

It has been a busy year for the Wildlife Division. In addition to the many critical and varied activities that you find described in this report, we have undertaken some major new directions. We have started to take advantage of some important successes in proactive habitat conservation efforts. We have signed agreements with several industrial forest landowners to cooperatively manage hundreds of thousands of acres of forestland for wildlife, as well as timber values. We continue to work with most of the major landowners to develop cooperative management agreements on lands across the state.

As outlined in the Habitat Group's section of this report, we continue to work with the Maine Natural Areas Program to implement a mapping project to identify areas that need special management consideration. This will help landowners know where they must address habitat protection regulations, or simply that there is some species on their land that we can help them protect through advice, assistance, or cooperative agreement. These areas include deer yards, locations of rare species, and high value wetlands.

As always, we are committed to balancing short-term and long-term needs of wildlife with the wishes and needs of Maine's people. I hope you enjoy this report.

Ken Elowe
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.

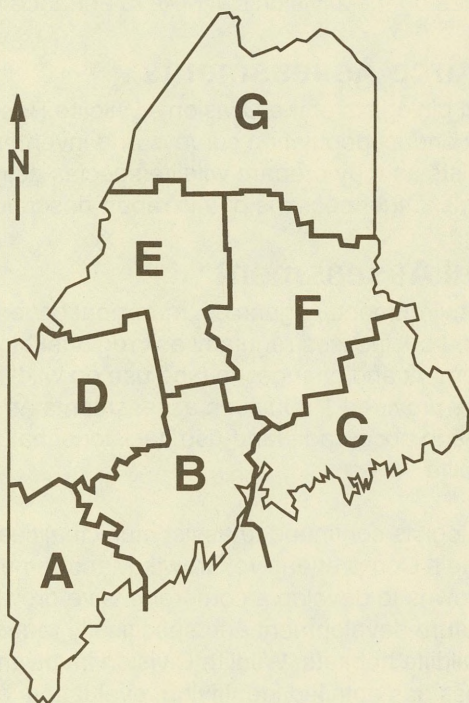
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REGIONAL WILDLIFE MANAGEMENT

The eighteen wildlife biologists who staff the seven regional field offices of the Maine Department of Inland Fisheries and Wildlife (MDIFW) constitute the majority of the Regional Wildlife Management Section (WMS). They are responsible for implementing the Wildlife Division's management program within their assigned geographic area (Figure 1). The Sidney regional office has two additional personnel who assist with operations at the Steve Powell Wildlife Management Area (WMA) on Swan Island and at the Frye Mountain WMA. The Regional Wildlife Management Section also employs and assigns a wildlife biologist to the Bureau of Parks and Lands (BP&L). 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

The Department of Inland Fisheries & Wildlife owns or has agreements on approximately 98,000 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 maintain 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 and adjustment if they are to continue to provide wetland habitats for a variety of wildlife. In addition, regional biologists maintain several hundred waterfowl nest boxes on the WMAs.

Regional staff mow small fields on the wildlife management areas 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 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 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. Over the last year, WMS biologists provided 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.

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 state-wide 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; and seabird nesting islands.

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 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, Canada geese, and to "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 in them to assess the number of deer using the area and characteristics of the yards' 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 organized towns, wildlife biologists provide 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 1,900 acres within zoned DWAs.

Wildlife Introductions

Regional biologists continued their successful efforts to reintroduce the wild turkey to its historical range in Maine. In addition, they monitored existing flocks of wild turkeys established by earlier releases. The Bird section of this report contains additional information about wild turkey management.

— G. Mark Stadler, Supervisor, Regional Wildlife Management Section

WILDLIFE MANAGEMENT SECTION HIGHLIGHTS

Bureau of Parks and Lands

The Bureau of Parks and Lands, Department of Conservation, has management responsibility for approximately 574,000 acres — 482,000 acres of Public Lands and 95,000 acres of Parks and Historic Sites. The Bureau manages the resources present on this acreage according to an Integrated Resource Policy (IRP), a planning document that guides the development of individual management plans for each Public Reserved Land unit. The existing IRP operates under a “dominant-use” land-classification system, where protection of the most sensitive resources takes precedence over other allowable, but secondary, uses.

A 30-member IRP Advisory Committee is currently reviewing the Bureau’s existing resource policy. This committee, made up of Bureau staff and non-bureau stakeholders, will make recommendations for new or revised resource management policies, as proposed by Technical Working Groups, in the areas of recreation, historic and cultural, fisheries and wildlife, natural and geologic features, and timber and renewable resources. Mark Stadler and I represent MDIFW on both the IRP Advisory Committee and the Fisheries and Wildlife Technical Group.

The revised IRP will guide the management of Public Reserved Land units, State Parks, and State Historic sites over the next ten years. The Bureau will present the final draft of the revised IRP to the public at four meetings next spring. We anticipate adopting the revised IRP in midsummer of 1999. The Bureau adopted its first IRP in 1985.

— Joseph E. Wiley, Staff Wildlife Biologist

Region A—Gray

Almost 50% of the state’s population lives within the 90 towns — approximately 10% of the state — comprising Region A, the southern most region in Maine. As development associated with this population encroaches upon and fragments wildlife habitat, and places people in proximity to wildlife, conflicts between wildlife and their “new neighbors” occur. These facts explain why Region A is busy addressing complaints about “nuisance” wildlife.

In response to these nuisance wildlife complaints, many involving “house and garden” pests, the Wildlife Division developed an Animal Damage Control Program (ADC). Over the past few years, a knowledgeable and dedicated core of ADC cooperators has evolved. The Regional Office maintains a list of these trained ADC cooperators, and we distribute this list to local police departments, sheriff offices, and state police barracks. This allows a timely response to many complaints.

Our ADC cooperators were extremely busy during 1997, handling at least 2,863 nuisance animals. Among these were 889 skunks, 683 squirrels, 512 raccoons, 287 woodchucks, 263 bats, 57 opossums, 52 beavers, 23 foxes, 23 porcupines, as well as an assortment of birds, snakes, and turtles. The Department's staff could not possibly handle this volume of complaints alone.

Regional biologists and wardens continue to handle larger wildlife species such as deer, bear, moose, and turkeys. The ADC program has been highly successful in resolving a large variety of nuisance complaints in a timely manner, thus freeing Department personnel to work on other projects.

— Philip A. Bozenhard, *Regional Wildlife Biologist*

Region B—Sidney

Region B staff are responsible for 22 wildlife management areas, totaling over 20,000 acres. In addition, the region manages several additional areas, such as leased marshes, via agreement.

Last year, the Division's habitat acquisition efforts expanded two wildlife management areas in the region. The Division added 80 acres to the R. Waldo Tyler WMA located in South Thomaston and Owl's Head, using a Coastal Wetlands Grant. The Tyler addition includes a mixture of upland forests and agriculture fields bordering the high-value salt marshes of the Weskeag River for nearly a mile. Acquisition efforts also enlarged the "Doc" Garcelon WMA, located in Augusta and Windsor, with the addition of 88 acres of upland bordering both Dam and Tolman Ponds in Augusta. This acquisition protects a significant amount of shoreline on both ponds and provides improved public access to this important management area in central Maine.

The Maine Wetlands Protection Coalition (MWPC) has also been successful in acquiring high-value salt marsh habitat in the lower Kennebec River and Merrymeeting Bay area — Maine's second most important coastal wetland conservation area after Cobscook Bay. The MWPC has acquired in fee or received conservation easements for nearly 900 acres. These wetland acres, and their associated estuarine and upland habitats, are especially important to migrating water birds in the Atlantic Flyway. Prior to their acquisition and protection, coastal residential development threatened them with increased run-off, siltation, and habitat degradation. The MWPC includes MDIFW, U.S. Fish and Wildlife Service, Lower Kennebec River Land Trust, Phippsburg Land Trust, The Nature Conservancy, Maine Coast Heritage Trust, Ducks Unlimited, and private landowners. MDIFW will be the agency responsible for managing these important habitats for wildlife.

— Eugene A. Dumont, *Regional Wildlife Biologist*

Region C—Machias

Regional staff in Machias oversee an extensive Animal Damage Control (ADC) program that seeks to minimize damage to public and private property while maintaining healthy wildlife populations for various recreational pursuits.

This ADC program involves a three-step approach to managing nuisance animals: prevention, deterrence, and relocation.

Black bears are both an asset and a liability in Downeast Maine. During the recent decline in deer numbers, bears have become an important game species and a mainstay for local guides and sporting camp owners. By contrast, bears can generate a significant cost to the area's wild berry industry. Bears can cause direct damage to plants and berries. They also can damage or destroy the bee hives that the growers specifically locate throughout the barrens to pollinate commercial blueberry and cranberry crops. Other complaints arise when bears raid dumpsters, household trash cans, barbecue grills, or livestock feeds. Regional staff resolve many bear problems by encouraging landowners to remove improperly stored garbage, install covers on dumpsters, or erect temporary electric fences around bee hives. We have experimented with chemical repellents to discourage bears from frequenting dumpsters and beehives. As a last resort, we capture nuisance bears and relocate them to the more remote parts of the region.

Management of beaver also requires a careful balance between benefits arising from their activities and the costs associated with the damage they can do. Beaver provide economic value to trappers. Beaver flowages provide many acres of high-quality wetlands which benefit fish, waterfowl, and a myriad of non-game species. On the other hand, beaver activity can damage commercial and ornamental trees, and flowages adjacent to railways or roads can damage the roadbed. Regional staff or ADC agents install wire fences around culverts at these roadside flowages to prevent beaver from plugging them. We may also insert PVC drain pipes through the dam to stabilize water levels at an acceptable level, ensuring the largest possible impoundment without threatening the road or any adjacent structure, such as a bridge. Some sites simply do not allow elevated water levels; only then do we consider trapping and relocating the beaver. This approach has resulted in ample numbers of beaver to satisfy public demand, creation of many high-quality wetlands, and a cost-effective means of minimizing damage to public and private property.

— *Dwight Welch, Ass't Regional Wildlife Biologist*

Region D—Strong

Scientists have recognized the harmful effects of mercury as an environmental pollutant for several decades. It has become an issue of concern in Maine in recent years, particularly with the implementation of a statewide fish consumption advisory. Mercury occurs in the environment naturally, but its ultimate source to most aquatic ecosystems is atmospheric deposition, primarily from coal burning and incinerator emissions. This "heavy metal" affects reproduction, behavior, and survival of humans and wildlife.

As a member of the New England Loon Study Working Group, I have been assisting with a study designed to determine the common loons' exposure to mercury and other heavy metals; identify potential effects on loon survival,

behavior, and reproduction; and investigate the relationship between fluctuating water levels and mercury exposure. Central Maine Power and Union Water Power Company initiated this study of mercury availability on their storage reservoirs as part of their hydroelectric relicensing process. Biodiversity, Inc., coordinates the study, which includes participation of volunteers from private industry, state and Federal agencies, nonprofit organizations, and universities.

Sampling has concentrated on both natural lakes and reservoirs with fluctuating water levels in the Kennebec River and Androscoggin River watersheds in Maine and New Hampshire. Researchers capture loons at night using spotlights, tape-recordings, and mimicked loon vocalizations to attract family groups. They then collect blood and feather samples and mark all loons with colored aluminum or plastic leg bands for future identification. They also measure mercury concentrations in fish loons prey upon.

Over the next several years, this study will provide information on availability of mercury in the Kennebec and Androscoggin watersheds, its effect on a long-lived wildlife species, and whether fluctuating water levels contribute to mercury exposure.

— Sandra L. Ritchie, *Regional Wildlife Biologist*

Region E—Greenville

The bobcat, and its northern cousin, the lynx, both reside in Maine's woodlands. The bobcat inhabits much of the state, but is less abundant in northern and western Maine where winter brings deep snow. The rarer lynx, however, is adapted for deep snow with its large "snowshoe-like" feet. Consequently, biologists think the lynx is restricted to northern and western Maine, although its exact distribution is not well known.

Region E wildlife biologists were concerned about the rarity of lynx and the lack of good information on its numbers and distribution. To address this, we conducted winter tracking surveys in the Moosehead Lake Region in the early 1990s. Our objective was to collect basic "presence or absence" information on lynx in different parts of our region. Prior to this time, information on lynx in the region was largely anecdotal, although Department personnel had observed lynx tracks on several occasions.

The Wildlife Division ran 1,200 kilometers (700 miles) of track surveys via snowmobile in 16 townships during the winter of 1995. These efforts resulted in 4 different 1-kilometer segments that contained lynx tracks, which translates to less than 0.4% (4/1,200) of all segments surveyed. We conducted similar tracking efforts during the winter of 1996/97 in a different part of the region. Unfortunately, we found no tracks that winter. This past winter, we switched gears a little and modified our plans. Instead of trying to cover large areas where we had no prior records of lynx, we concentrated our efforts in areas where we had documented lynx before to see if the animals were still there. Although terrible weather during most of January plagued the trackers, they

were still able to cover 900 kilometers by the end of the season. Two, 1-kilometer segments contained lynx tracks, or less than 0.3 % of all segments surveyed. We found these results discouraging, although somewhat expected when we considered the poor tracking conditions and the apparent low numbers of lynx. On a brighter note, Bill Noble, the Assistant Regional Biologist, documented lynx tracks in 2 new areas in the region this past winter.

— Douglas M. Kane, *Regional Wildlife Biologist*

Region F—Enfield

Herbaceous seeding — plantings of grasses and legumes — is a great wildlife management technique all landowners can use whether they own one acre or one million acres. Region F staff routinely plant herbaceous food and cover plots on our WMAs to improve habitat. Deer, bear, partridge, and hare forage directly on the greenery; small mammals hide and feed in the plots and provide food for foxes, owls, and hawks; and songbirds hunt for insects in these semi-permanent openings. Herbaceous plantings also prevent soil erosion and slow succession of woody brush onto the site.

Log landings and winter roads are the most common sites on which landowners can establish herbaceous food and cover plots, but shoulders and ditches of all-season gravel roads are also possibilities. Site preparation is critical to ready a proper seedbed and to eliminate or reduce competition from woody vegetation. Plantings made in late spring or early fall have the best chance for successful establishment. Successful seedings also may require application of up to 3 tons of lime and 600 to 700 pounds of 10-10-10 fertilizer per acre. The landowner may apply these with a bulk truck, a 4-wheeler with an attached spreader, or a hand spreader. The latter two methods are best suited to small sites or areas inaccessible to a bulk truck. Selecting the proper seed mixture to match shade conditions and to meet your wildlife management objective is another important consideration. Specific seed recommendations are available from your local regional wildlife biologists; grass and clover seed are readily available at local feed-and-seed stores.

So the next time you are out and about and see these grassy areas, remember, landowners have invested time and money in these sites to help wildlife. They restrict motor vehicle access on their property to protect the plantings; please respect their land and efforts by staying off these areas with your vehicle. Would you want someone driving across your lawn?

— Vasco E. Carter, *Ass't Regional Wildlife Biologist*

Region G—Ashland

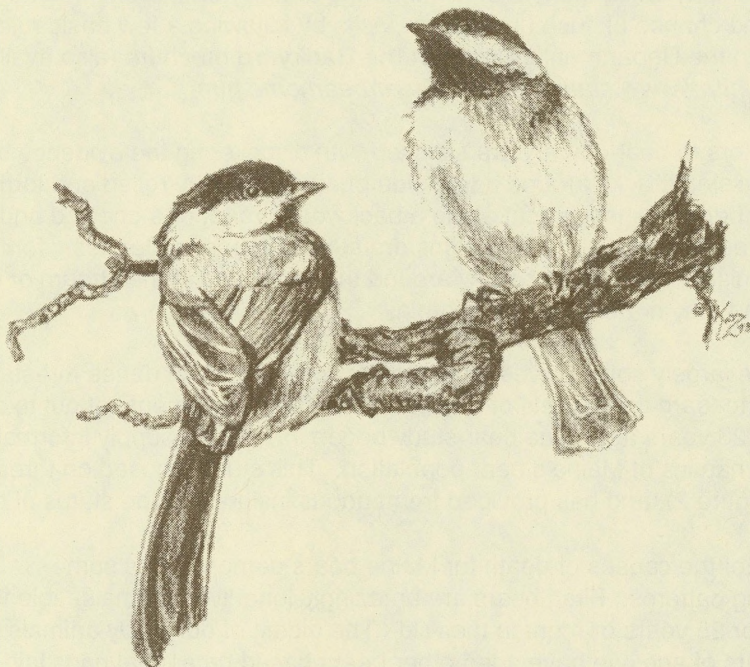
One of our region's main winter jobs is to inventory Deer Wintering Areas (DWAs) — mature, coniferous forest stands which deer occupy in the winter to escape deep snow and wind. This past winter, we aerially searched 40 unorganized towns for deer wintering areas. The plane of choice is a two-seat Super-Cub, which can travel at a relatively slow speed. These flight character-

istics allow us to document the presence of deer in the area and to map the extent of the wintering area. We sit in cramped seats behind the pilot — temperatures outside the plane often hover around 0° F — marking the exact location on a map where we observe deer, deer tracks and trails, active timber harvesting operations, or any other activity that may influence yarding deer on the ground. We systematically search for DWAs by flying the length of all waterways within a town: most deer wintering areas occur in dense conifer stands next to streams, rivers, wetlands, ponds, or lakes. Survey flights are best flown when the sun is shining and relatively high in the sky. These conditions enhance the contrast between tracks in the snow and the surrounding area. Our survey of a town is complete when we have flown all waterways and adjacent areas.

After we complete the DWA survey flights and have located and mapped the wintering areas, we conduct another series of winter surveys on the ground. We snowshoe along compass courses through the deer wintering area and record the amount of deer sign we see — deer tracks, beds, pellet groups, trails, browse — and the characteristics of the forest.

Aerial and ground surveys during the northern winter enable us to locate deer wintering areas, estimate the number of deer inhabiting each area, and assess the condition of the forest stands comprising the DWA. Knowing these, we are able to work cooperatively with individual landowners to manage these critical habitats.

— *Richard T. Hoppe, Regional Wildlife Biologist*



MAMMALS

BLACK BEAR

Maine is home to nearly 23,000 bears, more than any other Eastern state. These “black ghosts” of our forests are symbols of wildness to many Maine citizens, and visitors to Vacationland. Although black bears were traditionally viewed as creatures of deep, unbroken forests, they are adaptable, and often live in close proximity to people. Bears are present throughout much of the State, and are only absent from the extreme southwest coastal region. They are equally at home in the managed industrial forestlands of western, northern and eastern Maine, and along the edges of agriculture, in private woodlands of central portions of the State.

Because bears are shy and secretive, they are rarely seen. Often, we only get a fleeting glimpse of a rapidly disappearing bruin as it crosses a roadway, or melts into the cover of dense woods. More leisurely sightings of bears are usually obtained at a distance, through binoculars or spotting scopes on blueberry barrens, or across clearcuts. Our closest encounters often result from an unintentional attraction: odors related to preparing food in the backyard or while camping, or improper storage of food-containing garbage. Even food intended to attract other wildlife, as different from bears as songbirds, may catch the eye of a wandering bruin! Fortunately, we can reduce the chance of such unwelcome visits by following a few basic rules, as outlined in the Department’s **Bears in the Backyard** brochure (also available online at <http://www.state.me.us/ifw/bear/bearhome.htm>).

Most visitors to bear country are satisfied with discovering the evidence of a bear’s passing: tracks around a trail-side puddle, a freshly rolled and torn log, trampled berry bushes, a scat along a backwoods road, or a chewed and clawed tree or signpost. These signs are sure to increase alertness, for they hold promise — that dark shadow around the next bend in the stream or curve in the road may materialize into a bruin.

Bears live largely solitary lives, and occupy large ranges in dense forests. It is not easy to learn the secrets of their lives, but the Department set out to do just that, 23 years ago. The bear study began in 1975, to supply information on the dynamics of Maine’s bear population. This study focused on three areas (Figure 2), and has provided tremendous insight into the status of bears.

A review of the causes of death for Maine bears demonstrates some interesting patterns. First, bears are amazingly long-lived animals, able to survive for 25 years or more in the wild. The oldest of our study animals died at 25 years of age; we have aged other bears based on annual rings laid down

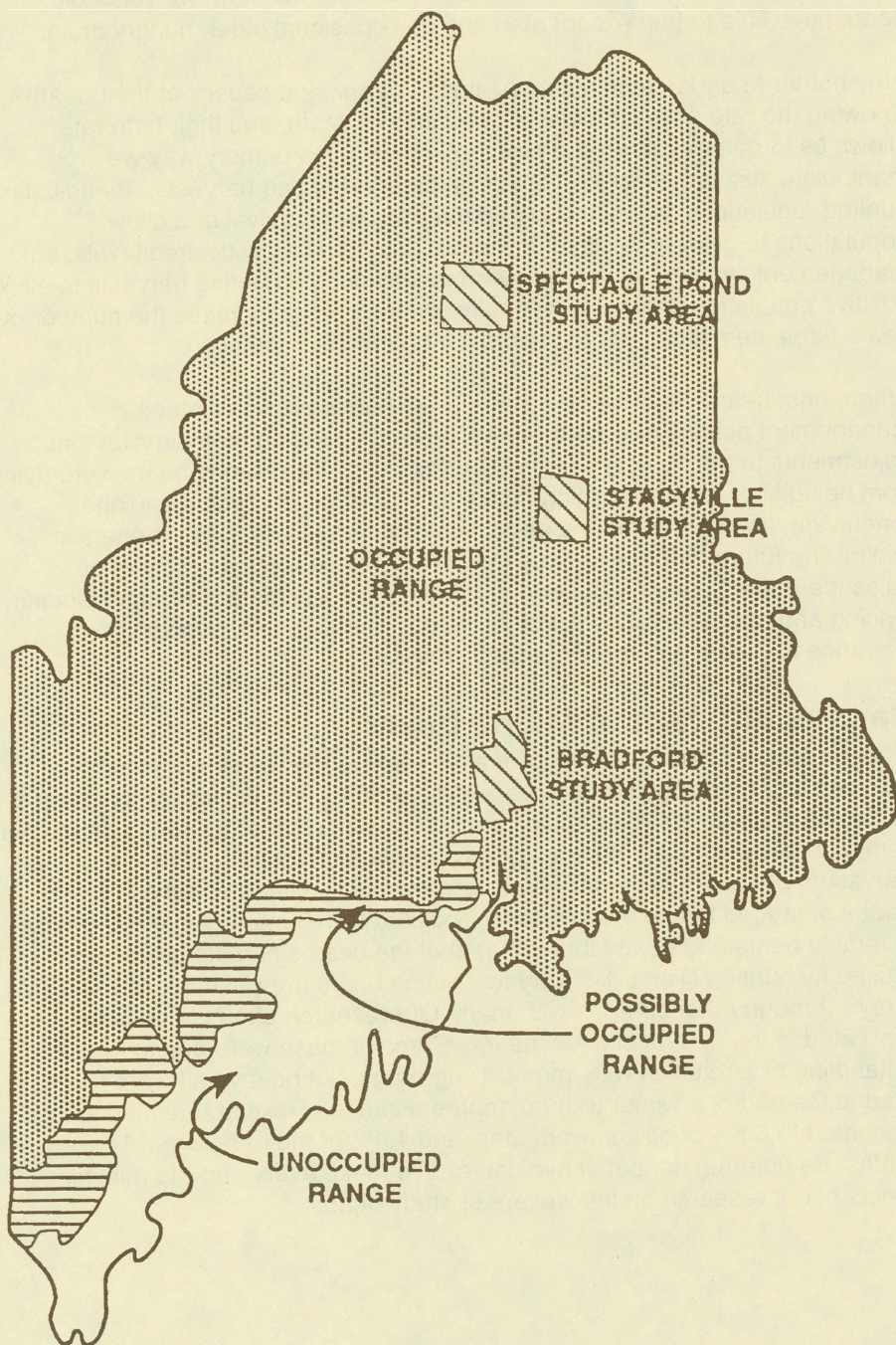


Figure 2. Maine bear range and location of three study areas.

in their tooth cementum at 26 years! Second, once they are two years old, bears have little to fear except man and an occasional older, hungry bruin.

Why bother to understand survival rates of bears, and causes of their death? Knowing the rate at which bears die, causes of death, and their birth rate allows us to determine trends in bear numbers. The primary way we manipulate sizes of bear populations is through hunting harvests. By adjusting hunting regulations, we increase or decrease bear survival and allow populations to grow or decline. If populations drop below desired levels, our management system may recommend restrictions on hunting harvests to allow positive population growth. Conversely, we may act to increase the number of bears harvested each year to control a too-plentiful population.

When most bears die of causes that are not hunting-related, other management actions may be more effective at changing their survival than adjustments to the hunting harvest. For example, if too many bears were dying from being shot while damaging agricultural operations, such as apiaries (beehives), an information and education program to assist beekeepers in minimizing future damage may be the best action to reduce numbers of nuisance-related deaths. Better equipment to protect hives, including electric fencing and relocation of beehives to reduce damage, would increase tolerance for bears and therefore their survival.

Causes of death of Maine bears

What do Maine bears die from? For a 15-year period (1981-1996), we captured and ear-tagged 1,094 bears (449 females, 645 males) and recorded the cause of death for 257 females and 296 males (Table 1). These bears died from a variety of causes: hunting, collisions with automobiles, disease or starvation, predation by larger bears, and research-related activities. Most deaths of tagged Maine bears were associated with hunting, as nearly half of all female bears and nearly three fourths of the deaths of male bears were caused by hunting (Table 1). Very few Maine bears are killed in collisions with cars or through other conflicts with man. Our research efforts have been implicated in the deaths of a few bears. Some of these were due to the stress of handling or a reaction with immobilizing drugs, but nearly half were found dead at the end of a winter with no apparent cause. Research-related losses amounted to 6.5% of all known deaths, and 1.4% of the handlings. These deaths are unfortunate, but unavoidable. We make every effort to minimize effects of our research on the welfare of study bears.

Table 1. Cause of death of black bears at three Maine study areas, 1981-1996.

Study Area	Sex	Age Class	Hunting	Crippling	Auto	Disease					Unknown	Total
						Research	Starvation	Other	Bear			
Spectacle Pond	Female	Cub	2	0	0	0	0	0	2		30	34
		Yearling	9	1	0	3	5	1	1		0	20
		Subadult	19	3	0	2	2	0	4		0	30
		Adult	44	0	0	5	0	1	2		1	53
		Combined	74	4	0	10	7	2	9		31	137
	Male	Cub	5	0	0	1	0	0	2		28	36
		Yearling	4	0	0	0	2	0	1		0	7
		Subadult	47	0	0	0	0	0	0		0	47
		Adult	40	0	1	0	0	0	0		0	41
		Combined	96	0	1	1	2	0	3		28	131
Stacyville	Female	Cub	0	0	0	0	0	0	0		7	7
		Yearling	0	0	0	2	2	0	0		1	5
		Subadult	5	0	0	2	1	0	0		0	8
		Adult	6	1	0	0	0	0	0		0	7
		Combined	11	1	0	4	3	0	0		8	27
	Male	Cub	0	0	0	0	0	0	0		7	7
		Yearling	9	0	0	0	0	0	0		0	9
		Subadult	10	0	0	0	0	0	0		0	10
		Adult	10	0	0	0	0	0	0		0	10
		Combined	29	0	0	0	0	0	0		7	36
Bradford	Female	Cub	1	0	1	3	2	0	0		19	26
		Yearling	11	0	0	6	2	0	0		1	20
		Subadult	14	1	2	4	1	0	1		1	24
		Adult	17	1	1	2	1	0	1		0	23
		Combined	43	2	4	15	6	0	2		21	93
	Male	Cub	3	0	0	5	0	0	1		22	31
		Yearling	7	0	1	0	0	0	1		0	9
		Subadult	59	0	2	1	0	0	0		0	62
		Adult	23	1	3	0	0	0	0		0	27
		Combined	92	1	6	6	0	0	2		22	12

¹Cause of death—for cubs (either sex): determined by in-den counts of newborns and yearlings;—for yearlings and older: telemetry studies for females, and ear tag returns for males.

Survival

Bears are long lived, and have very high survival. Cubs have the lowest survival; about 1 in 3 die during the first year of life. Most of these young bears are apparently lost to natural causes associated with inadequate nutrition. Over 15 years, we tagged 407 cubs in den as newborns. Only 11 (8%) of the 141 cubs which died before reaching one year of age were taken by hunters. The remaining 130 cubs died of unknown causes. As they age, chances that female bears will survive another year increase dramatically, and by the time they are two years of age, their survival is over 95% in the absence of hunting.

Male bears were not monitored with radiocollars, and their seasonal survival was not determined as accurately as females. Males have lower survival than female bears, apparently because they travel over greater distances and are exposed to more threats from other bears and people. Ear-tagged male bears most commonly die from hunting (Table 1). However, because individual male bears may breed with several females during a year, overall population growth is not as closely associated with male survival as it is with survival of females.

Because most deaths of adult bears are hunting related, regulated hunting harvests can effectively control their survival, and therefore the size and trend of the population. Maine's forests are capable of supporting more bears than

people would tolerate, and regulated hunting harvests are valuable tools for maintaining a substantial bear population at densities which provide a variety of benefits to Maine citizens.

The 1997 bear season

Maine's 1997 black bear season included 3 hunting seasons and a trapping season (Table 2). The early general hunting season opened August 25 and closed October 31. Bears could be hunted near natural food sources, or by stalking/stillhunting during this period. Hunting over bait was permitted from August 25 through September 20. The hound season overlapped the early general season, opening September 8 and closing October 31. The late general bear hunting season opened with the firearms deer season on November 1, and closed November 29. Hunters were restricted to hunting bears near natural food sources or by stillhunting during the late season. The bear trapping season opened September 1 and closed October 31.

Table 2. 1997 Maine bear harvest by Wildlife Management Unit and method of take.

Method of Take	Wildlife Management Unit								STATE
	1	2	3	4	5	6	7	8	
Hunting with bait	288	680	252	201	175	103	0	2	1,701
Hunting with dogs	43	22	95	86	54	44	0	0	344
Trapping	4	5	22	11	9	3	0	2	56
Unknown	38	20	37	50	14	31	1	8	19
Total	373	727	406	348	252	181	1	12	2,300
Archery	53	67	43	39	27	15	0	0	244
Assisted by guide	202	613	243	165	140	63	0	0	1,426

The 1997 harvest of 2,300 bears was marginally greater than the 1996 harvest of 2,246 bears. Except for 1995, when a wide-spread scarcity of natural foods increased bears' vulnerability to hunters, shortened bear seasons in the 1990s have been successful in reducing annual harvests below 2,300 bears.

Consequently, the bear population has grown slowly, and the spring 1998 bear population numbers about 22,000-23,000 bears. The 1995 harvest of 2,645 bears was the second largest harvest on record. Beechnuts, a primary fall food of bears in northern Maine, were scarce in 1997. Early season hunters posted strong harvests, as bears responded well to baits. However, as bears entered dens in mid-late October, late season hunters had difficulty sighting bears or fresh sign.

Geographic distribution of the harvest

Bears were harvested in 12 of the State's 16 counties in 1997. Most bears (706) were registered in Aroostook County, which yielded 31% of the statewide harvest, followed by Piscataquis County with 313 bears (14%). No bears were taken in Kennebec, Knox, Lincoln, or Sagadahoc counties. All Wildlife Management Units (WMU) contributed to the bear harvest. WMU 2

accounted for 727 bears, or 32% of the State harvest, followed by WMU 3 with 406 bears (18%) and WMU 1 with 373 bears (16%).

Timing Of The Harvest

Most bears (1,799) were taken during the early general season. An additional 344 bears were registered during the 8-week hound season, and 101 bears were registered during the late general season. Trappers reported 56 bears during the 6-week trapping season.

Residence Of Successful Hunters

Maine residents killed 798 bears, or 35% of the total. Nonresident hunters registered the remaining 1,502 bears.

Nonresidents accounted for 70% of the early general season harvest, and 69% of the take during the hound season. Resident hunters took 86% of the bears harvested during the late general season. Most bears taken over bait (72%) were taken by nonresident hunters. Hunting with hounds was also popular with nonresidents, as they registered 69% of the bears taken with dogs. Residents tagged 82% of the bears taken by unreported methods, and resident trappers accounted for 91% of the trapping harvest.

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 2,109 bears, or 92% of the harvest. Hunters using dogs took 344 bears (15% of the total harvest). Traditionally, a small but consistent percentage of the bear harvest is recorded by trappers. In 1997, 56 bears (2% of the harvest) were trapped.

Hunters tagged 199 bears by unreported methods in 1997. 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 1997 archery bear harvest totaled 244 bears, slightly higher than the 204 bears taken by archers in 1996.

Assistance By Registered Maine Guides

About 62% of successful hunters (1,426) employed Registered Maine Guides to assist them during their hunt. Most successful guided hunters (1147 or 64%) took their bears in the early general season. An additional 273 guided hunters took bears in the hound season, 6 trappers were guided to their bears, and 1 hunter was guided to a bear in the late general season. Guides helped take 67% of the bears taken over bait, 79% of the bears taken in front of dogs, 11% of bears that were trapped, and 4% of the bears taken by unreported methods.

Sex And Age Distribution Of The Harvest

The 1997 harvest included 1,301 males (57%), 998 females (43%), and one bear of unreported sex. Hunters registered 2,128 bears (93%) as adults, 171 (7%) as cubs, and age was not reported for one bear.

Prospects for the 1998 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 1998, the season will remain similar to those in recent years. The general hunting season will open August 31 and close November 28. Bears may be hunted over bait from August 31 until September 26. Bear hunting with dogs will be permitted from September 14 until October 30. Bear trapping will be permitted from September 1 through October 31.

Maine's spring 1998 bear population is estimated at approximately 22,000-23,000 animals, slightly above the Department's objective level of 21,000 bears. If the pattern of alternating years of abundant and scarce beechnut crops observed in the State continues, 1998 will see an abundance of beechnuts. Consequently, early-season bear harvests could be slowed, as hunters' baits will be less attractive to bruins which have plentiful natural foods to forage on. Subsequently, the late October and November harvest should remain strong in northern Maine as bruins continue to travel and feed late into the fall. The current bear season framework should once again restrict the harvest to about 2,300 bears.

Future Management of Black Bears in Maine

Maine's black bear resource is being managed to maintain distribution and abundance at 1985 levels, but new management directives may soon be developed. The Department's bear management goal is based on Maine's capacity to produce bears, as well as input from several public 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 groups have improved the Department's bear management system, communicating their viewpoints on the usefulness of bear harvest regulations and on animal damage control policies. These groups' support for current management has ensured successful population expansion, and should continue to provide responsible management of the resource in the future.

Reassessment of the status of bears and bear habitat will be part of our management efforts in 1998. Following public input, new management goals and objectives will be formed to guide bear conservation into the next century. Future bear management goals and objectives will continue to reflect the interests of Maine citizens in this valuable wildlife resource.

—Craig R. 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, their numbers in Maine are low; consequently, lynx in Maine are protected year-round. 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 includes: snowshoe hare, New England cottontail, gray squirrel, woodchuck, porcupine, and red squirrel.

1997-98 Fur Harvest

Trapping in 1997-98 for all furbearers, except beaver, was allowed from November 2 through December 31. Maine's special fox and coyote trapping season started a week earlier this year, and ran from October 19 through November 1. The beaver season ran from December 1 through March 31 in Wildlife Management Units (WMUs) 1, 2, 3 and 5, from December 15 through February 28 in WMUs 4, 6 and 7, and from January 1 through February 28 in WMU 8. Additional sections of WMUs 2 and 4 had extended opportunity for beaver trapping this year.

Hunting Seasons were as follows: October 1 through December 31 for raccoon; October 1 through November 30 for gray squirrel; October 1 through March 31 for cottontail and snowshoe hare (except on Vinalhaven [Oct. 1 - Feb. 28]); October 20 through December 31 for skunk and opossum; October 20 through February 28 for fox; and December 1 through January 31 for bobcat. Hunting was allowed year-round for coyote, woodchuck, porcupine, or red squirrel. All Sundays are closed to hunting in Maine.

The 1997-98 trapping season produced the highest upland furbearer harvest in years. The extended trapping season for fox and coyote helped bring about a record coyote harvest of 1,854 tagged pelts; however, red and gray fox harvest levels were within their normal range (Table 3). Fisher harvest levels exceeded the Department's harvest objective of 2,180 animals and were the highest since 1970, when over 3,500 animals were taken (Table 3). The increased harvest was mainly attributed to a growing fisher population (based on a steady increase in harvest and success rates under stable pelt prices). However, low levels of alternative foods, such as beechnuts and the new 3-day conibear tending laws in organized towns, may have contributed to the

Table 3. Furbearer harvests in Maine, 1990-Spring 1998.

	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98
Mink	1,803	1,881	1,549	1,341	1,365	1,139
Otter	887	908	1,324	760	1,237	865
Beaver	9,619	8,177	15,251	7,336	16,640	10,273
Marten	2,090	3,119	2,199	4,478	2,208	5,595
Fisher	1,345	1,623	1,546	1,756	1,886	2,746
Fox (R & G)	1,974	1,791	2,236	2,097	1,624	1,980
Coyote	1,356	1,410	1,647	1,440	1,587	1,854
Bobcat	123	180	157	175	128	199

increased fisher harvest. Marten harvest levels were the highest in 10 years. The marten population appears to be fairly stable, as the indices we use to monitor marten populations did not show any long-term trends in the population. The bobcat harvest was the highest in 12 years. Indices based on trapper success and track counts indicate a stable or increasing bobcat population. Snowshoe hare levels were reportedly higher this year (statewide); consequently, the food base for bobcat may be growing.

The aquatic furbearer harvest retreated back to normal levels after last year's near record beaver harvest. Beaver and otter harvests were down from last year because of poor ice conditions for trapping and lower than expected pelt prices for beaver. The mink harvest reached a new record low this year and continued an 11 year trend of declining harvest levels. Mink are often used as an indicator species for wetland ecosystem health; hence, we are interested in the status of their population and factors that may affect its stability. The declining mink harvest appears to primarily be due to low pelt prices (Table 4). An analysis of trapping success rates over the last 11 years showed that fewer upland trappers are trapping mink, and that this decline in mink trappers appears to be more related to pelt price than the number of mink that they have been able to catch. However, scattered reports of population declines persist and have raised concerns about trends in Maine's mink population. During the upcoming year, we will be gathering additional information on mink from trappers in order to better understand the status of Maine's mink population.

Management and Research

Marten Research

Our department continues to cooperate with Dr. Dan Harrison, at the University of Maine - Orono, on marten research. Since 1988, the main focus of Dr. Harrison's research has been on determining the effects of timber harvesting and trapping on marten populations. To accomplish these objectives, detailed studies were conducted on marten habitat and prey relationships as related to characteristics of local marten populations. This research is being used to make recommendations on ways to sustain profitable forest harvesting while maintaining viable marten populations. In

Table 4. Average prices paid for pelts, 1991-1998 trapping seasons.

Species	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98
Raccoon	\$7.00	\$9.00	\$9.00	\$10.00	\$17.00	\$14.00
Mink:						
Male	29.00	26.00	22.00	16.00	24.00	15.00
Female	16.00	13.00	11.00	14.00	16.00	9.00
Otter	29.00	50.00	52.00	42.00	46.00	43.00
Beaver	9.00	20.00	17.00	22.00	27.00	23.00
Marten	22.00	25.00	24.00	21.00	29.00	23.00
Fisher:						
Male	12.00	14.00	14.00	15.00	22.00	25.00
Female	33.00	29.00	30.00	27.00	40.00	34.00
Red Fox	10.00	14.00	16.00	16.00	20.00	17.00
Gray Fox	-	10.00	8.00	-	12.00	11.00
Coyote	20.00	20.00	16.00	12.00	20.00	17.00
Bobcat	25.00	30.00	30.00	25.00	25.00	35.00
Muskrat	1.50	2.00	2.00	2.00	4.14	3.00

addition, this information will be incorporated into MDIFW's management systems for marten and other forest species. To date, these long-term studies have produced one of the largest data sets on marten, and have made significant inroads in determining the impact of timber harvesting and trapping on marten populations. Master's student Angela Fuller is currently investigating the influence of partial harvest timber management (widely used in Maine) on marten behavior and habitat use.

Strategic Planning

As part of the Department's strategic planning process, species assessments for furbearers are being revised and updated this year. The first furbearer populations to be assessed will be coyote, beaver, and otter. The remaining furbearer assessments will be written by 2001. These assessments are a compilation of the best information available on the status and biological needs of wildlife species in Maine. They are a key element in the formulation of our strategic management plans and are formally reviewed by the public.

Trapping Research

The Department is continuing to work with Maine trapper's on addressing concerns about animal welfare and the public's perception of trapping. This

past fall, the State of Maine was invited to cooperate in a nationwide research program on determining 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. They will primarily be used to inform trappers about the best available traps and trap-modifications for limiting physical injury to animals and improving trapping efficiency for specific furbearers. 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, we were to be part of a four-state regional team in the Northeast that would test fox and coyote leghold traps. The Maine Trappers Association agreed to help recruit trappers and technicians to participate in the research. Unfortunately, the request for our participation came only a couple of weeks before the start of our trapping season. Such short notice raised issues concerning logistics and study design which could not be satisfactorily addressed prior to our trapping season. Consequently, the decision was made not to participate in this research until such time that our concerns could be adequately addressed. These concerns were discussed and addressed at a meeting in Kansas this past spring that was attended by all state agencies that were interested in the BMPs process. The president of the Maine Trapper's Association, Joe Powers, attended this meeting, along with the mammal group leader for MDIFW. Mr. Powers was instrumental in selecting traps for this year's study design, and gave the study design committee insight into concerns Maine trappers had about the BMPs process.

MDIFW will be working with Maine trappers and the Maine Trapper's Association, this fall, on BMP trap testing. Current plans are to trap coyote and fox and test the 1.75 coil Woodstream; the 1.75 coil Woodstream, modified with a center swivel and no offset jaw; and the 1.75 Sleepy Creek Offset, with a T-bar offset jaw and modified chain. Part of 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 is being handled by the International Association of Fish and Wildlife Agencies (IAFWA) with cooperation by various state agencies.

New England Cottontail

Background

New England cottontails, commonly called coonies, reach the northern limit of their distribution in Maine. Winter severity dictates how far north the animals can exist; however, the distribution of areas with thick brushy cover (early successional habitat) is the most important factor in determining where these animals live.

With the exception of Maine, the most common cottontail in New England is the Eastern cottontail, an introduced species which looks very much like the native

coony. Although they are similar in appearance, there are behavioral and genetic differences. Eastern cottontails are more willing to venture into the open, and can thrive in a wider variety of habitats than New England cottontails. Both are cottontails, but they are separate species which do not interbreed. No Eastern cottontails have been confirmed in Maine, although they are found in New Hampshire. Unlike Eastern cottontails, coonies have become rare and are now restricted to small areas of their former range.

Human activities have played a major role in altering the habitat that New England cottontails use in Maine. As farmland was abandoned, in the early part of the century, it grew up into the brushy thickets favored by this species. This type of habitat is short-lived. If left alone, it soon matures into forests that cannot support cottontails. Because agricultural clearings, fires, and clearcuts are much less common today in southern Maine, less land is available to revert to the brushy habitat New England cottontails need. In addition, much of the abandoned land that could revert to habitat for New England cottontail is being developed instead. Similar patterns of habitat loss and development have occurred throughout the range of New England cottontail. Not only has this habitat become scarce, it is now broken into very small patches, which are often separated by developed areas and unlikely to become suitable habitat.

New England cottontail populations likely have mirrored changes in the availability of habitat. Historical accounts indicate that their population increased during the early 20th century. By the 50s they were common in southern Maine and found as far north as Fryeburg and Waldo County. Cottontails are now rare in Maine, restricted to a very limited area (Figure 3).

Surveys

During the past 2 winters, we have collected information on the distribution of cottontails in Maine by searching suitable habitat or historic sites. Information on cottontails was collected from hunters, local naturalists, landowners, and Department employees. Nearly 40 areas were visited in southern Maine to determine if cottontails were still living there. Cottontail tracks were found in only 17 areas. Of 18 areas with no cottontail tracks, 6 had snowshoe hare populations, 8 had some habitat but no sign of either hare or cottontails, and 4 were recently developed and had no remaining habitat. Because of this year's ice storm, 11 areas could not be searched for tracks.

New England cottontails were not found in habitat patches much over 10 acres in size, nor were patches smaller than 2 acres occupied by cottontails. Only 4 occupied patches were smaller than 3 acres, and these were close to larger areas populated by cottontails. Cottontails tend not to live in sites dominated by softwood cover or sites occupied by snowshoe hare.

To determine if Eastern cottontails had now spread into Maine, we live-trapped animals at sites with cottontail sign. New England cottontails are a little smaller than Eastern cottontails, have shorter ears, and are slightly different in

color. Captured animals were weighed, measured, and examined for a dark spot between the ears (indicating they were New England cottontails). Fourteen rabbits were trapped and released in 9 patches. All were New England cottontails.

Future work

Starting this year, Dr. John Litvaitis, University of New Hampshire, and our Department will begin a research project funded, in part, by Maine's Outdoor Heritage Fund program. The focus of this research will be to (1) document historical habitat changes and relate them to the present distribution of New England cottontail, (2) develop a population index which MDIFW can use to monitor New England cottontail population trends, (3) determine the distribution of cottontails in Maine, (4) determine whether Eastern cottontails occur in Maine, and (5) possibly look at cottontail dispersal patterns in fragmented habitats. This information will be used to develop a species assessment and management system for New England cottontail.

—Walter J. Jakubas & Karen Morris



MOOSE

1997 Season

The 1997 moose season was held from October 6-11. As in past seasons, hunters saw many moose and were very selective (Table 5). Nearly 92% of the permit holders (1,374 of 1,500) registered a moose. Bulls made up 78% of the kill, and over 80% of the prime-aged animals (5-10 years) were male. Only 12 calves were shot (Table 6).

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

Year	Opening Day	Zones			Zones				ALL
		NW	NE	C	SE	SC	SW	S	
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

¹The SW, SC, and SE zones were expanded in 1986.

Last year, an additional zone was opened in western Maine (Figure 4). Hunters saw slightly fewer moose in the South zones than in SW and SC zones and slightly more than in the remaining zones. Hunter success was a bit below average but still high (Table 6).

Hunter Opinion Survey

Increasing numbers of permits, new Wildlife Management Districts (WMDs), and increasing numbers of moose in the south created new options and new needs for moose season regulations. This year, the annual questionnaire included some questions to help us determine hunters' opinions about some possible options for moose season regulations and timing.

There were mixed opinions on whether additional areas should be opened. However, most hunters (72%) said additional areas shouldn't be opened if it meant issuing fewer permits in existing zones (Figure 5). Nonetheless, 42% of the respondents indicated that they would accept a permit in a new zone with low success rates, and only 27% said they would turn down a permit to hunt in these zones.

Table 6. 1997 moose registrations

Zone	Males	Females	Total	% Success
CE	222	74	296	92
NE	192	50	242	93
NW	88	26	114	81
SC	105	32	137	98
SE	149	44	193	88
SO	61	9	70	88
SW	254	68	322	95
Total	1,071	303	1,374	92

MOOSE PERMIT ALLOCATIONS BY ZONE

Hunting permits will be allocated to the following seven zones (total number of permits follows in parentheses):

NE	Northeastern Zone (260)
NW	Northwestern Zone (140)
C	Central Zone (320)
SE	Southeast Zone (220)
SC	South Central Zone (140)
SW	Southwestern Zone (340)
S	South Zone (80)

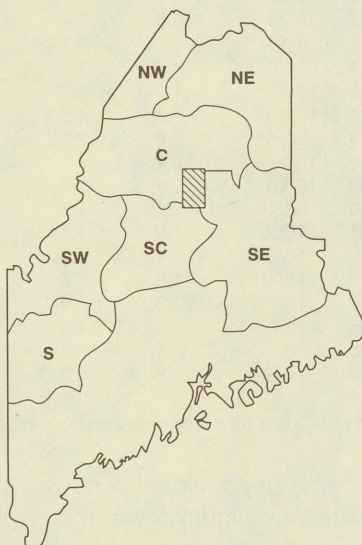
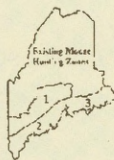


Figure 4. Maine moose hunting zones, 1997 and 1998.

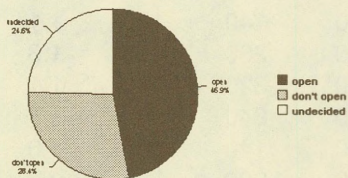
Because Maine's moose hunters select large bulls over cows or young animals, the moose hunting season could result in fewer large bulls for both hunters and viewers to enjoy. At the same time, a bull dominated harvest would not keep the moose population from expanding beyond the limits of the habitat or human tolerance. At some point, we will likely need to increase the harvest of cows without killing too many of the large bulls. Issuing some permits for antlerless moose only, as is done in several states, is one way to accomplish this. Although only a third of the hunters thought that issuing cow only permits was desirable, 62 % of the respondents said they would accept a cow only permit and only 21% said that they would turn one down.

Season timing is often a topic of debate. We asked hunters to evaluate the importance of several factors in deciding when to hold the moose season. Only 12% of the hunters thought that conflicts with fishing seasons were an

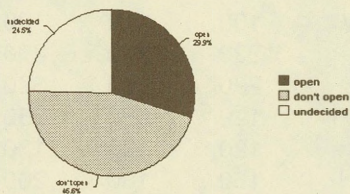
Figure 5. Results of moose hunter opinion survey on opening additional areas to moose hunting.



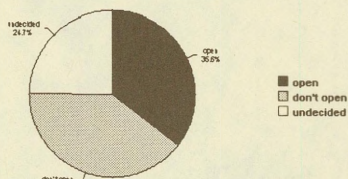
Should area 1 be opened to moose hunting?



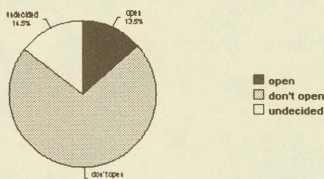
Should area 2 be opened to moose hunting?



Should area 3 be opened to moose hunting?



Should additional areas be opened to moose hunting if it meant issuing fewer permits in existing zones?



important consideration in deciding when to hold the season. There was no consensus on whether or not conflicts with other hunting seasons, conflicts with tourism, or leaf fall were important considerations in setting the dates of the moose season. There was a strong consensus that temperature and moose condition were important considerations. Unfortunately, using temperature as the deciding factor would lead us to hold the season later in the fall, while holding the hunt when bulls are in peak condition would lead to a September season. Hunter's preference for season timing appears to reflect this dilemma. Most hunters (52%) indicated that they preferred an early October season. Only 11% and 35% said they would prefer to hunt in September and late October, respectively.

Future Seasons

Because the new WMD's (Figure 6) were established after the 1998 moose season was established, we will continue to use the existing moose zones in 1998. For future seasons, new moose zones based on the WMD's will be established. However, we do not anticipate having 30 moose zones but expect to establish zones that combine several WMDs.

In 1998, the number of permits increased from 1,500 to 2,000 (Table 7). The NE zone received the greatest increase in permits. This zone had been one of the most lightly harvested in recent years. We expect to be killing about 9-10% of the winter population in all but the South and South Central zones where the harvest rate will be lower.

—Karen Morris

Table 7. Moose permit allocation history: number of permits issued.

Zone	Year						Permits/ 10 mi ²
	1986-93	1994	1995	1996	1997	1998	
NW	100	110	130	150	140	150	1.1
NE	220	230	270	270	260	470	1.3
CE	290	300	320	340	320	375	1.1
SW ¹	120	250	350	360	340	360	1.1
SC	120	130	130	150	140	185	1.0
SE ¹	150	180	200	230	220	380	0.7
SO	0	0	0	0	80	80	0.4
All	1,000	1,200	1,400	1,500	1,500	2,000	1.0

¹Significant area increase in '86.



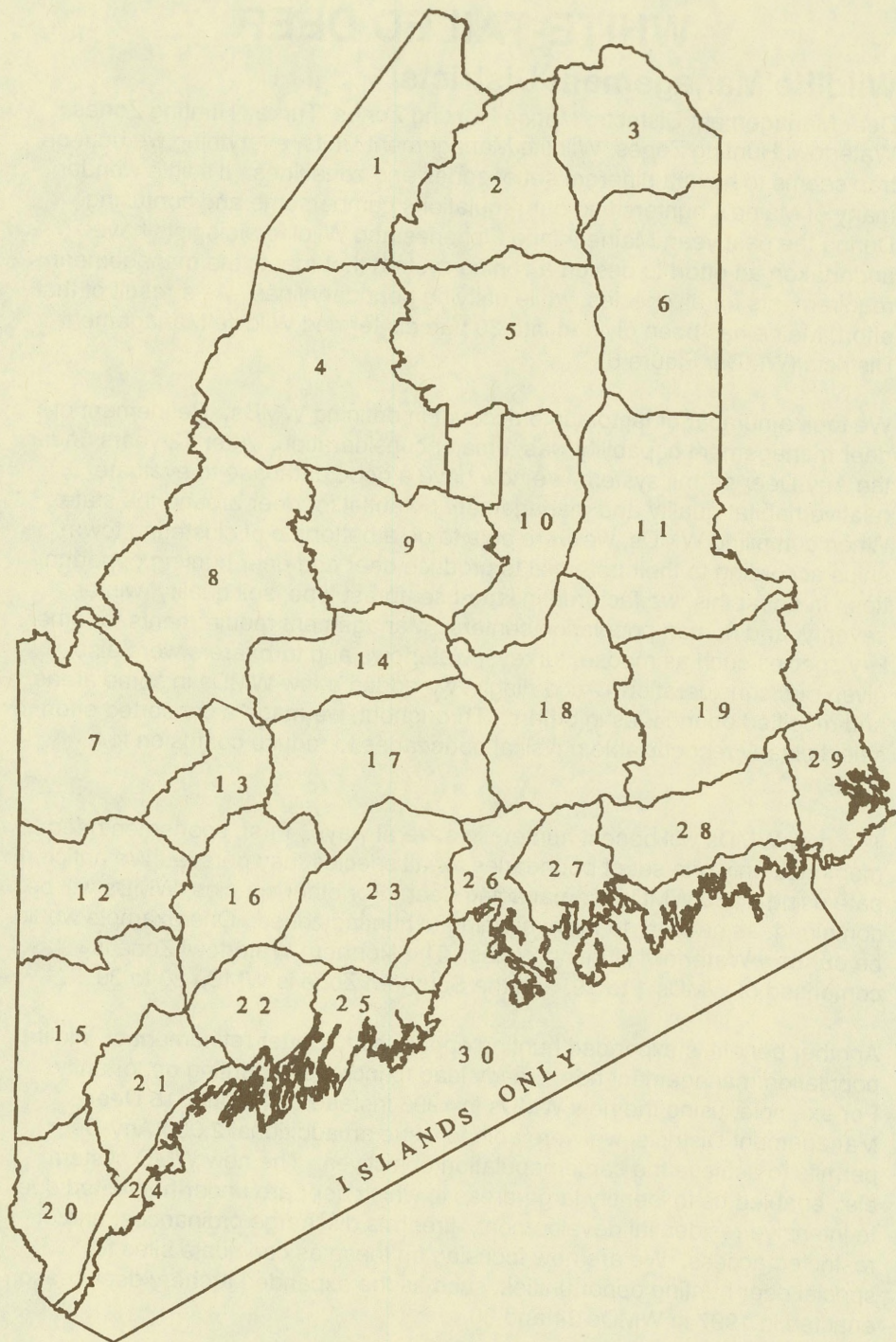


Figure 6. Maine's Wildlife Management Districts (WMDs).

WHITE-TAILED DEER

Wildlife Management Districts

Deer Management Districts, Moose Hunting Zones, Turkey Hunting Zones, Waterfowl Hunting Zones, Wildlife Management Units, everything we hunt or trap seems to have a different set of zones and zone lines. It's little wonder many of Maine's hunters find our regulations cumbersome and confusing. During the past year, Maine Inland Fisheries and Wildlife biologists have undertaken an effort to design a zoning system that meets the management requirements for all species, while unifying boundary lines. As a result of that effort, Maine has been divided into 30 parcels termed Wildlife Management Districts (WMDs; Figure 6).

We took a number of factors into account in defining WMDs. Refinement of deer management capability was a major consideration. After 12 years under the Any-Deer permit system, we now have a good database to evaluate relative habitat quality and management potential for deer around the state. When compiling WMDs, we were able to do a better job of clustering townships according to their potential to produce deer and deer hunting opportunities. In doing this, we factored in land-use, forest type, soil quality, winter severity, and human population centers. Management requirements for other key species such as moose, turkeys, waterfowl, and furbearers were also given due consideration. Accordingly, we added a few WMDs in some areas, and modified boundaries in others. Throughout, we made a concerted effort to select clearly recognizable physical boundaries to reduce confusion for hunters.

The new WMDs will benefit hunters in several ways. First, sportsmen need memorize only one set of boundaries for all species they pursue. We anticipate using all 30 WMDs for managing deer. For other species, WMDs will be combined, as needed, to form meaningful hunting zones. One example would be our new Waterfowl Hunting Zones. The Northern Waterfowl Zone is comprised of WMDs 1 to 19, and the Southern Zone is WMDs 20 to 30.

Another benefit is expanded hunting opportunity. Better refinement of wildlife population management has already lead to increased hunting opportunity. For example, using the new WMDs in 1998 instead of the prior 18 Deer Management Districts, we were able to issue an additional 2,000 Any-Deer permits to achieve the same population objectives. The new WMD system also enabled us to identify large areas in which deer are under-harvested due to intensive residential development, firearms discharge ordinances, and/or restricted access. We are now focusing on these as candidate sites for special deer hunting opportunities, such as the expanded archery deer season enacted in 1997 in WMDs 24 and 30.

Deer hunters will find themselves being drawn more consistently for an Any-Deer permit under the new WMD zoning system. Since the 30 WMDs are

smaller than the former deer management districts, these smaller zones include fewer human population centers. Hence, Any-Deer permits should be drawn more often by local hunters who live in rural areas than formerly was the case.

The new Wildlife Management District system was officially implemented for deer in January 1998. Hunters will note that Any-Deer permits were allocated among the 30 WMDs this year. For clarity, harvest stats for 1997 deer seasons are also presented by WMDs. Waterfowl hunting zones conforming to our new WMDs were approved in 1997. New hunting zones for moose, wild turkey, and ruffed grouse, plus trapping zones for furbearers will come on line by 1999.

All deer hunters should familiarize themselves with the new WMDs. Beginning in 1998, all successful deer hunters must state which WMD their deer was taken within, in addition to town of kill, when tagging their buck, doe, or fawn. These new tagging requirements apply to all four deer hunting seasons. This is necessary, because individual townships may be a part of more than one WMD, depending on the location of individual WMD boundaries. Detailed maps of individual WMDs may be acquired at most MDIFW offices, or you can download them from our website: <http://www.state.me.us/ifw>, or call our information line at (207) 287-8000 for information about our new WMDs.

1997 Deer Harvest

Season Dates and Structure

Maine's deer hunters could pursue white-tailed deer for 84 days within four separate hunting seasons during 1997. From September 6 to 30, bowhunters could pursue deer of either-sex in Wildlife Management Districts 24 and 30 (21 days; Figure 6). The statewide archery season took place between October 2 to 30 (26 days); deer of either sex were legal during this bowhunt, as well. The regular firearm season, which began for residents on November 1, and for all hunters on the following Monday (November 3), ended on November 29 (25 hunting days). Black powder enthusiasts had 6 days (December 1-6) to hunt white-tails in northern, western and eastern WMDs (Figure 6). Elsewhere, the muzzleloader season spanned a total of 12 days (December 1 to 13). Regardless of season, deer could not be hunted on Sunday. The limit on deer was one per hunter per year for the October archery, regular firearm, and muzzleloader seasons combined. Hunters participating in the limited area archery season in September had a separate limit of one deer of either sex per hunter. During the regular firearm and muzzleloader seasons, hunters could harvest a buck (a deer with antlers three or more inches in length) anywhere in Maine. Those who drew an Any-Deer permit could choose to take a doe or a fawn instead, but only in the WMD specified 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 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 which are legally registered during both archery seasons as well as during the regular firearm and muzzleloader seasons.

Doe quotas for 1997 in Maine were set at levels which would facilitate slow herd growth in each WMD. Generally, high winter survival and above-average fawn rearing success occur when mild winters prevail. This, in turn, enables us to accommodate higher doe and fawn harvests, while still achieving population increases. However, when severe winters occur, we must reduce hunter kills of does to begin rebuilding the herd.

During 1997, severe wintering conditions for deer forced us to drastically limit doe quotas in northern WMDs 1 through 14. In the remainder of the state, the 1997 winter was below-average in severity for deer. As a result, we were able to set more liberal harvest quotas for does in most southern Maine WMDs, while still maintaining slow growth in the herd. Despite mild wintering conditions, doe quotas remained very conservative in eastern Maine WMDs (Figure 6), as we attempt to increase "Downeast" deer populations. Statewide, doe quotas ranged from near zero (anticipated archery harvests only) in WMDs 1-6, and 27 to 29, to more than 1,000 in WMDs 17 and 23. When summed for all WMDs, doe quotas totaled 6,836 adult does (older than fawn) during 1997, or about 700 more does than the previous year. Since Any-Deer permittees and archers can choose to kill a fawn instead of an adult doe, we could expect a harvest of 4,100 fawns (male and female combined) when we set a quota approximating 6,800 adult does.

Generally, 3 to 8 Any-Deer permits must be issued to achieve a registered harvest of one adult doe. This is because 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 the 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 which 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 either-sex archery hunts count against doe quotas. This tends to reduce the number of Any-Deer permits that can be issued to meet adult doe quotas.

During 1997, Any-Deer permit allocations ranged from 102 in former Deer Management District 9 (now part of WMD 19) to 11,401 permits in former Deer Management District 12 (now primarily WMD 17). Statewide, we issued 41,796 Any-Deer permits, or 22% more than were issued during 1996

(34,492). No Any-Deer permits were allocated in northern (currently WMDs 1 to 6) and eastern parts of the state (currently WMDs 27, 28 and 29; Figure 6).

Any-Deer permits are allocated to qualified applicants in a random computer lottery. Both the application and the Any-Deer permit are free. During 1997, 93,823 applicants vied for a chance to draw one of 41,976 Any-Deer permits. Of these, 88% (82,871 applicants) were Maine residents. Among the 10,952 nonresident applicants were individuals who reside in 43 states and 5 Canadian provinces. In keeping with our landowner recognition program, 7,463 (18%) of the 41,976 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 37,142 (88%) Any-Deer permits, while nonresidents received 4,834 permits (12% 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

Overall, 31,152 deer were registered during 1997, of which 258 were taken during September archery, 745 during October archery, 29,604 during regular firearm, and 545 during muzzleloader seasons (Table 8). Relative to 1996 (28,375), deer registrations increased by 2,777 deer (10%). Among seasons, harvest increases were noted primarily for the regular firearm (+9%) and muzzleloader (+69%) seasons. Higher availability of Any-Deer permits, higher deer populations, and an abundance of tracking snow in the southern half of Maine contributed to increased deer harvests there. In northern DMDs, buck harvests declined 2 to 25% in response to lower survival during the preceding (1997) winter. For this reason also, Any-Deer permits were made less available in the north, contributing to a lower harvest of does and fawns. The deer harvest in 1997 was the 27th highest since record-keeping began in 1919, and is the highest since 1981, despite current restrictions on taking antlerless deer.

Table 8. Sex and age composition of the 1997 deer harvest in Maine by season type and week, statewide¹.

Season	Sex/Age Class				Total Deer	Total Antlerless Deer	Percent by Season & Week		
	Adult Buck	Adult Doe	Fawn Buck	Fawn Doe			Total	Adult Buck	Antlerless
Archery	374	408	112	109	1,003	629	3	2	5
September	92	115	24	27	258	166	1	<1	1
October	282	293	88	82	745	463	2	>1	4
Regular Firearm	19,002	6,737	2,115	1,750	29,604	10,602	95	97	92
Opening Saturday	1,739	523	157	134	2,553	814	7	9	7
November 3 - 8	4,610	1,445	474	363	6,892	2,282	22	23	20
November 10 - 15	4,399	1,272	467	338	6,476	2,077	21	22	18
November 17 - 22	4,178	1,183	368	299	6,028	1,850	19	21	16
November 24 - 29	4,076	2,314	649	616	7,655	3,579	25	21	31
Muzzleloader	284	174	45	42	545	261	2	<2	2
December 1 - 6	181	77	17	21	296	115	1	<1	1
December 8 - 13	103	97	28	21	249	146	1	<1	1
Total	19,660	7,319	2,272	1,901	31,152	11,492	100	100	100

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

Buck Harvest

For the second consecutive year, Maine deer hunters tagged a record number of antlered bucks. In 1997, the statewide harvest of bucks totaled 19,660, narrowly edging out the all time record buck kill set in 1996 (19,610). Recent buck harvests now average more than 50% higher than during the final years of either-sex hunting (1978-82). During 1997, the top 5 buck-producing WMDs were (in descending order) districts 24, 22, 23, 21, and 17, all in central and southern Maine, (Table 9; Figure 6). Bucks in the 2 1/2 and 3 1/2 year-classes were particularly evident in central and southern WMDs during 1997. This is a pleasant consequence of the above-average production and survival of fawns following 3 consecutive easy winters in the southern half of Maine. Buck harvests have been steadily increasing in central and southern Maine since 1983. Recent, record-breaking harvests of antlered bucks at the statewide level are largely attributable to buck harvest trends in the lower half of Maine.

Table 9. Sex and age composition of the 1997 deer harvest in Maine by Wildlife Management District¹.

Wildlife Management District	Sex/Age Class				Total		Harvest per 100 Adult Bucks		Harvest per 100 Sq. Mile Habitat	
	Adult		Fawn		Antlerless	All				
	Buck	Doe	Buck	Doe	Deer	Deer	Adult Does	Antlerless	Adult Bucks	All
1	525	6	2	1	9	534	1	2	37	38
2	176	3	0	0	3	179	2	2	15	15
3	111	1	1	0	2	113	1	2	12	12
4	412	10	2	1	13	425	2	3	21	22
5	486	21	3	2	26	512	4	5	31	33
6	332	13	1	1	15	347	4	5	24	25
7	533	64	33	14	111	644	12	21	39	47
8	544	73	21	12	106	650	13	19	27	32
9	159	31	9	7	47	206	19	30	17	22
10	212	49	17	8	74	286	23	35	24	32
11	560	98	33	22	153	713	18	27	34	43
12	548	137	40	34	211	759	25	39	58	81
13	475	219	60	51	330	805	46	69	84	142
14	391	117	26	24	167	558	30	43	49	70
15	1,322	609	212	177	998	2,320	46	75	133	233
16	1,191	635	182	162	979	2,170	53	82	166	302
17	2,502	1,289	371	346	2,006	4,508	52	80	184	331
18	742	188	62	54	304	1,046	25	41	57	80
19	204	8	2	2	12	216	4	6	17	19
20	775	504	150	134	788	1,563	65	102	129	260
21	908	534	197	170	901	1,809	59	99	186	371
22	1,103	493	164	108	765	1,868	45	69	212	359
23	1,913	907	290	248	1,445	3,358	47	76	210	368
24	921	545	176	150	871	1,792	59	95	334	649
25	623	258	58	55	371	994	41	60	129	205
26	955	292	72	61	425	1,380	31	45	154	223
27	526	117	38	26	181	707	22	34	64	87
28	202	7	0	2	9	211	3	4	24	25
29	161	7	3	0	10	171	4	6	33	35
30 ²	148	84	47	29	160	308	57	108	-	-
Statewide	19,660	7,319	2,272	1,901	11,492	31,152	37	58	67	107

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

² Area of deer habitat in WMD 30 has not been determined.

Prospects for buck hunters in the north were less rosy. Severe winters reduced availability of bucks of all ages for several sequential hunting seasons. Because of this, buck harvest in northern WMDs declined 5 to 25% during 1997. Effects of high mortality of buck fawns in one year are usually manifested as smaller numbers of mature bucks 3 to 4 years into the future.

Among the 19,660 antlered bucks taken statewide during 1997, roughly 7,650 (39%) were 1½ year-olds sporting their first set of antlers, while more than 4,500 (23%) 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 to 90% of the bucks available; in those states, bucks rarely survive beyond 3½ years! A cautionary note: Maine's bucks also are 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 number of older bucks in the herd.

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 1997 was 7,319 or 483 (7%) above the pre-set quota (Table 8). The new September archery season accounted for 115 does - - their harvest does not conflict with attainment of deer population objectives. The remaining 368 does taken in excess of quotas were largely the result of improved tracking conditions, which prevailed during the regular firearm and black powder seasons.

In no WMD were adult doe harvests sufficient to prevent deer populations from increasing (given adequate winter survival in 1998). Among WMDs, doe harvest ranged from 1 in WMD 3 to 1,289 in WMD 17 (Table 9; Figure 6). On a per square mile basis, the top 5 WMDs supporting doe harvests were, (in decreasing order), districts 24, 21, 23, 22, and 17. It is noteworthy that these, and several other Southern Maine WMDs, support higher doe harvests today than during the 1970s, 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, 2,272 buck fawns and 1,901 doe fawns were legally taken in Maine during 1997. Overall, the antlerless deer harvest totaled 11,492 (Table 8).

Harvest by Season and Week

Of the four separate deer hunting seasons, Maine's regular firearm season attracts the most hunters, and accounts for the greatest share of the total

harvest. In 1997, 95% of the total deer take occurred during the four-week firearms deer season (Table 8). Within that season, after a strong initial burst of hunting pressure on opening Saturday for residents (which accounts for 7% of the firearms harvest), hunter effort and deer harvest remained remarkably stable during each week. There is, however, a tendency for hunter effort to increase during the final (Thanksgiving) week. It is apparent that many hunters tend 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 8).

Although continually gaining in popularity, archery hunting for deer currently accounts for only 3% of the total deer harvest in Maine (Table 8). Black-powder hunting is also growing in popularity. Yet, our one- to two-week late muzzleloader deer season accounted for only 2% of the 31,152 deer tagged in Maine during 1997. The relative contribution of firearm vs. archery vs. black powder seasons to total deer harvest in 1997 is typical of long-term trends in harvest distribution by season.

Harvest by Hunter Residency

Maine residents claimed the lion's share (85%) of the deer harvest in 1997 (Table 10). Among seasons, the proportion of deer harvest registered by Maine residents was highest for the black powder season (96%), followed by the archery (94%), and regular firearm (84% residents) seasons. During the past five years, the proportion of deer harvest tagged by Maine residents has been increasing. Formerly, residents' share of the deer kill had consistently averaged 80%.

Regional differences occurred in the distribution of the harvest by residents and visitors to Maine (Table 10). In the more populous central and southern WMDs (Figure 6), 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, 61% of the deer harvested in remote, unpopulated WMD 1 were registered by nonresidents (primarily Canadians from Quebec). At the other end of the spectrum, 98% of the deer killed in heavily populated WMD 21 (primarily Cumberland Co.) were registered by Maine residents (Table 10).

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 1997, roughly 230,000 licenses, which permit deer hunting, were sold in Maine; 85% were bought by residents. License sales in 1997 were slightly below sales recorded in 1996 (232,000). Not all hunters who purchase big game hunting licenses actually pursue deer. According to recent (1988 and

Table 10. Deer registrations by Wildlife Management District (WMD) and hunter residence, 1997.

WMD	Deer registered by:				Total
	Residents		Nonresidents		
	Number	Percent	Number	Percent	
1	208	39	326	61	534
2	95	53	84	47	179
3	87	77	26	23	113
4	139	33	286	67	425
5	267	52	245	48	512
6	310	89	37	11	347
7	390	61	254	39	644
8	315	48	335	52	650
9	132	64	74	36	206
10	208	73	78	27	286
11	505	71	208	29	713
12	697	92	62	8	759
13	653	81	152	19	805
14	334	60	224	40	558
15	2,068	89	252	11	2,320
16	1,999	92	171	8	2,170
17	3,865	86	643	14	4,508
18	904	86	142	14	1,046
19	165	76	51	24	216
20	1,379	88	184	12	1,563
21	1,756	97	53	3	1,809
22	1,797	96	71	4	1,868
23	2,858	85	500	15	3,358
24	1,724	96	68	4	1,792
25	946	95	48	5	994
26	1,287	93	93	7	1,380
27	656	93	51	7	707
28	190	90	21	10	211
29	166	97	5	3	171
30	290	94	18	6	308
Statewide	26,391	85	4,761	15	31,152

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 1997 was approximately 178,500. Hunter density, therefore, averaged nearly six per square mile, statewide, and this hunter force expended an estimated 1.90 million hunter-days effort pursuing deer during our 84-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 average 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 the state. Overall, we offered only 48 days of hunting opportunity in the late 1970s vs. 84 days in 1997! Clearly, hunter effort is cumulative — adding new deer seasons, and more hunting days, does result 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.

Deer hunting pressure varies dramatically between northern and eastern WMDs relative to central and southern WMDs (Figure 6). The more lightly-hunted northern and eastern WMDs accommodate only 3 to 5 hunters per square mile; hunters there expend only 14 to 31 hunter-days per square mile of pressure 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 pressure 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 is the case in the north woods.

In its first year, the September archery season attracted 1,412 participants (98% residents). As noted earlier, this season was limited to WMDs 24 and 30 (Figure 6). Also, 13,650 residents and 1,150 nonresidents bought licenses which permitted them to hunt deer during the October archery season. The 14,800 archery licenses sold during 1997 represent a 15% increase above archery license sales in 1996. Since 1983, however, archery license sales 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 1,151 deer (1995 harvest).

Compared to the regular firearms season, which attracts at least 180,000 participants, relatively few deer hunters currently participate in Maine's late black powder deer season. Sales of muzzleloading season permits totaled 9,458 during 1997, slightly below black powder permit sales during 1996 (9,551). Undoubtedly, the addition of an extra week to the black powder season has sparked additional participation in this primitive firearm hunt. Muzzleloader license sales increased by 58% when we changed the black powder season from one to two weeks in 1995. Since its inception in 1981, however, 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 545 in 1997. 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 is the practice 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

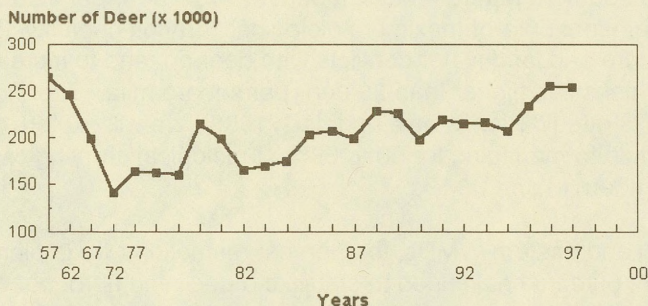
nearly 60,000 muzzleloader hunters instead of the current 10,000. These additional hunters would certainly have a negative impact on the availability of Any-Deer permits and antlered buck survival over time.

Deer hunting success averaged 17.5%, overall, during 1997. Success rate among nonresidents (18%) was slightly higher than success rate experienced by residents of Maine (17%). Apparent success rate among hunters who drew an Any-Deer permit (37%) was considerably higher than among hunters who were restricted to bucks-only (11%) during the firearms seasons. Any-Deer permittees could harvest either a doe, a fawn, or a buck, hence they would be expected to achieve higher success. Also, some hunters evidently pool their antlerless deer kill with Any-Deer permittees, which is illegal. Success rate among bowhunters differed markedly between the September archery season (18%) and the statewide season in October (7%). Deer are very abundant in much of WMDs 24 and 30; this accounts for the exceptional degree of success hunters enjoyed during the September archery season. Our least successful hunter group is the black powder enthusiast. Success rate during the muzzleloader season averaged 6% in 1997, which is slightly above long-term success rates (4 to 5%).

Overall success rate among deer hunters varies among WMDs (Figure 6), and is influenced by the relative number of Any-Deer permits we issue, as well as relative abundance of deer. Success rates in 1997 were lowest in northern Maine WMD 3 (6%); they were above-average in central and southern WMDs 15 to 17 and 20 to 24 (16 to 18% success rate). The highest success rate, overall, occurred in coastal island WMD 30 (32% success), although the quality of this estimate is poor for this WMD.

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 1960s (Figure 7). Our primary strategy was to balance doe losses from all causes with fawn production, by more efficiently regulating the legal



* Based on the HARPOP model. 57 is 1955-57; 62 is 1958-62; 67 is 1963-67; 72 is 1968-72; 77 is 1973-77. Remainder are individual years.

Figure 7. Maine's Statewide wintering deer population.

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.

The Deer Strategic Plan, implemented in 1986, called for increasing deer populations to 50 to 60% of the maximum supportable population in each WMD. Based on current data, we believe 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 be 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 255,000 deer (Figure 7). During the past 4 years alone, our wintering herd has increased from roughly 208,000 to its current maximum of 255,000 deer. During the past 4 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. 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) during 1995 and 1996. That level of herd growth continued during 1997 in the southern half of Maine, but populations have declined 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 (Figure 6). 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, carry populations of 50 to more than 100 deer per square mile. These populations exceed 60% of biological carrying capacity, and we receive more 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. Therefore, when the Deer Strategic Plan is next updated (1998), we will explore other options in addition to managing for 50 to 60% of biological carrying capacity in central and southern Maine WMDs.

Within northern and eastern WMDs, the harvest restrictions we implemented during the past 15 years has 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.

Prospects for the 1998 Deer Season

Deer season structure in 1998 is similar to 1997. The September archery season will span September 8 to 30. In addition to WMDs 24 and 30, we have expanded this hunt to several other 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 October 1 to 30. The residents-only opening to the regular firearm season on deer will be Saturday, October 31; all hunters may participate from November 2 to 28. Finally, the muzzleloader season will begin in all WMDs on November 30, but will end on December 5 in WMDs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 19, 28, and 29. Elsewhere, the muzzleloader season will continue until December 12.

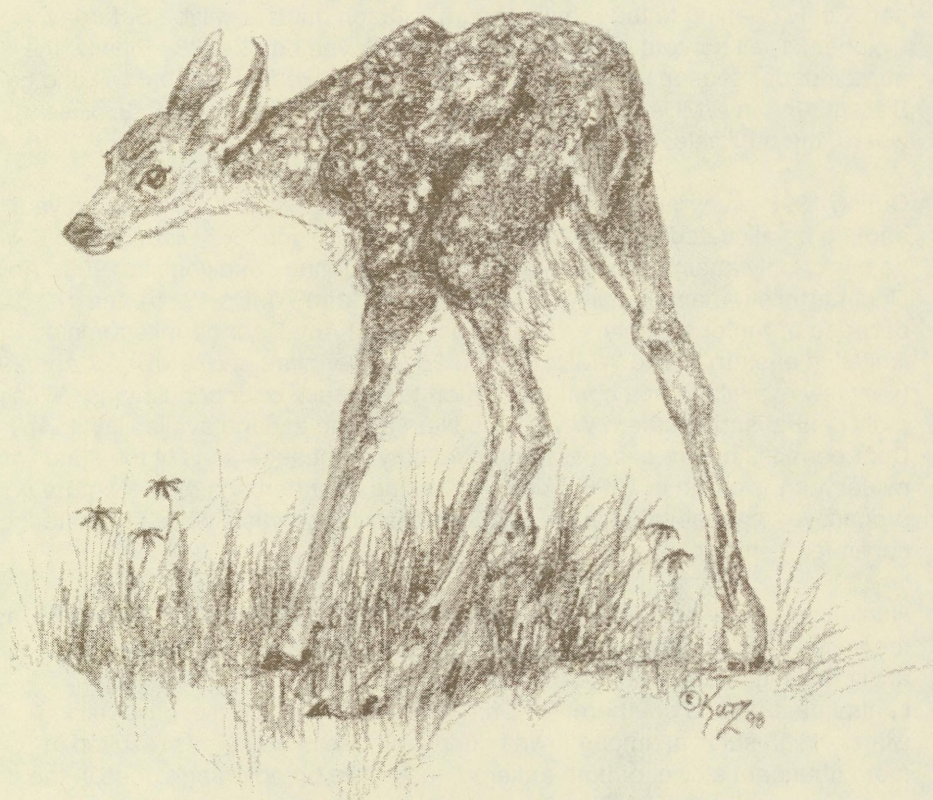
During 1998, we will issue 44,725 Any-Deer permits (2,750 more than a year ago), to be allocated among 22 of our 30 WMDs (Figure 6). Districts 1 to 6 will be bucks-only again this year due to severe wintering conditions in 1998. Any-Deer permits remain curtailed in WMDs 7 to 11 and WMDs 13, 14 and 18 because of winter severity, as well. Numbers of Any-Deer permits remain limited in eastern Maine WMDs 19 and 28 (no permits), and WMDs 27 and 29 (very few available), in a continuing effort to increase deer populations. Within most central and southern WMDs, we were able to expand availability of Any-Deer permits, in part, because winter severity in these regions of the state was milder than average in 1998. Also, expanding deer herds in Maine's more productive deer habitat enable us to increase doe harvests while still fostering continued herd growth.

Hunters will likely note fewer deer sightings in northern WMDs during 1998, as the second consecutive severe winter takes its toll. Elsewhere in Maine, we anticipate higher deer abundance and harvest in 1998. Within most central, eastern and southern WMDs, 1998 was the 4th consecutive mild winter. High survival among fawns during the past 4 years has resulted in more abundant stocks of both antlered bucks and breeding-age does in the southern two-thirds of Maine. This should be a good year for mature bucks in the hunter kill; more than one buck in 5 tagged statewide will be a mature buck. In 1997, 23% of the antlered buck harvest was 4½ to 15½ years old.

Our allocations of Any-Deer permits, combined with the either-sex archery hunts should yield about 7,900 adult does and 4,750 fawns, statewide in 1998.

Despite lower anticipated harvest in the north, the antlered buck harvest should top 20,000 for the first time ever. Overall, the statewide deer harvest should exceed 32,500, if normal hunting effort and hunting weather prevail.

—Gerry Lavigne

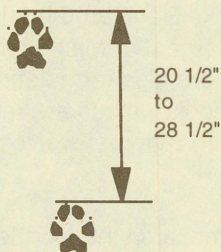
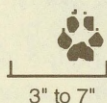


Differences between coyotes, wolves, and dogs

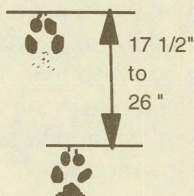
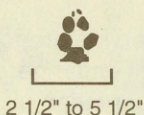
To determine whether an animal is a coyote or wolf, measure its total length (Tip of nose to tip of tail). An animal over 4 ft. in length *may* be a wolf.

Distinguishing track characteristics

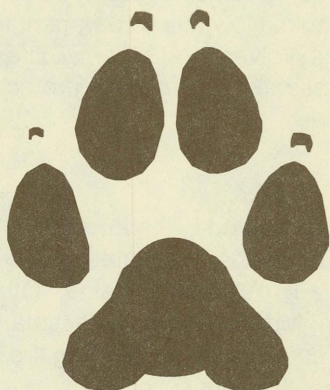
Wolf Track Pattern



Coyote Track Pattern

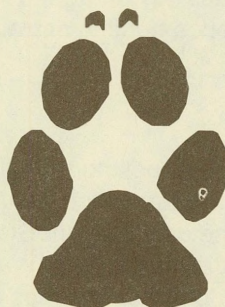


Dog Track Pattern



WOLF PRINT

Length: 3 7/8" to 5 1/2"
Width: 2 3/8" to 5"



COYOTE PRINT

Length: 2 7/8" to 3 1/2"
Width: 1 7/8" to 2 1/2"

OTHER MAMMALS

Gray Wolf

Wildlife Division biologists continued their efforts to detect the presence of wolves in the State during the winter of 1998. Although several credible reports of sightings and tracks were received, none provided indisputable evidence of these large canids. We have maintained contact with state, provincial, federal, and non-governmental biologists in order to stay current with issues surrounding wolves in the Northeast. In addition to the wolf sighting database, we coordinated winter snow-track surveys to detect the presence of wolves, and examined any unusual canid specimens brought to our attention. Snow tracking failed to detect sign of any large canids last winter, and no new specimens were reported.

In 1998, the US Fish and Wildlife Service proposed removing wolves in the Great Lakes Region from the federal endangered species list. This process will probably not influence wolf conservation elsewhere, including the Northeast. Wolf populations in Minnesota, Wisconsin and Michigan are expanding, and the State of Minnesota would like greater flexibility in managing its wolf population, which numbers about 2,000 animals. As wolf numbers have increased in the Great Lakes region, so too has the need to control the few wolves which create problems by preying on livestock. Regulated hunting and trapping seasons may soon play a role in the management of Minnesota's recovered wolf population. Michigan and Wisconsin are also formulating wolf management plans to be implemented when the region's wolves are removed from federal protection; these plans include the euthanization of wolves that kill livestock.

The Service intends to classify any wolves that may occur in the Northeast US as threatened under the Federal Endangered Species List. The "threatened" category will maintain Federal Endangered Species Act protection on any wild wolves that may travel into Maine, but would allow this Department to control any wolves causing damage to livestock. Wolves, and other wildlife species for which no open hunting or trapping seasons exist, are fully protected under State law.

Lynx

The USFWS is proposing to list lynx as threatened in the lower 48 States, under the Endangered Species Act. Maine is one of 4 states outside of Alaska, and the only Eastern State, where lynx currently reside. Other states with lynx populations include Washington, Montana, and Minnesota. The Federal listing process includes a public comment period during the summer and fall of 1998, to acquire public input prior to final action.

The lynx is being considered for listing under the Federal Endangered Species Act because of concern for changing habitat conditions in the West. In western states, lynx have been associated with old growth forests at high

altitudes, which are being cut over for timber. 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 their major prey, snowshoe hares. Maine's lynx are found primarily in the northwestern corner of the State. They are rarely encountered, and little is known about the status of the population. Historical records suggest that lynx have always persisted in low numbers in Maine, for the State is at the extreme southern edge of the species' geographic range. Current land use practices on industrial forestlands in northern Maine, which include areas of regenerating clear-cut stands that are prime snowshoe hare habitat, may be beneficial to lynx.

—Craig R. McLaughlin



BIRDS

UPLAND BIRDS

Wild Turkeys

A review of historical information in Maine reveals that wild turkeys appeared in significant numbers in York, Cumberland, and Oxford counties, and perhaps in reduced 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 extirpation of native wild turkeys in Maine in the early 1800s. Reversion of thousands of acres of farmland back to wooded habitat has greatly enhanced prospects for reestablishing wild turkeys into their former range.

Attempts to reintroduce turkeys to Maine began in 1942 when the Department of Inland Fisheries and Game released 24 birds on Swan Island in Sagadahoc County. These birds were supplementally fed in winter. 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 that 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 its 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 new game bird 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 acreages of wooded habitat, a good supply of mast-producing trees (beechnut and oak), and its mild winters with less 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 Eliot. 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 county. 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 relocated them to Maine to augment Maine's population.

Since 1990, instate trapping and transfer by regional biologists occur 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 Hancock County, particularly in towns adjacent to the Penobscot River, are common as birds crossed this major river on their own.

Wild turkeys are ground feeders and eat a wide variety of grasses, seeds, fruits and insects. In the northeast, turkeys reach their highest densities in areas with agricultural activities, particularly dairy farms. These sites enable them to get through the toughest of times during winter months. Here farms provide abundant 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 also provide good habitat for young turkeys. MDIFW biologists believe 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

In 1985, it was determined there were sufficient numbers of wild turkeys in Maine to have a limited spring (bearded turkeys only) 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 spring turkey hunting provides a quality big game hunting opportunity without jeopardizing restoration efforts. Therefore, in 1986, Maine held its first hunting season in York County when 500 hunting permits were issued. During that season, male turkeys were harvested.

Since 1986, MDIFW, with considerable input and help from the state chapter 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. 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.

This past spring, 2,250 hunters were permitted to hunt wild turkeys in Maine, beginning on May 1. During the first two weeks of the season, hunters could only hunt in the zone they were assigned (either north or south). During the remaining two weeks of the month-long season, turkey permit holders could hunt in either the South or the North Zone. Maine's 1998 wild turkey season ended with a record harvest of 594 birds (Table 11). In the north zone, 303 turkeys were tagged, and 291 were registered in the south zone.

Table 11. Wild turkey hunting effort and harvests, 1986-1998.

Year	Number of applicants	Number of permits	Wild turkeys harvested
1986	536	500	9
1987	519	500	8
1988	355	355	16
1989	463	463	19
1990	499	499	15
1991	508	500	21
1992	886	500	53
1993	1,079	500	46
1994	1,185	500	62
1995	1,714	750	117
1996	3,952	1,250	288
1997	5,091	1,750	417
1998	6,449	2,250	594

tal harvest represents a substantial increase over last year's total of 417 birds. Part of the increase is attributable to an increase in the number of hunters afield in 1998. But, more importantly, turkey populations increased significantly over the last few years. Expanding turkey populations occurred because of favorable weather (mild winters resulting in lower losses and favorable nesting and brood-rearing conditions) and hunters' aggressive trap and transfer activities.

As participation in turkey hunting increases, hunters must be sensitive to issues of safety and hunter interference. We receive information from hunters through MDIFW's annual *Turkey Hunter Survey*. Data from these surveys give us information on hunting effort, trends in turkey populations (Table 12). We now have 13 years of data behind us in Maine, and the turkey population continues to expand its range. These facts, and the relatively low harvest compared to the adaptability and wariness of this magnificent game

Management and Research

Emphasis was placed on the introduction of wild turkeys between York and Waldo Counties. A "leap frog" trap

Table 12. Trends in turkey hunter questionnaire results, 1992-1997.

	Year					
	1992	1993	1994	1995	1996	1997
Questionnaires						
Received	411	417	424	628	1,075	1,546
# Hunted	273 (66%)	303 (73%)	332 (78%)	452 (72%)	876 (82%)	1,341 (87%)
Hours Hunted	5,205	7,031	7,690	9,743	18,116	31,489
Gobblers Seen	403	513	815	1,202	3,586	5,548
Hens Seen	371	923	960	1,624	5,174	7,175
Turkeys Seen	774	1,436	1,775	2,826	8,760	12,723
# Shot At	72	78	107	154	406	581
# Registered	53	46	62	117	288	417
Weapon used						
Shotgun	257	283	305	429	825	1,260
Bow	22	32	42	24	39	52

and transfer technique was utilized with a goal of eventually joining these two populations. This goal was attained recently, and future restoration will be directed to suitable habitat north of existing populations.

During winter of 1997-98, biologists in Regions A and B trapped and moved 64 wild turkeys and released them at 4 new locations. MDIFW biologists, working with turkey enthusiasts from various Maine Chapters of the National Wild Turkey Federation, continue to monitor these birds and improve habitat for wild turkeys in Maine with dollars generated through fundraising activities.

By the year 2000, management efforts will focus on programs 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 our goal-oriented program will succeed in reestablishing wild turkeys into suitable habitat in Maine. We are thankful for the cooperation, financial support, and 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

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 Department. Birds from these strains do not survive or reproduce well in the wild, and they introduce inferior breeding stock into natural populations.

Ruffed Grouse

Hunting seasons

The ruffed grouse, or partridge, is considered by many, the premiere game bird in Maine. Maine data from early 1980s showed an estimated 100,000 hunters harvest over 500,000 grouse annually. More recent hunter surveys reveal approximately half of all licensed hunters in Maine hunted grouse and/or woodcock in 1987. Although no data exist on recent harvests except by moose hunters (see below), successful bird hunters reported grouse in excellent (1995) and fair (1996 and 1997) numbers in recent years.

Grouse reports from Maine Moose Hunter Survey

For the last five moose hunts, moose hunters were asked to report the number of grouse they and their party sighted and harvested during the moose hunting season (Table 13). 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 were reported to hunt grouse as well during the moose hunt. Results of the survey indicate that slightly more than half of all grouse taken during moose season are shot by moose hunt permittees and sub-permittees, and the other half are taken by others in the moose hunting party.

Table 13. Grouse harvests by moose hunters and others in their hunting party, 1993-1997.

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

Beginning in 1994, the number of grouse seen per 100 hours of hunting effort was recorded. That year, moose hunters reported sighting 35 birds per 100 hours of effort. In 1995, a banner grouse year in commercial forests by all accounts, the average number of grouse seen per 100 hours of hunting was nearly three times that of the previous year, at 107. In 1996, data indicate that the population was below average and the number of grouse seen per 100 hours was 20. During last fall's moose hunt, hunters reported an improved 25 birds per 100 hours of hunting.

The total reported grouse harvests by moose hunters, and individuals in their hunting parties, over the last five moose hunting seasons were 2,061; 2,578; 7,939; 1,707; and 2,292 birds (Table 13). The average grouse harvest over the five year period was 3,315. The total grouse take during the banner grouse

year of 1995 was over three times the previous year's harvest. This corresponds with the average sighting index where three times as many grouse were seen per 100 hours of hunting in 1995 than was reported in 1994.

The last statewide grouse harvest estimate was reported for the 1988 hunting season. That year, an estimated 579,100 grouse were taken. If we assume 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.

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. This species appears to do well without intensive management. However, more information on the status of the statewide population is warranted. 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. Timber harvesting continually revitalizes grouse habitat, and more and more commercial timber companies, state and private foresters, and small woodlot owners are utilizing harvest practices that improve or sustain habitat for ruffed grouse and other wildlife species, which utilize young forests.

—R. Bradford Allen

IMPORTANT!! Hunters, make sure you can distinguish between the legally hunted Ruffed Grouse and the Spruce Grouse, for which there is no open season. These two species of grouse do occur in the same areas of Maine, but the Spruce Grouse is far less common. In certain light conditions, the two species may look similar. As in any hunting situation, it is imperative that hunters be certain of their 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, select opening dates no earlier than 6 October, and reduce the number of hunting days to 30. Researchers with the U. S. Fish and Wildlife Service report that, despite these restrictions, the range wide woodcock population is still at a relatively low level.

The index of daily hunting success in the Eastern Region was the same as last year's. The index of seasonal hunting success decreased 19% in the East, but Maine hunters fared better and little change from 1996 was noted (USFWS American woodcock harvest and breeding population status report, 1998). First year results from the Harvest Information Program indicate that Maine has an estimated 8,300 woodcock hunters who, in 1996, harvested an estimated 26,000 birds. Unfortunately, because of an unidentified computer error, no woodcock harvest data from the 1997 hunting season are available.

Management and Research

Woodcock researchers in the East report that conditions on the 1997-98 wintering grounds for this diminutive bird were favorable for the second year in a row. Following the mild winter, birds migrated to Maine this spring at the normal time and experienced a warm spring with normal precipitation. However, early indications are that the number of male woodcock on singing grounds in the East were slightly lower than the previous year.

In Maine, two independent singing-ground surveys were conducted, one at Moosehorn National Wildlife Refuge in Calais and a separate, but similar, statewide survey. Greg Sepik, USFWS wildlife biologist and woodcock specialist, reported the number of singing male woodcock at Moosehorn was slightly higher than last year's number. When Maine's statewide singing-ground survey data were tallied, the overall male population index was 2.77, a nonsignificant decrease from 1997.

Maine's adult woodcock population remains below average. The reduced population can, to some extent, be replenished with a banner production year. This past May, researchers believe nesting and hatching conditions were favorable for female and newly-hatched woodcock despite a wet, but warm, period of weather in early May. Dan McAuley, a wildlife biologist with the U.S. Geological Survey (USGS), and his English Setter, Sadie, searched for and banded woodcock chicks this spring. Dan reported a good (although asynchronous) hatch this year. Further, Dan and colleagues from USGS, MDIFW, and USFWS, are in the second year of a study in Maine to investigate effects of hunting on survival and habitat use of woodcock. Hunting is not believed to be the cause of the woodcock population decline, nevertheless,

hunting opportunity has been reduced. Although reasons for the population decline are complex, the USFWS believes a conservative harvest management strategy is warranted. We too believe there is an immediate need to determine the effects of harvest on this population, and, for that reason, we have designed this study to investigate this issue. We are pleased to have several partners on this project. In addition to the government agencies listed above, Champion International, Inc. and the Ruffed Grouse Society are assisting us on this study.

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 grown, and range wide harvests remain high. In the Northeast, particularly, this increase in hunting pressure comes at a time when woodcock habitat was being lost to urban and industrial development, and a large amount of forest land grew into stages not suitable for woodcock. Several years of data from the Harvest Information Program will be vital for wise harvest management of this species.

Suitable habitat is the key for healthy wildlife populations. Regarding woodcock habitat, biologists in Maine have turned their attention to the commercial 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 commercial forest activities warrant attention. Further, our research shows that commercial 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 is critical if woodcock populations are to be maintained at, or improved beyond, current levels.

This author and many others were deeply saddened this spring by the death of friend and colleague (and internationally renowned woodcock biologist) Greg Sepik from Woodland, Maine. American woodcock have lost their greatest friend and ally.

—R. Bradford Allen

Pheasant

Pheasant populations currently exist at low levels where food and weather conditions permit winter survival. These limited wild populations are annually augmented by release of game-farm pheasants raised by fish and wildlife organizations and individuals with Maine Wildlife Propagators licenses.

The current pheasant stamp program, approved by the Maine Legislature in 1993, was modeled after the experimental 1992 program. A Pheasant Fund was established within the Department to manage moneys received from the sale of pheasant stamps. These dollars may only be used for costs directly related to administration of the pheasant program, including grants to

cooperators. These grants are used to defray costs of purchasing and raising pheasants in accordance with an agreement between the cooperators and the Department.

The Commissioner now enters into agreements with qualified rod and gun clubs, or hunting-oriented organizations, which allows for disbursement of money from the Pheasant Fund. Pheasants acquired and raised through this fund must be released under the direction of the Department on lands in York and Cumberland counties that are open for hunting to the general public.

The 1997 sale of stamps brought \$15,840 into the Pheasant Fund. The Department retains about \$1,000 annually to cover the cost of printing stamps and distributing them to vendors. The remaining funds are used for purchase of six-week old birds, and for reimbursements to cooperators to defray costs associated with raising them. In 1998, nine cooperators will raise 3,000 six-week old birds (Table 14).

— Patrick O. Corr

Table 14. Summary of pheasant fund statistics, 1992-1998

Year	Number of Stamps		Number of Cooperators	Ring-necked Pheasants Purchased		
	Paid	Comp*		6-weeks	Adults	Total
1992	610	10	8	1995	380	2375
1993	699	18	11	1905	434	2339
1994	960	61	7	2080	0	2080
1995	895	98	8	2370	0	2370
1996	896	37	10	2540	0	2540
1997	1056	143	10	2760	0	2760
1998	not available		9	3000	0	3000

*Complimentary licenses issued to hunters 70 and older

WATERFOWL

Current Waterfowl Populations

North American duck populations in 1998 are at high levels for most of the species annually estimated by Federal surveys. Population declines noted during the 1980s have been reversed since 1994 because of 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 1997 showed marked improvements in both mid-continent duck breeding populations and habitat quantity and quality. These data support continued liberal harvest regulations during 1998, even though this year's habitat survey indicated fewer May ponds in the prairies. In 1998, Atlantic Flyway hunters were again offered a framework that allows a 60-day season and a six-bird daily bag limit.

The Atlantic Flyway mid-winter waterfowl survey for black ducks has remained relatively stable since 1983 when harvest reductions were first established. Although no dramatic turnaround in the black duck's midwinter population index is obvious at this time, the long standing annual decline of 2.5 percent has been halted since 1983. While cause and effect is not proven, the cessation of the decline has coincided with U.S. and Canadian attempts to reduce the harvest rate on black ducks. Recent Maine Mid-winter Inventory numbers are presented in Table 15.

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 16). One goal of the state waterfowl management plan is to restore the relative proportions of species found breeding in Maine to historical levels.

Hunting Seasons and Participation

Waterfowl harvests in the United States have declined since 1978 when 15.1 million ducks were recorded in the 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 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 dropped from 14,545 (1981 to 1985) to 11,612 (1986-1990) to 9,908 (1991-1995). Preliminary duck stamp sales in 1997 for Maine was 9,568, up slightly from the all-time low of 8,704 recorded in 1995 (Table 17).

Table 15. Midwinter waterfowl survey data for Maine, January, 1994-97.

Species	Total Recorded by Year				
	1994	1995	1996	1997	1998
Mallard	383	1,248	480	556	995
Black Duck	9,796	20,379	15,848	14,597	24,027
Green-winged Teal	<u>5</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total Dabblers	10,179	21,627	16,328	15,153	25,022
Scaup	1,102	860	1,052	1,175	581
Common Goldeneye	4,956	6,424	3,776	5,429	4,543
Bufflehead	2,038	6,383	2,613	3,175	9,270
Common Merganser	<u>5,305</u>	<u>3,624</u>	<u>1,244</u>	<u>1,662</u>	<u>1,739</u>
Total Divers	13,401	17,291	8,685	11,441	16,133
Common Eider	47,824	49,003	35,716	39,001	31,809
Scoter	5,009	2,467	5,134	2,804	2,755
Oldsquaw	2,768	2,058	954	1,797	1,739
Harlequin	<u>0</u>	<u>0</u>	<u>3</u>	<u>24</u>	<u>0</u>
Total Sea Ducks	55,601	53,528	41,807	43,626	36,293
Unident. ducks	47	141	12	90	246
TOTAL DUCKS	79,228	92,587	66,832	70,310	77,694
Canada Goose	452	2,280	1,090	1,911	1,986
Brant	<u>10</u>	<u>0</u>	<u>13</u>	<u>15</u>	<u>0</u>
Total Geese	462	2,280	1,103	1,926	1,986
GRAND TOTAL	79,690	94,867	67,935	72,236	79,680

Table 16. Species frequency found in brood counts for Maine, 1956-1965, 1966-1976, 1980-1984 and 1986-1990¹.

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

*Known breeder: assigned 1 brood during 1956-65 and 1966-76 even though not observed in brood counts.

¹Mallard x black duck hybrids and Canada geese were excluded from analysis.

Table 17. Maine and Atlantic Flyway waterfowl harvest and duck stamp sales, 1961-1997.

Year	Waterfowl Harvest		Duck Stamps Sold	
	Maine	Atlantic Flyway	Maine	Atlantic Flyway
1961-65 (mean)	46,000	879,900	9,656	265,023
1966-70 (mean)	78,400	1,577,100	15,136	403,386
1971-75 (mean)	92,400	1,700,500	17,512	453,018
1976-80 (mean)	83,400	1,941,500	17,444	429,533
1981-85 (mean)	73,200	1,675,900	14,545	399,429
1986-90 (mean)	54,200	1,202,400	11,612	354,730
1991-95 (mean)	62,500	1,234,400	9,908	295,282
Final Estimates				
1996	72,126	1,560,059	9,251	291,926
Latest Mean	72,126	1,560,059	9,251	291,926
1997 preliminary	69,753	1,841,926	9,568	302,961

Season lengths were shortened significantly between 1985 and 1993 (from 50 days to 30 in the Atlantic Flyway); this, in concert with declining numbers of hunters, led to a plunge in the estimated number of hunter days afield. In the Atlantic Flyway, the number of adult hunter days dropped from more than 2.9 million in 1978 to 1.5 million in 1992. 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.

Restrictions in harvest regulations also resulted in reduced daily bag limits (5 birds to 3 per day); species restrictions in 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 plan for black ducks through 1993. Framework opening dates were moved back to October 1 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.

In addition to recent extended season lengths, 1997 was the first time states, with Sunday hunting prohibited by state law, were allowed additional week days to compensate for lost opportunity. The 1997 season selected in Maine allowed 46 days of hunting, the most liberal available to our hunters since 1958, when a 60-day Federal framework allowed 51 days of hunting.

Black Duck Harvest Management

Black duck population declines, measured by the midwinter waterfowl survey since the mid-1950s, led to a harvest reduction plan in the United States and

Canada. Between 1983 and 1987 (Period 1), black duck harvests were reduced in the U.S. by 42% (compared to the 1977-81 average) while the black duck kill in Maine for the same period was reduced by 61% (Table 18). Harvest reductions in other Atlantic Flyway states varied from 29% to 66% during this period. Reductions in Canada's black duck harvests have also been achieved since 1984. Our challenge will be to maintain a reduction in harvest rate for Maine black ducks while providing additional hunting opportunity for our hunters.

Table 18. Maine and Atlantic Flyway black duck harvest data, 1977-1996.

State	Period 1			Period 2			Period 3	
	Base Yrs	Cut days	f/Blacks	30-Day Seasons			40 & 50-Day Seas.	
	77-81	83-87	% Ch.	88-93	% Ch.	% Ch.	Aver.	% Ch.
	Aver.	Aver.	fr. Base	Aver.	fr. Base	fr. Per. 1	94-96	fr. Per.1
ME	20,820	8,080	-61	10,250	-51	+27	10,130	-51
VT	6,420	4,120	-36	3,280	-49	-20	3,230	-50
NH	6,940	4,940	-29	2,900	-58	-41	2,870	-50
MA	24,540	16,260	-34	12,800	-36	-21	11,330	-54
CT	8,140	4,200	-48	3,920	-52	-07	3,530	-57
RI	5,680	2,620	-54	2,080	-63	-21	2,030	-64
NY	43,920	28,340	-35	25,450	-42	-10	21,800	-50
PA	11,040	5,640	-49	5,020	-55	-11	6,000	-46
WV	1,120	540	-52	280	-75	-48	330	-70
NJ	37,220	22,760	-39	15,400	-59	-32	10,070	-71
DE	9,760	5,720	-41	6,400	-34	+12	4,230	-57
MD	29,400	14,960	-49	12,820	-56	-14	11,270	-62
VA	19,040	12,760	-33	7,720	-59	-39	7,430	-61
NC	11,140	5,900	-47	6,350	-43	+08	6,030	-46
SC	7,240	3,500	-52	2,420	-67	-31	2,230	-69
GA	2,360	1,460	-38	770	-67	-47	300	-87
FL	860	290	-66	120	-86	-59	70	-81
F'way	245,640	142,090	-42	120,560	-51	-15	103,780	-58

Although restrictive regulations continued in the Atlantic flyway between 1988-1993, Maine hunters during this period enjoyed expanded hunting opportunity for black ducks. 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. The Maine harvest of black ducks was higher during the period of 30-day seasons (Period 2, 1988-1993) than levels attained between 1983 and 1987. A 10-day delayed opening for black ducks was used again with the return to longer seasons in 1996 and 1997.

The return to 40 and 50 day duck seasons (Period 3) since 1994 has challenged Atlantic Flyway waterfowl managers, since the need to reduce black duck harvests is still required. However, seasons which maintain black duck harvest rate reductions, while allowing additional hunting opportunity for

hunters, have successfully been established. Maine's estimated annual black duck harvest since 1988 has been maintained at -51% of 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% of those measured prior to 1983.

Maine Statistics

A review of waterfowl hunter and harvest statistics provides an interesting comparison of Maine's waterfowlers and their success (Table 19). 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 9,568 duck stamps sold in 1997, is close to the number commonly measured in the early 1960s. This is, however, much lower than the average number sold during the 1970s.

Table 19. Maine waterfowl hunter and harvest statistics, 1961-1997.

Year	Number active hunters	Days afield by active hunters	Average days hunted	Average duck bag per day	Average season bag/htr.	Total duck harvest	Canada goose harvest
1961-65 (mean)	7,580	45,580	6.24	1.01	6.56	45,980	550
1966-70 (mean)	12,519	73,020	5.85	1.13	6.96	78,360	980
1971-75 (mean)	14,410	101,140	6.98	0.91	6.10	92,360	2,260
1976-80 (mean)	13,654	105,200	7.36	0.78	5.31	83,360	1,840
1981-85 (mean)	9,949	86,640	7.37	0.88	5.95	73,180	1,560
1986-90 (mean)	8,607	61,840	6.71	0.89	5.50	54,160	2,300
1991-95 (mean)	8,208	57,242	6.90	1.03	7.09	62,500	2,425
Final Estimates							
1996	8,123	63,334	7.41	1.10	8.13	72,126	1,149
Latest Mean	8,123	63,334	7.41	1.10	8.13	72,126	1,149
1997 preliminary	8,407	60,243	7.14	0.94	6.74	58,160	2,542

Hunters in 1996 spent an average of 7.41 days afield per season, which was slightly longer than the same measure from the 1960s (6.24 days). They were also more successful than their 1960s counterparts (1.1 ducks per day, compared to 1.01 in the 1960s). This daily duck bag is actually an improvement compared to the 1970s and 1980s, when it was generally less than one duck per day.

A 30-year perspective of the waterfowl species composition in the Maine harvest shows the relative importance of some ducks has dramatically changed over this period (Tables 20, 21, and 22). Harvests of mallards have

Table 20. Maine dabbling duck harvest statistics, 1961-1997.

	Mallard	Black Duck	Green-winged Teal	Blue-winged Teal	Wood Duck
1961-65 (mean)	960	21,080	5,960	840	4,500
1966-70 (mean)	2,360	32,060	12,000	4,460	5,500
1971-75 (mean)	4,600	32,680	13,340	4,640	7,660
1976-80 (mean)	5,040	23,580	9,620	2,740	9,880
1981-85 (mean)	4,660	12,740	8,700	1,380	11,240
1986-90 (mean)	4,700	8,280	7,100	640	6,840
1991-95 (mean)	7,960	11,040	5,080	400	8,000
Final Estimates					
1996	7,100	7,800	6,200	1,600	10,300
Latest Mean	7,100	7,800	6,200	1,600	10,300
1997 preliminary	9,385	9,382	11,722	597	6,133

Table 21. Maine diving duck harvest statistics, 1961-1997.

	Greater Scaup	Lesser Scaup	Ring-necked Duck	Buffle-head	Common Goldeneye
1961-65 (mean)	125	50	950	1,780	2,240
1966-70 (mean)	220	100	1,100	1,980	2,380
1971-75 (mean)	200	160	1,550	3,340	2,040
1976-80 (mean)	260	360	2,620	6,240	3,040
1981-85 (mean)	220	300	2,620	4,340	4,040
1986-90 (mean)	100	180	2,750	2,240	2,940
1991-95 (mean)	60	120	1,680	3,100	1,720
Final Estimates					
1996	0	100	2,100	3,500	2,000
Latest Mean	0	100	2,100	3,500	2,000
1997 preliminary	92	0	1,498	2,123	816

increased from less than 1,000 birds per year (1961-65 mean) to 8,000 birds per year (1991-95). The common eider is another bird that has shown steady and dramatic increases in the annual Maine kill. Showing sizable declines in the Maine harvest are black duck, blue-winged teal, white-winged scoter, surf scoter, and black scoter.

Reasons for these changes in species composition are variable and, in many cases, different for each species. Some explanations for these changes

Table 22. Maine sea duck harvest statistics, 1961-1997.

	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
Final Estimate					
1996	21,100	800	1,100	3,800	300
Latest Mean	21,100	800	1,100	3,800	300
1997 preliminary	18,927	501	1,456	2,918	523

include: duck population increases and decreases, duck population center shifts, changes in the number of duck hunters, hunter effort shifts from one species group to another, and specific regulatory management designed to restrict harvest opportunity on some species more than others. All of these causes, and others, in combination, have resulted in the observed changes in the Maine duck kill.

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 the U.S. Fish and Wildlife Service'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.

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 U.S. Fish and Wildlife Service (USFWS) helicopter. All open waters within the plots were surveyed, and locations of waterfowl were recorded. Analyses of these data have provided population and trend estimates for common inland breeding waterfowl during the five year experimental stage. A slight decline in breeding pairs of black ducks in Maine was demonstrated.

Evaluation of the five-year experimental helicopter plot surveys proved them to be too expensive for continued annual surveys. Fortunately for eastern waterfowl hunters, population trends measured by more economical fixed-wing aircraft were shown to be similar to trends measured by helicopter surveys. In 1995, a fixed-wing transect survey was initiated in Maine. The USFWS has expanded these surveys in Eastern North America, and now Maine and the eastern Canadian provinces have been surveyed by biologists using fixed-wing transect methodology since 1996. As data from these additional areas and years are evaluated, the results will be used to establish harvest regulations for the Atlantic Flyway. When these surveys are fully integrated into the regulation process, Eastern waterfowl frameworks will be more independent of the mid-continent surveys.

North American Waterfowl Management Plan

Coordination of Maine habitat protection efforts among several state and federal agencies, and private organizations, has resulted in some key land purchases, which will 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 will initially be directed toward the most significant and vulnerable areas.

The Cobscook Bay Focus Area, and the Merrymeeting Bay — Lower Kennebec River Focus Area, are the two priority regions selected for projects in Maine. Efforts in these areas have resulted in a coordinated plan to secure protection for these important ecosystems. To date, our Department has received more than \$1.9 million from grants through the North American Wetlands Conservation Act. These funds have allowed coordinated habitat

conservation projects through purchase of 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 (Penobscot Bay east), West Coast (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 new programs, the Loon License Plate and The Maine Outdoor Heritage Lottery, are now available and will 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 licenses that they are migratory bird hunters. This item must be checked on the license to legally possess ducks, geese, woodcock, snipe, rails, gallinules, and moorhens in Maine.

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. Under this program, states must certify migratory bird hunters and provide their names and addresses to the USFWS. This list of hunters is used to select a representative sample for their harvest surveys. All states are required to participate in this program by 1998.

Our Department has used this as an opportunity to improve our licensing program, and has developed data bases which will support conversion to point-of-sale licensing. The 1995 Maine hunting licenses were redesigned to be machine readable, and for one year were produced in a larger format than previously. Future licenses will be much different from those of the past, but their format and method for distribution are still being developed.

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 and wading birds, and migratory 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.

Bird group personnel have become involved in a number of other projects to broaden our participation in bird management activities. We participate in Breeding Bird Surveys, mourning dove surveys, eastern bluebird banding activities, tern management activities, Partnerships for Wildlife in Maine, Partners in Flight, the Fish and Wildlife Service's and University of Maine's eagle research, the Maine Coastal Nesting Islands Forum, and habitat protection initiatives with numerous private land trusts. Obviously, bird management activities in Maine continue to be both challenging and rewarding.

Maine colonial waterbird inventory

Twenty-one species of island nesting seabirds, plus waterfowl and wading birds, nest on approximately 10% of Maine's coastal islands. These birds are extremely vulnerable to human disturbance during the spring and early summer nesting season. For these reasons, monitoring and surveys of nesting colonies are warranted. Survey results from 1977 and 1997 are summarized in Table 23.

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 these staging areas to accumulate fat necessary to fly a non-stop, transoceanic flight to their South American wintering areas.

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

Bird project 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). In May, the Shorebird Staging Habitat Management System was completed and reviewed by the Wildlife Division. This document outlines criteria used to select a subset of shorebird feeding and roosting areas that are critical to migratory shorebirds. Termed "Areas of Management Concern", these areas qualify for NRPA protection. Management recommendations are described to assist biologists and landowners with a cooperative approach to protect and enhance shorebird habitats.

Table 23. Nesting colonial waterbird populations and number of colonies used, 1976-77 and 1994-97.

	1976-77		1994-97	
	Pairs	Colonies	Pairs	Colonies
Arctic Tern (ARTE)	1,640	9	4,034	11
Atlantic Puffin (ATPU)	125	1	234	4
Black-crowned Night Heron (BCNH)	117	8	118	7
Black Guillemot (BLGU)	2,668	115	12,287*	167
Cattle Egret (CAEG)	0	-	1	1
Common Eider (COEI)	22,390	241	28,200*	319
Common Tern (COTE)	2,095	24	7,044	21
Double-crested Cormorant (DCCO)	15,333	103	20,011*	126
Glossy Ibis (GLIB)	75	3	221	3
Great Black-backed Gull (GBBG)	9,847	220	15,800*	231
Great Blue Heron (GTBH)	903	18	644	14
Great Cormorant (GRCO)	0	-	169	8
Great Egret (GREG)	0	-	2	1
Herring Gull (HEGU)	26,037	223	28,290*	183
Laughing Gull (LAGU)	231	6	1,348	3
Leach's Storm-petrel (LHSP)	19,131	17	10,451	36
Little Blue Heron (LBHE)	4	2	25	2
Razorbill (RAZO)	25	2	190*	4
Roseate Tern (ROST)	80	3	237	6
Snowy Egret (SNEG)	90	4	210	5
Tricolored Heron (TRHE)	1	1	7	1

* 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.

Field surveys for 1998 will target shorebird areas located in Washington county and Cumberland county. Information collected will be used to further identify and assess these habitats.

—Lindsay Tudor

Saltmarsh bird surveys

Saltmarshes are generally considered the most productive communities in North America and provide habitat for a wide variety of vertebrates, including several bird species. Saltmarsh habitats are important brood-rearing areas for waterfowl, foraging areas for wading birds, and nesting areas for a few less common species of songbirds. Saltmarsh sharp-tailed sparrows are restricted to just the northeastern coastal states and occur only in this habitat type.

Understanding this species' status is a conservation priority in the Northeast, but in Maine, even their breeding range is not well-defined. We are completing the second year of a three-year, coastwide survey of the birds using Maine's saltmarsh resource. Knowledge of the distribution and types of

saltmarsh habitats occupied by sharp-tailed sparrows, and other species, is important for prioritizing land acquisitions and oil spill response and mitigation.

—Tom Hodgman

Wetland bird 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. By broadcasting tape recordings of the territorial male's vocalization, the presence of many of these species can be confirmed. In 1998, we began a survey, in cooperation with the Maine Natural Areas Program, to better define the distribution of 16 wetland bird species in over 40 wetlands in the Midcoast and Penobscot Bay regions. Target species include least and American bitterns, sora, Virginia and king rails, and pied-billed grebes, among others. Because the distribution and habitat requirements for these species is not well known, current habitat protection efforts may be inadequate to ensure long-term viability, especially for the less abundant species. Furthermore, three species, common moorhen, American coot, and least bittern, are currently listed as Special Concern in Maine. Some species detected during these surveys may prove to be so rare that they warrant the special protection afforded threatened and endangered species.

—Tom Hodgman

Songbird assessment

Maine is home to approximately 200 breeding birds and numerous other migrants and winter residents. The majority of these species are not hunted, and, as a consequence, have received little management attention. Analyses of 30 years of information from roadside bird surveys indicate populations of some of these nongame species appear to be in decline, while others appear stable or increasing (Table 24). In general, many of the species which use early successional habitats, like old fields, appear to be in decline, but many species of forest birds appear to be stable or increasing.

Apparent declines in populations of some songbirds have raised the awareness among national and international conservation groups about a pending crisis in bird conservation. National, regional, and state coalitions have taken shape since the early 1990's to address this complex issue. Within our agency, a set of songbird conservation plans have been developed to facilitate state-level action for songbird conservation. These plans will serve as an assessment of the research and management needs for this group of birds for years to come. Integrating the Partners in Flight list of priority species, MDIFW's list of Special Concern species, and results of the songbird assessment, will greatly advance songbird conservation in Maine. Furthermore, this work will contribute important information for regional songbird conservation strategies.

—Tom Hodgman

Table 24. Estimated trends for selected songbird populations (% change per year) observed in Maine according to the North American Breeding Bird Survey.

Species	Habitat	1966-1996	1966-1979	1980-1996
Red-winged Blackbird	Marshes and Wetlands	-4.0*	-2.5	-2.1*
Tree Swallow	Fields and Marshes	+0.4	+3.8	-0.8
Savannah Sparrow	Fields and Pastures	+1.2	+3.4	+1.5
Bobolink	Fields and Pastures	-1.0	+3.1	-6.4*
Eastern Meadowlark	Fields and Pastures	-8.0*	-10.0*	-7.1*
Eastern Bluebird	Fields and Orchards	+12.2*	-8.8	+17.0*
Chestnut-sided Warbler	Brushy/Shrubby Areas	-1.6*	+2.5	-1.5
Gray Catbird	Brushy/Shrubby Areas	-2.4*	-0.1	-4.0*
American Robin	Yards and Forest Edge	-0.7*	-2.2	-0.4
Baltimore Oriole	Forest and Edges	+2.5*	+7.0	-0.2
Wood Thrush	Forest	-1.0	+13.2*	-3.9*
Blue-headed Vireo	Forest	+9.4*	+17.4*	+2.7
Ovenbird	Forest	+1.6*	+4.9*	+0.8
Scarlet Tanager	Forest	+3.4*	+15.6*	+2.1
Black-capped Chickadee	Forest	+3.1*	-4.7*	+3.4*

* Denotes statistically significant trend (Sauer et al. 1997. The North American Breeding Bird Survey Results and Analysis. Version 96.2).

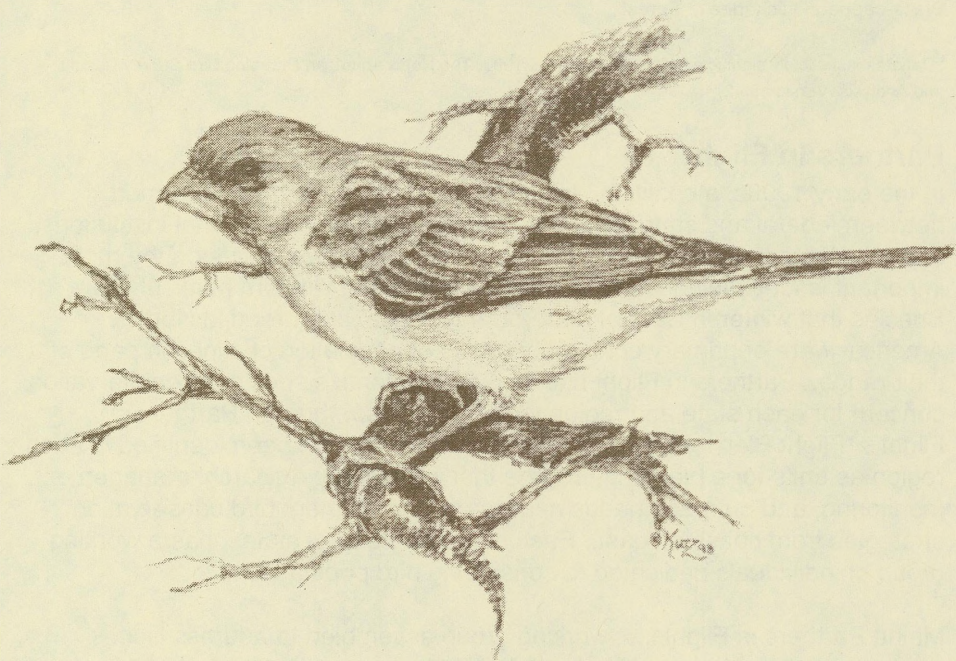
Partners In Flight

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. Species that winter in Central and South America, and breed in North America, were of primary concern because of population declines in parts of their range. Partners in Flight has worked to prioritize species of conservation concern for each state and region in the U.S. Also, through Partners in Flight's "Flight Plan", several physiographic areas have been identified in each region as units for a planning process that will identify research, management, monitoring, and outreach needs necessary to implement bird conservation strategies from coast to coast. Each state, or group of states, has a working group 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 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 MDIFW's Resource Assessment Section. The state coordinator also serves as Maine's representative to the regional Partners in Flight working group. Partners in Flight has encouraged state working groups to take responsibility for priority species within their borders before they become rare, by using cooperative management based on the best scientific data.

Within the Maine working group, small focus groups have emerged to address specific issues of landbird conservation in Maine. Current focus groups include atlasing and monitoring; information and education; and a group working to conserve habitat for grassland birds. More information about Partners in Flight activities in Maine, is available on our department's website (<http://www.state.me.us/ifw/pif>).

—Tom Hodgman



ENDANGERED AND THREATENED WILDLIFE

In 1976, the Maine Endangered Species Act was passed to conserve all species of fish and wildlife found in the state, as well as the ecosystems upon which they depend. The Act authorized the Commissioner of Inland Fisheries and Wildlife to gather information about the distribution, abundance, habitat needs, limiting factors, and other biological and ecological requirements of Maine's fish and wildlife species, and to develop programs to enhance or maintain populations. The Act also directed the Commissioner to designate selected species as Endangered or Threatened and to establish programs to conserve them. No funds were provided to carry out this mandate.

In 1983, the state legislature created The Maine Endangered and Nongame Wildlife Fund by adding a checkoff option to the Maine income tax form, and in 1994, initiated the "Loon License Plate." Fifteen percent of lottery ticket revenues from Maine's new Outdoor Heritage Fund are also earmarked for Endangered and Threatened species projects. All three programs allow people to donate to Endangered Species and other nongame wildlife management programs. The people of Maine contribute about \$85,000 a year through the tax form option, nicknamed the "Chickadee Checkoff" (Table 25), and, in its first four years, more than 105,000 loon license plates have been sold, raising about \$500,000 annually for nongame and endangered wildlife projects. MDIFW has received about \$300,000 of competitive grants from the Outdoor Heritage Fund. These voluntary means of contributing provide the core funding for Maine's rare and Endangered Species programs. Grants

Table 25. A history of contributions from the "Chickadee Checkoff" to the Maine Endangered and Nongame Wildlife Fund.

Year	Total Given	Number of Givers	Average Donation	Percent of Taxpayers Giving
1984	\$115,794	25,322	\$4.57	5.34%
1985	\$129,122	29,200	\$4.42	5.96%
1986	\$112,319	26,904	\$4.17	5.41%
1987	\$114,353	26,554	\$4.31	5.19%
1988	\$103,682	24,972	\$4.15	4.75%
1989	\$93,803	20,322	\$4.62	3.65%
1990	\$88,078	18,332	\$4.80	3.23%
1991	\$92,632	19,247	\$4.81	3.42%
1992	\$95,533	18,423	\$5.18	3.19%
1993	\$82,842	15,943	\$5.20	2.80%
1994	\$84,676	10,863	\$7.79	1.99%
1995	\$81,775	10,014	\$8.17	1.79%
1996	\$90,939	11,024	\$8.25	1.95%
1997	\$77,511	8,686	\$8.92	1.52%

from the U.S. Fish and Wildlife Service for Federal Endangered and Threatened Species provide another essential source of funding.

All money donated, whether from the tax checkoff, car registrations, grants, or direct gifts, is 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 Endangered and nongame species. A nine-member citizen advisory council advises the Commissioner regarding the fund and the programs it supports. This section summarizes the work supported by The Maine Endangered and Nongame Wildlife Fund in 1997. Other related accomplishments are found in the Mammal, Bird, and Habitat sections.

Private organizations, individual volunteers, and every bureau of the Maine Department of Inland Fisheries and Wildlife are part of these successes. The U.S. Fish and Wildlife Service (USFWS) is a major partner. However, special thanks are due the thousands of Maine people who generously contribute to The Maine Endangered and Nongame Wildlife Fund. As you read this, take pride in your accomplishments—and please, as you fill out your tax return next year, and register your car, join with us again in conserving Maine's Endangered and Nongame species.

ENDANGERED SPECIES LISTING

The first comprehensive review of the status of species in Maine was initiated in 1984. Four scientific review committees (one each for birds, mammals, fish, and amphibians-reptiles) were established to evaluate all vertebrate species occurring in Maine, to determine their risk of extinction from within the State, and to recommend species for listing as Endangered or Threatened. Their recommendations were reviewed by MDIFW biologists and scientists. Public workshops and meetings were held to discuss listing recommendations, and a final list was submitted to the rulemaking process.

Six species were added as Endangered and four as Threatened in December, 1986, bringing the total number of Endangered and Threatened Species listed under Maine's Act to 27. The committees also identified about 80 other species thatr 1) could warrant listing but for which insufficient data were available to make that determination, or 2) did not currently warrant listing but could easily become Endangered or Threatened.

Maine's choice of the comprehensive, proactive approach to listing Endangered Species has resulted in a stable and predictable environment for decision-making, in both the public and private sectors, regarding Endangered Species issues. It has provided the foundation for an orderly development of public policy, and is primarily responsible for Maine being largely free of costly conflicts about Endangered Species. It has also eliminated the necessity of the State to react to unexpected or unwarranted petitions for listing.

Determination of a species' status as Endangered or Threatened is based on the species' probability of extinction from Maine as determined from an assessment of each species' population, life history, and biology. It is essential that this step be objective and biologically-based, focusing on a species' risk of extinction from Maine. To ensure this objectivity, regulations were adopted in 1994, after public hearings and discussions, which specify six biological parameters to be used in evaluating a species' risk of extinction from Maine, they are:

1. population viability;
2. population size;
3. population trend;
4. population distribution;
5. population fragmentation; and
6. endemism, meaning the species only occurs in Maine.

A species' status as Endangered or Threatened is a technical question analogous to determinations the Department of Transportation makes regarding bridge and highway integrity, or that doctors make in diagnosing diseases. After those determinations, there is a second step to determine what management actions, if any, are appropriate.

The biological status of species is dynamic; information about many species has improved, and public policy issues confronting the State have expanded. For these reasons, the 1986 list, as expected, was in need of revision if it was to continue to serve as it had for the past ten years.

The Department initiated the second comprehensive review of the status of species in Maine in 1994. Scientific Review Committees were again created. In addition to committees for birds, mammals, fish, and amphibians-reptiles, a committee addressing invertebrates was added for this review. This was done after consulting with the Legislature to clarify the intent of the Endangered Species Act, and to address the need for a clear and predictable public policy on invertebrates.

The committees undertook a comprehensive review of all species in Maine, screened them against established guidelines and criteria, reviewed technical reports, and consulted with experts throughout the U.S. and Canada. Recommendations were reviewed and discussed at public meetings and with a wide range of interested parties. As a result, 20 species were proposed to be listed as Endangered or Threatened, which is less than 1% of all species considered, and included 7 species of birds, 1 fish, and 12 invertebrates.

In May 1997, the legislature approved and the Governor signed legislation adding these new Endangered and Threatened Species to Maine's list. In addition to these Maine listed species, there are a number of federally listed species whose occurrence in Maine is known or suspected. A complete listing of both Maine and federally listed species is given in Table 26.

Table 26. Maine and Federally Endangered and Threatened fish and wildlife species (as of June 10, 1997)

Maine Endangered Species

Birds

- | | |
|---|---|
| Golden Eagle - <i>Aquila chrysaetos</i> | Least Tern - <i>Sterna antillarum</i> |
| Peregrine Falcon - <i>Falco peregrinus*</i> | Black Tern - <i>Chlidonias niger</i> |
| (breeding pop. only) | Sedge Wren - <i>Cistothorus platensis</i> |
| Piping Plover - <i>Charadrius melodus**</i> | Grasshopper Sparrow - <i>Ammodramus savannarum</i> |
| Roseate Tern - <i>Sterna dougallii*</i> | American Pipit - <i>Anthus rubescens</i> (breeding pop. only) |

Reptiles and Amphibians

- | | |
|---|--|
| Blanding's Turtle - <i>Emydoidea blandingii</i> | Box Turtle - <i>Terrapene carolina</i> |
| Black Racer - <i>Coluber constrictor</i> | |

Mayflies

- A Flat-headed Mayfly - *Epeorus frisoni*

Damselflies and Dragonflies

- Ringed Boghaunter - *Williamsonia lintneri*

Butterflies and Moths

- | | |
|---|--|
| Clayton's Copper - <i>Lycaena dorcas claytoni</i> | Hessel's Hairstreak - <i>Mitoura hesseli</i> |
| Edwards' Hairstreak - <i>Satyrrium edwardsii</i> | Katahdin Arctic - <i>Oeneis polixenes katahdin</i> |

Maine Threatened Species

Birds

- | | |
|--|---|
| Bald Eagle - <i>Haliaeetus leucocephalus**</i> | Harlequin Duck - <i>Histrionicus histrionicus</i> |
| Razorbill - <i>Alca torda</i> | Arctic Tern - <i>Sterna paradisaea</i> |
| Atlantic Puffin - <i>Fratercula arctica</i> | Upland Sandpiper - <i>Bartramia longicauda</i> |

Mammals

- Northern Bog Lemming - *Synaptomys borealis*

Amphibians and Reptiles

- | | |
|---|--|
| Spotted Turtle - <i>Clemmys guttata</i> | Loggerhead Turtle - <i>Caretta caretta**</i> |
|---|--|

Fish

- Swamp Darter - *Etheostoma fusiforme*

Mollusks

Tidewater Mucket - *Leptodea ochracea*

Yellow Lampmussel - *Lampsilis cariosa*

Mayflies

Tomah Mayfly - *Siphonisca aerodromia*

Damselflies and Dragonflies

Pygmy Snaketail - *Ophiogomphus howei*

Butterflies and Moths

Twilight Moth - *Lycia rachelae*

Pine Barrens Zanclognatha - *Zanclognatha martha*

Federally Listed Endangered or Threatened Species

(Currently or historically occurring in Maine but not listed under Maine's Endangered Species Act)

Birds

Eskimo Curlew - *Numenius borealis**/?

Mammals

Gray Wolf - *Canis lupus**/?

Humpback Whale - *Megaptera novaeangliae**

Eastern Cougar - *Felis concolor cougar**/?

Finback Whale - *Balaenoptera physalus**

Right Whale - *Eubalaena glacialis**

Sperm Whale - *Physeter catodon**

Amphibians and Reptiles

Leatherback Turtle - *Dermochelys coriacea**

Atlantic Ridley Turtle - *Lepidochelys kempi**

Sei Whale - *Balaenoptera borealis**

Fish

Shortnose Sturgeon - *Acipenser brevirostrum**

Beetles

American Burying Beetle - *Nicrophorus americanus**/?

Butterflies and Moths

Karner Blue - *Lycaeides melissa samuelis**/?

* = Federally listed Endangered Species ** = Federally listed Threatened Species

? = current presence uncertain in Maine.

(For the companion list of Endangered and Threatened Plants in Maine, contact the Maine Natural Areas Program, DOC, State House Station #93, Augusta, ME 04333)

HABITAT MANAGEMENT AND PROTECTION

Habitat protection is the most critical need of most Endangered and Threatened Species in Maine. MDIFW uses a variety of methods to protect critical habitat, including land acquisition, voluntary management agreements with landowners, conservation easements, environmental permit review, and designation as Essential Habitat under the Maine Endangered Species Act. Voluntary management with landowners, habitat acquisition, and conservation easements are the best tools for long-term protection of significant sites. Several important acquisitions were made by, or with the help of, the Department in 1997. Cooperative landowners, The Nature Conservancy, Maine Coast Heritage Trust, U.S. Fish and Wildlife Service, local land trusts, and others have worked together on these projects.

MDIFW reviewed hundreds of environmental permit applications in 1997, ranging from subdivision proposals to construction of natural gas pipelines. All applications were screened to ensure protection of sensitive wildlife areas.

Another important habitat protection tool regularly used by the Department is voluntary, cooperative management of important sites for Endangered or Threatened wildlife. In 1997, cooperative management arrangements were in place on dozens of sites, including lands under jurisdiction of the state Bureaus of Public Lands and Parks and Recreation, Baxter State Park, Acadia National Park, U.S. Fish and Wildlife Service, most major timber industry landowners, and other private landowners.

Essential Habitat designation under the Maine Endangered Species Act also continues to be a valuable tool in protecting sites for Endangered and Threatened Species. Currently, 320 bald eagle nest sites, 9 piping plover and least tern nesting, feeding, and brood-rearing areas, and 21 roseate tern nesting areas have been identified as Essential Habitat. The success of this program continues to be demonstrated not only in the species' response to Essential Habitat protection, but also in the cooperative partnerships that have developed between state agencies, municipalities, and private landowners, thus avoiding land-use conflicts where Endangered Species are of concern.

—Mark A. McCollough

ENDANGERED AND THREATENED SPECIES STUDIES

Bald Eagle

1997 was a year of bad news and good news for bald eagles in Maine. Recovery of the population was hampered by an unprecedented 12% decline in

Table 27. Bald Eagle nesting and productivity in Maine, 1962-1970 and 1972-1997¹.

Year	Occupied Sites	Successful Sites		No. Young Fledged	Young Fledged/Nest		Occupied Nests Fledging # of Young			
		N	%		Occupied	Successful	0	1	2	3
1962	27	8	30	8	0.30	1.00	19	8	0	0
1963	32	9	28	12	0.38	1.33	23	6	3	0
1964	28	6	21	6	0.21	1.00	22	6	0	0
1965	33	4	12	4	0.12	1.00	29	4	0	0
1966	28	7	25	11	0.39	1.57	21	3	4	0
1967	21	4	19	6	0.29	1.50	17	2	2	0
1968	23	9	39	11	0.48	1.22	14	7	2	0
1969	29	11	31	15	0.52	1.36	18	7	4	0
1970	32	8	25	11	0.34	1.38	24	5	3	0
1972	29	8	28	8	0.28	1.00	21	8	0	0
1973	31	6	19	6	0.19	1.00	25	6	0	0
1974	36	12	33	12	0.33	1.00	24	12	0	0
1975	31	9	29	11	0.35	1.22	22	7	2	0
1976	41	12	29	19	0.46	1.58	29	6	5	1
1977	50	24	48	35	0.70	1.46	26	16	5	3
1978	62	20	32	32	0.52	1.60	42	9	10	1
1979	52	29	56	38	0.73	1.31	23	20	9	0
1980	56	29	52	40	0.71	1.38	27	19	9	1
1981	63	34	54	49	0.78	1.42	29	19	15	0
1982	72	36	50	56	0.78	1.56	36	17	18	1
1983	74	40	54	60	0.81	1.50	34	20	20	0
1984	66	35	54	46	0.70	1.31	31	24	11	0
1985	86	51	59	75	0.87	1.47	35	27	24	0
1986	89	50	56	76	0.85	1.52	39	25	24	1
1987	91	46	51	65	0.71	1.41	45	28	1	1
1989	109	45	41	70	0.64	1.56	64	20	25	0
1990	123	69	56	98	0.80	1.42	54	40	29	0
1991	127	79	61	117	0.92	1.48	48	44	32	3
1992	140	77	55	113	0.81	1.47	63	43	32	2
1993	150	84	56	115	0.77	1.37	66	53	31	0
1994	175	101	58	142	0.81	1.40	74	61	39	1
1995	192	118	62	176	0.92	1.47	74	63	52	3
1996	203	95	47	141	0.69	1.48	108	50	44	1
1997	176	108	61	179	1.02	1.66	68	40	65	3

¹Data comparisons between the periods 1962-67 and 1968-97 are invalid due to variations in survey methodology, regional emphasis, and intensity. 1988 data were incomplete due to a lack of funds.

the nesting population, to 176 pairs of eagles from the record high 203 set in 1996 (Table 27). The drop in breeding pairs can largely be attributed to high adult mortality during 1996-1997, as 25 adult bald eagles were found dead or seriously injured in Maine in 1996 alone. The impact of the reduced nesting population was partially offset in 1997 by the highest number of eaglets fledged (raised to independence) in Maine to date - 179 - three more than the previous record set in 1995.

Poor nesting success has typified Maine's eagle population, slowing the rate of recovery. Environmental contaminants, such as organochlorine chemicals (especially DDE, a by-product of the insecticide DDT, and industrial pollutants such as PCBs) 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 continues cooperatively with the University of Maine and federal wildlife officials to examine these lingering impacts. However, in 1997 Maine's eagles reached a record high productivity level of 1.02 fledglings per occupied nest - a level more typical of bald eagle populations in other parts of the country where lower contaminant burdens in eagles are less likely to impair reproduction.

Preliminary survey results from 1998 indicate the nesting population, with an increase to 192 nesting pairs, has recovered some of the loss experienced in 1997. The second phase of the annual survey will reveal the number of eaglets produced, and whether the population has sustained the healthy level of productivity attained in 1997. 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 and their habitat.

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, they were victimized by the effects 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.

Peregrines for reintroduction are produced in special captive breeding projects. Young peregrines arrive at their planned release sites in Maine 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. Daily care, feeding, and monitoring promote normal development of young peregrines, enhancing their survival following late summer dispersal.

Many peregrines die of natural causes, just like other wild animals, so it is important to maintain the supply of reintroduced peregrines until a viable population is re-established. The needs and options for continuing these peregrine releases are reviewed annually to optimize their effectiveness. A total of 139 young peregrines were successfully released at 8 different locations in Maine during 1984-1996. More than 93% of young peregrines released in Maine have successfully made the transition into the wild.

In 1997, MDIFW conducted the last reintroduction of captive-produced peregrines in Maine. With diminishing emphasis on peregrine reintroduction in favor of other more imperiled raptor species in South and Central America, the Peregrine Fund offered one last group of peregrine chicks for Maine's successful restoration program. Four of five young fledged successfully; the fifth falcon was culled from Maine's wildlands by a sharp-eyed and swift red-shouldered hawk. Observations of peregrines at 10 other locations in 1997 provide some optimism for future population increases. Four eyries (nest sites) were successful, and a total of 11 young falcons were naturally produced.

The combined input of 15 (4 from captive breeding/hacking, 11 from natural production) young peregrines in Maine during 1997 should contribute to an increasing number of peregrines in upcoming years. If you witness the spectacular vertical dives of a peregrine, or otherwise suspect their presence, please contact the nearest MDIFW office. Watch and enjoy a rare and thrilling sight!

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 U.S. However, 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 14 consecutive years, and in 1997, did not attempt to nest at all. 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 grim 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 forestlands in Maine cannot be used as hunting areas by golden eagles.

Golden 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. This is a special opportunity to help understand the species' decline. 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.

The immediate priority in Maine has been to manage the few suitable nesting habitats that once supported golden eagles. The last remaining pair is being carefully monitored to learn more of the species' needs in the East, and to identify factors limiting their existence. There is some evidence of increases in a small breeding population in eastern Canada, an area upon which the future of golden eagles in Maine is dependent.

—Charles S. Todd & Andrew Weik

Grasshopper Sparrow and Grassland Bird Surveys

Grasshopper sparrows are listed as Endangered by MDIFW because of low numbers and declining nesting habitat. Maine is presently the northeastern edge of the range of grasshopper sparrows. The species now nests at only four locations in the southern part of the state. Grasshopper sparrows inhabit large sandy grasslands and blueberry barrens, which are vegetated with sparse bunch grasses. These grassland habitats are also rare in Maine, and each requires some form of 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 1997 census identified 25 singing males, the best indicator of territorial pairs. Fifty-two singing males were found at three other locations in 1997.

The Kennebunk Plains was purchased by the State of Maine and The Nature Conservancy and is now a Wildlife Management Area managed by MDIFW, in cooperation with 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, the City of

Sanford, and the Maine Department of Transportation to maintain Grasshopper Sparrow habitat at the Brunswick Naval Air Station, Sanford Municipal Airport, and the Augusta 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 has focused primarily on 4 species of state and regional concern — grasshopper sparrow (State Endangered), upland sandpiper (State Threatened), vesper sparrow (Special Concern) and Eastern meadowlark (Special Concern) — but includes all species that are encountered. During May-July 1997, over 900 point counts were conducted on 310 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 survey. 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, a State Endangered species, were encountered in 2 wet meadow sites, and 1 nesting pair of short-eared owls was recorded.

The survey data are being used to build an electronic database to track grassland bird populations, and have added substantially to the Biological Conservation Database maintained by MDIFW to track rare and endangered species. Information from this survey, and concurrent surveys in New York and other New England states, shows that Maine, especially Washington County, is particularly important to the conservation of upland sandpipers and vesper sparrows in the northeastern U.S. These survey data have also been integral in consultations with managers of airports and military installations.

The grassland bird survey continues during May - July 1998. During this period, if you observe any grasshopper sparrows (outside of the Kennebunk Plains and Sanford Municipal Airport), sedge wrens, short-eared owls, or loggerhead shrikes, please report your observations (include date, location, species, number and behavior of individuals) to the nearest MDIFW office.

—Charles S. Todd & Andrew Weik

Piping Plover

Piping plovers are small, sand-colored shorebirds that nest on sandy beaches and dunes along the Atlantic Coast from South Carolina to Newfoundland. In Maine, the piping plover is listed as Endangered by MDIFW because of its extreme rarity in the state and because of threats it faces during the nesting season.

In 1990, a recovery plan was completed for the piping plover in Maine, establishing the Department's goals and objectives. The objectives were to increase the plover population to at least 20 nesting pairs at 7 sites and producing at least 2 chicks per pair.

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 18 sites in 1996 (Table 28). Nineteen different beaches have been used during the period. The overall population trend has been one of increase, due largely to intensive management at nesting sites and cooperation of private landowners and towns in southern Maine.

Table 28. Piping Plover nesting and productivity, 1981-1997.

Year	Number of Pairs	Chicks fledged	Productivity
1981	10	9	0.90
1982	10	18	1.80
1983	6	7	1.17
1984	21	9	0.43
1985	15	28	1.87
1986	15	31	2.07
1987	12	21	1.75
1988	20	15	0.75
1989	16	38	2.38
1990	17	26	1.53
1991	18	45	2.50
1992	24	49	2.04
1993	32	76	2.38
1994	35	70	2.00
1995	40	95	2.38
1996	60	98	1.63
1997	47	93	1.98

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 (Table 28). 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 nine of the past eleven years. The trend in productivity has been generally one of increase since 1981. In 1997, 47 pairs of piping plovers nested at 18 sites and successfully fledged 93 chicks.

The population decreased slightly in 1997; a rangewide trend that may have been due to adverse wintering conditions. Some range expansion may have occurred also as New Hampshire recorded its first nesting piping plovers in years. In 1997, MDIFW proposed to add three new Essential Habitats in Wells, Scarborough, and Biddeford. The proposal was postponed until 1998 to accommodate summer resident landowners.

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 partial funding 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, fencing, and signs.

—Mark A. McCollough

Least Tern

Least terns are the smallest of four species of terns that nest along the coast of Maine. Least terns nest on a few sandy beaches in southern Maine. They are listed as Endangered by MDIFW because of their rarity and because of threats to nesting colonies and habitat.

Nesting colonies of least terns in Maine are monitored and protected by Maine Audubon Society and The Nature Conservancy biologists, with partial funding provided by MDIFW. During the past 11 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 (Table 29). Since 1979, total productivity in Maine has ranged from 12 to 123 young fledged annually. In 1997, 50 pairs nested at 4 sites and produced only 11 fledglings.

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

Table 29. Nesting & Productivity of Least Terns in Maine, 1977-1996.

Year	Number of Pairs	Chicks Fledged	Productivity
1977	55	50	0.90
1978	93	66	0.70
1979	78	31	0.39
1980	62	34	0.54
1981	78	21	0.26
1982	39	26	0.66
1983	54	29	0.53
1984	88	82	0.93
1985	105	12	0.11
1986	124	30	0.24
1987	89	12	0.13
1988	98	40	0.40
1989	83	8	0.09
1990	65	44	0.69
1991	52	25	0.48
1992	94	123	1.47
1993	125	114	0.91
1994	89	79	0.89
1995	100	16	0.16
1996	60	30	0.50
1997	50	11	0.22

development. In 1997, vandals disrupted one of the largest colonies and destroyed some eggs and chicks. Maine Audubon offered a \$5,000 reward through Operation Game Thief. Management of least terns in Maine includes protection of nesting colonies with symbolic fencing, snow fencing or chicken wire, and predator control. Symbolic fences are fences of stakes and twine with warning signs around the nesting colonies. 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 A. 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 gulls on the coast (a predator and competitor of the terns), and an increase of 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 and 237 pairs nested in Maine in 1997 (Table 30); a 50% increase from the previous year! In the 1930s, 200-300 pairs nested in the state.

Table 30. Number of nesting pairs of terns off coastal Maine, 1984-1997.

Year	Common Terns	Arctic Terns	Roseate Terns
1984	2,543	3,170	76
1987	2,173	3,170	52
1988	2,955	3,824	74
1989	2,741	4,151	81
1990	2,810	3,979	108
1991	4,032	3,898	128
1992	3,716	4,356	122
1993	4,313	4,478	142
1994	4,361	5,029	144
1995	5,011	5,138	153
1996	5,847	4,401	161
1997	7,102	3,976	237

Recovery of this species is a cooperative venture among the U.S. Fish and Wildlife Service, National Audubon Society, Maine Audubon Society, College of the Atlantic, and MDIFW. In 1990, MDIFW developed a recovery plan for the roseate tern. The Department's goal is to increase the population of roseate terns to about 300 pairs. In 1992, 21 nesting islands used by roseate terns were protected by Essential Habitat provisions of the Maine Endangered Species Act. In 1994 and 1995, new tern restoration projects were initiated to benefit roseate terns at the mouth of the Kennebec River and Blue Hill Bay.

Populations of common terns and arctic terns (Threatened) are also benefiting from this effort.

—Mark A. McCollough

Blanding's and spotted turtles

Two of Maine's rarest reptiles, the spotted and Blanding's turtles, are semi-aquatic species preferring clean, 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 Atlas 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, in collaboration with the University of Maine Wildlife Department and Maine Audubon, 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 have been surveyed, and approximately 100 new sites have been discovered.

In 1997, MDIFW and the Maine Natural Areas Program began working with towns, land trusts, private landowners, and private conservation groups to initiate planning for conserving the habitat of these species on a 50,000 acre area surrounding Mount Agamenticus.

—Mark A. McCollough

OTHER STUDIES

A number of species of fish and wildlife are of concern to Maine and other state fish and wildlife agencies in the Northeast, and may warrant Federal Endangered or Threatened species listing. As part of MDIFW's Endangered Species Cooperative Agreement with the USFWS, and in cooperation with other states, MDIFW periodically conducts special investigations and management projects for those species. The purpose is to acquire information about the species and their conservation needs, or to manage the species, and, if successful, thereby possibly eliminate the need to list the species as Endangered or Threatened. Actions this past year included the following:

Wood turtles

Although not Endangered or Threatened, wood turtles are a species of management concern in Maine. They are found throughout the state in streams and rivers. During summer months they inhabit adjacent riparian areas. Appropriate habitat occurs throughout the state. 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. In 1996 and 1997, these studies were expanded by MDIFW and the University of Maine with the help of an Outdoor Heritage Fund grant. Graduate student Brad Compton was able to track about 35 radio-tagged turtles and locate nests. His study is the first to document nesting ecology of the wood turtle in the state. A second student will conduct a state-wide and range-wide genetics study.

—Mark A. McCollough

Tomah Mayfly

The Tomah Mayfly is listed as a Threatened Species in Maine and was formerly considered a candidate for federal listing by the USFWS. This large 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) by University of Maine entomologist, Dr. Cassie Gibbs, in the 1970s. It has since been found at 10 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 its genus (*Siphonisca*) 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 seasonally-flooded sedge meadows along large streams or rivers to complete its life cycle. This highly productive habitat supports abundant populations of Mayfly nymphs which, in turn, serve as prey for the Tomah Mayfly. Although sedge meadows are not an uncommon habitat type in Maine, for some unknown reason 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!

MDIFW has been cooperating with the University of Maine and the USFWS to learn more about this intriguing insect and to insure 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.

—Beth I. Swartz & Mark A. McCollough

Freshwater mussels

Freshwater mussels are relatively sedentary, bottom-dwelling invertebrates 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 lifestyle belies its importance. As filter feeders, mussels provide a valuable service to their aquatic environments by siphoning out 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 then chance upon, 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 eleven species currently documented as living here (Table 31). Although most of our mussel species are widely distributed throughout the State, each one has a unique set of habitat requirements: some are found only in flowing water, others occur only

Table 31. Freshwater mussels of Maine

Common Name	Scientific Name
Eastern River Pearl Mussel	<i>Margaritifera margaritifera</i>
Eastern Elliptio	<i>Elliptio complanata</i>
Triangle Floater	<i>Alasmidonta undulata</i>
Brook Floater	<i>Alasmidonta varicosa</i>
Eastern Floater	<i>Pyganodon cataracta</i>
Newfoundland Floater	<i>Pyganodon fragilis</i>
Alewife Floater	<i>Anodonta implicata</i>
Squawfoot	<i>Strophitis undulatus</i>
Yellow Lampmussel	<i>Lampsilis cariosa</i>
Eastern Lampmussel	<i>Lampsilis radiata radiata</i>
Tidewater Mucket	<i>Leptodea ochracea</i>

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 because 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.

In 1992, with financial support from the U.S. Fish & Wildlife Service, MDIFW initiated surveys to determine the status, abundance, and distribution of the State's rarer species of freshwater mussels. In the five years since this research began, MDIFW has surveyed more than 1,500 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, are very limited in range and distribution and occur in abundance at only a few sites. Both species are listed as Threatened in Maine. Three additional species, the brook floater, squawfoot, and triangle floater, are also 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 that 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 occurrence of the State's freshwater mussels and learn about their life histories, habitat

requirements, and conservation needs. 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 1998, MDIFW also plans to produce a statewide atlas for Maine's freshwater mussels which will summarize the information gathered during the past five years, and provide a valuable reference for resource managers and the public.

—*Beth I. Swartz & Mark A. McCollough*

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 (Threatened) and the extra-striped snaketail dragonfly (Special Concern) 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.

Two University of Maine graduate students, Billie Bradeen and Dan Boland, were funded in part by MDIFW and the U.S. Fish and Wildlife Service to study the life history and habitat needs of these dragonflies in the Aroostook River watershed. Their work has provided insights into the status of these rare invertebrates and helped state and federal agencies better understand their conservation needs.

In 1996, MDIFW received an Outdoor Heritage Fund grant to conduct a statewide atlas of the dragonflies and damselflies of Maine. Paul Brunelle of Halifax, Nova Scotia will be gathering all of the historic data on these species; designing a 5-year, volunteer-based, atlasing project, and producing fact sheets and a poster of the rare and endangered dragonflies and damselflies of Maine.

In 1995, the banded bog skimmer dragonfly (Endangered), was discovered in York County by MDIFW biologists. This dragonfly, one of the rarest in North America, is known from fewer than 30 sites - most of which have fewer than 50 individuals. The Maine population is now the northernmost population known. In 1997, MDIFW assessed population numbers and found two more populations in central York County.

—*Mark A. McCollough*

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 state-wide 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.

Since then, the U.S. Fish and Wildlife Service identified the black tern as a candidate for the Federal Endangered Species List, and, in 1996, MDIFW listed the species as Endangered. Black terns nest in New England 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. The number of nesting pairs has increased from 36 pairs in 1991 to about 90 pairs in 1997. Nesting colonies have been found in eight wetlands.

In 1997, Fred Servello, a faculty member of the Department of Wildlife Ecology at the University of Maine, began a 3-year study of black tern ecology and populations.

—Mark A. McCollough

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 fewer than 1,000 individuals and may be declining. More than half of that population winters in Maine. Hunting for Harlequin ducks was curtailed in the late 1980s.

Work focusing at several objectives relative to the conservation of the Harlequin duck was conducted in 1997. 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; 3) working to coordinate regional and national survey, management, and research activities with Canadian and other U.S. interests; 4) conducting a major literature review and data compilation for the Harlequin Duck in Maine; and 5) drafting a "species assessment."

MDIFW listed the Harlequin duck as a Threatened species, under Maine's Endangered Species Act, in 1996 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) the fact that more than 90 percent of those Harlequins in Maine are located at fewer than five locations.

A petition has been submitted to the USFWS to federally list the Harlequin as Endangered or Threatened. 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. For example, birds are surveyed during December-March, which includes the migration periods; only limited areas have been 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 the adjacent islands in Jericho and Penobscot Bays.

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, Glenn Mittelhauser, who is conducting this research, has captured and marked over 70 birds.

—Patrick O. Corr & Mark A. McCollough

Vernal pools

Many of Maine's amphibians depend on vernal pools as breeding habitat. Some, like spotted salamanders, blue spotted salamanders and wood frogs use these habitats almost exclusively. In southern Maine, Blanding's and



spotted turtles use vernal pools extensively. We know little about why some vernal pools receive greater wildlife use than others. These small wetlands can now potentially be protected under state wetland protection laws.

Funding from the Environmental Protection Agency, the Nongame and Endangered Wildlife Fund, and the Outdoor Heritage Fund is being used to support a study of wildlife values associated with vernal pools in York County. A University of Maine graduate student, Anne Perillo, is studying invertebrate and amphibian use of 45 vernal pools. Another UM graduate student, Danielle DiMauro, is studying amphibian use of human created vernal pools (skidder ruts, roadside ditches, gravel pits) in forested areas being actively logged. In 1997, MDIFW and Maine Audubon studied amphibian use of vernal pools in southern (York, South Berwick) and central (Edinburg) Maine. Over 50 volunteers attended workshops and assisted in field surveys. In 1997, MDIFW and Maine Audubon continued studies to evaluate the effectiveness of using low-level aerial photography to locate potential vernal pools in hardwood and softwood dominated settings.

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. A Maine "Citizen's Guide to Locating and Describing Vernal Pools" was completed. Best Management Practices guidelines for forest management and development are being compiled.

—Mark A. McCollough

Amphibian Monitoring

Since 1990, many herpetologists have been concerned that amphibian populations may be declining worldwide. MDIFW has no data to assess trends in Maine's 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 survey organized by the U.S. Geological Service - Biological Resource Division. Sixty-two frog and toad road monitoring routes were established. Each spring, volunteers will drive their routes three times, recording their observations 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!

—Mark A. 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 conserving biological diversity, inventorying and monitoring the status of rare species and ecological communities, tracking

their locations, and facilitating 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, which operate cooperatively with TNC.

At the heart of every Natural Heritage Program is the Biological and Conservation Data System (BCD), a 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.

—Beth I. Swartz

WILDLIFE HABITAT

The Wildlife Habitat Group continued to work on several major wildlife habitat projects including the Habitat Consultation Areas Mapping Project (HCAMP) and preparation of species habitat assessments. Completion of these tasks required close coordination with wildlife biologists in the Division's seven regional offices and with 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.

HABITAT CONSULTATION AREAS MAPPING PROJECT (HCAMP)

HCAMP is being implemented by MDIFW, in cooperation with the Maine Natural Areas Program (MNAP) in the Department of Conservation. A grant from the Outdoor Heritage Fund (proceeds from instant lottery games) provided much needed funding to bring this project into MDIFW offices, at MNAP, and other state agencies by June 1998.

We developed HCAMP maps, both hardcopy and digital versions, with input from other Wildlife Division staff (wildlife habitats) and the MNAP staff (plants and natural communities). Each HCAMP map 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 mi², or about 154 acres). Grid cells are "turned on" by:

- Locations of Endangered, Threatened, and special concern plants and animals;
- Essential Habitats for state Endangered and Threatened animals;
- Deer wintering areas;
- Waterfowl and wading bird habitats;
- Shorebird feeding and roosting areas;
- Seabird nesting islands; and
- Rare or exemplary natural communities.

If a proposed project falls within a cross-hatched 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 intend to periodically update (current maps expire December 31, 1998) these maps, which highlight habitats for the public, in order to:

- facilitate, streamline, and provide predictability to the environmental permitting process;
- help landowners plan for impacts of proposed projects on candidate Natural Resource Protection Act (NRPA) Significant Habitats, Essential Habitats for state Threatened and Endangered animals, 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.

Because many areas defined on the maps include unregulated habitats, these 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, AND WADING BIRD HABITAT MAPPING

Our Group has completed the laborious process of initially entering Deer Wintering Areas (DWA) and Waterfowl and Wading Bird Habitats (WWH) into the Geographic Information System (GIS). DWAs in both LURC jurisdiction and organized towns (candidate Significant Habitats) have been mapped by MDIFW regional biologists. During the last year, with assistance of regional wildlife biologists, we have also completed digitizing WWHs. These areas have previously been included on maps provided to organized towns as part of the comprehensive planning process. Although boundaries of many areas are preliminary, this is the first step towards providing a tool to track these habitats, analyze how they occur over the landscape, and provide input to the Habitat Consultation Areas maps.

SPECIES HABITAT ASSESSMENTS

Wildlife Division species specialists are working hard to update species assessments for the current planning cycle. These documents will be taken to a public working group to develop goals and objectives for species management over the next 10-15 years. 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 and quality of wildlife habitat.

OTHER HABITAT PROJECTS

We are working cooperatively on a number of other projects. MDIFW contributed to the U.S. Biological Survey GAPS project in their efforts to assess species diversity and identify areas of high species diversity in Maine. In addition, our Department has been the major contributor of wildlife data for a coastal island prioritization project. Another effort is underway, in cooperation with the University of Maine, to develop land cover/use maps of Maine based on satellite imagery. These maps will be useful in identifying wildlife habitats and measuring wildlife habitat changes over time.

We are also assisting in mapping habitats for protection under the Natural Resources Protection Act (NRPA). Criteria are being developed by Wildlife Division staff to define these habitats, and existing data are being prepared for the GIS to facilitate habitat mapping and protection. We will be preparing maps and providing them to the Department of Environmental Protection (DEP) for implementation of habitat protection. Maps prepared by MDIFW, which designate Seabird Nesting Islands as Significant Habitats, are currently being processed by DEP through rulemaking.

Finally, we are continuing to increase our current knowledge of GIS and computer technology to help meet our goals of conserving and managing wildlife habitats. We are also planning 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. There are many challenges ahead for the Wildlife Division as we move into a more active role of habitat conservation and management. This will require a major effort for the Wildlife Division team.

GEOGRAPHIC INFORMATION SYSTEM (GIS)

Using the GIS, the Habitat Group is able to track a wide variety of wildlife habitats with digital data, analyze these data, and generate maps of important habitats for conservation and management. For the past year, we continued to focus much of our effort on entering 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 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 Areas maps (see above description) is one example of GIS-produced maps.

In addition to the above wildlife habitat projects, work is continuing on identifying sensitive coastal wildlife areas for marine oil spill response; digitizing DWA and Waterfowl/Wading Bird Habitats (WWH); tracking Essential Habitats for Endangered or Threatened species; and mapping locations of Endangered, Threatened, or special concern species.

—Rich Dressler & Mark Caron

OIL SPILL RESPONSE AND PLANNING

***Julie N* spill damage assessment**

The Natural Resource Damage Assessment (NRDA) is developing a settlement proposal to restore resources injured during the 1996 Julie N oil spill in Portland harbor. Based on studies through August 1997, an assessment is being completed to determine damages. Restoration projects will be designed to restore damaged natural resources and compensate Maine citizens for losses. The cost of these projects will be borne by the owner of the Julie N.

Marine oil spill response and planning

Oil spill planning efforts continued over the past year in coordination with wildlife species specialists and regional biologists. Our highest priority is identifying sensitive coastal wildlife areas for protection in the event of a marine oil spill. Our oil spill biologist has provided data updates to DEP on a variety of coastal species (shorebirds, seabirds, waterfowl, wading birds, seals, Endangered and Threatened species, etc.) to generate revised Environmental

Vulnerability Index (EVI) or oil spill response maps. Those areas identified will be given highest priority during oil spill response and cleanup. We are collecting and providing current coastal wildlife information to periodically update these maps. MDIFW has been working to identify specific habitats that should be protected from oil spills throughout the year.

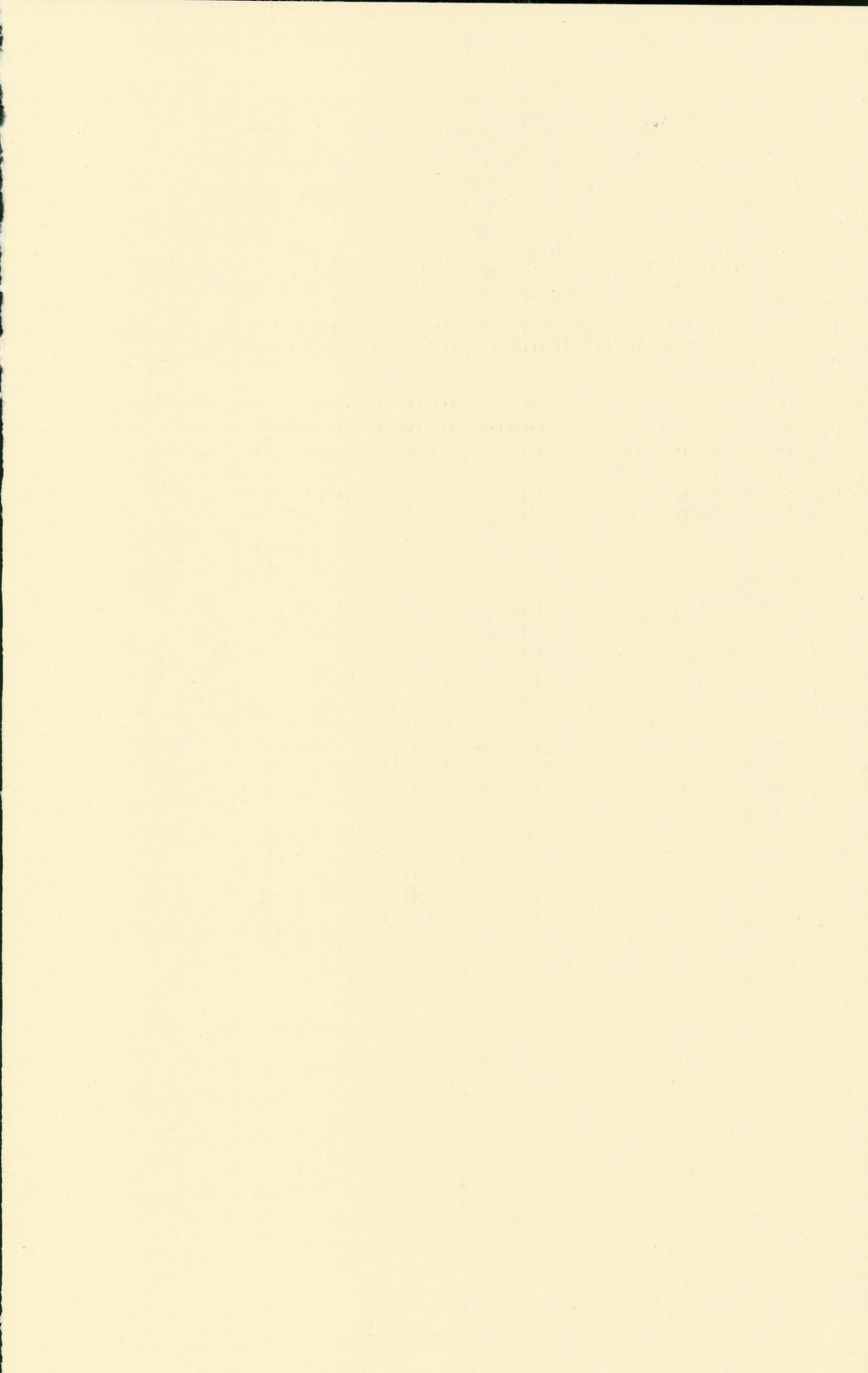
Another component of our oil spill planning efforts is wildlife rehabilitation. We are working closely with the DEP to implement the wildlife rehabilitation plan outlined in the Marine Oil Spill Contingency Plan for the State of Maine. A major component of this plan is training state/federal agency staff and volunteers to conduct wildlife rehabilitation. In coordination with the State wildlife rehabilitation contractor, International Bird Rescue and Research Center, we conducted another intensive 2-day training session for agency staff and other individuals in 1997, as well as a refresher course for those individuals previously trained. A 1-day training session was held for volunteers in Brunswick. In addition to training, we are working with DEP and the Oil Spill Advisory Committee on procurement of rehabilitation materials and equipment in preparation for oil spill response. We have completed a Memorandum of Agreement with the Maine National Guard to use their facilities for wildlife rehabilitation during an oil spill.

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 Plan, and have also participated in preparing 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 Wildlife 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.

—John Kenney & Rich Dressler

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***

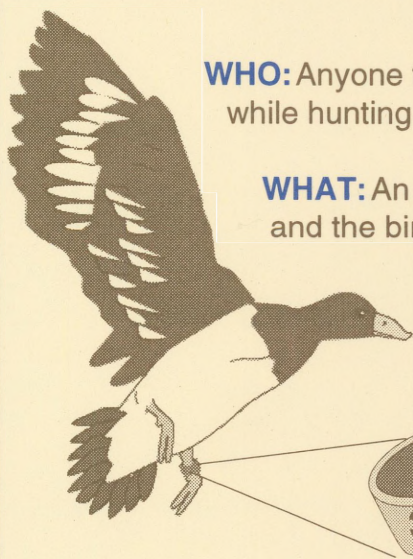


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New Reporting Procedures Now Available

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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 National Biological Service*