

MASSACHUSETTS WILDLIFE

No. 1, 2018

\$3.00



**Common Carp,
Prescribed Fire &
Gypsy Moths**



MASSACHUSETTS WILDLIFE

Vol. 68

No. 1

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On the Cover: Aquatic Biologist Leanda Fontaine Gagnon displays an adult Common Carp, *Cyprinus carpio*, captured from an electrofishing survey on The Oxbow in Northampton. Although not native to the U.S., carp were introduced in the late 1800s and now occur in every state except Alaska. The state record carp for Massachusetts, caught in 2012, holds steady at just over 46 pounds! Photo by Bill Byrne/MassWildlife

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A Prescription for Fire

by Alex Entrup

A match is struck and a gloved hand lowers it to the forest floor. The flame comes into contact with a drop of fuel from a drip torch—poof! The transformative power of fire is now in the woods. To survive, like an animal, the fire must move, consuming oxygen and fuel as it seeks out, inhabits, and subsequently alters its environment. As the young fire crackles and a wisp of smoke rises into the still morning air, a woman wearing a hard hat and fire-resistant clothing uses the dancing flame to ignite her drip torch. She snaps her wrist and flings a line of fire into the woods. Looking back at a dozen of her fellow prescribed burn crew members, she yells, “Fire on the ground 10:14!” She expands the burning area along a trail. The crew watches intently as the fire grows and smoke ascends through the trees. A line of two-to-three foot tall flames marches into the wind, consuming all leaf litter, shrubs and grasses that lie in its path. Scribbling in his log is the Burn Boss who is overseeing this habitat management operation. He closely observes the smoke and fire and says, “Looks like today might be a good day to burn.”

Over the next six hours, the 11-acre ‘burn unit’ will see its forest floor turn from brown to black. At days end, all ‘smokes’ and ‘smolders’ will be extinguished, the entrance gate closed, and a wildlands fire crew will return home dirty and tired. As rainfall softens cracked, dry earth and breeds new life, a new home for wildlife will be reborn through fire.

In the weeks and years that follow, life will return to the landscape. Resident animals will emerge from their hiding places and resume their lives. Meanwhile, other kinds of wildlife will discover this newly created habitat, call it home, and raise their young. Bright green sprouts will push their way up from the ash. Flowers will bloom and set seed.

While this fire seems to have started in an instant with the simple strike of a match, this was no ordinary fire. It was a prescribed fire started not with a match, but with a plan. The ultimate goal of this plan is to create habitat for wildlife and plants that depend on places which are periodically burned. In the short term, to actually execute a prescribed burn, the planning process begins months or even



years before the spark hits the ground. Many questions must first be answered before it is determined how and when to burn.

Planning begins with a walk in the woods by a trained habitat or restoration ecologist. A forest is not always as it seems. Seeing the forest through the trees is only the beginning. The restoration ecologist's job is to evaluate the potential shrubland, grassland, or pine barren habitat within the existing forest. Years of fire suppression and fire exclusion have created densely packed forests where once there were few trees and more open spaces. Closed canopies now shade out sun-loving plants and push out the animals that rely on those plants for survival. Less than 5% of the Massachusetts landscape consists of shrublands, young forest or grasslands. This dearth of habitat has resulted in a negative impact on populations of wildlife that depend on these types of habitats, such as Whip-poor-wills, Ruffed Grouse, Bar-

rens Buckmoths, and an endangered plant, the Sandplain Gerardia. It takes a special eye to stand in a forest today and see not only what is, but what it was and what it could be.

Fire was once common in many landscapes in New England. Native Americans set fires to improve hunting grounds, increase yields in foraging areas, and to clear brush around their villages. Occasional lightning strikes would create free-moving fires, and many plant and animal communities were formed with fire as a driving force as they followed the retreat of glaciers. Today, fire-influenced natural communities such as oak forests, pine barrens, heathlands, grasslands, and fens are regionally rare. They support young forest, shrub, and grass habitats critical for wildlife in Massachusetts. These special habitats are host to many rare plants and animals, and game species. One of the primary reasons for the lack of these habitats is directly due to the lack of



A drip torch is used to light a fire line at the Francis A. Crane WMA in Falmouth.



periodic fires which keeps the habitat at an earlier stage of growth.

The first step is to identify an area suitable for implementing a prescribed fire. Once it is identified, the planning and paperwork begins. Prescribed fire was given its name because each fire must follow a carefully constructed prescription or treatment known as a prescribed fire plan (or burn plan). A highly-trained specialist, familiar with fuels and fire behavior, the Burn Planner, is required to write the burn plan. He or she works with a team of resource specialists and must consider numerous factors specific to the site and to the factors affecting crew and public safety. After decades of experience, protocols for conducting prescribed fires and training fire crews have been established by wildland fire professionals. The Burn Planner draws from these recognized protocols as the planning process unfolds.

Working in collaboration with the land manager and other resource specialists, the Burn Planner will lay out what will be required to create the desired habitat and safety outcomes. First, he or she determines the boundaries of the area to be burned (burn unit), specifies where areas

need to be cleared of flammable material along those boundaries and prepares a contingency plan to suppress any potential escaping fires. The Burn Planner also studies nearby communities to identify smoke-sensitive areas, such as neighborhoods, schools or hospitals. Weather and wind conditions under which a burn can take place are spelled out in precise detail in order to limit potential impacts. The plan specifies the number and type of resources, strategies, expected fire behavior, hazards to the crew, and many other elements.

With the plan in place, permissions and various permits to burn must then be secured by the landowner. Air quality is an important public health concern. The Department of Environmental Protection (DEP) is tasked with reviewing and issuing permits for any activities that impact air quality. DEP carefully reviews the burn application and issues a permit for the timeframe and environmental conditions under which they will allow the burn. The burn plan is reviewed by MassWildlife's Natural Heritage and Endangered Species biologists to assess potential impacts to rare or endangered species. If necessary, they may request changes in the plan.

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A Burn Crew member ignites a fire line with a drip torch during a controlled burn in Southwick.



Photo by Ralph Taylor/MassWildlife

Partnering for Prescribed Fire



It's not uncommon for a prescribed burn crew in Massachusetts to include staff from MassWildlife and the Department of Conservation and Recreation (DCR), non-profit conservation staff from groups such as The Nature Conservancy and The Trustees of Reservations, municipal firefighters, the Massachusetts Army National Guard, AmeriCorps, U.S. National Park Service, and the U.S. Fish and Wildlife Service. Beyond habitat restoration, prescribed fire can help to protect people and property from uncontrolled wild fires. This is accomplished by reducing flammable debris (fuel load) in areas where there haven't been periodic fires for many years.

One example is Montague Plains WMA. Left unmanaged, conditions on the dry, sandy Plains can lead to uncontrolled, potentially dangerous wildfire—as evidenced by a serious fire in the early 1900s and several others that threatened the village in the 1930s and 40s. By 1999, when MassWildlife acquired the property, growing fuel loads and a history of fire suppression were leading to increased risk. Forest thinning operations commenced almost immediately; followed by carefully executed prescribed fires in partnership with UMass Amherst, DCR's Bureau of Forest Fire Control, and the Montague and Turners Falls Fire Departments. Cutting and burning operations have rotated across the WMA ever since. Recent computer modeling shows these activities not only significantly reduced wildfire risks to people and property. As planned, these operations also benefited a host of less common wildlife and plants thriving in the restored habitat.

Although partner missions and priorities may vary, they are united in recognizing that by pooling resources, collective goals can be achieved. State and federal partners, conservation groups, and local fire departments provide critical personnel, fire equipment support, technical advice, and training opportunities all of which is much appreciated by all parties involved. As Dave Celino, Massachusetts' Chief Fire Warden at DCR puts it, "Landowners and land managers, communities, and citizens all share responsibilities for managing our lands, protecting our natural and cultural resources, and making our communities safe and resilient for future generations." Periodic prescribed burns are and will continue to be necessary for both conservation and public safety on lands managed by conservation partners.

His statement is true not only on the state level, but also on the regional and national scale. Celino serves as the Chair of the Northeast Regional Cohesive Wildland Fire Management Strategy Committee comprised of 20 Midwestern and Northeastern state partners, including MassWildlife. The Committee uses a collaborative approach to implement a wildland fire management strategy which accomplishes important goals: restoring and maintaining resilient landscapes across all jurisdictions; preparing communities so they can live with and withstand a wildfire without loss of life and property; and safely, efficiently, and effectively responding to wildfires when they happen. The Committee also provides a valuable forum for partners to share best practices.



Burn Crew members monitor the woodland edge at the Crocker's Neck Conservation Area in Barnstable during a prescribed burn.

Photo © Joel R. Carlson

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A local Conservation Commission may also review the burn plan for potential impacts to wetlands. Local fire departments hold authority over all fires within their districts. Before any fire can be lit, the local fire chief must feel comfortable with the plan to issue a permit.

With permissions, permits and a signed plan in hand, it is finally time to turn our attention back to the burn unit. A time window during which the best burn results can be expected is chosen. Trails and fuel breaks are raked and mowed to prevent fire from easily crossing a control line to other flammable fuels outside the burn unit's perimeter. Neighboring landowners near the burn unit are notified about the planned burn through newspaper and radio advertisements, door hangers, or social media posts. When the weather is finally right, crew requests are issued, and all other fire program managers in the area are notified. A meet up time and location are established, and the burn unit is scouted one more time to make sure conditions on the ground are as expected.

The day of the burn finally arrives. Burn crews are often up and on the road before sunrise. In Massachusetts, it takes a village to safely burn the woods! Prescribed burn crew members come from a wide variety of locations, backgrounds, organizations and agencies (see inset on page 21). While there is a wide range of professions, skills, and experience present, through common training exercises, qualification requirements, and repeated experiences with burns, the burn crew operates with precision under the leadership of the Burn Boss.

As the morning dew evaporates and vegetation dries, preparations are nearly complete. Everyone checks in, equipment is carefully inspected, and assignments are doled out. The Burn Boss leads a morning briefing that covers weather, hazards, tactics, contingencies, communications, and everything else that a prescribed burn crew needs to know or anticipate. After all questions and concerns are addressed, crew members leave the briefing, travel to their assigned positions and wait for the order to put fire on the ground.

Which brings us back to where we left

off ... when fire hit the ground at Crocker's Neck Conservation Area in Barnstable that April morning, burn conditions were just right. The burn unit was bounded by the Popponesset Bay to the east, a small trail to the south, and a dirt road on the western boundary. The vegetation was dry, but not too dry, and the wind was blowing gently from the northwest, pushing smoke out toward Popponesset Bay and the ocean beyond.

After a wide area along the downwind firebreak was burned out and blackened to prevent wind from blowing fire across control lines, attention could be turned to burning the unit interior. The Burn Boss conferred with the Ignition Boss on an ignition strategy. A series of small dots of fire (often called point source fires) were lit in a grid pattern from the south end moving north allowing a slow burn to progress and come together within the unit. Working from the downwind side into the wind, the fire was kept from growing too large or escaping. The small shrubs, grasses, pine litter, and leaves were consumed by the fire, while the larger, more mature pitch pine and oak trees in the unit were left unharmed. Ignition team members moved along the dirt road on the western perimeter line at a pace that just kept up with the point source firing sequence within the unit. A DCR forest fire truck equipped with a tank and pump with hoses mounted in the pickup truck bed, followed alongside the ignition team making sure stray embers wouldn't start new fires on the other side of the road. With each point source firing or ignition dot, the fire's path takes another bite out of the unit. The holding crew reported no problems and the prescribed burn seemed to be going as planned.

Then the wild card, New England weather came into play. An important and extremely variable factor to monitor during any burn is wind, particularly wind speed and wind direction. Sudden changes in wind direction or speed can cause fires to escape the unit boundaries, endanger crew, or jeopardize community safety. On Cape Cod, and most other coastal areas, sea breezes can be a concern. As

the land warms and the air rises, cool air is brought into the land from over the water. This can often cause a sudden change in wind direction. The signs of an impending sea breeze can be difficult to detect without considerable experience and attention. Fortunately, each burn has a crew member trained and assigned as the Fire Effects Monitor (FEMO). The FEMO monitors not only fire behavior and fuel conditions, but most importantly the weather. The FEMO usually performs weather readings every hour, and communicates the readings to the Burn Boss and crew. On this particular day the FEMO noticed clouds moving in the opposite direction of the prevailing wind. He contacted the Burn Boss over the radio to inform him of a possible change in conditions.

Recognizing there was the potential for a slow-moving backing fire to quickly turn into a faster-moving and more intense head fire burning with the shifting winds, the Burn Boss was concerned the fire could potentially jump the northern perimeter of the burn unit. Fortunately the fire break preparations were adequate and his well-staffed and trained crew gave the Burn Boss the confidence to complete the burn with a slight shift in strategy.

The crew was split in two, one half of the crew moved along the side of the established fire to make sure it did not cross the road, and the remaining crew burned along the north boundary creating a barrier of burned and blackened land. Within minutes of beginning the operation, the predicted sea breeze kicked in, winds shifted and the fire's behavior changed. The slow-moving fire inside the unit began to move a little faster and the flame lengths grew a little higher. With a secure line on both ends of the unit, and two flaming fronts moving toward each other, there was little for the crew to do but watch and wait for the unit to burn out. As the fires came together, flames shot up to the tree tops for a brief moment, and then everything settled down. The remaining stumps, logs and downed sticks continued to glow as they burned down and the grass and leaf litter slowly extinguished as it turned to ash.

After a series of patrols around the unit boundaries to ensure no fire could escape, the crew convened for the usual After Action Review to discuss the day's operation. The crew reviewed the burn goals, the decisions and tactics employed, and talked through what went well, what could have gone better, and what lessons could be carried into the future. Stories were shared and eventually some crew members were released to head home. The remaining members were assigned to seek out any remaining smokes and smolders—digging and spraying water until each smoke was snuffed out. Covered in ash from head-to-toe, the last of the crew loaded up the remaining equipment as the Burn Boss gave the final “all clear”. “Smoke Ahead” signs were taken down and returned to the equipment trailer and everyone headed home.

The next morning the Town Conservation Agent visited the newly burned unit to evaluate the site and confirm there were no smoldering hotspots. Finding that all was in order the unit was officially declared out. Within a few days, green grass shoots began pushing up through the ash. A few weeks later, buds unfurled

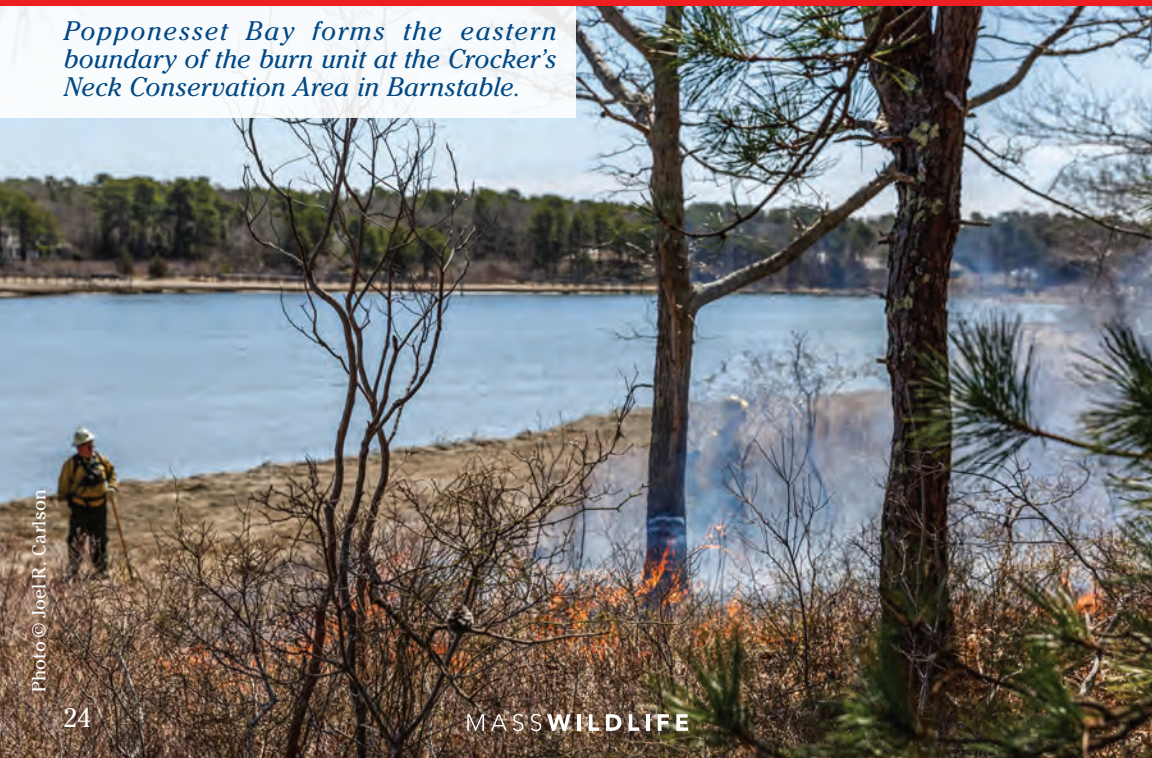
on shrubs and wildlife filtered back into the burn unit to feed on the succulent new growth. Burned landscapes experience a period of great productivity following a burn. Within two to three years, the renewed landscape will shelter and nourish the wildlife that calls this habitat home. Eventually the habitat will be too old and overgrown and will be in need of another “refreshing” burn. Once again a burn plan will be put into place and a prescribed burn crew will be called upon to bring fire back to where it is needed, restarting the cycle.



About the Author

Alex Entrup is a Senior Specialist for Northeast Forest and Fire Management, LLC, a natural resources management and consulting firm, based in Sandwich, Massachusetts, that specializes in a range of forestry, wildlife, vegetation, and prescribed fire planning, implementation, and management services. He is qualified as a Type 2 Burn Boss, and received his M.S. in Biology from the University of New Orleans. He moved to the region and began working for Northeast Forest and Fire Management in 2016.

Popponesset Bay forms the eastern boundary of the burn unit at the Crocker's Neck Conservation Area in Barnstable.



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