

Chesapeake Marshlands National Wildlife Refuge Complex

Using Science to Burn for Wildlife

Acre for acre, tidal marshes in the mid-Atlantic region are some of the most productive areas for plants and wildlife on the planet. People have set fires in these marshes since the time when only Native Americans lived here. In fact, these fires once combined with natural fires to burn on the order of every one to six years. Today at Chesapeake Marshlands National Wildlife Refuge Complex, we and our partners not only annually burn about 11,000 acres of tidal marsh, we also use science and adaptive management to guide our decisions on how best to burn for wildlife.

Why Burn a Marsh?

Research confirms what native peoples have known for years; fire stimulates growth of marsh plants such as grasses and sedges. Studies here show that removing plant cover by prescribed fire increases plant production after the fire, mostly due to increased sunlight and higher soil temperatures. Lush marsh growth after fires provides food and cover for marsh wildlife including waterfowl such as ducks, geese, and swans, and furbearers such as muskrats.



Tom Miller/USFWS

Muskrats also benefit from regrowth after fires. These muskrat houses were only slightly scorched during a prescribed fire because recent muskrat activity made them moist. Old, inactive houses burn completely.



Gary Zahm/USFWS

Prescribed fire maintains nesting and feeding habitat for American bitterns.

Secrets of Marsh Burning Revealed

Prescribed fires also benefit rare “secretive marsh birds” such as sparrows, rails, and bitterns. For example, biologists have found that saltmarsh sparrows and least bitterns are more likely to use marshes here that have been burned than those that have not been burned. When northern seaside sparrows return in the spring from wintering grounds, they seem to be especially attracted to recently burned areas with fresh green growth of saltmeadow hay.

Are Animals Harmed by Prescribed Burns?

Fire is a natural, recurring process in the area and many plants and animal species have lived with fire and other disturbances for centuries. Most animals have ways of surviving fire. For example, wildlife scientists elsewhere have observed rails moving to moist areas during burns and researchers here found that fire does not reduce habitat use by Virginia rails. Burning in a patchy, mosaic pattern is often recommended to provide safe areas

for wildlife. Here, researchers have observed that controlled burns are uneven, removing about 70 percent of above ground vegetation. That patchiness and rapid plant regrowth are thought to attract seaside sparrows to areas burned just months before the nesting season.

Timing is Everything

Although studies here found the highest number of northern seaside sparrow nests per acre in areas that had been burned immediately before the nesting season, researchers found that survival of young birds was low there, probably due to increased predation. Researchers concluded that burning every 3-4 years likely creates the best conditions overall for seaside sparrow reproduction. Intervals between fires over 4 years resulted in fewer seaside sparrows per acre, possibly related to a buildup of plant litter.



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American black ducks thrive on lush marsh plants that spring up after prescribed burns. Over 50,000 waterfowl visit here during migration.

Measuring changes in marsh elevation on the order of inches across miles of wetlands requires state-of-the-art tools. Here we use Real-Time Kinematic Global Navigation Satellite System (RTK GNSS) technology. This measures marsh surface elevation referenced to a common surface, the National Vertical Datum (NAVD88). A stationary base GNSS receiver and portable “rover” receiver measure marsh position in three dimensions via satellites. The RTK GNSS applies real-time corrections to these measurements to determine marsh surface elevation within 1-5 cm of accuracy. These data are compared to local tidal data to determine whether wetland surface elevation is increasing or decreasing relative to average local water levels. RTK GNSS receivers collect position data in a matter of seconds, are mobile, and can be used in remote areas that cannot be reached by traditional survey equipment.



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The RTK GNSS in action

Does Burning Affect Marsh Loss?

About 8,000 acres of tidal marshes in our area were lost in the last 100 years due to sea level rise and other factors. Sea levels within the Chesapeake Bay are rising at nearly twice the average global rate and our area is predicted to be especially hard hit, so we want to know if annual prescribed fires offset or contribute to marsh loss. To find out, we have worked with United States Geological Survey partners to use cutting edge technology to study sinking marshes. Preliminary results suggest that frequent prescribed fire stimulates above and belowground plant growth, slowing marsh collapse from below. Researchers suggested that if frequent burning is stopped, more marsh may be lost. We continue to monitor marshes to determine the effect of prescribed fires.

Keeping Invasive Species at Bay

Prescribed fires also improve wildlife habitat by helping control invasive species. Common reed, for example, is

a non-native species that has invaded many wetlands. We use prescribed fire to remove dead reed canes to improve the success of later herbicide applications targeting this non-native plant.

Science Partners

Below are just a few of our allies who help us gather important data about burning for habitat:

- U.S. Geological Survey
- National Geodetic Survey
- State of Maryland
- The Nature Conservancy
- University of Maryland
- University of Delaware
- The National Aquarium at Baltimore

We Protect Your Habitat, Too

By burning frequently, we also reduce wildfire risk to natural areas and surrounding communities. Without burning, large tracts of marshlands accumulate thick mats of dead grasses and sedges each growing season.

Shrublands along marsh edges contain abundant wax myrtle, with leaves and branches containing flammable compounds, and berries coated in naturally combustible wax. During dry, warm periods, these plants can ignite, especially common reed which can burn explosively up to 20 miles an hour with flame lengths greater than 35 feet!

We take several precautions to make sure prescribed fires do not escape and smoke keeps away from homes. These include mowing and clearing firebreaks and positioning fire engines near homes or sensitive resources when we burn. In marshlands we burn when water is over the marsh surface. We light fires only when winds blow smoke away from communities. We also make sure roads are safe by posting signs to warn about potential smoke or firefighter activity. During a burn, we monitor the weather, smoke, and traffic to keep conditions safe.

Located on the Eastern Shore of Maryland and Virginia, Chesapeake Marshlands National Wildlife Refuge Complex is the most complete network of protected lands in Chesapeake Bay. The Complex includes Blackwater, Eastern Neck, Martin, and Susquehanna National Wildlife Refuges. Other parts include the Barren Island, Watts Island, Garrett Island, Bishops Head, and Spring Island Divisions.

Chesapeake Marshlands NWR Complex
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<http://www.fws.gov/northeast/chesapeakemarshrefugecomplex/>

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Tom MacKenzie/USFWS

Common reed burns fast, so helping control this invasive plant with fire helps reduce fire risk, too.