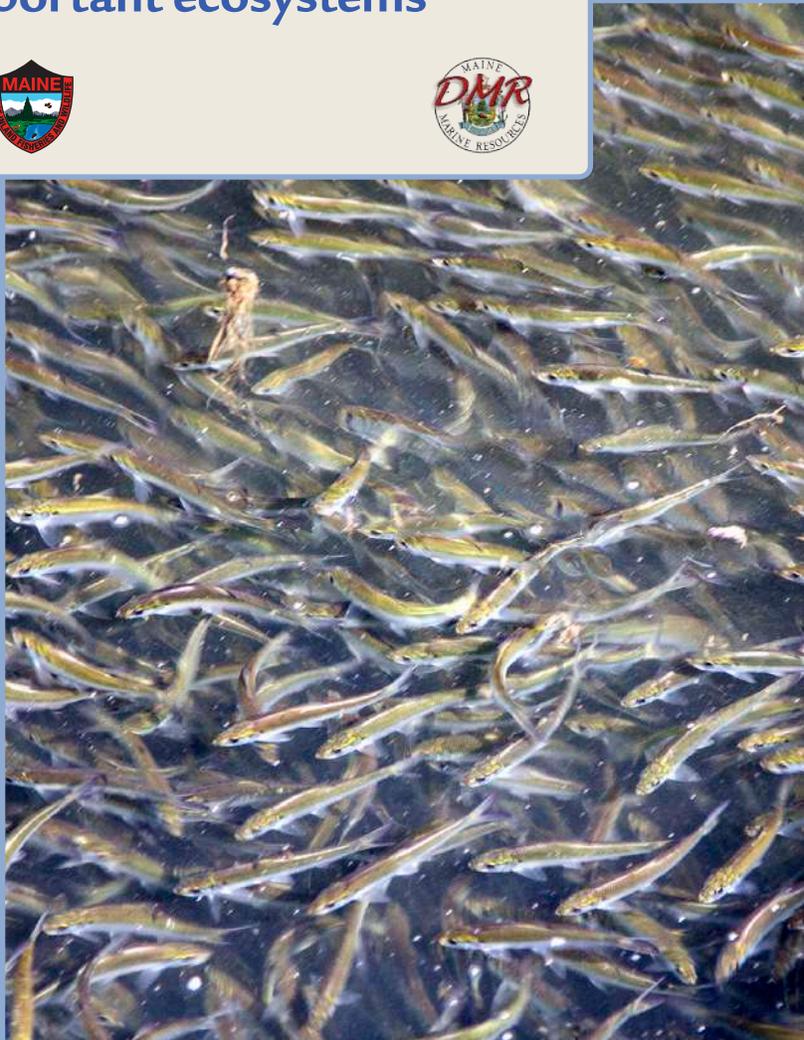
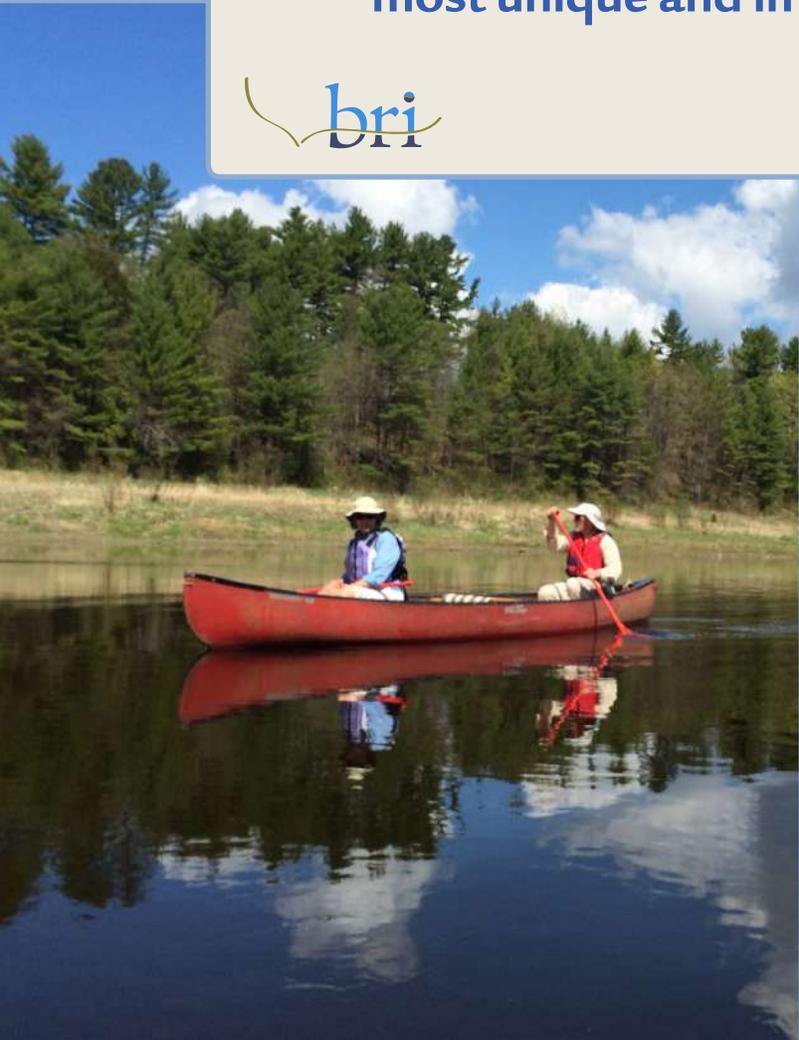




The Lower Sebasticook River
A landowner's guide for supporting one of Maine's most unique and important ecosystems



What Is Unique about the Lower Sebasticook River?

Just northeast of Waterville, Maine, the meandering Sebasticook River drains into the mighty Kennebec. While valued by locals for its scenic, economic, and recreational importance, the Sebasticook plays a much larger role in the greater region. The abundance of fish in its waters makes this river unique on the East Coast.

Each spring, several million river herring (alewives, *Alosa pseudoharengus*, and blueback herring, *Alosa aestivalis*) migrate from the ocean up the Kennebec River and into the lower Sebasticook, destined for freshwater spawning areas in lakes and streams. This massive pulse of fish benefits the ecosystem in many ways, but perhaps the most charismatic users are Bald Eagles.

In 2014, biologists from Biodiversity Research Institute (BRI) and the Maine Department of Inland Fisheries and Wildlife (MDIFW) surveyed Bald Eagles along a five-mile stretch of the Sebasticook, between the Benton Falls Dam and the confluence with the Kennebec River (Figure 2). That study gathered, for the first time, information characterizing eagle use of the lower Sebasticook River (see project summary on page 4). Most notably, the study determined that this short

river stretch probably hosts the largest summer aggregation of Bald Eagles in the Northeastern U.S., making the Sebasticook River one of the most important resources to the Bald Eagle population in the east. The Sebasticook demonstrates the strong interconnectedness between healthy fisheries, wildlife and the land uses around this river (Figure 1).

This publication highlights the unique ecological importance of the lower Sebasticook River to people, fish, and wildlife. In addition, we offer guidelines and specific ideas to promote stewardship and conservation to riverfront landowners given their important role in safeguarding its shared local natural resources.

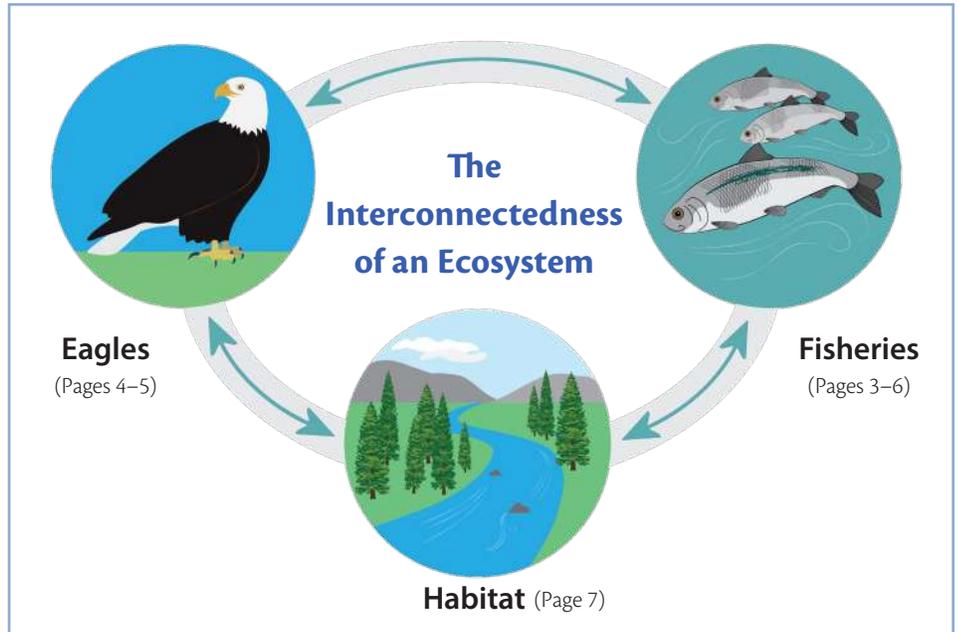


Figure 1. River ecosystem components such as the fishery, predators (e.g., eagles), and the habitat itself are notably interconnected, as is their management and conservation.

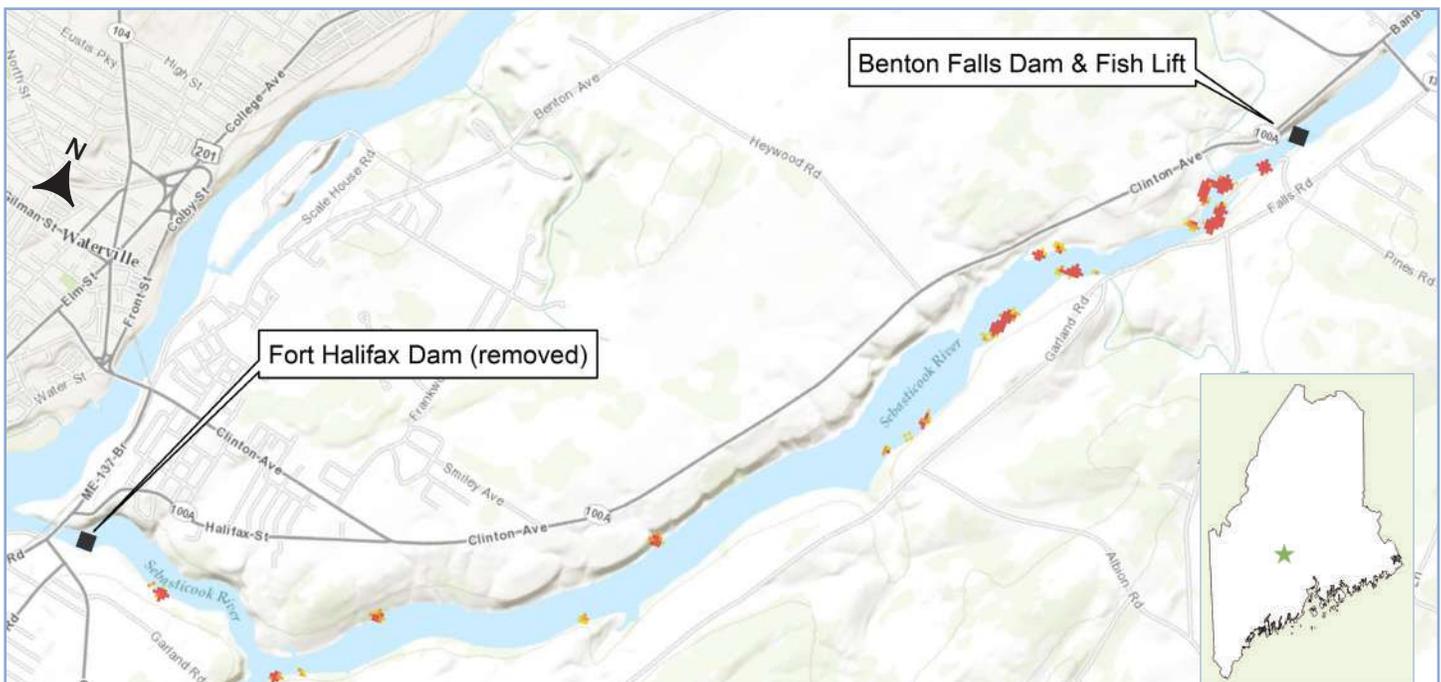


Figure 2. The Lower Sebasticook River. The five-mile stretch of river between the Benton Falls Dam and the Lower Kennebec River is one of the most ecologically unique and important areas in Maine due to the millions of fish it concentrates and the extent to which wildlife (such as Bald Eagles from throughout the state) depend on it.

Fisheries and the Sebasticook: A Tale of Resiliency

River herring—tales of abundance and decline in an ecological cornerstone

River herring have a dramatic positive effect on the health of aquatic ecosystems. Once found in every coastal river in New England, these small, silvery fish fueled legendary tales of extraordinary abundance as large schools annually made their way from the ocean to freshwater river and lake habitats, and back again. Their abundance led to their widespread historical use by Native Americans and early colonists and, more recently, by lobster fishermen for bait.

Extensive dam construction on rivers and streams during the 18th, 19th and 20th centuries resulted in the prolonged exclusion of river herring from spawning areas, ultimately leading to catastrophic population declines throughout their range.

A historic recovery on the Sebasticook

In 1998, hydroelectric companies entered into an agreement with the State of Maine, federal fisheries agencies, and several conservation organizations to help restore dwindling anadromous fish populations by reestablishing fish passages along the Kennebec River and the Sebasticook. With the removal of the Edwards Dam on the Kennebec in 1999, the Fort Halifax Dam on the Sebasticook in 2008, and the installation of a fish lift at Benton Falls in 2006, river herring and other anadromous fish were once again able to reach their spawning grounds, and populations began to recover. In 2018, a record-breaking 5.7 million fish had passed over the Benton Falls dam.



As River herring populations have recovered from drastic declines, they have once again become a resource for Maine lobster fishermen. In 2018, roughly one-half million river herring were harvested below the Benton Falls Dam.

THE IMPORTANCE OF RIVER HERRING

- River herring provide an important food resource for a vast number of freshwater and marine species (e.g., river otters, salmon, turtles, and whales).
- These fish provide a healthy, high-fat food staple for all consumers.
- They tie our oceans, rivers, and lakes together by introducing marine-derived nutrients into freshwater systems and vice versa.
- Herring are low in contaminants compared to several inland fish.
- Schools of herring provide cover for anadromous fish (e.g., salmon) from predators.

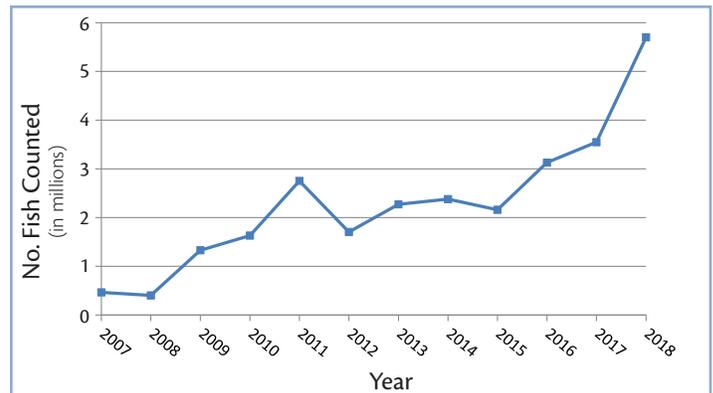


Figure 3. Number of upstream migrating fish on the Sebasticook. Data from 2009 forward reflect counts at the Benton Falls fish lift; 2007-2008 counts reflect numbers manually moved over the Fort Halifax Dam, which was removed in 2008.

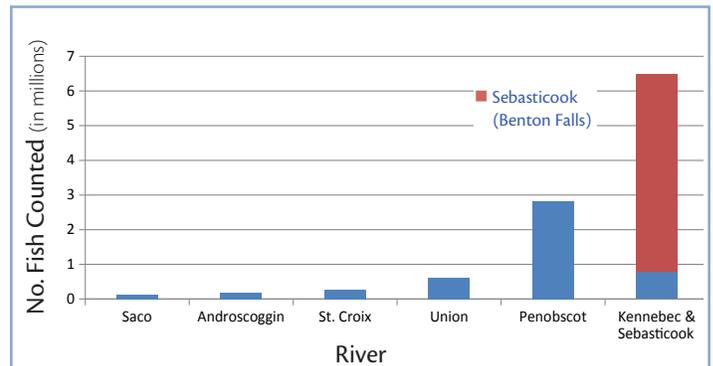


Figure 4. 2018 River herring counts at six major Maine rivers. More herring are counted migrating upstream at the Benton Falls Dam on the Sebasticook compared to any other river in Maine or along the east coast. Source: Maine Department of Marine Resources. Penobscot counts include Blackman Stream, Milford and Orono. Kennebec count includes Webber Pond and Lockwood. Counts do not include herring harvested by lobster fishermen (roughly one-half million below the Benton Falls dam on the Sebasticook).

The Sebasticook: A Support Network for Maine's Bald Eagle Population

Residents of Waterville, Winslow, and Benton have long known that the Lower Sebasticook River is a unique natural resource. They have seen numbers of migrating river herring soar from nothing to well over five million, and have seen Bald Eagles and other wildlife flock to its shores to partake in the bounty. In 2014, biologists from BRI and MDIFW studied Bald Eagle use patterns along a five-mile stretch of the Sebasticook spanning between Benton and the Kennebec. Here, we highlight the findings of that and other studies that demonstrate the Sebasticook's value to Maine's Bald Eagle population.

How many eagles use the Sebasticook—and when?

Bald Eagle numbers increase and decrease in direct response to the fish migration on the Sebasticook (Figure 5). The mid-June peak daily eagle count of 64 eagles occurred nearly two weeks after the peak of the upstream fish migration. Eagle use observed on the Sebasticook likely translates to use by hundreds of eagles throughout the entire year, making it one of the most notable resources to the broader population in the region.



The white head and tail characteristic of the Bald Eagle do not fully develop until adulthood at approximately 4-5 years of age. Juvenile Bald Eagles are commonly observed perching and feeding along the Sebasticook during the river herring fish migration.

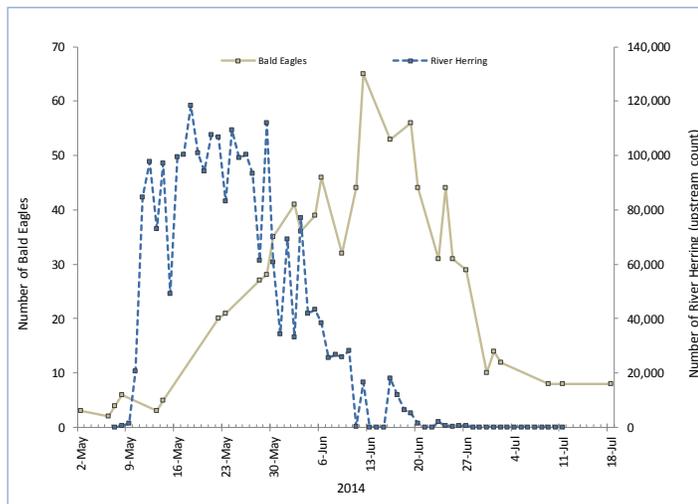
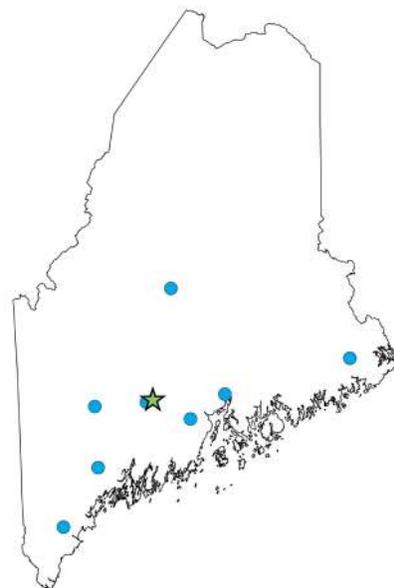


Figure 5 (above). Counts of Bald Eagles using the Sebasticook relative to the number of river herring counted at the Benton Falls dam during May-June 2014. Source: DeSorbo et al. 2015a, 2015b

Figure 6 (right). Origins of eagle visitors (blue dots) to the Sebasticook (star) as indicated by satellite telemetry. Source: DeSorbo et al. 2015c



A survival boost to Maine's Bald Eagles

The Sebasticook affects not only local eagles, but the entire population of Bald Eagles in the region as well. Here's why:

The Sebasticook provides a safe haven to young eagles.

The majority of eagles using the Sebasticook during summer months are the next generation of breeders—juveniles aged 1-3 years old. During those months, territorial adults will defend “their” resources against all intruders, especially subordinate and inexperienced juveniles. The Sebasticook provides bountiful food and a safe haven for juvenile eagles, thereby boosting their survival and ultimately buffering the population from future population declines.

The river has a broad regional influence. The Sebasticook's influence likely extends into neighboring states and Canada. In a study tracking movements of fledgling Bald Eagles throughout Maine, nearly 40 percent of 21 satellite-tagged fledgling eagles visited the Sebasticook from natal areas as far as 100 miles away (Figure 6).

Eagles rarely forget a good thing. Bald Eagles—particularly wide-roaming juveniles—commonly return to areas with plentiful food supplies.

River herring are low in mercury. Bald Eagles and other fish-eating wildlife residing on many of Maine's lakes and rivers can be exposed to dangerously high levels of mercury (Evers 2015, DeSorbo et al. 2018). Bald Eagles feeding on river herring, which are low in mercury, have reduced exposure to this harmful neurotoxin.

What You Can Do to Protect Bald Eagles



The Sebasticook: A Key Resource for Maine's Bald Eagle Population

Central Maine is one of the strongholds of New England's breeding Bald Eagle population—particularly during years of low reproduction. This region also hosts what is probably the highest summer concentration of juvenile eagles in the northeastern U.S. These two sectors of the population—breeders and nonbreeders—jointly play a key role in influencing the stability of the broader Bald Eagle population in the northeast. Landowners in central Maine, especially those along the Lower Sebasticook River corridor, have a unique opportunity to promote the conservation of Bald Eagles and their habitat in this region, thereby benefitting fish, people, and a diverse array of wildlife for generations to come.

What you can do to support a healthy eagle population:

Protect perch and roost trees. Eagles perch in large, older trees while foraging and roosting. The majority of eagle perching “hotspots” documented along the Sebasticook were among large white pine trees along the riverbank. Dozens of eagles were also commonly observed roosting in tree stands set back from the shoreline. Landowners can help eagles and other wildlife by protecting stands of older trees from cutting and by promoting the growth of new trees along the shoreline.

Protect nest trees. Maine's inland Bald Eagles commonly nest in the tall white pines, but they will also nest in oaks, poplars, and other tree species. If you have a Bald Eagle nest on your property, please contact the Maine Department of Inland Fisheries and Wildlife (MDIFW) office in your region to ensure they are aware of the nest. Biologists from the MDIFW and the U.S. Fish and Wildlife Service can help you avoid interfering with successful nesting and unintended violations of laws protecting eagle nests as outlined in the [National Bald Eagle Management Guidelines](#).

Avoid disturbing nesting eagles. Disturbances at nest sites can interfere with successful nesting and chick survival. Breeding eagles are most sensitive to disturbance during early nesting and incubation periods (March-April). During May-June, eagle chicks rely on their parents for protection, warmth, and shade.

Maine eaglets take their first flights in mid-late July or early August. Please keep people and dogs away from nest sites during this period as fledglings commonly end up on the ground.

Avoid disturbing foraging eagles. Eagles feeding along the Sebasticook, particularly juveniles, are practicing valuable life skills and boosting their chances of survival. Please keep a respectful distance from foraging eagles, and allow them to recover after disturbance.

Use nonlead ammunition and fishing tackle. Lead toxicity is a leading cause of mortality for Maine eagles and other species. Eagles are primarily exposed to lead when scavenging gut piles or carcasses containing lead fragments. Consider using nonlead alternatives for ammunition and fishing tackle (which similarly impacts waterbirds). Many sportsmen now prefer nonlead ammunition alternatives due to improved performance and lower risk of human exposure to lead.



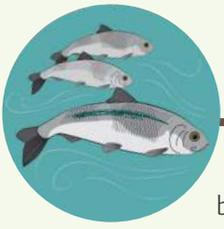
Aggregations of eagles of mixed age classes are common along the Sebasticook, making it regionally unique and ecologically important.

Resources:

- Maine Department of Inland Fisheries and Wildlife: www.maine.gov/ifw/
- U.S. Fish & Wildlife Service, Maine Field Office: www.fws.gov/mainefieldoffice
www.fws.gov/northeast/ecologicalservices/eagle.html
- Bald Eagle Research in Maine – Biodiversity Research Institute: www.briloon.org
- Information on Bald Eagles – American Eagle Foundation: www.eagles.org/
- Information on nonlead ammunition: www.huntingwithnonlead.org



Lead ammunition fragments upon impact (as shown on the right side of the photo). These fragments are commonly eaten by Bald Eagles and other scavengers; very low levels of lead exposure can cause death for these wildlife.



What You Can Do to Protect the River and Fisheries

As highlighted on pages 2-3, the Sebasticook hosts a unique regional fishery resource, which in turn strongly benefits wildlife such as Maine’s Bald Eagle population (see page 4) as well as other species. Efforts to help the continuing recovery of river herring and other anadromous fish benefit entire ecosystems, from inland lakes to the sea. Here, we outline some actions riverfront landowners, and users in general, can take to help support healthy rivers and fisheries:

Reduce use of fertilizers and pesticides. Fertilizers are high in nitrogen and other nutrients, which upon entering into waterways, can cause serious cascading ecological problems such as algal blooms and fish die-offs. Pesticides can be toxic to aquatic life and other organisms. Limit use of these products if possible, and take measures to keep them from ending up in waterways. Consider using fertilizer and pesticide alternatives.

Contain human and farm waste. Ensure that septic and leach fields are up to code, and limit potential for accidental runoff into waterways. Keep farm animals and their waste from entering waterways. Do not graze animals near the riverbank.



Buffer shoreline from erosion. A natural shoreline includes layers of native vegetation—grasses, shrubs, trees—often in different stages of development. This vegetation cools near-shore nurseries essential for fish and insects, and it buffers the river from nutrient runoff that can wreak havoc in aquatic ecosystems. Consider allowing native riverfront vegetation, including large trees, to grow. Also consider leaving downed trees that fall on the shoreline, as they provide important habitat for fish.

Prevent introduction of invasive fish and plants. Never transport live fish (other than legal baitfish), and properly dispose of unused baitfish on land. Never release baitfish into waterbodies. Diligently remove plant material from boats, motors and trailers to avoid introducing invasive plants into waterbodies. Specific resources for invasives:

Fish: www.maine.gov/ifw/fishing-boating/fishing/index.html

Plants: www.maine.gov/dep/water/invasives/

Design river access. Design pathways or access roads with the river in mind. Footpaths that meander help to reduce soil erosion and are easier to maintain. Retaining grass substrates in walkways and access roads will also help protect water quality.

Support river restoration efforts. Get involved locally and support efforts that promote responsible stewardship and fish restoration, such as “connectivity projects” (i.e., replacing culverts that are barriers to fish passage; www.fws.gov/GOMCP/).

Attend public events. Support and learn about conservation efforts by attending public events such as the annual Benton Alewife Festival (mid-May) and World Fish Migration Day events (www.worldfishmigrationday.com).

Obey municipal shoreland zoning ordinances: Local and state ordinances are designed to minimize erosion, protect water quality, and preserve the natural beauty of shoreland areas. Check ordinances:

Winslow Shoreland Zoning:

www.ecode360.com/32425883

Benton Shoreland Zoning:

www.bentonmaine.info/ceo.html

Maine Shoreland Zoning Handbook:

www.maine.gov/dep/land/slz/citizenguide.pdf

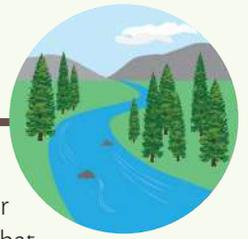
Benefits to landowners include:

- Increased opportunity to observe a diversity of wildlife, including numerous birds, mammals, reptiles and amphibians
- Increased privacy and aesthetic beauty
- Increased property values

Resources:

- Maine Department of Inland Fisheries and Wildlife: www.maine.gov/ifw/
- Maine Department of Marine Resources: www.maine.gov/dmr
- US Fish & Wildlife Service Gulf of Maine Coastal Program: www.fws.gov/GOMCP
- Atlantic Salmon Federation: www.asf.ca/main.html
- National Fish and Wildlife Foundation: www.nfwf.org/Pages/default.aspx
- Maine Rivers: www.mainerivers.org
- First Light Habitat Design and Education for the Eco-minded: www.firstlighthabitats.com
- Alewife Harvesters of Maine: www.alewifeharvesters.org

How to Protect the Sebasticook for Future Generations



The Sebasticook River knits together local communities, the land, fish, and wildlife, all while upholding its unique natural character and vitality. Riverfront lands play an especially influential role in the overall health of rivers. Our choices regarding land use are reflected in the health of the river and all that depend on it. Here, we outline ways that Sebasticook landowners can work with land trusts to help promote the long-term vitality and legacy of the Sebasticook for future generations.

What is a Land Trust?

Land trusts are charitable, community-based nonprofit organizations that work in partnership with willing landowners to achieve shared conservation goals such as preserving wildlife habitat, protecting clean water, or maintaining land for farming and forestry. Land trusts typically acquire and manage land or conservation easements, but many also provide resources, educational programs, and recreational opportunities. Land trust staff can provide expertise and guidance about how to protect your land and secure a lasting legacy, often at no cost.

Long-term Conservation Options to Protect the Legacy of the Sebasticook River

Provide for a conservation easement—A conservation easement is a voluntary, permanent legal agreement between a landowner and a land trust that limits future activities on the land while it remains in private ownership. Land trusts work with landowners to draft restrictions based on the unique characteristics of the land and the interests of the landowner. These restrictions can be placed on entire parcels or on certain portions. **Benefits to landowners include:**

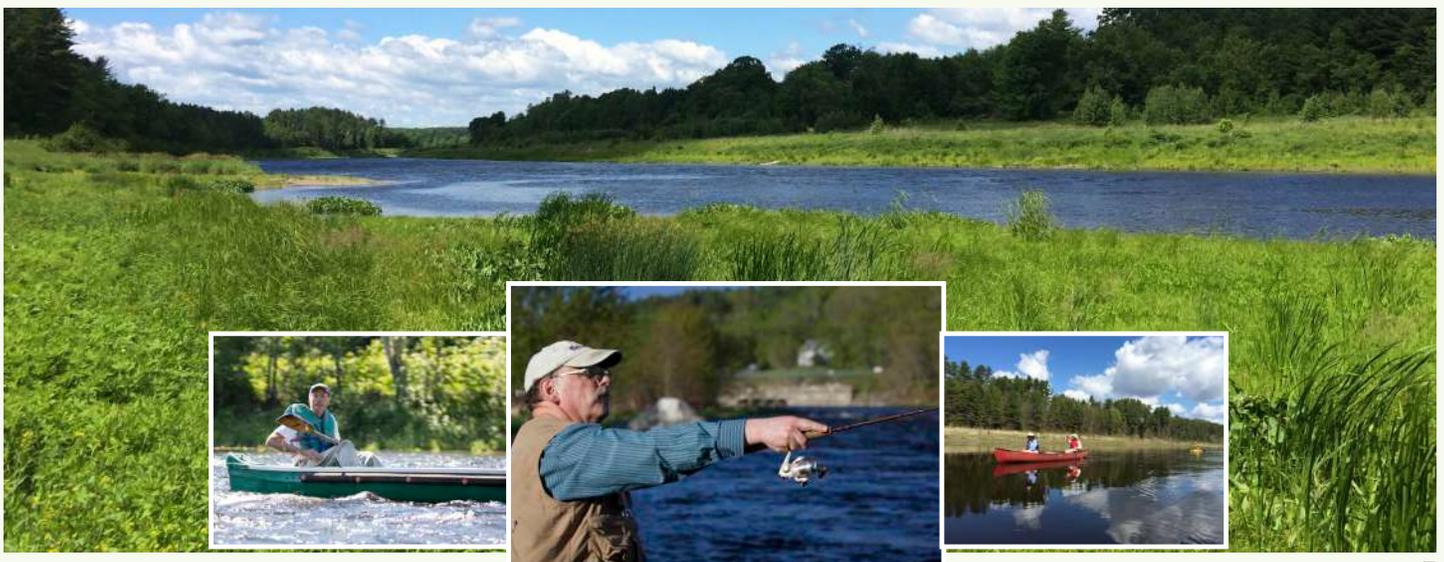
- Ability to retain property title—landowners may continue to live on the property, sell it, or pass it on to heirs;
- The security of knowing their conservation vision for the land will be honored by all future landowners—a land trust ensures that restrictions are followed in perpetuity;
- Reduced potential for disputes over inherited lands ; and
- Possible tax benefits.

Donate land to conservation—Donating property to a land trust allows the property to be permanently preserved. Land donations for conservation purposes may qualify for federal tax benefits. Donating land may be attractive to landowners who:

- Treasure their property and want to see it preserved for the common good;
- Own property they no longer wish to use;
- Own highly appreciated property, the sale of which would prompt a high capital gains tax;
- Own substantial real estate holdings and wish to reduce property and estate tax burdens;
- Recognize that greater expertise is needed to protect and manage their land; or
- Have no heirs willing or able to protect the land's conservation values.

Resources:

- Sebasticook Regional Land Trust: www.sebasticookrlt.org
- ME Dept. Inland Fisheries & Wildlife www.maine.gov/ifw/fish-wildlife/wildlife/lands
- Maine Land Trust Network: www.mltn.org
- Land Trust Alliance: www.landtrustalliance.org
- Rise & Shine Consulting, conservation assistance for landowners: <http://riseandshine.consulting/>
- The Nature Conservancy: www.tnc.org





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