2021-2022

RESEARCH + MANAGEMENT REPORT

Regional Wildlife Management

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2021-22 RESEARCH & MANAGEMENT REPORT

Maine Department of Inland Fisheries and Wildlife protects and manages Maine's fish and wildlife and their habitats, promotes Maine's outdoor heritage, and safely connects people with nature through responsible recreation, sport, and science.

Regional Wildlife Management

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» Game Mammals Conservation & Management

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» Non-Game Mammals Conservation & Management

» Beginning with Habitat Updates

» Bird Conservation & Management

» Reptile, Amphibian, and Invertebrate Conservation & Management

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Cover photo Aroostook river at dusk by Mark Caron.

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WILDLIFE MANAGEMENT

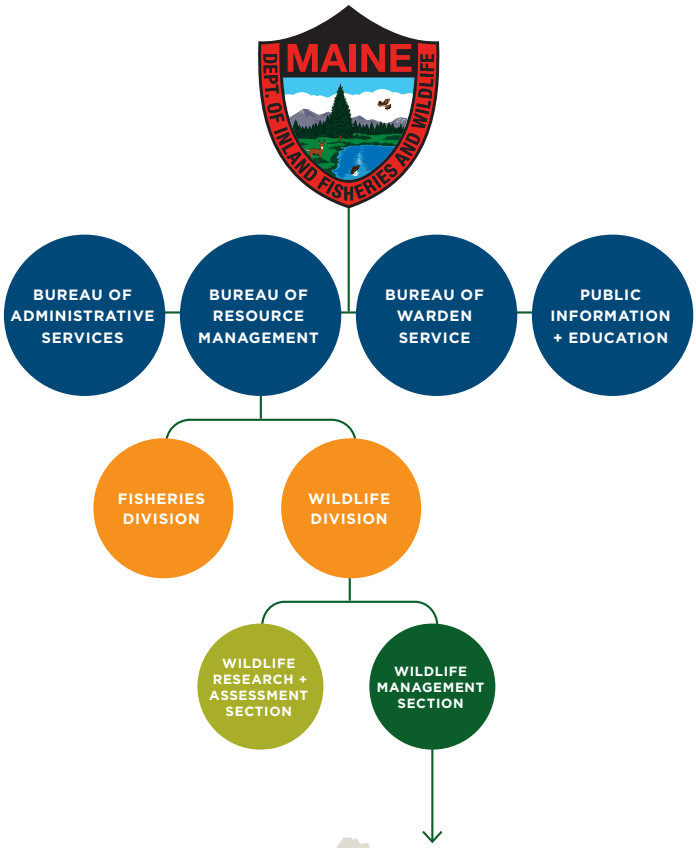
Ryan Robicheau
Wildlife Management Section Supervisor

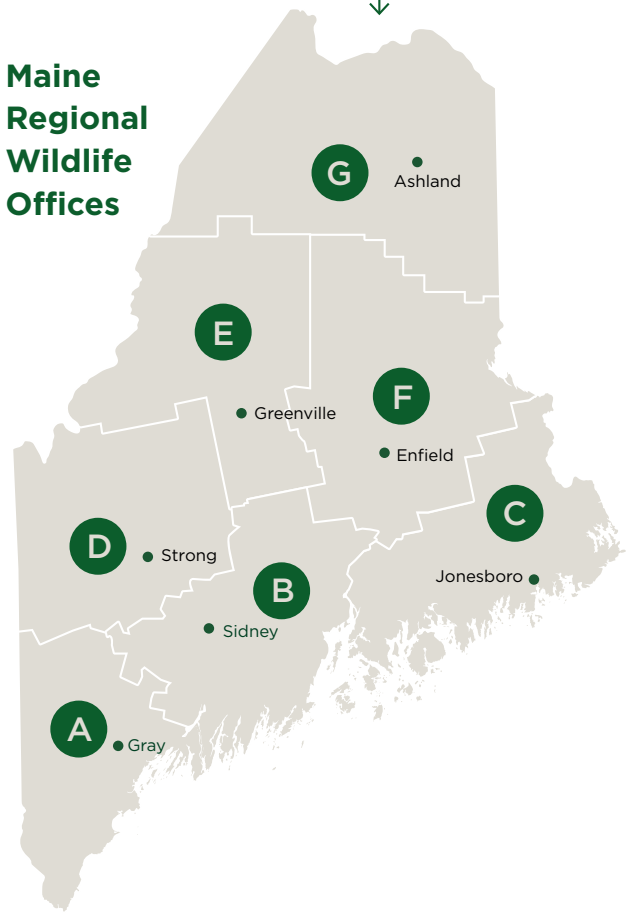
The following pages highlight work activities of the Wildlife Management Section over the past year, covering a wide array of topics that the dedicated men and women within the Section have been engaged in. These range from contaminant sampling in wildlife species to timber harvesting for habitat management.

The Section is composed of two or three wildlife biologists in each of our seven geographic districts throughout the state; our Lands Management Program; a wildlife biologist assigned to the Maine Department of Agriculture, Conservation and Forestry; and a wildlife biologist who provides technical assistance to private landowners. Combined, our staff provide a suite of services to other sections of the Department, other state agencies, the public, and conservation partners.

The Wildlife Management Section engages in all Wildlife Division efforts, including:

- Biological data collection for game species
- Non-game wildlife surveys
- Species management and planning
- Environmental review of development projects
- Administration/coordination of the nuisance wildlife policy
- Administration/coordination with wildlife rehabilitators
- Technical assistance to landowners
- Management of Department-owned Wildlife Management Areas
- Oversight of conservation easements held by the Department





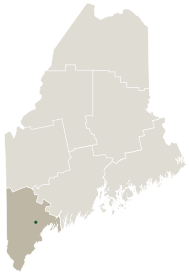
Priorities identified in recent Department planning efforts have refined the Section's efforts to achieve Department goals. We have enhanced our capabilities to provide technical assistance to private landowners, we are engaging with conservation partners to address climate change (including increased saltmarsh and coastal ecosystem restoration/conservation efforts), and we have renewed our efforts to acquire deer habitat land in northern, eastern and western Maine.

As part of the Beginning with Habitat program, the Wildlife Management Section increased its capacity to engage with landowners interested in managing their land and its habitats in a specific way. For example, one landowner's objective might be to benefit Species of Greatest Conservation need identified in the State Wildlife Action Plan, or to promote biological diversity, while another may want to focus on creating and maintaining high quality habitat for popular game species.

Throughout last year, the Department coordinated with stakeholders from Virginia to Maine in a region-wide effort to conserve and restore coastal saltmarsh habitats. Legacy agricultural practices in marshes, tidal restrictions created by transportation infrastructure, and climate change have all heightened the focus on these valuable ecosystems and the important wildlife habitats they provide. Our goal in this effort was to prioritize Maine marshes for restoration and conservation funding. As a result, numerous restoration projects have been implemented, with the Department engaged in projects at the Scarborough Marsh Wildlife Management Area, R. Waldo Tyler Management Area, and two marshes at the Kennebec River Estuary Wildlife Management Area. Conservation partners have also taken the lead on marshes scattered across the coast of Maine.

In 2021, The 130th Maine State Legislature passed an "Act to Preserve Deer Habitat" (H.P. 288 – L.D. 404), creating a new effort to conserve and manage deer habitat in northern, eastern, and western Maine. Per this legislative directive, the Department has prioritized and actively pursued conservation of areas important to deer in places where winter shelter is critical to survival. The legislation created staff capacity to focus on these important habitats and enhanced conservation funding opportunities through the Land for Maine's Future program. It also increased our capabilities to acquire and manage lands through the Deer Management Fund, which is supported by harvested deer registrations. Lands acquired under this effort will be incorporated into the Wildlife Management Area system, with a focus on management for deer habitat and public access.

The ensuing report provides a view into the diverse nature of the Wildlife Management Section's work this past year. As you'll see, much of this involves engagement with other Department staff and conservation partners to balance the biological and social aspects of protecting, conserving, and enhancing Maine's wildlife resources.



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Scarborough Marsh Wildlife Management Area

A time to celebrate 50 years, plovers, terns, New England cottontail, and more

Sean Campbell

Scarborough Marsh Wildlife Management Area (SWMA) is a wildlife oasis in the middle of one of Maine's most populated coastal areas. Situated to the south of Portland and to the north of Biddeford, Saco, and Old Orchard Beach, this WMA is an essential breeding, resting, and foraging area for waterfowl, shorebirds, wading birds, numerous marine species, and other diverse wildlife species. Spanning more than 3,000 acres, it is the largest marsh system in the state and consists of high and low marsh communities, regularly and irregularly flooded salt marsh, salt creeks, coastal fresh marsh, tidal flats, and upland habitats. The marsh is fed by three major tributaries: the Scarborough, Nonesuch, and Libby rivers.

Scarborough Marsh Wildlife Management Area

The Department began to acquire land for the Scarborough Marsh WMA in 1959. Being primarily wetland, the main management objective was to protect and improve the area for resident and migratory waterbirds. The WMA provides critical habitat for a broad array of waterfowl, saltmarsh and nelson's sparrow, egrets, and herons. And many shorebird species depend on its rich ecosystem for food, nesting habitat, and a place to rest during migration. The WMA is used by the state-endangered piping plover *(Charadrius melodus)*, least tern *(Sterna antillarum)*, New England cottontail *(Sylvilagus transitionalis)*, and Least Bittern *(Ixobrychus exilis)*. It is also heavily utilized by the public. The Department manages for appropriate public access and recreation, including consumptive activities (hunting, trapping, and fishing) and non-consumptive uses (canoeing, kayaking, hiking, birding, and wildlife viewing). The marsh also sustains local businesses in the realms of clamming, aquaculture, guide services, restaurants, and tourism; and it provides ecological services ranging from protection against coastal storms to carbon sequestration.

New England Cottontail (NEC) is the only rabbit native to Maine and is listed as state-endangered with an estimated state population around 300 individuals. NEC are an obligate early successional species that have suffered dramatic population declines since the 1960, primarily due to habitat loss and fragmentation. Currently, NEC only occur in six Maine towns and one WMA: SWMA. In March 2022, as part of the range-wide and state recovery strategy, MDIFW staff released eight rabbits into the Gervais parcel in an effort to re-establish a population. Prior to the release, NEC had not been documented in SWMA since 2010.

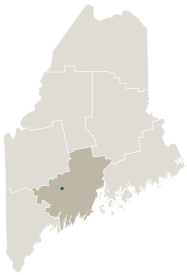
The released rabbits were fitted with radio telemetry collars, and we are currently monitoring their survival and trail cameras pictures have confirmed a successful breeding season. The 46-acre Gervais parcel where the rabbits were released was acquired in 2009, and MDIFW has managed it, along with surrounding uplands, for early successional habitat through forest management practices, native shrub plantings, invasive species control, prescribed fire, and mowing. We will conduct tracking and pellet surveys in the winter of 2022 to estimate abundance and breeding success. We anticipate releasing additional rabbits at Scarborough Marsh in fall 2022 and in 2023. Partners assisting in this project have included USFWS, breeding programs at Rodger Williams Park Zoo, Queens Zoo, Great Bay National Wildlife Refuge, and Patience Island, and volunteer citizen scientists who have contributed countless hours of work.

New England Cottontail

The three-acre Higgins Beach Unit of Scarborough Marsh is a disjunct parcel from the rest of the marsh. However small and separate, this essential coastal dune habitat plays a critical role in the recovery of Maine's piping plovers and least terns. It hosts over 70 least tern nests and a growing number of nesting piping plovers, numbered at six pairs in 2022. Since MDIFW owns this area, we have been able to increase seasonal management efforts, such as dog restrictions on the beach, increased educational signage, and symbolic and electric fence exclosures. A group of over 40 volunteers has been working to protect the nests and encourage the birds to settle and nest earlier in the year. Partnering with Maine Audubon staff to help monitor and manage for plover and terns across the state, our staff documented the earliest plover nest to hatch this year in Maine on May 24th at the Higgins Beach Unit.

This year, MDIFW celebrated 50 years of partnership with Maine Audubon at the Scarborough Marsh WMA. In 1972, Maine Audubon converted on old clam shack on the edge of the marsh into the Scarborough Marsh Audubon Center. Since its beginnings, the center has grown to serve the local community and visitors alike. Audubon Center Director Linda Woodard, who has worked tirelessly on the marsh for over 35 years, has grown the programs to engage over 10,000 people annually, including over 1,500 school children. The center serves as a focal point to engage the public on the importance of the marsh through naturalist guided tours, exhibits, a nature store, a nature trail, and canoe and kayak rentals.

Looking into the future, management actions on SWMA will continue to focus on providing optimal habitat for migratory waterfowl, shorebirds, fish, NEC, and a diversity of other species while balancing the increased demand for public access and use of these resources. Some of the challenges this management area faces stem from historical uses of the marsh, like ditching and plugging for agriculture, saltmarsh hay production, and mosquito control, large berms for railroads and roads that intersect the marsh, water control structures, and undersized culverts that restrict natural flows of water. Climate change and sea level rise bring new challenges that will impact our ability to manage the marsh for wildlife species. And phragmites and other invasive species also threaten the natural ecosystem and ability to provide optimal habitat. Targeted management actions in the past have addressed some of these issues; and as we move forward, we will continue collaborating with other entities to develop a comprehensive understanding of these natural and man-made processes across the entire marsh. All of this will help guide our management actions to sustain SWMA's ecological services and promote its resilience to sea level rise.



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Investigating PFAS in Maine Wildlife

Kendall Marden

As Regional Wildlife Biologists, we expect to deal with a wide variety of projects. Some are routine and seasonal, while others are novel but ephemeral. This past year, we embarked on a large project in central Maine that will continue to gain statewide significance. Growing awareness of — and broad concerns about — PFAS in the environment prompted this new area of investigation.

PFAS is an acronym for per- and polyfluoroalkyl substances — a group of thousands of manmade chemicals. The six that have been studied most are associated with health issues including increased cholesterol, decreased birth weights, reduced immune response from vaccines, and increased risk of kidney and testicular cancer. They have been used in a variety of household products, clothing, and other manufactured goods, largely for their water and grease resistant properties. PFAS are also found in certain types of firefighting foam.

These chemicals often end up in food, water, and elsewhere in the environment, where they are consumed by humans and animals. While much is still unknown, the body of information linking PFAS to negative health issues is growing, and many State of Maine agencies are working diligently to better understand their prevalence and impacts. Given the crossover of many issues, those agencies have been communicating and assisting one another regularly.

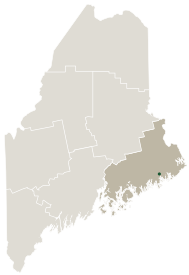
MDIFW's responsibility lies in managing wildlife and fish, including human/wildlife interfaces. While Maine CDC has the lead role on consumption advisories for both salt and freshwater fisheries, they along with other agencies will be helpful in assisting MDIFW in understanding more about PFAS compounds in wildlife. Given the breadth and depth of the issue, our focus will be the distribution and quantity of PFAS in wildlife to inform if and where we should issue an advisory on wild game consumption to protect public health.

Areas of greatest concern for environmental contamination in Maine stem from the past spreading of sludge on agricultural areas as a fertilizer. Locations that may have repeated applications of firefighting foam are also a potential concern. Our focus on testing wildlife so far has been in the greater Fairfield area, which has been identified as a hot spot for past sludge spreading. This investigation will likely be ongoing for some time, though we are working diligently to learn as much as we can in a timely fashion.

In the fall of 2021, we tested eight deer from a small area with highly contaminated soils to see if PFAS was present in the deer. Our findings prompted a consumption advisory on deer for a large area out of an abundance of caution.
We have since started a much larger research project aimed at investigating deer and wild turkey in the Fairfield area. Beginning in the spring of 2022, MDIFW worked with nearly 60 private landowners and USDA-Wildlife Services to collect and test 71 turkeys, and 60 deer for PFAS. Our goal is to better understand if PFAS is present in animals in an area, and to what level it exists. This will allow us to determine if advisories are needed, and in what area they would apply.

Understanding PFAS distribution in wildlife will be more difficult than working with plants and domestic animals that are stationary or fenced in. Wildlife is more mobile, and there are still lots of questions about how animals consume and excrete PFAS, and how quickly levels rise or drop in the muscle tissue when exposure changes. New information on PFAS distribution and levels in soil and water will help direct our research in wildlife.

This is a complicated issue that will continue to develop, likely for years. As we work to comprehend the situation, we expect to have positive information to share, along with possible advisories. For more information on PFAS in Maine see **maine.gov/dep/spills/topics/pfas/** or **mefishwildlife.com/deerconsumptionadvisory.**



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Offshore surveys in Region "Sea"

Christine West

Over the last year, the biologists in Region C have visited conservation easements, checked on deer wintering areas, attended meetings and trainings, presented at public speaking events with local partners, worked with local school groups, handled nuisance wildlife calls and emails, participated in duck banding and satellite tagging, surveyed for American woodcock, ruffed grouse, nightjars, marsh birds, breeding birds, peregrine falcons, amphibians and reptiles, captured and fitted a satellite transmitter on a great blue heron, collected white-tailed deer bio data, and deployed bat detectors throughout the region. All of these are the regular duties and responsibilities of a regional wildlife biologist.

Aside from its expansive blueberry barrens, Region C is mostly known for its continuous undeveloped coastline dotted with uninhabited islands, exposed ledges, and 15-to-20-foot tides. This coastal ecosystem provides regional staff with many opportunities to get out on the ocean and explore Maine's state-owned islands.

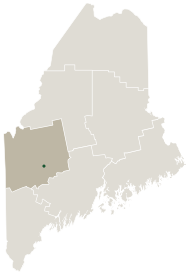
The Coast of Maine Wildlife Management Area (WMA) includes islands and ledges owned or managed by MDIFW, varying widely in size, shape, and habitat. Even though the WMA comprises over 300 islands and spans the whole coastline, most of the islands are located within Region C.

Guests, volunteers, and other MDIFW staff members have embarked with Region C this year on boat trips to survey birds or check on island conservation easements. Nate Webb, MDIFW wildlife division director, and Ryan Mola, stewardship director at Downeast Coastal Conservancy, came aboard the Region "Sea" to do a conservation easement site visit at Huckins Island in Cobscook Bay.

Region C biologists have also been deploying bat detection units on some of the region's state-owned offshore islands to determine bat species presence and abundance. The data we gather will give us critical information on how bats are using the offshore island ecosystem in down east Maine.

Finally, the Maine Bird Atlas, a large citizen science project, is in its final year of surveys. During the breeding season, we know that many colonial waterbirds utilize Region C islands as nesting colonies; but the wintering bird populations on some of these offshore islands and ledges are not as well known. One component of the Maine Bird Atlas has been wintering bird surveys; and so the Region C crew was tasked over the last few winters with surveying by boat for wintering birds near offshore islands and exposed ledges along the region's coast.

Prior to each survey season, project coordinators establish targeted priority blocks. Last winter, Region C biologists tagged along with Marine Patrol officers on their large vessel out of Jonesport to safely explore and tally birds further offshore. The winter of 2022/2023 will be the last of the wintering bird atlas surveys, and the Region "Sea" crew will be ready to set sail and put in more hours navigating the coast of Maine.



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Conserving Former Farmland and Fast Flying Falcons

Sarah Boyden

Giving New Life to a Historical Homestead on Hancock Pond

The Fahi Pond Wildlife Management Area includes three properties within the town of Embden. The Hancock Pond Parcel is located at the northwest corner of the Fahi WMA, covering 428 acres of early successional hardwood forest and including a hand-carry boat launch on Hancock Pond. In the 1800s, the Hancock Pond parcel was home to a farming community known for their cider orchards. Stone foundations and deep dug wells that were once part of the old homesteads can be found throughout the property, along with a few remanent apple trees hiding in the dense regenerating forest. Wild grapes drape the trees surrounding the stone structures, and small patches of irises and lilies are found throughout the property. It doesn't take much to imagine the farms of the 1800s in full production, with sheep, cows, horses, vegetable gardens, and humble flower beds surrounding the stone foundations. The view from Hancock Pond sweeps across the western mountains to some of highest peaks in Maine, including the distant Bigelow Range, Mount Abraham, and Sugarloaf Mountain.

In modern times, the farming landscape of Western Maine has shrunk to a small fraction of what it once was. Farming benefits many different wildlife by creating food and open habitat in an otherwise forested landscape. When the farms of the area were abandoned sometime in the early 1900s, fields grew up in dense patches of early successional, quick-growing forests. As those forests matured, the faster-growing tree species were replaced by longer-lived, mature species of maple, beech, and ash, along with pockets of hemlock, balsam fir, and spruce. Recently, forest managers have harvested the mature forest of Hancock Pond, resetting the growth cycle and promoting the faster-growing, early successional tree species common during the post-farming era when fields began reverting to forest.

Early successional forests provide habitat and food for a variety of wildlife species. The dense young forest at Hancock Pond is preferred ground for ruffed grouse, whose drumming can be heard throughout the property, along with the early spring peenting and strutting display of American woodcock. Areas of disturbance created during forestry harvest often grow in with dense thickets of berries and other fruiting shrubs and trees, including raspberries, blackberries, blueberries, and cherries. These species provide important food sources, but most will not persist as the forest ages; instead, they will be replaced by mature, longer-lived trees.

As land managers, we can mimic the wildlife benefits of early successional forests by introducing diversified wildlife habitats onto the landscape. At the Hancock Pond parcel, we have begun to implement small projects that increase food availability, nesting habitat, cover, and forage. As a nod to the farmers who worked the property in the 1800s, we planted a small orchard of dwarf apple trees that will provide an abundant food source for many wildlife species including deer, bear, turkey, and grouse. In the early spring, apple flower blossoms will provide an early source of pollen for a variety of pollinator species. Importantly, these apple trees will not be treated or sprayed with pesticide chemicals. Although the resulting apples will likely be full of holes and not aesthetically pleasing, there will be no ill effects to pollinators. Plus, worms and insects attracted to the apples (what most consider apple tree pests) will provide additional food sources for birds and small mammals.

We selected dwarf apple trees for a couple of reasons. First, they produce fruit much sooner than standard apple trees, which take several years to mature from bare root stock. Second, they are easy to maintain. With their lower branches, pruning is much easier for land managers. Those low branches also make fruit more accessible for deer and bear. Already, even though they're just in the sapling stage, wildlife gravitates to the cleared area surrounding the trees. Grouse and turkey can often be found taking dust baths in the dirt around the trees and snowshoe hare are found along the edges of the orchard clearing, sampling the newly emerging vegetation. Bare soil surrounding the trees will be planted with a low-growing clover mix that will not compete with the apple trees' nutritional requirements but will provide cover for small mammals and browse for turkey, deer, and bear.

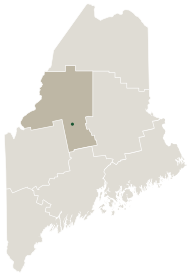
Protecting the Peregrine Falcon

Peregrine falcons, like many other bird species, faced drastic population declines in the recent past due to the effects of DDT, and in the 1960s they were considered extirpated from Maine. Thanks to intensive work including the banning of DDT in the early 1970s and a peregrine falcon reintroduction effort in the 1980s and '90s, Department biologists and other conservation partners recently documented 27 successful breeding pairs and 41 total pairs of the species throughout the state over the course of one year.

Peregrines are listed as endangered under the Maine Endangered Species Act. Given their status, regional biologists often work with private landowners to minimize impacts to nesting peregrines on their properties. Recently, driving past a former paper mill in central Maine, I noticed white guano streaking at the top of the old smokestack — the telltale sign of a peregrine falcon perch point. Peregrines are known for finding high spots to hunt from, often targeting the abundant pigeon populations found at both active and inactive mills.

With a small amount of survey effort, we located the peregrine nest on a windowsill in an old part of the mill and helped coordinate with the Department species specialist and the mill owner to ensure the nest would not be disturbed. In these situations, if necessary, we will create alternative nesting platforms or boxes to encourage the birds to nest in a location that won't interrupt the private landowner. If relocating a nest isn't an option, we monitor the nest and advise the landowner once the nestlings have fledged, allowing the owners to coexist with nesting peregrines. In most cases, the landowners are happy to accommodate, and are often excited to watch the pair raise their young.

Peregrines are dramatic avian hunters, reaching speeds over 200 mph to capture their bird prey. Given their affinity for urban environments, we occasionally hear observations like the one from ticket holders waiting in line at a local concert who watched a peregrine dive bomb a pigeon in the middle of the parking lot. It wasn't the show they came for, but not something they will soon forget.



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Caught on Camera: The Use of Cameras to Help Manage Wildlife

Scott McLellan

The Maine Department of Inland Fisheries and Wildlife (MDIFW) is tasked with monitoring and managing all of Maine's fish and wildlife species. Biologists are trained to explore and determine the most efficient and cost-effective methods of monitoring wildlife populations – specifically, whether a population exists in certain areas, and if so, whether it is increasing, decreasing, or stable.

One method of gathering population-specific information is through the deployment of game cameras. Not every wildlife species is easily detected using cameras, but some such as moose are. In 2021, MDIFW began a partnership with the USGS Vermont Cooperative Fish and Wildlife Research Unit to monitor moose. This was part of a larger Northeastern U.S. effort to research and understand regional moose populations, driven by a 30% decline of moose populations in northern New England over the past 20 years. Part of this plan involves using game cameras across the core moose range in northern Maine. We have chosen areas that we have long-term population data from and continue to collect data from annually using methods such as aerial flights.

While moose are the primary focus of this study, the camera protocol is designed to collect information from a wide variety of mammals from American marten to fisher to snowshoe hare. Currently, we monitor 80 game cameras in areas north of Moosehead Lake. Every three months, we visit the cameras via snowmobile, ATV, or on foot to perform required maintenance (battery and SD changes, for example). These cameras are situated on natural game trails, edge habitats, or funnel areas that would attract free ranging wildlife, and are placed significant distances apart from each other so that they don't photograph the same animals. Additionally, each camera site has a marked stake for recording snow depth (in 2-cm. increments) during fall, winter, and spring, a vial with an attractant (skunk essence), and a turkey feather. The purpose of the skunk essence and feather are to draw certain species closer to the camera for a better photograph.

This project will give us excellent insights into a multitude of mammalian wildlife species in a remote part of the state that is otherwise difficult to get information from. We expect to yield management-related information from species such as fisher, snowshoe hare, white-tailed deer, American marten, and, of course, moose. We may not gather quite as much information on smaller species such as long and short-tailed weasel that are fast and don't stay near camera sites for long.

Biologists will continue to explore and learn what these cameras can reveal. Based on past experiences using cameras to study white-tailed deer and other species, we expect to gain specific information on moose survival, recruitment (survival of young to a specific age class), density, sex ratios, population trends, and more. Upon review and analysis of the data by a team of researchers and managers across the northeastern U.S., final results will be pooled and tallied. We will compare these with other data that we collect during the two-year survey period using different (off-camera) scientific methods, as a measure of double-checking results.

Roach River Wildlife Management Area

Scott McLellan

Roach River Wildlife Management Area (WMA) is one of two such conservation areas in the greater Moosehead Lake region. MDIFW acquired Roach River WMA in 1990 to protect and promote vital fish and wildlife habitat amidst growing pressure from developers. Roach River resides north of Greenville and to the east of Moosehead Lake, adjacent to Kokadjo. This river is the most important Moosehead Lake tributary in terms of spawning and nursery areas for landlocked salmon and brook trout, so the acquisition three decades ago was a critical conservation move.

The WMA spans 6.3 miles, connecting First Roach Pond to Moosehead Lake's Spencer Bay, and is one of only two major inlets to Maine's largest body of water. MDIFW's ownership includes both the water and a 250-foot strip of woods (from the high-water mark) along each side of the river, plus an additional 250 feet of easement along the 6.3-mile river. Exceptions to this continuous ownership include a few small leases with permanent structures on the east end. The 250-foot strip of mature, softwood-dominated woods on each side of the river provides important habitat for a medley of wildlife including American marten, river otters, mink, white-tailed deer, fisher, reptiles/amphibians, songbirds, waterfowl, and birds of prey. This riparian zone functions as a permanent home for some, nesting habitat for others, a travel corridor for certain species, and a foraging and resting point for many.

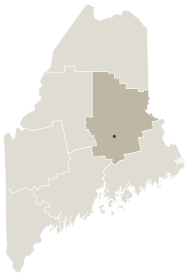
Recreational activities such as fishing, hunting (except baiting for black bears), trapping, birdwatching, and canoeing/kayaking are permitted and encouraged.

For those seeking angling opportunities, the river offers seven major access points (three along the Roach River North Road off the Spencer Bay Road, two along the Hardwood Valley Road south of the river, and two in Kokadjo near the river's origin). All access points except one (the one at the dam along Lily Bay Road) require a five to 15-minute walk to reach the river's edge, and their parking are not obviously marked as such. The trails are generally easy to follow, with flagging tape occasionally tied to tree limbs to help guide anglers. Additionally, there are brown boxes with informational cards at many of the trail heads for anglers to record their time spent and results. Fisheries biologists then use these data to make informed management decisions.

Many of the 69 WMAs across the state require some level of wood harvesting to promote or maintain a particular habitat type, which in turn helps out a focal species. For example, if the primary goal of the WMA is to provide quality ruffed grouse habitat, we will plan to harvest within hardwood-dominated stands on a frequent basis. At the Roach River WMA though, since the wood is so close to the river, there is no harvesting (both for legal and conservation purposes). Instead, the goal is to maintain a wooded buffer along the river to protect it from the sun and keep water temperatures cooler, preserving and sustaining the fishery there and in Moosehead Lake.

Angler box at Roach River

Roach River Wildlife Management Area



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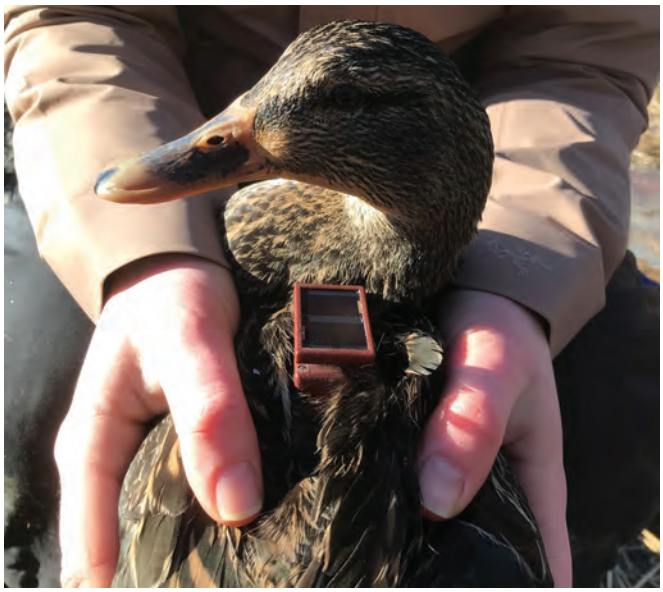
Connor White

Duck Banding

The great state of Maine is home to 34 species of waterfowl for at least part of their annual migration, staging, or breeding cycles. These waterfowl can be classified into four generic types: dabbling ducks, diving ducks, sea ducks, and geese. In the 1980s, North America's overall waterfowl population began to decline, prompting the Maine Department of Inland Fisheries and Wildlife to prioritize management efforts to conserve these species. Waterfowl biologists, hunters, and enthusiasts across the continent have long advocated for the preservation and management of waterfowl habitat to ensure healthy populations for future generations. To date, of Maine's 100,000+ acres of Wildlife Management Area (WMA) land, roughly half serves as important waterfowl habitat. An added benefit to conserving waterfowl habitat is that it is also utilized by declining invertebrate species, bats, loons, wading birds, amphibians, deer, moose, and a variety of Maine's species of conservation concern.

Maine's regional biologists install and monitor duck boxes on WMAs to provide nesting opportunity for cavity nesters such as wood duck, goldeneye, and hooded merganser. In the spring, we visit the duck boxes, count eggs, and band nesting adult females. During the early summer, we perform brood surveys to measure nesting success. This involves paddling waterbodies searching for hen waterfowl with their ducklings. During the late summer and again in winter, we capture flocks of waterfowl, apply leg bands and GPS transmitters to monitor movement and mortality, and collect bio-samples for disease surveillance. Biologists will also perform winter waterfowl surveys along the coast of Maine via watercraft and airplane to collect data. In late winter, we visit duck boxes across the WMAs to document nesting attempts vs successful hatching. We also manage water levels using pre-existing dams, and in certain situations we introduce beavers to WMAs to promote interspersion within the waterway.

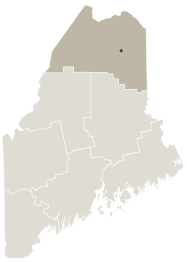
Overall, to confidently monitor waterfowl populations, biologists perform egg counts and brood surveys, apply GPS transmitters and leg bands, conduct winter bird counts, and sample for diseases to measure recruitment, movement, and survival rates. Waterfowl are migratory species that don't adhere to state or country borders, so our agency cooperates with other states and provinces within the Atlantic Flyway to assess their population trends. By comparing hunter harvest data with brood and band return data across the Flyway, we can monitor population trends at the species level. Estimates generated from this data allow biologists to determine whether waterfowl species are increasing, decreasing, or stable.



By knowing the trend and movement of a species, we can adjust bag limits and hunting seasons accordingly. For example, through our management efforts, we have noted a gradual decline in mallard populations across the Flyway, while hooded merganser populations have been increasing. To meet management objectives for these species, The Flyway has increased the bag limit for hooded mergansers and decreased the mallard daily bag limit. As populations continue to change across the Flyway, harvest limits for certain species will change, too. As biologists, we will keep striving to collect the most accurate and valuable data, so that any resultant management or regulation changes will ensure healthy waterfowl populations for future generations.

Many of our regional WMAs offer ample waterfowl viewing and hunting, along with other outdoor recreation. We encourage you to take a paddle on the Sawtelle Deadwater, go birding on Pond Farm, or float down the Mattawamkeag River. Our WMAs may be managed for wildlife, but they are open for all to enjoy!

Duck Banding



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Pollard Flats Expansion

Amanda DeMusz

The Pollard Flats WMA in Masardis was one of Aroostook County's smaller WMAs until 2021, when it doubled in size from 223 to 505 acres with the purchase of an abutting property. This purchase served many functions, adding valuable habitat protections as well as guaranteed public access to the WMA.

The original parcel only had official public access via the Aroostook River on the WMA's eastern boundary. Access via land was limited due to a private access road. With purchase of the additional acreage, the Department now owns the road access to the original parcel, plus additional acreage of mixed habitats to the west. There are now two land access points off the Garfield Road, providing sportsmen and non-consumptive users access to enjoy this WMA's bounty of flora and fauna.

Within the Pollard Flats WMA, a diverse mosaic of grassland, upland, and wetland resources provide habitat for a wide range of species. The original parcel contained mostly grassland and wetland habitat types, both of which are valuable and declining in Maine. The new acreage increased the WMA's grassland resources and significantly increased its wetland resources, while adding a valuable upland interface to the property.

Moose walking across field

Grassland habitat has been the focus of management on much of the original parcel. We have used a combination of mechanical rotational mowing and prescribed fire to maintain the grassland and ensure habitat for species such as bobolink and American Kestrel. In the summer of 2021, the newly acquired fields were mechanically mowed to remove shrubs that had grown in and to begin restoration of the grassland. We will add this new acreage to our rotational management on the WMA to create additional resources for grassland birds.

Wetland habitat has been the second focus of management on the original parcel. In the past, we applied wetland restoration activities to bring back the quality of the wetland on the WMA. The new parcel was purchased with a focus on wetland habitat and with funding from Maine Natural Resources Conservation Program (MNRCP). It has a variety of wetland and aquatic resources including forested, scrub-shrub and emergent wetlands, perennial streams, ephemeral drainages, and a series of beaver dams that have added to a diverse open wetland area. Each of these wetland types provides valuable ecological functions and habitat for a variety of species from invertebrates to salamanders and even moose.

Access point improvements are underway and will provide the public with safe access to the many resources available in this lightly visited property. In the spring and summer, you can enjoy the colors of the grasslands and plethora of avian species singing away the day. In the fall, the uplands and grassland edges offer opportunities for grouse, woodcock, and waterfowl hunting, as well as beaver and muskrat trapping. And in the winter, strap on some snowshoes or backcountry skis and enjoy the variety of animal tracks in the snow. Any time of year, Pollard Flats has a lot to offer the outdoor enthusiast, and we are very excited about the opportunities this recent expansion provides for you to enjoy its bounty.

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Sarah Spencer
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State Parks Provide Habitat for a Rare Rabbit

Sarah Spencer

Maine's State Parks and Historic Sites provide space for recreation and education all across Maine, from camping with friends and family to paddling, fishing, hiking, picnicking, or relaxing on the beach. These special places are also home to some of Maine's rare, threatened, and endangered species.

One role of the MDIFW biologist assigned to Bureau of Parks & Lands is to work with these sites' managers to conserve and protect wildlife. This means something different for each species and site: at some sites, it's necessary to keep trails closed during sensitive times of year. At others, we enhance habitat by altering characteristics of vegetation or providing artificial structures for nesting and protection. One such species that needs the latter level of help is the New England cottontail – Maine's only native rabbit.

The New England cottontail's range once included New England and New York, extending from midcoast Maine south to Connecticut and westward into eastern New York; but it is now restricted to six towns in York and Cumberland County. They are an entirely different species than the snowshoe hare, which is well-adapted to Maine's deep snow and long winters (and is a hare, not a rabbit). It is also not to be confused with the eastern cottontail, a nonnative rabbit that competes with the New England cottontail for habitat and is nearly indistinguishable without having them in hand or having DNA analysis.

In 2007, Maine listed New England cottontail as an endangered species; and in 2006, the U.S. Fish & Wildlife Service listed it as a candidate species for federal protection under the Endangered Species Act. In 2015, that designation was dropped because of the conservation actions being implemented across the New England cottontail's range by state and federal agencies, partner organizations, and individuals, all doing their part to protect the species.

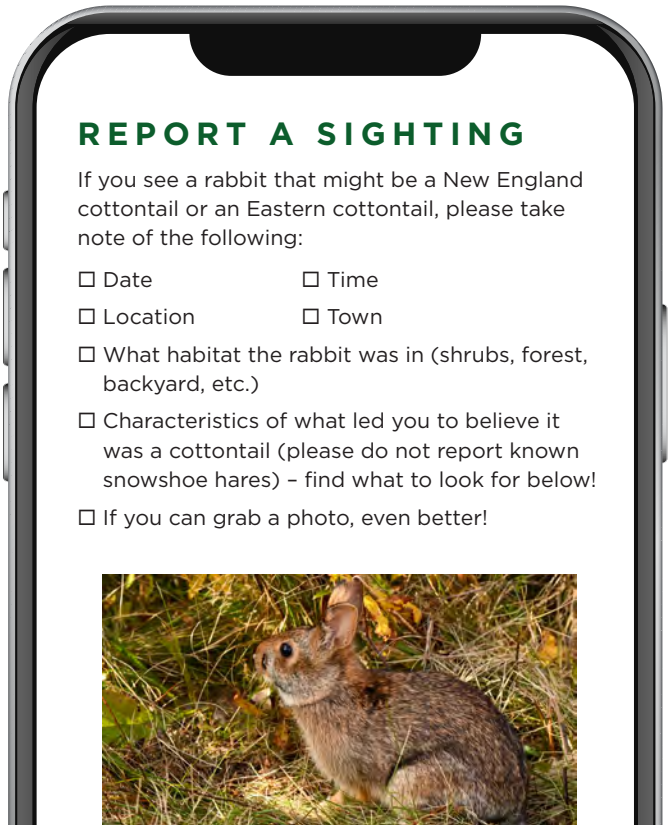
Such actions have helped keep New England cottontails from becoming even more imperiled; and at three State Parks in Cumberland County, this endangered species is thriving. Crescent Beach, Two Lights, and Kettle Cove State Parks have the habitat characteristics New England Cottontails need to thrive; and Park staff, volunteers, and biologists are all working together to enhance it even more.

New England cottontails need shrublands and young forests to thrive. We refer to these areas as early successional habitats, meaning they are the first stages of vegetation to grow back after an area is cleared. If you look at an overgrown field or an extremely dense young forest that would be challenging for you to walk through, that's exactly the kind of area this species thrives in. With time, the dense shrubs and trees grow into older trees with sparse vegetation underneath, and at that point the habitat is no longer preferred by these rabbits.

Have you seen a rabbit lately? Keep an eye out and help us protect Maine's only native rabbit. Report your rabbit sighting at **mefishwildlife.com/rabbits**

Habitat enhancements at Crescent Beach, Two Lights, and Kettle Cove include several projects aiming to keep targeted areas from becoming older forest. Park staff mow fields and young shrublands annually or every other year to keep them relatively short and young, providing quality food resources for rabbits adjacent to established shrublands, while also benefiting native pollinators and songbirds. During the summer, we mow strips of grass just a few feet away from shrublands. The mown areas encourage growth of non-woody vegetation for rabbits to eat, and the adjacent shrubby patches provide cover from predators. A decade ago, we installed artificial burrows in dense shrub areas, giving rabbits a place to hide from predators year-round and raise their young in the spring and summer.

In shrublands, cherry, aspen, and maples are typically the first trees to become established, so when they reach 3-4 inches in diameter, biologists girdle them. Girdling removes the parts of the tree that move water (xylem) and nutrients (phloem), collectively called the cambium. We can use several tools for this, including a hand saw, draw knife, or hatchet. We recently added an electric chainsaw to our toolbox, which helps us girdle more trees in less time. When we do this in winter, the tree doesn't have the ability to move water into the branches to produce leaves in the spring, so the part of the tree above the ground dies, keeping it from shading out the shrubs underneath. Trees like aspens will then use the sugars and nutrients in their roots to send up shoots from the root system, providing a food source for rabbits the following winter. Similarly, maples will sprout new shoots from the stump. At State Parks we do this on a relatively small scale, girdling individual trees in small areas to keep a steady supply of short, young woody stems to feed New England cottontails.



In addition to the mowing and girdling, we added two more management actions to the list in winter 2021/22. The first was clearing of shrubby growth along the edges of hiking trails and other key areas to encourage growth of summer food adjacent to protection from predators, and the second was to remove small groups of non-native invasive shrubs from old fields and replace them with shrubs native to the ecosystem, which provide higher quality habitat for New England cottontail, birds, and invertebrates. State Park staff have established a dedicated group of volunteers who got started on some of the shrub clearing during the winter, and we are all looking forward to engaging more volunteers with these projects in the future.

If you find yourself in one of these special State Parks and see a rabbit, take a moment to appreciate this endangered species and all the efforts underway to keep them around for generations to come. Remember to always keep your distance and keep pets on a leash to prevent any unwanted interactions. After your walk, be sure to report your rabbit sighting at mefishwildlife.com/rabbits.To learn more about how you can help, visit **www.newenglandcottontail.org.**

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Habitat Management at Frye Mountain Wildlife Management Area: Compartment F

The MDIFW Lands Program Team

Operating within MDIFW's Wildlife Management Section, the Lands Program supports the work of wildlife biologists by planning and implementing habitat enhancement and maintenance projects on State-owned Wildlife Management Areas (WMAs).

The Frye Mountain WMA is no stranger to these projects. It has seen a variety of operations over the decades to maintain and enhance the forest and field habitats for many different wildlife species. For the past two years, Compartment J has been the focus of a timber harvest operation that is slated to finish this coming winter. The next area scheduled for treatment is Compartment F, situated in the southwestern corner of the 5,000-acre WMA. Located entirely in the town of Montville, this 472-acre compartment can be accessed by road from the south using Morrill Rd. or from the north using High Bridge Rd. High Bridge Rd. can be accessed by Walker Ridge Rd. if coming from Rte. 220, or Frye Mt. Rd. if coming from Rte. 137.

To help facilitate operations, we will be improving High Bridge Rd. to make trucking easier, reduce road degradation, and reduce sedimentation of nearby water resources. We will also be building two new roads so that we can more economically harvest the area, more easily perform field mowing, invasive plant control, apple tree pruning, and other management activities, and give the public better access to this mostly isolated compartment. This road work is slated to begin in fall 2022 so that timber harvesting can begin in winter 2022/23.

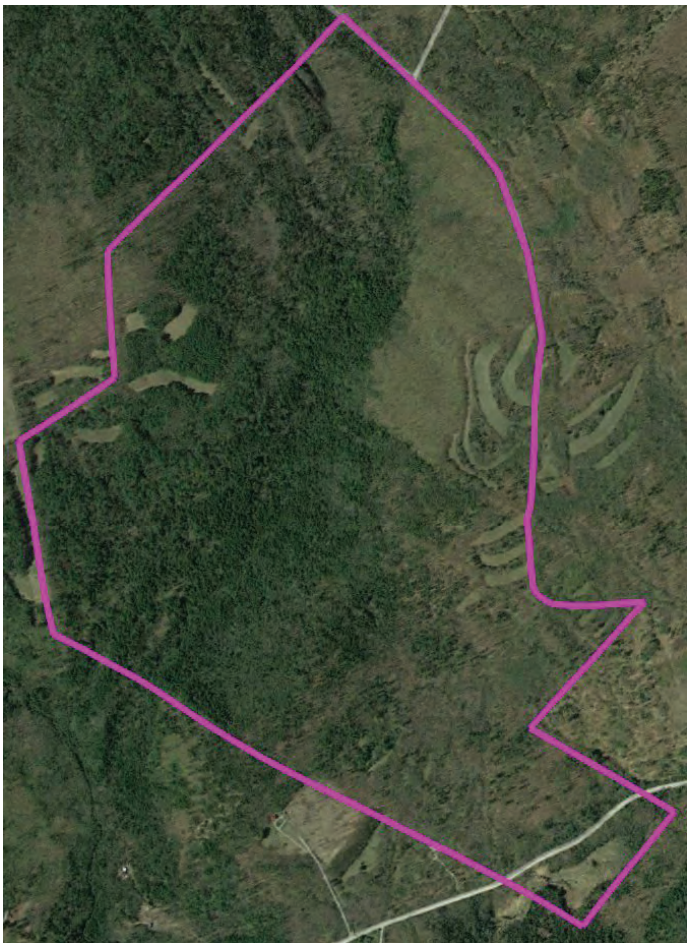

Figure 1. Compartment F is outlined in pink. Leaf off imagery clearly shows the network of maintained fields and matrix of hardwood, softwood, and mixed wood forests.

In 2020, MDIFW developed a Forest & Wildlife Management Operations Report, also known as a harvest prescription, for Compartment F. The Lands Program staff cruised and inventoried the entire compartment and have set wildlife habitat management goals and objectives based on current forest types, soils, and habitat features. We planned and developed these goals and objectives in coordination with wildlife biologists from MDIFW and Maine Natural Areas Program (MNAP). The proposed operations in the report are subject to competitive bidding through Maine's Division of Procurement Services to ensure equal work opportunities for qualified businesses.

Compartment F features a variety of forest types including oak-beech and oak-pine uplands, northern hardwoods, hemlock, and spruce-fir. It also has maintained fields, as well as open water, scrub-shrub, and forested wetland habitats. This wide range of habitats presents numerous opportunities for enhancement through thoughtful silviculture.

Like much of Maine, Compartment F was once heavily cleared for agricultural use. Many stone walls, cellar holes, and barbed wire fences buried deep into the trunks of trees tell us that the landscape was mostly not forested. While farm abandonment would have happened slowly since the end of the Civil War, much of the forest in Compartment F originated when the farms located there were sold to the Federal Government during the Great Depression. Tree cores and the natural mortality of mature balsam fir and intolerant hardwoods corroborate this. With these clues, we can age much of the forest to be between 80 and 110 years old. Because of this land use history, Compartment F lacks vertical or horizontal structural diversity and has stands of intolerant hardwoods and fir that are in the process of collapsing.

To remedy this, we plan to regenerate portions of the compartment to a younger age class through single tree selection and small and large group selection treatments. In doing so, we will remove the short-lived, pioneer tree species such as paper birch, aspen, and balsam fir. This will establish a new generation of trees, increase structural habitat diversity, and improve tree species diversity. Thinning treatments will remove trees of low vigor to give healthier residual trees more space and resources to grow.

Cavity trees, standing snags, rare trees, and other "wildlife" trees will be left regardless of silvicultural treatment to aid in nesting, roosting, and hibernation. Management operations may also include the cutting, felling, and on-the-ground retention of three to six low-quality pulpwood trees per acre. This will add coarse and fine woody debris (CWD) to the forest floor, enhancing the habitat for invertebrates, amphibians, and reptiles. Cumulatively, these management techniques will aid the forest in its natural progression and create a more natural forest ecosystem to benefit as many wildlife species as possible.

Upland areas will be managed for hard mast (nut) production, prioritizing northern red oak and mast-producing American beech for their value as wildlife food sources. Other upland areas will be managed for red oak and eastern white pine, which together provide a mix of acorns and pine softwood cover that eastern wild turkeys love for roosting.

In general, we will manage the mid-slope areas, which are composed of northern hardwoods, with single-tree and small-group selection methods to promote long-lived, shade-tolerant northern hardwoods species. These include sugar maple, yellow birch, white ash, American basswood, and red oak. This will eventually create an uneven-aged forest with a varied structure suited to a wide variety of wildlife. All at once, it will include newly regenerating areas with woody browse and herbaceous plants, mature trees for cover, trees with cavities, and trees bearing nuts, seeds, and catkins for food.

We will primarily manage the lowland areas to maintain and improve the mixed and softwood cover already growing there. Thinning and single-tree selection to remove intolerant hardwoods, fir, red maple, and overtopped or otherwise low-quality trees will release and encourage the regeneration of longer-lived softwood species like hemlock, red spruce, and cedar. These more mature softwood-heavy stands in low lying areas near water resources make for excellent deer wintering areas due to their protection from the elements, with overlapping crowns of hemlock preventing deep snow accumulations and offering refuge from wind and cold nights. Sprouts from red maple and other hardwood stumps also provide a winter food source.

Figure 2. The current over-mature condition of the field edges at Compartment F.

Figure 3. Ideal field edge conditions, as seen at the Ruffingham Meadow WMA.

We will use even-aged treatments like overstory removals and clear cuts in select locations to create and maintain young hardwood forest habitat adjacent to fields, alder flats, and wetlands for the benefit of Ruffed Grouse and American Woodcock. Compartment F features several boomerang-shaped fields that in some cases are only separated by several feet of trees and woody vegetation. The original intent of these fields was to maximize the amount of "edge" habitat that grouse like to use for nesting, foraging, and cover; but the wooded strips between the fields are aging out of ideal grouse habitat and becoming mature forest. The centerpiece of the Compartment F prescription is a 30-acre overstory removal that encompasses the wooded strips and forested edges of nine fields to bring them back to a younger age structure with trees that are small and dense for cover but has enough light on the edges to promote soft mast-producing shrubs for food and additional cover.

As we plan and implement habitat management across Compartment F, we will also need to manage invasive plant species so that desirable native species and herbaceous plant communities can establish themselves, develop, and regenerate. An invasive plant is defined as a plant that is not native to a particular ecosystem, whose introduction causes, or is likely to cause, harm to the economy, environment, or human health. A handful of invasive plant species, including non-native honeysuckle, multiflora rose, Japanese barberry, Asiatic bittersweet, and others have been found in abundance on the Frye Mountain WMA; Compartment F is no exception. In collaboration with MNAP, we have implemented a multi-faceted plan to survey and treat these species on the compartment, both pre- and post-harvest. This is important because timber harvests can exacerbate problems with invasive plants by inadvertently releasing them from overstory competition instead of the native plants and trees that we want to grow.

Long-Term Ecological Benefits of Deer Wintering Areas (DWAs) and Northern Conifer Forest Management

Daniel Hill

Northern, Eastern, and Western Maine's whitetail deer are at their northern range limit due to the severity of winters in those parts of the state. Maine Department of Inland Fisheries and Wildlife (MDIFW) is responsible for improving Deer Wintering Area (DWA) habitat conditions throughout these areas to help deer survive the significant snow depths, cold temperatures, and long-term resource restriction. To that end, MDIFW is working with landowners and local conservation organizations to acquire, manage, and assist with managing DWAs. This is one strategy we are using to meet our whitetail deer management objectives. Maine's whitetail deer require a more mature spruce-fir softwood-dominated forest with a minor hardwood component to help protect them from the harsh elements from December through April or even May, depending on the year and location. The mature softwood provides cover from snow accumulations and severe winds, while the hardwood provides a source of winter food within proximity of shelter. Deer in these areas are considered migratory, travelling as far as 75 miles to find these habitats with the components that will help them survive until the spring. The more acres of quality wintering habitat, the more deer that will utilize them, and the more successful Maine's deer populations will be at surviving the winter long-term.

A softwood dominated Northern conifer stand in winter Photo by Daniel H. Hill.

DWAs also provide seasonal and year-round benefits to a suite of other wildlife species. A lot of times, they border riparian, lowland wetland, or forested wetland ecosystems, and provide connectivity and habitat for other mammals, birds, reptiles, amphibians, invertebrates, and more. Some such wildlife species include fisher, snowshoe hare, American beaver, merlin, American three toed and black-backed woodpeckers, rusty blackbird, pine grosbeak, spruce grouse, Northern saw-whet owl, and great blue heron.

Vernal pools are integral components of a forested ecosystem and are found throughout Maine's northern conifer forests. Just some of the species that utilize vernal pools within DWAs include reptiles and amphibians like wood frog, green frog, blue-spotted salamander, spotted salamander, common gartersnake, and painted turtle, as well as invertebrates like freshwater mussels such as creeper, Mayflies such as the Tomah mayfly, dragonflies such as pygmy snaketail, and butterflies such as the Clayton's copper. Some of the species listed above are common, while others are threatened, endangered, or species of special concern in Maine. Long-term vernal pool management will improve water quality and the diversity of flora and fauna species associated with these habitats.

The northern conifer or Acadian forest type is found in northern Maine, eastern Canada, and higher elevations in northern New York, Vermont, and New Hampshire (Braun 1950). It lies in a transition zone between the boreal forest and the eastern temperate forest and is characterized by spruce species and balsam fir with components of eastern white pine, northern white cedar, eastern hemlock, and hardwoods including red maple, aspen, and birch. The northern conifer forest was historically called the spruce-fir forest, as its primary timber species were balsam fir and red, black, and white spruce. (Source and Credit to: Northern Conifer Management by Granstrom et. Al.)

Silvicultural techniques associated with DWA management include a suite of activities to improve the overall forest health and strength of trees after management activities. One technique that can be used to assist with the development of a more mature Northern conifer forest is precommercial thinning (or PCT). PCT is commonly utilized to intervene with forest development at a softwood stand's younger stage to enhance its species makeup and overall hardiness. A forester and biologist set a species priority list based on the site's conditions, including promotion of the strongest individual trees and tree species for the stand's future development. This list will include longer-lived quality softwood species (red spruce, Eastern hemlock, and Northern white cedar) to promote a softwood dominated habitat. The tree types and species that will be removed first are hardwoods (red maple, sugar maple, paper birch, yellow birch, and ash) and lower-quality softwoods that will not benefit the stand as it matures. Individual hardwoods that are removed tend to resprout, providing a reachable food source for deer as the stand develops. In a DWA, the goal of PCT is to assist with stand development and transition younger softwood stands to a more mature condition in a shorter amount of time, while also providing a food source for the deer within proximity of developing shelter.

A young softwood dominated Northern conifer stand in winter. Photo by Daniel H. Hill

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